

Keeping Chromatography Cool Since 1982





For 40 Years,  
We've Wanted  
Just One Thing:

To Keep You  
Happy





**Y**our family and friends may not know what you do (even after you've explained it to them 17 different ways), but we know what you do – and we heart you for it. Not everyone can say that what they do directly impacts humanity and the world we live in. That's pretty cool. Amazing, really.

We're here to do whatever it takes for you to do what you do best – putting on that lab coat (or whatever your go-to power gear is these days) and putting your best brain forward, day in and day out, to make the world a better place.

## BE-HAPPY™ GUARANTEE

Your happiness is our mission. Take 45 days to try our products. If you are not happy, we'll make it right.

[www.phenomenex.com/behappy](http://www.phenomenex.com/behappy)

# Table of Contents

OUR COMPANY	2 – 4
REFERENCE STANDARDS	5 – 6
FILTRATION	7 – 16
SYRINGES	17 – 26
VIALS	27 – 48
SAMPLE PREPARATION / SPE	49 – 86
GC COLUMNS, ACCESSORIES, AND APPLICATIONS	87 – 185
HPLC/UHPLC	186 – 362
SUPERCritical FLUID CHROMATOGRAPHY (SFC)	363 – 372
FLASH CHROMATOGRAPHY	373 – 382
PREP COLUMNS AND BULK MEDIA	383 – 402
PURIFICATION AND ANALYSIS OF SYNTHETIC DNA/RNA	403 – 413
ACCESSORIES AND LAB SAFETY	414 – 432
APPENDICES	433 – 464



## Our Mission

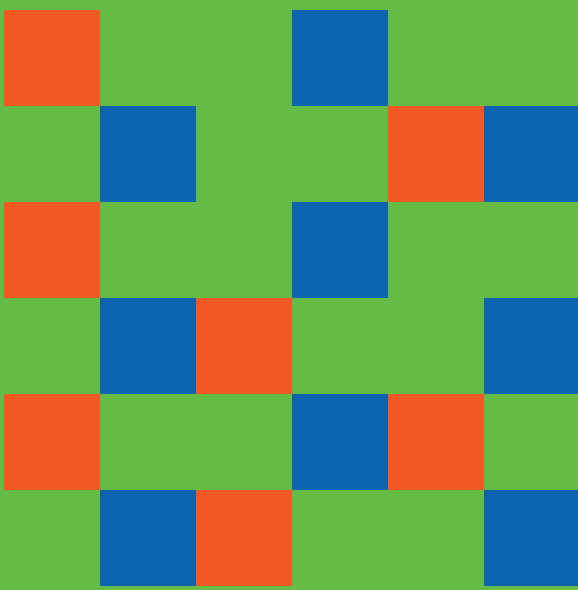
Keeping scientists at the heart of our every day through unforgettable support and standout technology to build a brighter future together.

## Our Promise

Our mission drives us to build sincere and meaningful relationships by working alongside scientists and connecting labs with exceptional technology, unrivaled service, and world-class technical support.

The Phenomenex team is empowered by a culture built on trust, integrity, and kindness — one that places scientists at the heart of our every day. We are inspired by the impact our customers make on the world and we will always go above and beyond to help them in our shared pursuit to create a brighter future for humanity. That is our promise.

Matt Turner  
President



Enabling  
scientists  
*inside* the lab to  
create a better  
world *outside*.

# We're Celebrating the 40 BIG



It is hard to believe  
it's been 40 years since  
we first started our journey  
with you.



**B**ack in 1982, against all odds, an architect broke into the scientific field and grew Phenomenex from its humble beginnings in a garage to a global firm spanning 6 continents. We didn't have much back then. But instead of worrying about what we didn't have, we focused on our strengths and persevered. We built strong relationships with our customers by serving them better than any other company. We brought on the industries' best and brightest scientists for internal product development, and we laser-focused on manufacturing high-quality, instrument-agnostic consumables.

We dedicated ourselves to serving humanity and built up the people and communities around us through a deep and unending commitment to philanthropy, because we knew back then what we strongly believe today, that to give selflessly and joyfully makes the world (and us) better.

Today, as part of the Danaher family of global life science and technology innovators, Phenomenex harnesses the power of collaboration and shared learnings to develop new technologies and improve existing product performance – providing a vast portfolio of high quality analytical solutions, complemented by unrivaled customer service and technical support.

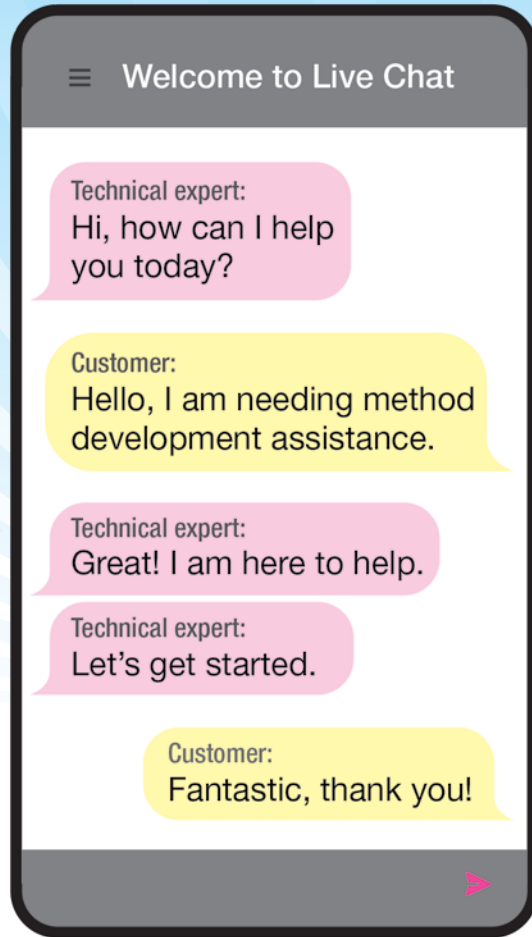
Thank you for coming along with us on this adventure. We're so happy you're a part of our family and excited for you to be part of what's next.

All the good things,

*The Phenomenex Phenoms*



# 24/7 Live Chat with Technical Experts



You have things to do.  
How can we help?



# chat now

Quotes, Methods, Tips... We're here to help

[www.phenomenex.com/chat](http://www.phenomenex.com/chat)



# Reference Standards

Phenova™ Certified Reference Materials

5 - 6



“ The Phenova standards are well packaged and easy to use. ”

**Van Spohn**  
**ARI Labs, Inc., USA**

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Reference Standards  
Phenova Certified Reference Materials..... 6

# Reference Standards



Currently offered by Phenomenex in USA and Canada only. Other regions coming soon.

## Certified Reference Materials For Organic Environmental Analysis

### Calibration, Internal, and Surrogate Standards

Formulated and manufactured with the following quality characteristics:

- ISO/IEC 17025 and ISO Guide 34 compliant
- Raw materials are chosen from sources of the highest purity
- Characterized using qualified methods
- Produced with the lowest possible uncertainty
- Manufactured in labs that are ISO-accredited under documented procedures

### An Exclusive Quality Factor

Phenova CRMs are manufactured by Phenova, Inc., an experienced proficiency testing (PT) provider who manufactures extremely precise PT standards for global environmental laboratories. Using the same strict precision to produce Phenova CRMs, laboratories benefit from a higher caliber of quality and **A New Standards of Confidence** with their analysis.



Visit

[www.phenomenex.com/standards](http://www.phenomenex.com/standards)  
for a full listing of products and analyte composition.



or

Call us and we can make a customized standard!

## Who Needs to Use Certified Reference Materials?

All environmental labs accredited to ISO/IEC 17025 must use CRMs. Even if your lab does not have this accreditation it still benefits from having a high standard, quality product.

Located in Golden, CO, Phenova, Inc. is a subsidiary of Phenomenex, Inc. and is accredited to:

### ISO Guide 34:2009

General requirements for the competence of reference material producers.

**A2LA Cert No. 2427.02**

### ISO/IEC 17025:2005

General requirements for the competence of testing and calibration laboratories.

**A2LA Cert No. 2427.03**

### ISO/IEC 17043:2010

Conformity assessment – General requirements for proficiency testing.

**A2LA Cert No. 2427.01**

### TNI EL-V3-2009

General requirement for environmental proficiency testing providers.

**A2LA Cert No. 2427.01**







### Filtration Products

Column Couplers .....	16
Filter Membranes .....	13
Inlet Filters	
Metal-free / Biocompatible.....	14
Stainless Steel .....	14
In-Line Filters	
Biocompatible PEEK .....	15 - 16
Stainless Steel .....	15 - 16
Mobile Phase Filtration Accessories .....	11 - 12
Mobile Phase Filtration System .....	11
Solvent Pickup Adapter .....	12
Solvent and Waste Protection .....	12
Syringe Filters	
Non-Sterile .....	8 - 10
Sterile .....	10
Syringes, Disposable.....	10

“ We have found your syringe filters to be **competitively priced** and well made compared with our usual brand. They don't seem to clog as quickly and there is no loss of performance for our sample prep, usually 2mL vials of Pharmaceutical active ingredients.

” **Wes Herridge**  
**Laleham Healthcare, UK**

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

## Phenex LC/GC Approved Syringe Filters

For sample and solvent filtration prior to LC or GC analysis

### Phenex Offers:

- Broad chemical compatibility
- Minimized extractables
- Excellent flow rate
- High total throughput
- Certified quality
- 100 % integrity tested
- Low hold-up volume
- Low protein adsorption
- Bi-directional use



- Particulate, PVC, and extractable-free filters
- Less system downtime
- More consistent, reproducible results
- Increased column lifetime

### Syringe Filter Selection Guide

#### 1. Choose filter diameter based on sample volume

≤ 2mL Sample Volume	2 - 10mL Sample Volume	10 - 100mL Sample Volume
4 mm Diameter	15 mm Diameter	25 - 28 mm Diameter

#### 2. Choose a pore size based on your sample

Sample Description	Recommended Filter Pore Size
General aqueous or mixed organic samples prior to LC analysis with columns packed with > 3 μm particles. General clarification of GC, SFC, CE, and GPC samples. Viscous samples or samples containing high levels of particulate matter.	0.45 μm
General aqueous or mixed organic samples prior to LC analysis with columns packed with ≤ 3 μm particles. Removal of fine particulate matter prior to GC, SFC, CE, and GPC samples.	0.20 μm
Viscous samples such as serum, plasma or other biological matrices. Solutions with high particulate load such as some environmental, biofuels or food and beverage applications.	Glass Fiber Filter with 0.45 μm filter membrane

#### 3. Suggested syringe filter membranes

Membrane Type	Recommended Uses
<b>RC</b> (Regenerated Cellulose)	<b>For Aqueous and Mixed Organic Solutions</b> A broad range of aqueous and mixed-organic solutions. Fast-flow and ultra-low protein and non-specific binding characteristics. Broadly recommended as an excellent general purpose/high-performance sample filter for most applications.
<b>PTFE, Teflon®</b> (Polytetrafluoroethylene)	<b>For 100% Organic Solutions</b> Well-suited for the clarification of non-aqueous samples. Hydrophobic membrane, excellent for filtration of organic-based, highly acidic or basic samples and solvents. A hydrophobic membrane, that can be made hydrophilic by wetting with alcohol and then flushing with deionized water.

#### Additional syringe filter membranes

Membrane Type	Recommended Uses
<b>PES</b> (Polyethersulfone)	Polyethersulfone membranes exhibit very fast-flow and ultra-low protein binding characteristics. Phenex-PES membranes are typically broadly recommended for filtering critical biological samples, tissue culture media, additives and buffers.
<b>NY</b> (Nylon)	Nylon has inherent hydrophilic characteristics and works well for filtration of many aqueous and mixed-organic samples. In combination with a glass pre-filter (Phenex-GF/NY), this membrane is excellent for the filtration of particle-laden samples, such as foods and beverages, environmental, biofuels, and dissolution samples.
<b>CA</b> (Cellulose Acetate)	Cellulose Acetate (CA) membranes exhibit ultra-low protein binding and are broadly used in the filtration of biological samples. In combination with a glass pre-filter (Phenex-GF/CA), this membrane is excellent for filtration of tissue culture media, general biological sample filtration and clarification.
<b>GF</b> (Glass Fiber)	Glass Fiber (GF) filters are made of inert borosilicate glass and have a nominal 1.2 μm pore size. They are commonly used with highly viscous samples or samples containing high concentrations of particulate matter (e.g., food analysis, biological samples, soil samples, fermentation broth samples, removal of yeasts, molds, etc.).
<b>PVDF</b> (Polyvinylidene Fluoride)	Hydrophilic PVDF membrane provides high flow rates and throughput, low extractables, and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes.

# Filtration Syringe Filters

## Phenex™ Syringe Filters (cont'd)

**Tip: Try a Sample Pack!**

Request yours today by phone or visit [www.phenomenex.com/sample](http://www.phenomenex.com/sample)



Ordering Information <sup>1</sup> Phenex Syringe Filters		4 mm Diameter for ≤ 2 mL sample volumes		15 mm Diameter for 2 – 10 mL sample volumes		25 - 28 mm Diameter for 10 – 100 mL sample volumes	
Membrane Type/Size	Part No.	Unit	Part No.	Unit	Part No.	Unit	
RC (Regenerated Cellulose)	<a href="#">AF0-3203-12</a>	100/pk	<a href="#">AF0-2203-12</a>	100/pk	<a href="#">AF0-8203-12</a> <sup>5</sup>	100/pk	
	<a href="#">AF0-3203-52</a>	500/pk	<a href="#">AF0-2203-52</a>	500/pk	<a href="#">AF0-8203-52</a> <sup>5</sup>	500/pk	
PES <sup>3</sup> (Polyethersulfone)	—	—	—	—	<a href="#">AF0-8208-12</a> <sup>7</sup>	100/pk	
	—	—	—	—	<a href="#">AF0-8208-52</a> <sup>7</sup>	500/pk	
PTFE <sup>6</sup> (Polytetrafluoroethylene)	<a href="#">AF0-3202-12</a>	100/pk	<a href="#">AF0-2202-12</a>	100/pk	<a href="#">AF0-1202-12</a>	100/pk	
	<a href="#">AF0-3202-52</a>	500/pk	<a href="#">AF0-2202-52</a>	500/pk	<a href="#">AF0-1202-52</a>	500/pk	
NY (Nylon)	<a href="#">AF3-3207-12</a>	100/pk	<a href="#">AF0-2207-12</a>	100/pk	<a href="#">AF0-1207-12</a>	100/pk	
	<a href="#">AF3-3207-52</a>	500/pk	<a href="#">AF0-2207-52</a>	500/pk	<a href="#">AF0-1207-52</a>	500/pk	
0.20 µm GF/NY <sup>2</sup> (Glass Fiber/Nylon)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a Nylon (NY) membrane. Excellent for filtration of particle-laden samples, such as foods and beverages, environmental, biofuels, and dissolution samples. Use less hand pressure to filter even the most difficult samples. Outlet connection is luer lock.				<a href="#">AF0-1A47-12</a> <sup>7</sup>	100/pk	
					<a href="#">AF0-1A47-52</a> <sup>7</sup>	500/pk	
PVDF (Polyvinylidene Fluoride)	—	—	<a href="#">AF6-5206-12</a> <sup>8</sup>	100/pk	<a href="#">AF6-6206-12</a>	100/pk	
	—	—	<a href="#">AF6-5206-52</a> <sup>8</sup>	500/pk	<a href="#">AF6-6206-52</a>	500/pk	
GF/PVDF (Glass Fiber/Polyvinylidene Fluoride)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a PVDF membrane. The hydrophilic PVDF membrane provides high flow rates and throughput, low extractables and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes.				<a href="#">AF6-6C06-12</a>	100/pk	
					<a href="#">AF6-6C06-52</a>	500/pk	
CA <sup>4</sup> (Cellulose Acetate)	—	—	—	—	<a href="#">AF0-8204-12</a> <sup>7</sup>	100/pk	
	—	—	—	—	<a href="#">AF0-8204-52</a> <sup>7</sup>	500/pk	
GF/CA <sup>2,3,4</sup> (Glass Fiber/Cellulose Acetate)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a CA membrane. Excellent for filtration of tissue culture media, general biological sample filtration and clarification. Outlet connection is luer lock.				<a href="#">AF0-8A09-12</a> <sup>7</sup>	100/pk	
					<a href="#">AF0-8A09-52</a> <sup>7</sup>	500/pk	
RC (Regenerated Cellulose)	<a href="#">AF0-3103-12</a>	100/pk	<a href="#">AF0-2103-12</a>	100/pk	<a href="#">AF0-8103-12</a> <sup>5</sup>	100/pk	
	<a href="#">AF0-3103-52</a>	500/pk	<a href="#">AF0-2103-52</a>	500/pk	<a href="#">AF0-8103-52</a> <sup>5</sup>	500/pk	
PES <sup>3</sup> (Polyethersulfone)	—	—	—	—	<a href="#">AF0-8108-12</a> <sup>7</sup>	100/pk	
	—	—	—	—	<a href="#">AF0-8108-52</a> <sup>7</sup>	500/pk	
PTFE <sup>6</sup> (Polytetrafluoroethylene)	<a href="#">AF0-3102-12</a>	100/pk	<a href="#">AF0-2102-12</a>	100/pk	<a href="#">AF0-1102-12</a>	100/pk	
	<a href="#">AF0-3102-52</a>	500/pk	<a href="#">AF0-2102-52</a>	500/pk	<a href="#">AF0-1102-52</a>	500/pk	
NY (Nylon)	<a href="#">AF3-3107-12</a>	100/pk	<a href="#">AF0-2107-12</a>	100/pk	<a href="#">AF0-1107-12</a>	100/pk	
	<a href="#">AF3-3107-52</a>	500/pk	<a href="#">AF0-2107-52</a>	500/pk	<a href="#">AF0-1107-52</a>	500/pk	
0.45 µm GF/NY <sup>2</sup> (Glass Fiber/Nylon)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a Nylon (NY) membrane. Excellent for filtration of particle-laden samples, such as foods and beverages, environmental, biofuels, and dissolution samples. Use less hand pressure to filter even the most difficult samples. Outlet connection is luer lock.				<a href="#">AF0-1B47-12</a> <sup>7</sup>	100/pk	
					<a href="#">AF0-1B47-52</a> <sup>7</sup>	500/pk	
PVDF (Polyvinylidene Fluoride)	—	—	<a href="#">AF6-5106-128</a>	100/pk	<a href="#">AF6-6106-12</a>	100/pk	
	—	—	<a href="#">AF6-5106-528</a>	500/pk	<a href="#">AF6-6106-52</a>	500/pk	
GF/PVDF (Glass Fiber/Polyvinylidene Fluoride)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a PVDF membrane. The hydrophilic PVDF membrane provides high flow rates and throughput, low extractables and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes.				<a href="#">AF6-6D06-12</a>	100/pk	
					<a href="#">AF6-6D06-52</a>	500/pk	
GF/CA <sup>2,3,4</sup> (Glass Fiber/Cellulose Acetate)	An integrated syringe filter unit containing an inert borosilicate glass fiber prefilter and a CA membrane. Excellent for filtration of tissue culture media, general biological sample filtration and clarification. Outlet connection is luer lock.				<a href="#">AF0-8B09-12</a> <sup>7</sup>	100/pk	
					<a href="#">AF0-8B09-52</a> <sup>7</sup>	500/pk	
1.20 µm GF <sup>2,3</sup> (Glass Fiber)	Prefiltration of heavily contaminated or highly viscous samples. When used in-series preceding a membrane filter, clogging of the membrane filter is prevented and sample clean up is optimized. Outlet connection is luer lock.				<a href="#">AF0-8515-12</a> <sup>7</sup>	100/pk	
					<a href="#">AF0-8515-52</a> <sup>7</sup>	500/pk	



- Larger quantity purchases at significant savings are available.
- Glass fiber filters are 28 mm diameter and made of borosilicate. They will remove 90 % of all particles >1.2 µm.
- Housing material is methacrylate butadiene styrene (MBS) polymerisate. Also known as Cyrolite®.

- Cellulose acetate is surfactant-free.
- 26 mm diameter.
- Hydrophobic membrane. Can be made hydrophilic by pre-wetting with IPA.

- 28 mm diameter.
- 17 mm diameter.
- Additional dimensions and membrane types are available. Please contact your local Phenomenex technical consultant or distributor for availability or assistance.



Above syringe filters are non-sterile. Housing is made of medical-grade polypropylene (PP), and offer luer lock inlet/slip outlet connections, unless otherwise indicated.



# Filtration Syringe Filters and Disposable Syringes

## Phenex™ Syringe Filters (cont'd)

### Syringe Filter Applications and Recommended Membranes

Application / Sample	Recommended Filter	First Alternative	Second Alternative
LC and GC Sample Prep	RC	PTFE	PES
Aggressive or Pure Organic Solvents	PTFE	RC	NY
Protein Analysis / Biological Samples	PES	RC	GF/CA
High Particulate Loads	GF/NY	GF + RC	PTFE
Environmental Methods	GF/NY	RC	PTFE
Food and Beverage	GF/NY	RC	PTFE
Clinical Research / Toxicology	RC	PES	NY
Dissolution Testing	GF/NY	RC	PTFE
Ion Chromatography	RC	PES	PTFE
Trace Metals (ICP-MS, AAS)	RC	PES	NY
Capillary Electrophoresis (CE)	RC	PES	NY
Tissue Cultures, Media, Buffers	GF/CA	PES	RC

**i** For high load and particulate-laden samples you may consider placing a Glass Fiber (GF) prefilter, either integrated with the membrane as one unit (Phenex-GF/NY or -GF/CA) or in series with the membrane syringe filter of your choice.



**Syringe Filter Finder**  
3-step tool designed to help you find the appropriate syringe filter to help you successfully remove particulates from your sample matrix.  
[www.phenomenex.com/SFfinder](http://www.phenomenex.com/SFfinder)

## Sterile Syringe Filters

Sterile syringe filters from Phenomenex are ready-to-use, individually blister packaged units, offering high flow rates at low inlet pressures, for rapid sterile filtration.



### Ordering Information

#### Sterile Syringe Filters

Part No.	Pore Size (µm)	Disc Diameter (mm)	Membrane Material	Unit
<a href="#">AF0-8455</a>	0.2	28	CA Luer/Slip	50/pk
<a href="#">AF0-8456</a>	0.45	28	CA Luer/Slip	50/pk
<a href="#">AF0-8457</a>	0.2	28	PES Luer/Slip	50/pk
<a href="#">AF0-8458</a>	0.45	28	PES Luer/Slip	50/pk
<a href="#">AF0-8459</a>	0.2	25	RC Luer/Slip	50/pk

## All-Plastic Disposable Syringes

- Use for all syringe filter applications\*
- Luer-lock outlet makes connection easy
- Made of ultra-clean, high-purity plastics



### Ordering Information

#### All-Plastic Disposable Syringes

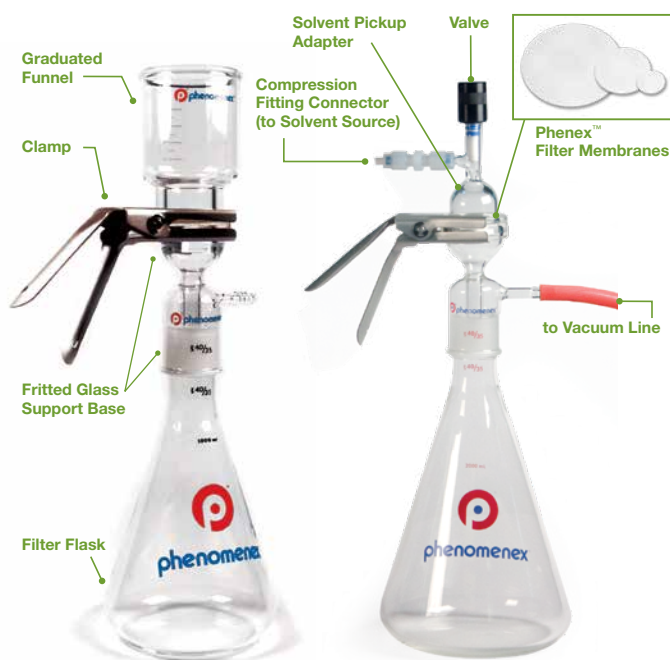
Part No.	Description	Capacity (mL)*	Unit
<a href="#">AS0-8408</a>	Plastic Disposable Syringes, Luer-lock	3	100/pk
<a href="#">AS0-8409</a>	Plastic Disposable Syringes, Luer-lock	5	100/pk
<a href="#">AS0-8410</a>	Plastic Disposable Syringes, Luer-lock	10	100/pk
<a href="#">AS0-8411</a>	Plastic Disposable Syringes, Luer-lock	20	100/pk

\* Choose larger volume syringe to reduce force on syringe filter membrane. 10 mL syringe is recommended.

## All-Glass Vacuum Mobile Phase Filtration System

FilterSys™

- Prevents pump and system component damage
- Rapid filtration of buffers, organics and corrosive liquids
- Removes damaging microparticulates and bacterial contaminants
- HPLC and GC solvent and sample filtration



**WARNING:** The apparatus should be used with a water aspiration line, not a true vacuum line, unless secured behind an appropriate safety shield.

Designed for rapid filtration of particulate matter from HPLC solvents, this unit is an excellent value. Protect your instrument and column from costly damage by clarifying all your HPLC solvents and buffer solutions before use. This vacuum filter assembly comes with a sample reservoir and receiving flask. A 47 mm diameter membrane filter is placed between the fritted-glass support base and the sample reservoir, secured in place by an aluminum clamp. The support base itself is connected to the receiving flask by a vacuum-tight ground-glass joint. Only low-extractable borosilicate glass and the membrane filter come into contact with the mobile phase. The vacuum hose connection is made above the filtration drip tip to prevent contamination from the vacuum line.

Recommended filter membranes: Nylon is a highly resistant material and can be used with almost all laboratory solvents. Since Nylon is hydrophilic, no prewetting of the filter is required. PTFE (Teflon®) membrane filters are excellent for organic or other aggressive solvent systems. Extremely low levels of extractables (plasticizers, contaminants, etc.) make this an excellent filter for trace analysis work. PTFE is hydrophobic, so it is not recommended for the filtration of aqueous solutions.

### Ordering Information

#### Mobile Phase Filtration System

Part No.	Description	Unit
<b>Complete Assembly</b>		
<a href="#">AH0-1566</a>	FilterSys, 47 mm, 300 mL funnel with 1 L vacuum flask	ea
<a href="#">AH0-3314</a>	FilterSys, 47 mm, 500 mL funnel with 2 L vacuum flask	ea
<a href="#">AH0-3315</a>	FilterSys, 47 mm, 1000 mL funnel with 4 L vacuum flask	ea
<b>Component Parts</b>		
<a href="#">AH0-1567</a>	Fritted support base, 47 mm, 40/35 taper	ea
<a href="#">AH0-1568</a>	Funnel, graduated, 300 mL, 47 mm	ea
<a href="#">AH0-3323</a>	Funnel, graduated, 500 mL, 47 mm	ea
<a href="#">AH0-3324</a>	Funnel, graduated, 1000 mL, 47 mm	ea
<a href="#">AH0-1569</a>	1 liter filter flask, 40/35 taper	ea
<a href="#">AH0-3321</a>	2 liter filter flask, 40/35 taper	ea
<a href="#">AH0-3322</a>	4 liter filter flask, 40/35 taper	ea
<a href="#">AH0-1570</a>	Aluminum clamp, 47 mm	ea
<b>Filter Membranes</b>		
<a href="#">AF0-0503</a>	Nylon, 0.2 µm, 47 mm	100/pk
<a href="#">AF0-0504</a>	Nylon, 0.45 µm, 47 mm	100/pk
<a href="#">AF0-0514</a>	PTFE, 0.5 µm, 47 mm	100/pk



For compatible Solvent Pickup Adapter, see p. 12  
For additional Filter Membranes, see p. 13



Verex™ Certified sample vials, inserts, caps, and seals are guaranteed to ensure problem-free, reproducible performance you can trust – all at competitive prices. See page 27

or Visit:

[www.phenomenex.com/VialFinder](http://www.phenomenex.com/VialFinder)

## Solvent Reservoirs / Bottle Filter Cap

- Eliminates makeshift HPLC reservoir covers, such as aluminum foil, Parafilm®, etc.
- Neatly seals to prevent particulate contamination
- Minimizes solvent evaporation and gas absorption

A disposable filter (any size Luer lock Teflon® or nylon syringe filter) on the pressure equalization port minimizes the reabsorption of dissolved gases and prevents particle contamination. These assemblies fit the standard screw cap bottles with 38 mm cap size. The 1/8 in. OD Teflon feed line from the cap attaches directly to the HPLC pump. All cap parts are compatible with most common HPLC solvents.



### Ordering Information

Filter Cap			
Part No.	Description	Cap Size	Unit
AH0-1565	Filter Reservoir Cap	38 mm	ea

## Solvent Reservoir and Reagent Bottles

- Popular 1 and 2 liter sizes, equipped with 3-way valve cap
- Low-leaching (low alkali), borosilicate glass
- Chemically inert, internal PTFE seal

These wide-mouth GL45 mobile phase reservoirs come in 1- and 2-liter sizes. The reservoirs have easy-to-read volumetric markings to indicate the amount of solvent remaining. The versatile 3-way valve cap supplied with each reservoir provides a totally-inert PTFE (Teflon) seal against the solvents inside.



### Ordering Information

Reservoir and Valve Cap Assembly*			
Part No.	Mfr. No.	Description	Unit
AH0-4142	3200	HPLC Reservoir, 1000 mL clear glass, GL45 wide-mouth, includes 3-way Valve Cap	ea
AH0-4143	3203	HPLC Reservoir, 2000 mL clear glass, GL45 wide-mouth, includes 3-way Valve Cap	ea

\* Fittings not included. See p. 423 [AQ0-2950](#)

## Increase Lab Safety with HPLC/UHPLC Solvent Protection SecurityCAP™

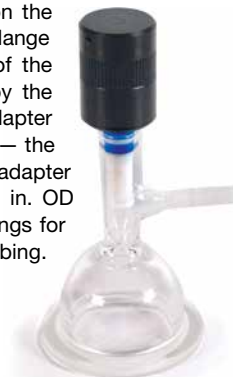
### HPLC/UHPLC Solvent (Eluent) and Waste Protection

- **Safer Laboratory Work Environment**  
Solvent vapors and gasses are restricted to the containers
- **Confidence During Quality and Safety Audits**  
Eliminate aluminum foil or parafilm covering solvent bottles
- **Easy to Use**  
No more twisting tubes during bottle exchange



## Solvent Pickup Adapter

This glass adapter enables direct pickup of mobile phase solvent for filtration using the Phenomenex FilterSys™ (see previous page). Safe in-line filtration with the pickup adapter replaces the tedious and dangerous pour-and-wait funnel filtration method. Eliminate the possibilities of spilling solvents and breathing toxic vapors. Replacing the funnel adapter on the FilterSys unit, the 47 mm pickup adapter with flange holds the membrane filter in place on top of the fritted support base, which in turn is held by the aluminum clamp (not included). The pickup adapter draws solvent directly from the reagent bottle — the safest way to transfer and filter solvents. The adapter includes a 4 mm PTFE (Teflon) valve with 1/4 in. OD outlet, PTFE 90° elbow with compression fittings for 1/4 in. OD tubing, and 3 feet of 1/4 in. OD PTFE tubing.



### Ordering Information

Solvent Pickup Adapter		
Part No.	Description	Unit
AH0-2947	Mobile Phase Pickup Adapter, 47 mm	ea



For Ordering and Additional SecurityCAP Information, see pp. 417-418



## Additional Filtration Products

### Regular sample filtration means:

- Less system downtime
- Fewer troubleshooting problems
- Improved results

Removal of particulate matter to sub-micron levels is critical before any drug, tox, or dirty environmental sample is injected into an HPLC, GC or mass spectrometer. Also, products that remove matrix components, interferents, and chemical garbage will improve your results. Check out the following useful products:

Mini-Index	Page No.
------------	----------

### Filtration Products (General Laboratory)

- Syringe filters ..... 8 - 10
- Membrane filters and filtration apparatus ..... 11 - 13
- Solid Phase Extraction (SPE) devices
- Tubes and well plates ..... 50 - 78
- Vacuum manifolds ..... 79 - 81

### Column Protection devices

- SecurityGuard
  - UHPLC (2.1 to 4.6 mm ID) ..... 335
  - Analytical (2 to 8 mm ID) ..... 330 - 334
  - SemiPrep (9 to 16 mm ID) ..... 332 - 334
  - PREP (18 to 29 mm ID) ..... 332 - 334
  - PREP (30 to 49 mm ID) ..... 332 - 334
  - SFC (18 to 29 mm ID) ..... 332 - 334
  - SFC (30 to 49 mm ID) ..... 332 - 334
- Inlet filters
  - Biocompatible PEEK ..... 14
  - Stainless steel ..... 14
- In-line filters
  - Biocompatible PEEK
    - Analytical ..... 15
    - SemiPrep ..... 16
  - Stainless steel
    - Analytical ..... 15
    - Prep ..... 16

## Filter Membranes

### Phenex™

- RC, Nylon, PTFE (Teflon®), and other membranes available
- Wide selection of membrane sizes

Phenex PTFE (Teflon®) and Regenerated Cellulose (RC) membrane filters offer excellent chemical resistance to almost all laboratory solvents and samples. They do not introduce unwanted plasticizers or extractables into the sample or mobile phase. Since Regenerated Cellulose (RC) is hydrophilic, filtering of aqueous solvents is simple. No prewetting is required. PTFE is hydrophobic and so is not recommended for the filtration of aqueous solutions.



### Ordering Information

Filter Membranes				
Part No.	Pore Size (µm)	Disc Diameter (mm)	Membrane Material	Unit
<b>Nylon</b>				
<a href="#">AF0-0500</a>	0.45	13	Nylon	100/pk
<a href="#">AF0-0501</a>	0.2	25	Nylon	100/pk
<a href="#">AF0-0502</a>	0.45	25	Nylon	100/pk
<a href="#">AF0-0503</a>	0.2	47	Nylon	100/pk
<a href="#">AF0-0504</a>	0.45	47	Nylon	100/pk
<b>PTFE</b>				
<a href="#">AF0-0512</a>	0.45	25	PTFE	100/pk
<a href="#">AF0-0514</a>	0.45	47	PTFE	100/pk
<b>Cellulose Acetate (CA)</b>				
<a href="#">AF0-8436</a>	0.45	25	CA	100/pk
<a href="#">AF0-8437</a>	0.2	25	CA	100/pk
<a href="#">AF0-8438</a>	0.45	47	CA	100/pk
<a href="#">AF0-8439</a>	0.2	47	CA	100/pk
<b>Regenerated Cellulose (RC)</b>				
<a href="#">AF0-8440</a>	0.45	13	RC	100/pk
<a href="#">AF0-8441</a>	0.2	13	RC	100/pk
<a href="#">AF0-8442</a>	0.2	25	RC	100/pk
<a href="#">AF0-8443</a>	0.45	47	RC	100/pk
<a href="#">AF0-8444</a>	0.2	47	RC	100/pk
<b>Polyethersulfone (PES)</b>				
<a href="#">AF0-8445</a>	0.2	25	PES	100/pk
<a href="#">AF0-8446</a>	0.45	25	PES	100/pk
<a href="#">AF0-8447</a>	0.2	47	PES	100/pk
<a href="#">AF0-8448</a>	0.45	47	PES	100/pk
<b>Cellulose Nitrate Ester (MCE)*</b>				
<a href="#">AF0-8454</a>	0.45	47	MCE	100/pk



\*MCE = Mixed Cellulose Esters  
Above filter membranes are non-sterile.  
Phenex is a trademark of Phenomenex.



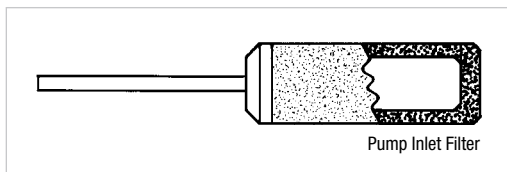
For a useful Membrane Selection Guide, see p. 8

## Inlet Filters

### Stainless Steel

- Protects pumps and check valves
- Easy to replace
- Low cost

HPLC solvent inlet filters are used at the low pressure inlet side of the pump to help protect the check valves, injector and column from damaging particulate contamination. Solvent filters are constructed of Hastelloy Steel and are available for 1/16 in. ID and 1/8 in. ID tubing. Due to the large surface area of the cylindrical frit, virtually no backpressure or cavitation is developed. The filter is easily cleaned by backflushing or sonicating.



### Ordering Information

#### Solvent Inlet Filters - Stainless Steel

Part No.	Description	Unit
<a href="#">AF0-0356</a>	Solvent Inlet Filter, 2 µm, for 1/16 in. ID tubing	ea
<a href="#">AF0-0359</a>	Solvent Inlet Filter, 2 µm, for 1/8 in. ID tubing	ea
<a href="#">AT0-2955</a>	Teflon Tubing, 5 ft. L x 1/8 in. OD x 1/16 in. (0.062 in.) ID	ea
<a href="#">AT0-2956</a>	Teflon Tubing, 10 ft. L x 1/8 in. OD x 1/16 in. (0.062 in.) ID	ea
<a href="#">AT0-8609</a>	Teflon Tubing, 5 ft. L x 1/4 in. OD x 1/8 in. (0.125 in.) ID	ea
<a href="#">AT0-8610</a>	Teflon Tubing, 10 ft. L x 1/4 in. OD x 1/8 in. (0.125 in.) ID	ea



Important: Depending on the mobile phase, we recommend that you change your inlet filter every one to six months.



For disposable Syringe Filters offering convenient and economical sample and solvent filtration, see pp. 8 - 10

### Metal-Free/Biocompatible

- Biocompatible
- Flat bottom design uses all available mobile phase
- High surface area for long filter life

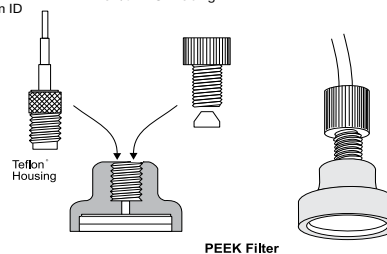
The Solvent Saver™ Inlet Filter Unit utilizes a flat filter element that sits parallel to the bottom of the HPLC reservoir. The design allows the filter to draw all but the last 2 % of the mobile phase from the reservoir without drawing air into the system.

The Solvent Saver Inlet Filter is manufactured by pressing a PEEK filter element into an inert Teflon® housing. The top of the housing has female 1/4 in.-28 threads to accept 1/8 or 1/16 in. OD tubing via PEEK flangeless fittings and Tefzel® ferrule (sold separately) or direct connect various size tubing using the Unifit adapter (sold separately). The Unifit adapter slip-fits onto 1.5, 2.2 or 3.0 mm ID tubing. This filter is excellent for sensitive biochromatography and ion chromatography applications where metal surfaces may corrode or interact with samples.



Unifit adapter (sold separately AQ0-8339) slip-fits onto 1.5, 2.2 or 3.0 mm ID tubing

1/4 in.-28 flangeless fitting (included) attaches to 1/8 in. OD tubing



### Ordering Information

#### Solvent Saver Inlet Filter - Metal-Free

Part No.	Description	Unit
<a href="#">AH0-1562</a>	Solvent Saver Inlet Filter with 10 µm PEEK filter with Flangeless fitting for 1/8 in. OD tubing	ea
<a href="#">AQ0-8339</a>	Solvent Saver Unifit Adapter, Tri-Step Tubing Connector, PEEK	ea
<a href="#">AQ0-2949</a>	Flangeless Nut and Ferrule for 1/8 in. OD tubing, 1/4 in.-28 threads, red Delrin	10/pk
<a href="#">AQ0-2950</a>	Flangeless Nut and Ferrule for 1/8 in. OD tubing, 1/4 in.-28 threads, green Delrin	10/pk
<a href="#">AT0-2953</a>	Teflon Tubing, 5 ft. L x 1/16 in. OD x 1/32 in. (0.031 in.) ID	ea
<a href="#">AT0-2955</a>	Teflon Tubing, 5 ft. L x 1/8 in. OD x 1/16 in. (0.062 in.) ID	ea
<a href="#">AT0-2956</a>	Teflon Tubing, 10 ft. L x 1/8 in. OD x 1/16 in. (0.062 in.) ID	ea
<a href="#">AT0-8610</a>	Teflon Tubing, 10 ft. L x 1/4 in. OD x 1/8 in. (0.125 in.) ID	ea

## In-Line Filters

### Stainless Steel (Analytical)

- Removes particulates from flow path
- Minimizes sample peak dispersion

In-line Filters are available to protect expensive HPLC columns from damaging microparticulates. Using one of these filters between the injection valve and the column is recommended for all HPLC systems. The 3 mm diameter filter element is recommended for use with conventional 4.6 mm diameter columns. Column In-line Filters are supplied with two 6 cm L x 0.007 in. ID connecting tubes. Pressure rating is 5000 psi (345 bar).



#### Ordering Information

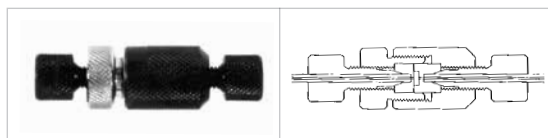
##### Stainless Steel In-Line Filters (Analytical)

Part No.	Description	Unit
<a href="#">AF0-0377</a>	In-line Filter with 0.5 µm Porosity x 3 mm dia. filter	ea
<a href="#">AF0-0378</a>	Replacement Filter Disks: 0.5 µm x 3 mm	5/pk

### Metal-Free/Biocompatible (Analytical)

- Biocompatible
- Virtually no band broadening or peak distortion
- Easy fingertight connection


This in-line filter assembly removes fine particles from the solvent stream without adding band broadening or peak distortion to your separation. Microparticulates down to 0.5 µm are effectively removed before they have a chance to plug your column and degrade your separation. The Polyglas™ frit with fluoropolymer frit assembly design is fully biocompatible and easily installed using fingertight connections. Pressure-rated to 5000 psi (345 bar).




#### Ordering Information

##### Metal-Free/Biocompatible In-Line Filter (Analytical)

Part No.	Description	Unit
<a href="#">AF0-1736</a>	In-line Filter, 0.5 µm Fit	ea

 For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

 For SecurityGuard™, the universal guard cartridge system, see p. 330

### KrudKatcher™

- Universal fit to virtually all manufacturers' analytical columns
- Saves expensive columns and equipment from damaging microparticulates
- Convenient, disposable in-line filter

There are two types of KrudKatchers depending on system backpressure and dead volume demands: the KrudKatcher Classic and the KrudKatcher Ultra.

Whereas conventional in-line filters typically cost much more and often require replacement parts and tools, the KrudKatcher is a simple, low-cost unit that is easily replaced and discarded when the backpressure indicates clogging or excessive particle build up. The universal connection is compatible with all standard 1/16 in. 10-32 internal threaded end-fittings used in columns, guard columns, injector valves, and other LC equipment.

#### The KrudKatcher Classic:

- Pressure-rated to **5000 psi (345 bar)**
- Hand-tightened connection



The KrudKatcher Classic houses an integrated 316 stainless steel depth filter that efficiently removes microparticulates from the flow stream with minimal contributions to system dead volume (2 µL). The 2.0 µm filter has a PEEK filter body and the 0.5 µm has a stainless steel filter body.

#### Ordering Information

##### KrudKatcher Classic Disposable In-Line Filter (Analytical)

Part No.	Description	Unit
<a href="#">AF0-5728</a>	KrudKatcher Disposable Pre-Column Filter, 0.5 µm	10/pk
<a href="#">AF0-5727</a>	KrudKatcher Disposable Pre-Column Filter, 2.0 µm	10/pk

#### The KrudKatcher Ultra:

- Fits virtually all UHPLC / HPLC columns 1.0 to 4.6 mm ID
- Pressure rated to **20000 psi (1375 bar)**
- Extremely low dead volume minimizes sample peak dispersion

The KrudKatcher Ultra filter body houses an integrated 2.0 µm 316 stainless steel depth filter that efficiently removes microparticulates from the flow stream without contributing to system backpressure or dead volume (<0.2 µL).



#### Ordering Information

##### KrudKatcher Ultra In-Line Filter (Analytical)

Part No.	Description	Unit
<a href="#">AF0-8497</a>	HPLC KrudKatcher Ultra Column In-Line Filter, 2.0 µm Depth Filter x 0.004 in. ID	3/pk

KrudKatcher Ultra requires 9/16 in. wrench. Wrench not provided. See p. 417



## In-Line Filters (cont'd)

### Metal-Free/Biocompatible (SemiPrep)

- For columns 8 to 18 mm ID
- Effective pre-column filtration
- Replaceable filter element



Phenomenex's Biocompatible SemiPrep in-line filter holder with replaceable filter element (2 µm PEEK frit) will help protect your column investment by safely removing particulate matter and insoluble material from the mobile phase and sample matrix. The filter consists of a stainless steel body, two PEEK end-fittings, and a separate PEEK frit. When you need to replace the filter, simply unscrew the assembly, remove the frit and replace it. This filter unit can be placed in the flow path before or after the column with little or no effect on peak shape. Pressure rated to 6000 psi (414 bar).

#### Ordering Information

##### Metal-Free/Biocompatible In-Line Filter (SemiPrep)

Part No.	Description	Unit
<a href="#">AF0-8420</a>	HPLC SemiPrep Column In-Line Filter 2.0 µm Porosity x 10 mm dia. filter, Biocompatible	ea
<a href="#">AF0-8428</a>	Replacement In-Line Filter Disk, PEEK, 2.0 µm Porosity x 10 mm dia.	5/pk

### Stainless Steel (PREP)

- Economical protection for preparative HPLC columns and injectors
- For columns 19 to 30 mm ID
- Replaceable filter element

Preparative columns and the HPLC systems on which they are used are costly and must be protected against fouling. Phenomenex's PREP In-line Filter holder with replaceable filter element (2 µm stainless steel frit) will help protect your investment by safely removing particulate matter and insoluble material from the mobile phase and sample matrix. The filter unit can be placed in the flow path before or after the column with little or no effect on peak shape. This versatile filter can also protect check valves, injectors and detectors. Pressure rated to 8000 psi (551 bar).



#### Ordering Information

##### Stainless Steel In-Line Filters (PREP)

Part No.	Description	Unit
<a href="#">AF0-7866</a>	HPLC PREP Column In-line Filter, S.S., 2.0 µm Porosity x 21.2 mm dia.	ea
<a href="#">AF0-7867</a>	Replacement In-Line Filter Disks, S.S., 2.0 µm Porosity x 21.2 mm dia.	5/pk
<a href="#">AQ0-7877</a>	PREP Replacement O-Rings, 1 in. OD x 7/8 in. ID x 1/16 in. CS, Fluorocarbon	2/pk
<a href="#">AT0-0465</a>	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 10 cm L	5/pk
<a href="#">AT0-0466</a>	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 20 cm L	5/pk

## Analytical Column Couplers

### Sure-Lok™ Coupler

- Universal and reusable
- Solvent resistant material
- Low dead-volume connection
- Compatible with all 10-32 internal-threaded fittings

#### Applications:

- Filter to column
- Column to column
- Precolumn to column
- Column to detector



Sure-Lok Coupler (PEEK)

Sure-Lok Couplers contain two Sure-Lok male nuts at either end of a 5 cm long 1/16 in. tubing. The PEEK biocompatible coupler has all parts composed of PEEK, including the 0.010 in. ID tubing. Fingertight to 5000 psi (345 bar).

#### Ordering Information

##### Sure-Lok Couplers (Analytical to SemiPrep)

Part No.	Description	Unit
<a href="#">AQ0-1392</a>	PEEK Sure-Lok Coupler	ea
<a href="#">AQ0-1393</a>	PEEK Sure-Lok Coupler	10/pk

## PREP Column Coupler



#### Ordering Information

##### PREP Column Coupler

Part No.	Description	Unit
<a href="#">AQ0-8376</a>	PREP Coupler, Stainless Steel Tube, Nuts, and Ferrules 10-32 Threads, 1/16 in. OD x 0.030 in. ID	ea



#### Protect your column and equipment with Phenex™ Syringe Filters

Filtering your sample helps prevent column and frit blockage, undue wear on detectors, pumps, valves, injector seals, and abnormally high operating pressures. Non-filtered samples can also lead to non-reproducible results and significant instrument downtime. See page 8 or Visit:

[www.phenomenex.com/SFfinder](http://www.phenomenex.com/SFfinder)



For SecurityGuard™, the universal guard cartridge system, see p. 330



## Syringes

GC Syringes.....	18
HPLC Syringes .....	23
General Use Syringes.....	25

“*Technical assistance is always very thorough.*”

**Sherri Tapp**  
**Symbiotic Research LLC**

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

# GC Syringes




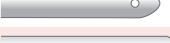

## Technical Information

### Needle Gauge Dimensions

Gauge	OD		ID	
26	0.018 in.	0.46 mm	0.0102 in.	0.26 mm
26s	0.019 in.	0.47 mm	0.0050 in.	0.13 mm
25	0.021 in.	0.51 mm	0.0102 in.	0.26 mm
23s	0.025 in.	0.64 mm	0.0060 in.	0.15 mm
23	0.025 in.	0.64 mm	0.0132 in.	0.34 mm
22s	0.028 in.	0.72 mm	0.0060 in.	0.15 mm
22	0.028 in.	0.72 mm	0.0162 in.	0.41 mm



### Needle Point Styles

Style	Description	Advantage
	AS/Cone	Exclusively for Agilent autosamplers
	2, BV (Beveled tip)	Optimal septum piercing for reduced septum coring
	3, LD (Blunt tip)	General sample pipetting and HPLC injectors
	5 (Conical with side hole)	Side hole for sample filling and dispensing, headspace
	H (Dome with side hole)	Side hole for sample filling and dispensing. Dome tip minimizes septum coring.

### Needle / Needle Connection Styles

Style	Description	Manufacturer	Advantage
ASN	Autosampler Needle	Hamilton®	For use with autosamplers
ASRN	Autosampler Removable Needle	Hamilton	For use with autosamplers
RN	Removable Needle	Hamilton	Allows freedom to change needle style or replace broken needles
N	Cemented Needle	Hamilton	Low dead volume, for low-volume syringes
KH	Knurled Hub	Hamilton	Able to handle pressure up to 6000 psig
LTN	Luer Tip Cemented Needle	Hamilton	Fixed needle with Luer Tip, for mid-volume syringes
TLL	PTFE (Teflon®) Luer Lock	Hamilton	Luer Lock with locking hub for use with syringe filters
F	Fixed Needle	SGE®	Economical and more reproducible
R	Removable Needle	SGE	Allows freedom to change needle style or replace broken needles
FLL	Fixed Luer Lock	SGE	Allows use with syringe filters
LL	Luer Lock	SGE	Allows use with syringe filters



GC SYRINGES | SYRINGES - SAMPLE HANDLING

## GC Autosampler Syringes

for Agilent® GC 7673, 7683, 7693, and 6850 Autosampler Systems

### Ordering Information

#### Hamilton Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.	
<b>Microliter Syringes</b>										
5	ASN	23s	1.71 in.	Agilent	75	87987	9301-0892	20168	ea	<a href="#">AS0-4386</a>
5	ASN	23s	1.71 in.	Agilent	75	87990	20170		6/pk	<a href="#">AS0-7641</a>
5	ASN	26s	1.71 in.	Agilent	75	87989	21230		6/pk	<a href="#">AS0-8683</a>
5	ASN	23s-26s	1.71 in.	Agilent	75	87993	24593		ea	<a href="#">AS0-8380</a>
10	ASRN	23s	1.71 in.	Agilent	701	80357	24795		ea	<a href="#">AS0-8836</a>
10	ASN	23s	1.71 in.	Agilent	701	80387	9301-0713	20167	ea	<a href="#">AS0-4387</a>
10	ASN	23s	1.71 in.	Agilent	701	80390	9301-0725	20169	6/pk	<a href="#">AS0-4388</a>
10	ASN	26s	1.71 in.	Agilent	701	80389	24599		6/pk	<a href="#">AS0-4389</a>
10	ASN	23s-26s	1.71 in.	Agilent	701	80393	24596		ea	<a href="#">AS0-8684</a>
10	ASN	23s-26s	1.71 in.	Agilent	701	80391	24600		6/pk	<a href="#">AS0-8685</a>

#### Teflon Tip Gastight® Syringes

10	ASN	23s-26s	1.71 in.	Agilent	1701	80079	n/a		ea	<a href="#">AS0-8837</a>
10	ASN	23s	1.71 in.	Agilent	1701	80080	n/a		ea	<a href="#">AS0-9079</a>



\*Similar to but not always an exact equivalent to the original manufacturer's product.



# GC Syringes

## GC Autosampler Syringes (cont'd)

for Agilent® GC 7673, 7683, 7693, and 6850 Autosampler Systems (cont'd)

SGE® Syringes										
Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.	
<b>Microliter Syringes</b>										
5	F	23	42 mm	Cone	SK-5F-HP-0.63	001814	24783	6/pk	<a href="#">ASO-8687</a>	
5	F	26	42 mm	Cone	SK-5F-HP-0.47	001804	24782	6/pk	<a href="#">ASO-8688</a>	
5	F	23s-26s	42 mm	Cone	SK-5F-HP-0.63/0.47	001822	21214	6/pk	<a href="#">ASO-8689</a>	
5	F	23-26	42 mm	Cone	5F-HP-0.63*0.47	001821	5181-1273	21210	ea	<a href="#">ASO-5208</a>
10	F	26	42 mm	Cone	SK-10F-HP-0.47	002804	24786	6/pk	<a href="#">ASO-7637</a>	
10	R	23	42 mm	Cone	10RHP-0.63	002815	24795	ea	<a href="#">ASO-8690</a>	
10	F	23	42 mm	Cone	10F-HP-0.63	002810	24785	ea	<a href="#">ASO-8691</a>	
10	F	26	42 mm	Cone	SK-10F-HP-0.47	002804	24786	6/pk	<a href="#">ASO-7637</a>	
10	F	23	42 mm	Cone	SK-10F-HP-0.63	002814	24787	6/pk	<a href="#">ASO-8692</a>	
10	F	23s-26s	42 mm	Cone	10F-HP-0.63/0.47	002821	21212	ea	<a href="#">ASO-8693</a>	
10	F	23s-26s	42 mm	Cone	SK-10F-HP-0.63/0.47	002822	21215	6/pk	<a href="#">ASO-8694</a>	
<b>Teflon® Tip Gastight® Syringes</b>										
10	F	23	42 mm	Cone	HF-HP-GT-0.63	002812	24789	ea	<a href="#">ASO-8695</a>	
10	F	23-26	42 mm	Cone	10F-HP-GT-0.63/0.47	002826	5181-1267	ea	<a href="#">ASO-5209</a>	
10	F	23-26	42 mm	Cone	SK10F-HP-FT-0.63/0.47	002827	5181-3361	6/pk	<a href="#">ASO-5210</a>	

for PerkinElmer® AutoSystem™ and Clarus® 500 GC Systems

### Ordering Information

SGE Syringes									
Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
<b>Microliter Syringes</b>									
0.5	R	23	70 mm	Cone	0.5BR-PE-0.63	000478	24811	ea	<a href="#">ASO-8697</a>
5	F	23	70 mm	Cone	5F-PE-0.63	001954	24813	ea	<a href="#">ASO-8698</a>

for Varian® 8000 Series GC Systems

### Ordering Information

SGE Syringes									
Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
<b>Microliter Syringes</b>									
10	R	25	53 mm	Side Hole	10R-VA8X-II	002924	24852	ea	<a href="#">ASO-8699</a>
10	F	26	50 mm	Cone	10F-C/F-5/0.47C	002980	24922	ea	<a href="#">ASO-8700</a>
10	F	26	50 mm	Bevel	10F-VA8400-5/0.47	002950	21202	ea	<a href="#">ASO-8701</a>

for Shimadzu® AOC 9GC Systems

### Ordering Information

Hamilton Syringes									
Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
<b>Microliter Syringes</b>									
5	RN	26s	2 in. /51 mm	2	75RN	87930	24617	ea	<a href="#">ASO-8702</a>
5	N	26s	2 in. /51 mm	2	75N	87900	24938	ea	<a href="#">ASO-4390</a>
10	RN	26s	2 in. /51 mm	2	701RN	80330	24530	ea	<a href="#">ASO-0100</a>

### Ordering Information

SGE Syringes									
Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
<b>Microliter Syringes</b>									
10	R	23	42 mm	Cone	10R-S-0.63	002898	24845	ea	<a href="#">ASO-8703</a>



\*Similar to but not always an exact equivalent to the original manufacturer's product.

GC Autosampler Syringes continued on next page.

# GC Syringes

## GC Autosampler Syringes (cont'd)

for Thermo Scientific® GC Systems

### Ordering Information

#### SGE® Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
<b>Microliter Syringes</b>									
10	F	26	80 mm	Cone	10F-C/F-8/0.47C	002992	24924	ea	<a href="#">ASO-8704</a>
10	R	26	80 mm	Cone	10R-C/F-8/0-0.47C	002993	24934	ea	<a href="#">ASO-8705</a>

## for CTC/LEAP GC Systems

### Ordering Information

#### Hamilton® Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
<b>Microliter Syringes</b>									
1.2	N	26	2 in./51 mm	Cone	7701.2N	203185	22755	ea	<a href="#">ASO-8706</a>

### Ordering Information

#### SGE Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
<b>Microliter Syringes</b>									
10	F	23	50 mm	Cone	10F-C/F-5/0.63	002981	24923	ea	<a href="#">ASO-7638</a>
10	R	23	50 mm	Cone	10R-C/F-5/0.63	002984	24932	ea	<a href="#">ASO-8709</a>
10	F	26	50 mm	Cone	10F-C/F-5/0.47C	002980	24922	ea	<a href="#">ASO-8700</a>
10	F	26	50 mm	Cone	SK10F-C/F-5/0.47C	002986	24925	6/pk	<a href="#">ASO-8711</a>
10	R	26	50 mm	Cone	10R-C/F-5/0.47C	002982	24930	ea	<a href="#">ASO-8712</a>



\*Similar to but not always an exact equivalent to the original manufacturer's product.

## GC Manual Syringes

### Ordering Information

#### Hamilton Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
<b>Microvolume Syringes</b>									
5	N	26s	2 in./51 mm	2	75N	87900	24938	ea	<a href="#">ASO-4390</a>
5	RN	26s	2 in./51 mm	2	75RN	87930	24617	ea	<a href="#">ASO-8702</a>
10	N	26s	2 in./51 mm	2	701N	80300	20174	ea	<a href="#">ASO-0077</a>
10	N	26s	2 in./51 mm	2	701N	80366	20175	6/pk	<a href="#">ASO-0016</a>
10	RN	26s	2 in./51 mm	2	701RN	80330	24530	ea	<a href="#">ASO-0100</a>
25	N	22s	2 in./51 mm	2	702N	80400	24531	ea	<a href="#">ASO-0078</a>
10	N	26s	2 in./51 mm	5	701NPT5	80339	24967	ea	<a href="#">ASO-0094</a>
<b>Positive Displacement Syringes</b>									
0.5	KH	25	2.75 in./70 mm	2	7000.5	86259	24545	ea	<a href="#">ASO-8715</a>
1.0	KH	22	2.75 in./70 mm	2	7101	86211	24549	ea	<a href="#">ASO-8716</a>
1.0	KH	25s	2.75 in./70 mm	2	7001	80135	24547	ea	<a href="#">ASO-1918</a>
1.0	KH	25s	2.75 in./70 mm	3	7001	80100	24548	ea	<a href="#">ASO-8717</a>
2.0	KH	25	2.75 in./70 mm	2	7002	88411	24551	ea	<a href="#">ASO-8718</a>
5.0	KH	24	2.75 in./70 mm	2	7105	88011	24555	ea	<a href="#">ASO-8719</a>
<b>Teflon Tip Gastight Syringes</b>									
10	N	26s	2 in./51 mm	2	1701	80000	24557	ea	<a href="#">ASO-4391</a>
10	RN	26s	2 in./51 mm	2	1701	80030	24558	ea	<a href="#">ASO-1898</a>
25	N	22s	2 in./51 mm	2	1702	80200	24559	ea	<a href="#">ASO-8720</a>
25	RN	22s	2 in./51 mm	2	1702	80230	24560	ea	<a href="#">ASO-1899</a>
50	N	22s	2 in./51 mm	2	1705	80900	24561	ea	<a href="#">ASO-0061</a>
50	RN	22s	2 in./51 mm	2	1705	80930	24562	ea	<a href="#">ASO-1900</a>
100	N	22s	2 in./51 mm	2	1710	81000	24563	ea	<a href="#">ASO-0062</a>
100	RN	22s	2 in./51 mm	2	1710	81030	24564	ea	<a href="#">ASO-1901</a>
250	N	22s	2 in./51 mm	2	1725	81100	24567	ea	<a href="#">ASO-0063</a>

# GC Syringes

## GC Manual Syringes (cont'd)

### Ordering Information

#### Hamilton® Syringes (continued)

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
<b>Teflon® Tip Gastight® Syringes (continued)</b>									
250	RN	22s	2 in./51 mm	2	1725	81130	24568	ea	<a href="#">ASO-1902</a>
500	LTN	22	2 in./51 mm	2	1750	81217	24571	ea	<a href="#">ASO-0064</a>
500	RN	22	2 in./51 mm	2	1750	81230	24572	ea	<a href="#">ASO-1903</a>
1 mL	LTN	22	2 in./51 mm	2	1001	81317	24575	ea	<a href="#">ASO-0065</a>
1 mL	RN	22	2 in./51 mm	2	1001	81330	24576	ea	<a href="#">ASO-8721</a>
1 mL	TLL	–	–	w/o slots	1001	81320	24578	ea	<a href="#">ASO-1907</a>
2.5 mL	TLL	–	–	w/o slots	1002	81420	24584	ea	<a href="#">ASO-1908</a>
2.5 mL	RN	22	2 in./51 mm	2	1002	81430	24582	ea	<a href="#">ASO-8722</a>
2.5 mL	N	22	2 in./51 mm	2	1002	81417	24581	ea	<a href="#">ASO-8723</a>
10 mL	TLL	–	–	w/o slots	1010	81620	20179	ea	<a href="#">ASO-1910</a>

### Ordering Information

#### SGE® Syringes

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
<b>Microvolume Syringes</b>									
5	F	26	50 mm	2	5F	001000	24700	ea	<a href="#">ASO-8725</a>
5	R	26	50 mm	2	5R	001050	24701	ea	<a href="#">ASO-8726</a>
10	F	26	50 mm	2	10F	002000	24702	ea	<a href="#">ASO-8727</a>
10	F	26	50 mm	2	SK-10F	002030	24715	6/pk	<a href="#">ASO-8728</a>
10	R	26	50 mm	2	10R	002050	24703	ea	<a href="#">ASO-8729</a>
<b>Positive Displacement Syringes</b>									
1.0	R	23	70 mm	2	1BR-7BV	000506	24775	ea	<a href="#">ASO-8738</a>
1.0	R	26	70 mm	Cone	1BR-7/0.47	000570	24776	ea	<a href="#">ASO-8739</a>
<b>Teflon Tip Gastight Syringes</b>									
10	F	26	50 mm	2	10F-GT	002200	24725	ea	<a href="#">ASO-8741</a>
25	F	25	50 mm	2	25F-GT	003200	24727	ea	<a href="#">ASO-8743</a>
50	F	25	50 mm	2	50F-GT	004200	24729	ea	<a href="#">ASO-8744</a>
50	R	25	50 mm	2	50R-GT	004250	24730	ea	<a href="#">ASO-8745</a>
100	F	25	50 mm	2	100F-GT	005200	24734	ea	<a href="#">ASO-8746</a>
100	R	25	50 mm	2	100R-GT	005250	24735	ea	<a href="#">ASO-8747</a>
250	F	25	50 mm	2	250F-GT	006200	24738	ea	<a href="#">ASO-8748</a>
250	R	25	50 mm	2	250R-GT	006250	24739	ea	<a href="#">ASO-8749</a>
500	F	25	50 mm	2	500F-GT	007200	24742	ea	<a href="#">ASO-8750</a>
1 mL	RN	23	50 mm	Bevel	1MDR-GT	008100	24750	ea	<a href="#">ASO-8845</a>
1 mL	LL	–	–	–	1MDF-LL-GT	008025	24752	ea	<a href="#">ASO-0120</a>
2.5 mL	R	23	50 mm	Bevel	MDR-GT	008500	–	ea	<a href="#">ASO-8752</a>
5 mL	LL	–	–	–	5MDR-LL-GT	008760	24757	ea	<a href="#">ASO-0121</a>
10 mL	LL	–	–	–	10MDR-LL-GT	008960	24759	ea	<a href="#">ASO-0122</a>



\*Similar to but not always an exact equivalent to the original manufacturer's product.



# GC Syringes

## VICI® Series A-2 Gas Syringes

- Push-button valve and smaller volumes
- Pressure-Lok® design offers gas-tight injections
- Inject without carrier backflushing to sharpen peaks and improve separations
- Leak-tight to 250 psi - liquids and gases
- No plunger "blow out" at elevated pressures

The A-2 features a push-button valve, which allows sample storage up to 250 psi in syringes as small as 25 µL. This is useful with small liquid samples containing low-boiling components that would be lost through evaporation using ordinary syringes.

The positive rear stop (in 100 µL and larger sizes) prevents plunger blowout at elevated pressures, protecting against sample loss or operator injury. Like the Series A gas syringe, the A-2 has all the standard Pressure-Lok features such as a PTFE plunger tip, PTFE-sealed needle and ultra-smooth bore. Replacement components are available for easy repair.



### Ordering Information

#### VICI Precision Sampling Syringes

Part No.	Mfr. No.	Description	Capacity (µL)	Unit
<a href="#">ASO-4739</a>	050023	Series A-2 Syringe	25	ea
<a href="#">ASO-4740</a>	050024	Series A-2 Syringe	50	ea
<a href="#">ASO-4741</a>	050025	Series A-2 Syringe	100	ea
<a href="#">ASO-4742</a>	050031	Series A-2 Syringe	250	ea
<a href="#">ASO-4743</a>	050032	Series A-2 Syringe	500	ea
<a href="#">ASO-4744</a>	050033	Series A-2 Syringe	1000 (1 mL)	ea
<a href="#">ASO-4745</a>	050034	Series A-2 Syringe	2000 (2 mL)	ea
<a href="#">ASO-4746</a>	050035	Series A-2 Syringe	5000 (5 mL)	ea

Notes: (1) All other VICI Precision Sampling products not listed are available.  
 (2) Removable needle: 0.028 in. x 0.005 in. x 2.00 in., bevel, open end on 25, 50 and 100 µL (p/n 943050, 3/pk); 0.029 in. x 0.012 in. x 2.00 in., bevel, open end on all others (p/n 943051, 3/pk).

## Filtration Products from Phenomenex

"Filtration is the **easiest way** to improve your results, guard your system components from damage, and protect your column investment".



### Phenex™ Syringe Filters

- Increase column lifetime and save money!
- Ensure more accurate, consistent results
- Eliminate damaging microparticulates

Particulates can damage expensive equipment, valves, columns and pumps. They can also lead to erratic analytical results. Pre-filtering samples prior to analysis is critical in preventing column and frit blockage, undue wear on valve seals, and abnormally high operating pressures.

Sample or Mobile Phase Volume (mL)	Filter Membrane (diameter, mm)	Format
≤ 2	4	Syringe filter
2 to 10	15	Syringe filter
10 to 100	25-28	Syringe filter
> 100	47	Membrane disk
> 1000	90	Membrane disk

### Ordering Information<sup>1</sup>

Part No.	Pore Size (µm)	Phenex Membrane
<b>4 mm Diameter (500/pk)</b>		
<a href="#">AF0-3103-52</a>	0.45	RC
<a href="#">AF0-3102-52</a>	0.45	PTFE <sup>6</sup>
<a href="#">AF3-3107-52</a>	0.45	NY
<a href="#">AF0-3203-52</a>	0.20	RC
<a href="#">AF0-3202-52</a>	0.20	PTFE <sup>6</sup>
<a href="#">AF3-3207-52</a>	0.20	NY
<b>15 mm Diameter (500/pk)</b>		
<a href="#">AF0-2103-52</a>	0.45	RC
<a href="#">AF0-2102-52</a>	0.45	PTFE <sup>6</sup>
<a href="#">AF0-2107-52</a>	0.45	NY
<a href="#">AF0-2203-52</a>	0.20	RC
<a href="#">AF0-2202-52</a>	0.20	PTFE <sup>6</sup>
<a href="#">AF0-2207-52</a>	0.20	NY
<b>25–28 mm Diameter (500/pk)</b>		
<a href="#">AF0-8103-525</a>	0.45	RC
<a href="#">AF0-8108-527</a>	0.45	PES <sup>3</sup>
<a href="#">AF0-1102-52</a>	0.45	PTFE <sup>6</sup>
<a href="#">AF0-1107-52</a>	0.45	NY
<a href="#">AF0-8B09-527</a>	0.45	GF/CA <sup>2,3,4</sup>
<a href="#">AF0-8203-525</a>	0.20	RC
<a href="#">AF0-8208-527</a>	0.20	PES <sup>3</sup>
<a href="#">AF0-1202-52</a>	0.20	PTFE <sup>6</sup>
<a href="#">AF0-1207-52</a>	0.20	NY
<a href="#">AF0-8A09-527</a>	0.20	GF/CA <sup>2,3,4,7</sup>
<a href="#">AF0-8515-527</a>	1.20	GF <sup>2,3</sup>

Housing is made of medical-grade polypropylene (PP), unless otherwise indicated. Above syringe filters are non-sterile.

1. Additional membrane types available.
2. Glass fiber filters are 28 mm diameter and made of borosilicate. They will remove 90% of all particles >1.2 µm.
3. Housing material is methacrylate butadiene styrene (MBS) polymerisate. Also known as Cyrolite®.
4. Cellulose acetate is surfactant-free.
5. 26 mm diameter.
6. Hydrophobic membrane. Can be made hydrophilic by pre-wetting with IPA.
7. 28 mm diameter.

Syringes continued on next page.



For additional Phenex Syringe Filters and a useful Membrane Selection Guide, see pp. 8-10

# HPLC Syringes

## for Rheodyne®, Altex and Valco® (VISF-2) Injectors



### Ordering Information

#### Hamilton Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
5	RN	22s	2 in./51 mm	3	65	87943		ea	<a href="#">ASO-3353</a>
10	N	22s	2 in./51 mm	3	701	80365	21250	ea	<a href="#">ASO-0022</a>
25	N	22s	2 in./51 mm	3	702	80465	21251	ea	<a href="#">ASO-0023</a>
50	N	22s	2 in./51 mm	3	705	80565	21252	ea	<a href="#">ASO-0024</a>
100	N	22s	2 in./51 mm	3	710	80665	21253	ea	<a href="#">ASO-0025</a>
250	N	22	2 in./51 mm	3	725	80765	21254	ea	<a href="#">ASO-0026</a>
500	N	22	2 in./51 mm	3	750	80865		ea	<a href="#">ASO-0027</a>

## for Waters® U6K Injector, Removable Needle



### Ordering Information

#### Hamilton Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	RN	25s	1.97 in./50 mm	3	801	84815	21255	ea	<a href="#">ASO-0028</a>
25	RN	25s	1.97 in./50 mm	3	802	84816	21256	ea	<a href="#">ASO-0029</a>
50	RN	25s	1.97 in./50 mm	3	805	84817	21257	ea	<a href="#">ASO-0030</a>
100	RN	25s	1.97 in./50 mm	3	810	84818	21258	ea	<a href="#">ASO-0031</a>

## Hamilton® 10 mL Gastight® Priming Syringe, for Waters HPLC Pumps (Models 6000, 6000A, 501, 510, 610 and 610E)



### Ordering Information

#### Hamilton Syringe

Volume (mL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	W	-	-	-	1010	81610	21265	ea	<a href="#">ASO-1906</a>

## Replacement Needles

### Point Style #2 (Beveled Tip)



### Ordering Information

#### Hamilton Replacement Needles

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
2.5-100	RN	26	2 in./51 mm	2	RN NDL	7758-04		6/pk	<a href="#">ASO-1904</a>
25-100	RN	26	2 in./51 mm	2	RN NDL	7758-02	24939	6/pk	<a href="#">ASO-4392</a>
25-100	RN	22s	2 in./51 mm	2	RN NDL	7758-03	24940	6/pk	<a href="#">ASO-4393</a>
0.250-10 mL	RN	22s	2 in./51 mm	2	RN NDL	7779-03	24944	6/pk	<a href="#">ASO-4398</a>

### Point Style #3 (Blunt Tip)



### Ordering Information

#### Hamilton Replacement Needles

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
2.5-100	RN	22s	2 in./51 mm	3	RN NDL	7770-01	24941	6/pk	<a href="#">ASO-4394</a>
0.250-10 mL	RN	22	2 in./51 mm	3	RN NDL	7780-04	24945	6/pk	<a href="#">ASO-4397</a>
0.250-10 mL	RN	22s	2 in./51 mm	3	RN NDL	7780-03		6/pk	<a href="#">ASO-4400</a>



Needle point #2 (22° bevel) is used for GC and most applications that require the puncturing of a septum.



Needle point style #3 (90°) is appropriate for HPLC applications.



\*Similar to but not always an exact equivalent to the original manufacturer's product.



For Rheodyne HPLC Sample Injectors, see pp. 428-431

HPLC Syringes continued on next page.



Removable Needle (RN, R)

Cemented Needle (N, F)

# HPLC Syringes

## Replacement Needles (cont'd)

### for Rheodyne®, Valco® HPLC Injectors, 2 in. Fixed Needles

#### Ordering Information

##### SGE® Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	F	22	2 in./51 mm	LD	10F-LC	002301	24860	ea	<a href="#">ASO-0142</a>
25	F	22	2 in./51 mm	LD	25F-LC	003300	24861	ea	<a href="#">ASO-0143</a>
50	F	22	2 in./51 mm	LD	50F-LC	004300	24862	ea	<a href="#">ASO-0144</a>
100	F	22	2 in./51 mm	LD	100F-LC	005300	24863	ea	<a href="#">ASO-0145</a>
250	F	22	2 in./51 mm	LD	250F-LC	006300	24864	ea	<a href="#">ASO-0146</a>
500	F	22	2 in./51 mm	LD	500F-LC	007300	24865	ea	<a href="#">ASO-0147</a>

### for Rheodyne, Valco HPLC Injectors, 2 in. Removable Needles

#### Ordering Information

##### SGE Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	R	22	2 in./51 mm	LD	10R-GT-LC-SS	002313	24866	ea	<a href="#">ASO-4370</a>
25	R	22	2 in./51 mm	LD	25R-GT-LC-SS	003312	24867	ea	<a href="#">ASO-4371</a>
100	R	22	2 in./51 mm	LD	100R-GT-LC-SS	005312	24869	ea	<a href="#">ASO-4373</a>
500	R	22	2 in./51 mm	LD	500R-GT-LC-SS	007312	24871	ea	<a href="#">ASO-4375</a>

### for PerkinElmer®, Fixed Needles

#### Ordering Information

##### SGE Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Unit	Part No.
5	F	23	2.76 in./70 mm	Cone	-	001957	ea	<a href="#">ASO-7636</a>

### for CTC/LEAP, Fixed Needles

#### Ordering Information

##### SGE Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Unit	Part No.
10	F	23	1.97 in./50 mm	Cone	-	002981	ea	<a href="#">ASO-7638</a>



Removable Needle (RN, R)



Cemented Needle (N, F)



\*Similar to but not always an exact equivalent to the original manufacturer's product.



For Rheodyne HPLC Sample Injectors, see pp. 428-431



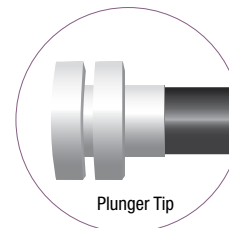
# General Use Syringes

## General Use Syringes for:

- Pipetting
- Diluting
- Delivering



Gastight syringes have a polymer tipped plunger, often PTFE, which essentially wipes the interior of the syringe barrels. This reduces the risk of deposition on the barrel which may cause cross-contamination or plunger seizing



## Hamilton® 1700 Series Gastight® Syringes, Needle Point Style 2 (Beveled)

### Ordering Information

#### Hamilton Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	RN	26s	2 in./51 mm	2	1701	80030	24558	ea	<a href="#">ASO-1898</a>
25	RN	22s	2 in./51 mm	2	1702	80230	24560	ea	<a href="#">ASO-1899</a>
50	RN	22s	2 in./51 mm	2	1705	80930	24562	ea	<a href="#">ASO-1900</a>
100	RN	22s	2 in./51 mm	2	1710	81030	24564	ea	<a href="#">ASO-1901</a>
250	RN	22s	2 in./51 mm	2	1725	81130		ea	<a href="#">ASO-1902</a>
500	RN	22s	2 in./51 mm	2	1750	81230		ea	<a href="#">ASO-1903</a>



## Hamilton 1700 Series Gastight Syringes, Needle Point Style 3 (Blunt)

### Ordering Information

#### Hamilton Syringe

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
10	RN	22s	2 in./51 mm	3	1701	80065		ea	<a href="#">ASO-4380</a>
25	RN	22s	2 in./51 mm	3	1702	80265	24560	ea	<a href="#">ASO-4381</a>
50	RN	22s	2 in./51 mm	3	1705	80965	24562	ea	<a href="#">ASO-4382</a>
100	RN	22s	2 in./51 mm	3	1710	81065	24564	ea	<a href="#">ASO-4383</a>
250	RN	22s	2 in./51 mm	3	1725	81165	24568	ea	<a href="#">ASO-4384</a>
500	RN	22s	2 in./51 mm	3	1750	81265	24572	ea	<a href="#">ASO-4385</a>

## Hamilton 1000 Series Gastight Syringes

### Ordering Information

#### Hamilton Syringe

Volume (mL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
1	TLL	-	-	w/o slots	1001	81320	24578	ea	<a href="#">ASO-1907</a>
2.5	TLL	-	-	w/o slots	1002	81420	24584	ea	<a href="#">ASO-1908</a>
5	TLL	-	-	w/o slots	1005	81520	20178	ea	<a href="#">ASO-1909</a>
10	TLL	-	-	w/o slots	1010	81620	20179	ea	<a href="#">ASO-1910</a>
-	TLL	22	2 in./51 mm	2	KF722	90122		6/pk	<a href="#">ASO-1915</a>
-	TLL	16	2 in./51 mm	2	KF716	90116		6/pk	<a href="#">ASO-1916</a>



Needle point #2 (22 ° bevel) is used for GC and most applications that require the puncturing of a septum.



Needle point style #3 (90 °) is appropriate for HPLC applications.



\*Similar to but not always an exact equivalent to the original manufacturer's product.

General Use Syringes continued on next page.

# General Use Syringes

## SGE® Syringes, Gas Tight Luer Lock

### Ordering Information

#### SGE Syringe

Volume (mL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Unit	Part No.
1	F	-	-	-	1 mL GT	008025	ea	<a href="#">ASO-0120</a>
5	R	-	-	-	5 mL GT	008760	ea	<a href="#">ASO-0121</a>
10	R	-	-	-	10 mL GT	008960	ea	<a href="#">ASO-0122</a>

## SGE Replacement Needles, Removable, for Gas Tight Luer Lock Syringes

### Ordering Information

#### SGE Replacement Needles

Volume (µL)	Needle/Needle Connection	Gauge	Needle Length	Needle Style	Model	Mfr. No	Similar to Mfr. No.*	Unit	Part No.
-	R	23	1.97 in./50mm	BV	NLL-5/23	039802	24763	5/pk	<a href="#">ASO-2016</a>
-	R	23	1.97 in./50mm	H	NLL-5/23H	039803		2/pk	<a href="#">ASO-2017</a>



\*Similar to but not always an exact equivalent to the original manufacturer's product.

## Phenex™ Syringe Filters

- Increase column lifetime and save money!
- Ensure more accurate, consistent results
- Eliminate damaging microparticulates

### Ordering Information<sup>1</sup>

Part No.	Pore Size (µm)	Phenex Membrane
<b>4 mm Diameter (500/pk)</b>		
<a href="#">AF0-3103-52</a>	0.45	RC
<a href="#">AF0-3102-52</a>	0.45	PTFE <sup>6</sup>
<a href="#">AF3-3107-52</a>	0.45	NY
<a href="#">AF0-3203-52</a>	0.20	RC
<a href="#">AF0-3202-52</a>	0.20	PTFE <sup>6</sup>
<a href="#">AF3-3207-52</a>	0.20	NY
<b>15 mm Diameter (500/pk)</b>		
<a href="#">AF0-2103-52</a>	0.45	RC
<a href="#">AF0-2102-52</a>	0.45	PTFE <sup>6</sup>
<a href="#">AF0-2107-52</a>	0.45	NY
<a href="#">AF0-2203-52</a>	0.20	RC
<a href="#">AF0-2202-52</a>	0.20	PTFE <sup>6</sup>
<a href="#">AF0-2207-52</a>	0.20	NY
<b>25–28 mm Diameter (500/pk)</b>		
<a href="#">AF0-8103-525</a>	0.45	RC
<a href="#">AF0-8108-527</a>	0.45	PES <sup>3</sup>
<a href="#">AF0-1102-52</a>	0.45	PTFE <sup>6</sup>
<a href="#">AF0-1107-52</a>	0.45	NY
<a href="#">AF0-8B09-527</a>	0.45	GF/CA <sup>2,3,4</sup>
<a href="#">AF0-8203-525</a>	0.20	RC
<a href="#">AF0-8208-527</a>	0.20	PES <sup>3</sup>
<a href="#">AF0-1202-52</a>	0.20	PTFE <sup>6</sup>
<a href="#">AF0-1207-52</a>	0.20	NY
<a href="#">AF0-8A09-527</a>	0.20	GF/CA <sup>2,3,4,7</sup>
<a href="#">AF0-8515-527</a>	1.20	GF <sup>2,3</sup>

Housing is made of medical-grade polypropylene (PP), unless otherwise indicated. Above syringe filters are non-sterile.

1. Additional membrane types available.
2. Glass fiber filters are 28 mm diameter and made of borosilicate. They will remove 90% of all particles >1.2µm.
3. Housing material is methacrylate butadiene styrene (MBS) polymerisate. Also known as Cyrolite®.
4. Cellulose acetate is surfactant-free.
5. 26 mm diameter.
6. Hydrophobic membrane. Can be made hydrophilic by pre-wetting with IPA.
7. 28 mm diameter.



For additional Phenex Syringe Filters and a useful Membrane Selection Guide, see pp. 8-10



## All-Plastic Disposable Syringes

- Use for all syringe filter applications
- Luer-lock outlet makes connection easy
- Capacities ranging from 3 to 20 mL
- Made of ultra-clean, high-purity plastics

### Ordering Information

#### All-Plastic Disposable Syringes

Part No.	Description	Capacity (mL)*	Unit
<a href="#">ASO-8408</a>	Plastic Disposable Syringes, Luer-lock	3	100/pk
<a href="#">ASO-8409</a>	Plastic Disposable Syringes, Luer-lock	5	100/pk
<a href="#">ASO-8410</a>	Plastic Disposable Syringes, Luer-lock	10	100/pk
<a href="#">ASO-8411</a>	Plastic Disposable Syringes, Luer-lock	20	100/pk

\*Choose larger volume syringe to reduce force on syringe filter membrane. 10 mL syringe is recommended.



### Recommended Plastic Syringes for use with Phenex Syringe Filters

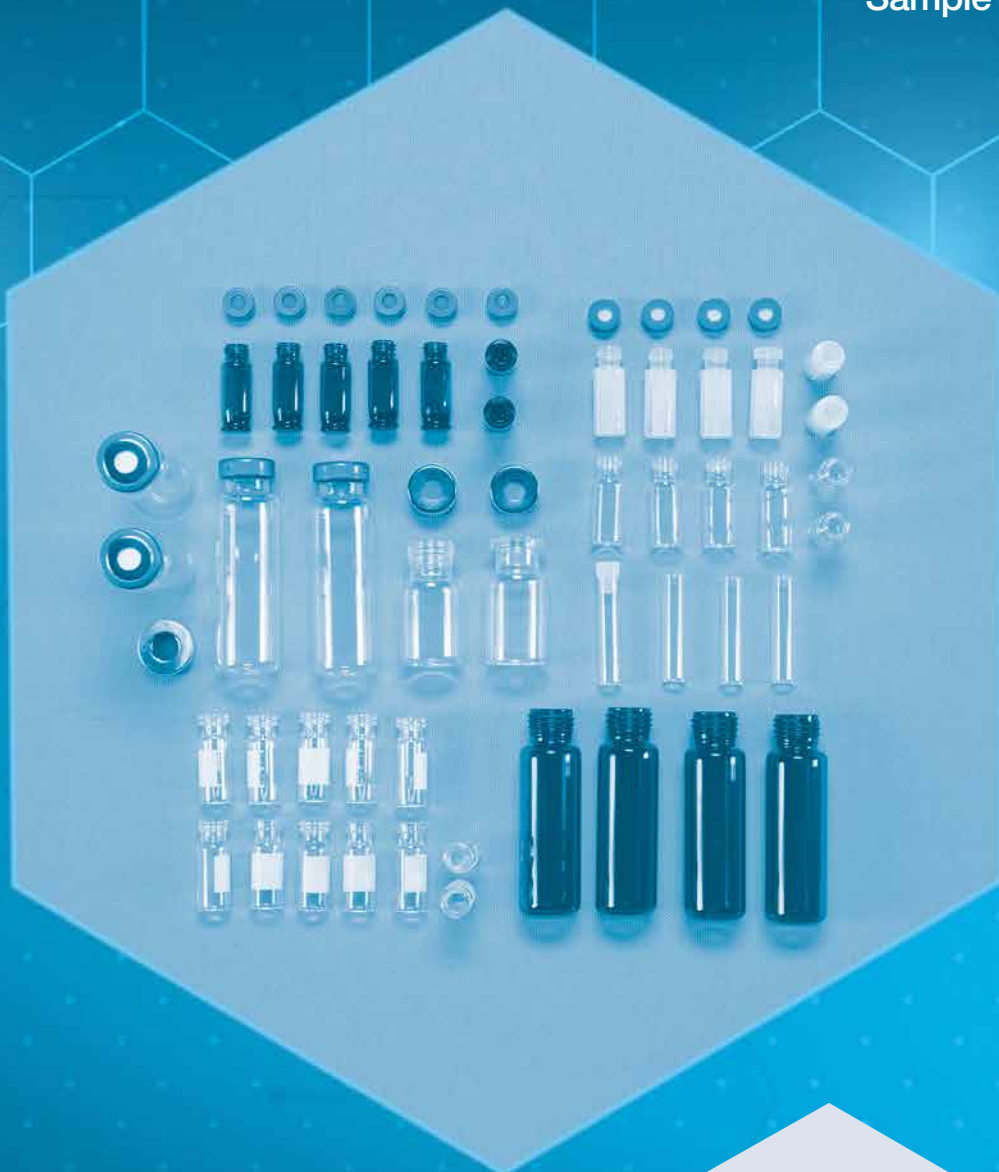
Part No. [ASO-8410](#):  
10 mL Plastic Disposable Syringes, Luer-Lock 100/pk

Part No. [ASO-8411](#):  
20 mL Plastic Disposable Syringes, Luer-Lock 100/pk



### Pressure Forces Generated from Plastic Syringes:

- 20 mL can generate 2.0 bar
- 10 mL can generate 3.4 bar
- 5 mL can generate 5.2 bar
- 3 mL can generate 6.9 bar



## Sample Vials

<b>Verex Filter Vials</b> .....	28-29
<b>Autosampler Vials, Caps, Septa, and Inserts</b>	
Verex Vials Quality and Certification .....	30-31
8 mm .....	39
9 mm .....	32, 36-38
10 mm .....	32, 40
11 mm .....	32-35
13 mm .....	41
Limited Volume Specialty, 12 x 32 mm .....	32
<b>Shell Vials</b> .....	41
<b>Headspace Vials</b> .....	42
<b>VOA / ASE Vial Kits</b> .....	43
<b>Storage Vial Kits</b> .....	43
<b>Verex-EU Vials and Caps</b> .....	44-46
<b>Verex-IN Vials and Caps</b> .....	47
<b>Verex Vial Resources</b> .....	48

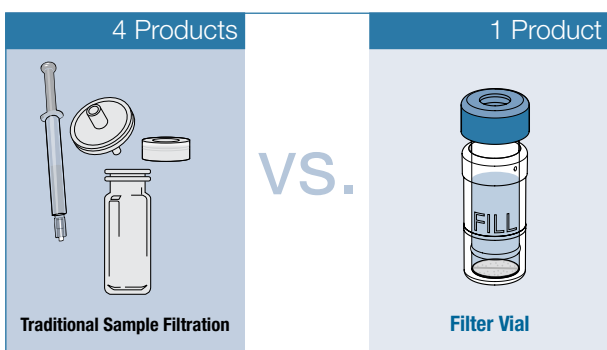
“ I am **very pleased** to do business with Phenomenex. . . . for me you are a kind of benchmark for other companies. ”

**Jos Mecklenfeld**  
QPS, Netherlands

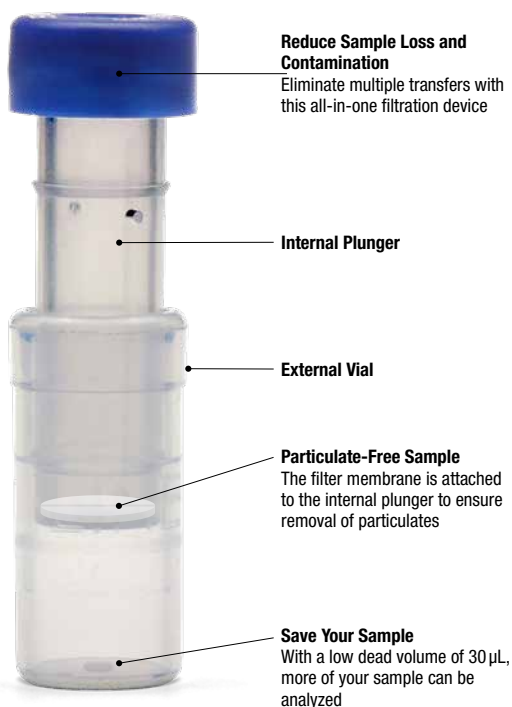
The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

## Filter Vial Products

Verex Filter Vials are designed to offer quick and efficient sample preparation by incorporating a syringe, filtration membrane, vial, and cap/septa all into one product. Each filter vial is comprised of two parts: the external vial to be filled with sample and an internal plunger equipped with a filtration membrane and cap that includes a pre-slit PTFE/Silicone septa. Simply, dispense your sample into the external vial and compress the internal plunger to filter. This produces a particulate-free sample ready for analysis. Verex Filter Vials are a standard 12 x 32 mm vial and can be easily loaded into an autosampler.



FILTER VIAL PRODUCTS | VIALS - SAMPLE HANDLING



## Verex Filter Vials Offer:

- Simplified workflow
- Less system downtime
- Reduced lab waste
- Broad chemical compatibility



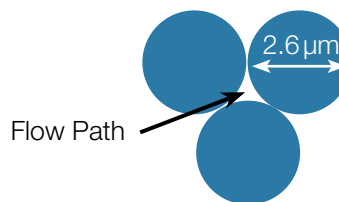
## Filter Vial Selection Guide

### 1.

#### Choose a pore size based on chromatographic media and flow path

For HPLC/UHPLC columns packed with  $\leq 3 \mu\text{m}$  chromatographic media, a Verex Filter Vial with  $0.20 \mu\text{m}$  filter membrane is recommended. Filter membranes with a  $0.20 \mu\text{m}$  pore size provides an effective barrier against unwanted particulates entering the system flow path. This reduces column plugging, leading to longer column lifetimes and increased system up-time. For HPLC columns with  $> 3 \mu\text{m}$  chromatographic media, a Verex Filter Vial with  $0.45 \mu\text{m}$  filter membrane is recommended.

Particle Size ( $\mu\text{m}$ )	Flow Path ( $\mu\text{m}$ )	Effective Filter Pore Size ( $\mu\text{m}$ )
5	0.72	0.45
3	0.43	0.20
2.6	0.38	0.20
1.7	0.25	0.20



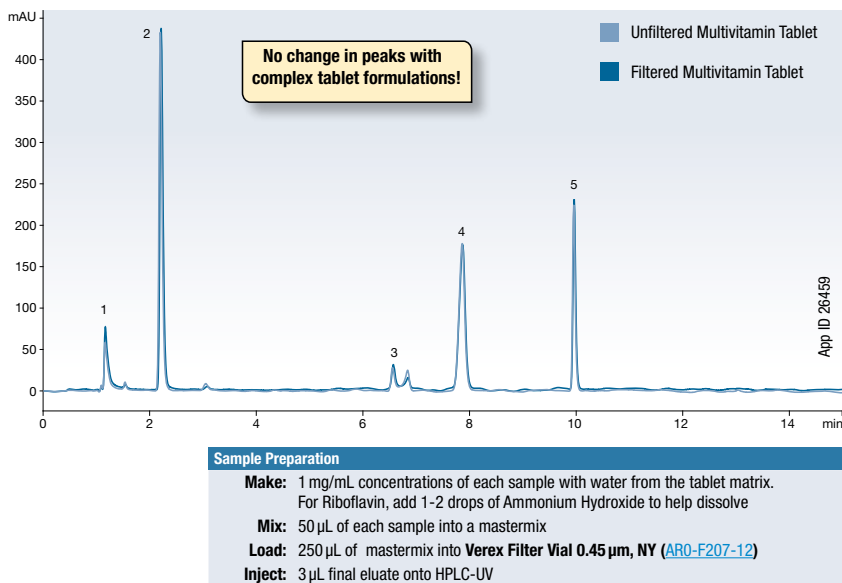
### 2.

#### Choose a filter membrane according to the characteristics of your sample and filtering objective

Membrane Type	Recommended Uses
<b>RC</b> (Regenerated Cellulose)	Hydrophilic Regenerated Cellulose filter membranes exhibit fast-flow and ultra-low protein and non-specific binding characteristics and are compatible with a broad range of aqueous and mixed-organic solutions. This membrane is broadly recommended as an excellent general purpose/high-performance samples' filter for most applications.
<b>PTFE</b> (Polytetrafluoroethylene)	Polytetrafluoroethylene is an inherently hydrophobic membrane excellent for filtration of organic-based, highly acidic or basic samples and solvents. Widely used in chromatography, it is especially well suited for the clarification of non-aqueous and organic samples.
<b>NY</b> (Nylon)	Nylon has inherent hydrophilic characteristics and works well for filtration and clarification of many aqueous and mixed-organic solvent solutions.
<b>PES</b> (Polyethersulfone)	Polyethersulfone membranes exhibit very fast-flow and ultra-low protein binding characteristics and ensures removal of particulate matter. This membrane is ideally suited for use in many biological studies and is broadly recommended for filtering critical biological samples, tissue culture media, additives and buffers.
<b>PVDF</b> (Polyvinylidene Fluoride)	Hydrophilic Polyvinylidene Fluoride filter membranes provide high flow rates and throughput, low extractables, and broad chemical compatibility. This membrane binds less protein than nylon or PTFE membranes and is typically used in clarification of biological samples or dissolution testing.



## Multivitamin Tablet Analysis by HPLC-UV



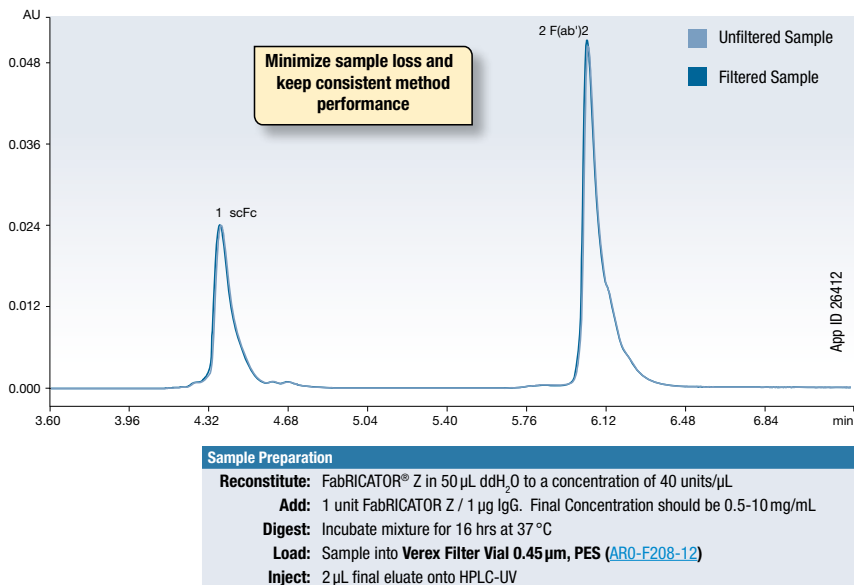
### LC-UV Conditions

**Column:** Synergi™ 4  $\mu$ m Hydro-RP  
**Dimension:** 150 x 4.6 mm  
**Part No.:** [00F-4375-E0](#)  
**Pressure (bar):** 142  
**Mobile Phase:** A: 20 mM Potassium phosphate + 0.1 % Hexane sulfonate, pH 3.0  
 B: Acetonitrile

Gradient	Time (min)	% B
	0	3
	3	3
	18	50
	18.1	3
	20	3

**Flow Rate:** 1.5 mL/min  
**Temperature:** 30 °C  
**Detection:** UV @ 210 nm  
**Injection Volume:** 3  $\mu$ L  
**Instrument:** Agilent® 1100 HPLC with Quaternary Pump  
**Sample:** 1. Thiamine  
 2. Pyridoxine  
 3. Pantothenic Acid  
 4. P-Aminobenzoic Acid  
 5. Riboflavin

## Monoclonal Antibody (mAbs) Fragments



### LC-UV Conditions

**Column:** Synergi™ 4  $\mu$ m Hydro-RP  
**Dimension:** 150 x 4.6 mm  
**Part No.:** [00F-4375-E0](#)  
**Pressure (bar):** 142  
**Mobile Phase:** A: 0.1 % TFA in Water  
 B: 0.1 % TFA in Acetonitrile

Gradient	Time (min)	% B
	0	25
	10	45
	11	80
	13	80
	13.1	25
	17.1	25

**Flow Rate:** 0.8 mL/min  
**Detector:** UV-Vis @ 280 nm  
**Sample:** Nivolumab, IdeZ Digested

- Diverse color options make identification and reorder simple and easy!



### Ordering Information

Description	Membrane Pore	Part No.	Unit
Verex Filter Vial-RC (Regenerated Cellulose)	0.20 $\mu$ m	<a href="#">ARO-F103-12</a>	100/pk
	0.45 $\mu$ m	<a href="#">ARO-F203-12</a>	100/pk
Verex Filter Vial-PTFE (Polytetrafluoroethylene)	0.20 $\mu$ m	<a href="#">ARO-F102-12</a>	100/pk
	0.45 $\mu$ m	<a href="#">ARO-F202-12</a>	100/pk
Verex Filter Vial-NY (Nylon)	0.20 $\mu$ m	<a href="#">ARO-F107-12</a>	100/pk
	0.45 $\mu$ m	<a href="#">ARO-F207-12</a>	100/pk
Verex Filter Vial-PES (Polyethersulfone)	0.20 $\mu$ m	<a href="#">ARO-F108-12</a>	100/pk
	0.45 $\mu$ m	<a href="#">ARO-F208-12</a>	100/pk
Verex Filter Vial-PVDF (Polyvinylidene Fluoride)	0.20 $\mu$ m	<a href="#">ARO-F106-12</a>	100/pk
	0.45 $\mu$ m	<a href="#">ARO-F206-12</a>	100/pk

## Vials for UHPLC/HPLC/GC/SFC and MS Analysis

### Leading in Quality, Delivery, and Support

The most critical point of your analysis is when you put your sample in the vial. Verex certified sample vials, inserts, caps and seals are guaranteed to ensure problem-free, reproducible performance with consistent results you can trust.

### All Vials, Caps, and Kits

- **Advanced manufacturing**
- **Multi-step QA/QC**
- **Cleanroom packaged**
- **Certified**

With the demand for better product reproducibility and performance in glass, septa and caps, we developed Verex HPLC / GC vial products with high quality materials to exceed industry specifications and tolerances. Verex innovative precision products provide air-tight, leak-free seals to safely transfer and store your most important samples. Through extensive testing, we've created guaranteed-fit vial products that offer compatibility with virtually any autosampler for trouble-free operation.

With tightly controlled 100% traceable manufacturing processes, we re-defined the standards for lot traceability and certification of every Verex product to ensure a uniform product with optimum performance for any application. For those with the most sensitive applications, choose Verex-Certified PLUS or Certified MSQ products for excellent ultra-grade cleanliness. Bottom line, Verex is your sample transfer and storage solution.

Vials and inserts are made of inert, high-purity, chemically-stable borosilicate glass to exacting specifications, individually heat-treated to burn off any impurities, then packaged in a cleanroom environment. Choose from crimp, snap, and screw types or mix and match vials and caps to your application. Most vials are offered with or without a write-on marking spot or "patch". For easy selection or purchase convenience, our assembled vial kits are ready to go!

Verex caps / seals / closures are made to exacting specifications, giving a tight seal each and every time. The aluminum crimp seals, plastic screw and snap caps come with highly pure septa material and are available in pre-slit and non-slit formats. Economical press-fit and specially formulated bonded-in septa styles are both available. And our mass spec certified (MSQ) screw caps provide you with a state-of-the art solution for your most challenging, sensitive applications.

A variety of complete vial kits are available to meet the most demanding needs of chromatographers, from routine analytical to high-sensitivity work:

- **33-Expansion clear glass (USP Type 1 borosilicate, Class A), 51A amber glass**
- **Limited volume (high sample recovery) vials**
- **Silanized (deactivated) glass**
- **Polypropylene for biocompatibility**
- **Certified and special MS-certified (caps and vials)**

AUTOSAMPLER VIALS | VIALS - SAMPLE HANDLING

### Three Levels of Certification

	 LEVEL 1 Certified	 LEVEL 2 Certified PLUS (Cert+)	 LEVEL 3 Certified MSQ (Cert + MSQ) (Mass Spec Quality)
<b>Ultra Clean</b> Specially designed and treated for mass spectrometry (MS) applications.			✓
<b>Low Bleed</b> Special cap / closure processing, treating, and testing for low bleed of residual organics. For high sensitivity GC-MS and LC-MS applications.		✓	✓
<b>Dimensionally Verified</b> Machine vision cameras and gauges inspect critical dimensions and tolerances to produce uniform, defect-free products.	✓	✓	✓
<b>Lot Traceable</b> Vial and cap packs are 100% traceable through the manufacturing process. Certificate of Conformance available by lot number upon request.	✓	✓	✓
<b>Clean Room Packaged</b> Ensures particulate- and contaminate-free products for clean chromatography.	✓	✓	✓
<b>Part Number Extension</b>	No Extension	Certificate of Conformance Included; Extension -C	Certificate of Conformance Included; Extension -M
<b>Part Number Example</b>	<a href="#">ARO-8952-13</a>	<a href="#">ARO-8952-13-C</a>	<a href="#">ARO-8952-13-M</a>

Need help matching your current vials and caps to Verex? Visit: [www.phenomenex.com/VialFinder](http://www.phenomenex.com/VialFinder)



## Vials for UHPLC/HPLC/GC/SFC and MS Analysis (cont'd)

All Verex products are fully lot-tested and certified. The details of product specifications and testing are available at [www.phenomenex.com/verex](http://www.phenomenex.com/verex). The “Certified PLUS” rating signifies the highest quality available from Phenomenex. A Certificate of Conformance is included. Depending on the product, Certified PLUS may indicate, for example, special processing or treating and/or testing for low bleed or residual organics. Certified products offer excellent performance, especially for high sensitivity, mass spectrometry applications.



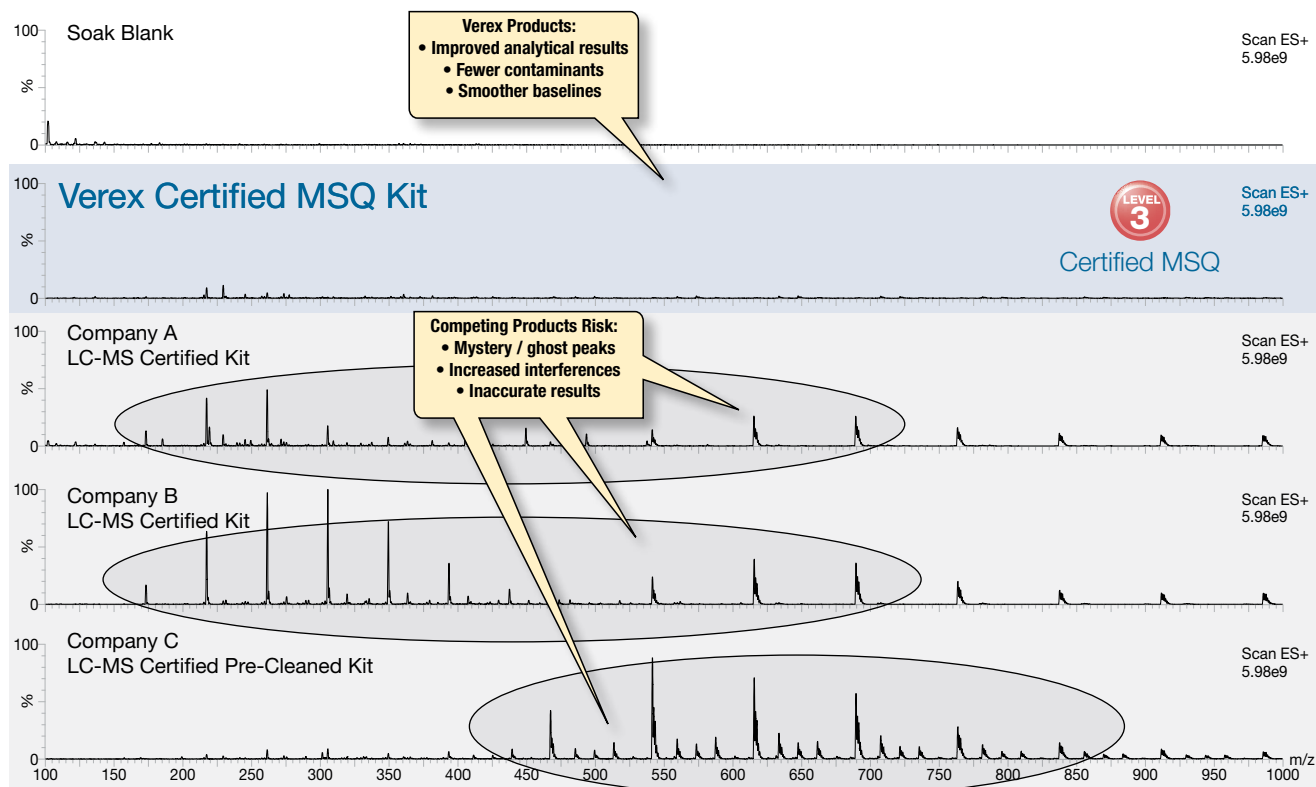
From the manufacturing of our products to their timely delivery and superior customer support, we are dedicated to continually improving our processes to consistently meet or exceed your expectations.



### Vials, The Most Critical Part of Your Analysis!


Though they may look alike, not all vials offer equivalent performance. Variations in product quality can adversely affect your chromatography, leading to mystery peaks, loss of analytes, and

irreproducible results. Begin every analysis with high quality Verex products to minimize troubleshooting delays, and costly, unnecessary rework.



Comparative separations may not be representative of all applications.

## 12 x 32mm Limited Volume Specialty Vials and Kits

	Type and Description	Finish	Material	Total Volume	Residual Volume	Available as	Page Number	Part Numbers
	High-Recovery CD Vial Center-draining	9 mm Screw Thread	Glass	1.5 mL	< 20 µL	Convenience Kits (certified and regular)	37 37 36 36	<a href="#">ARO-9981-13</a> <a href="#">ARO-9982-13</a> <a href="#">ARO-9985-13-C</a> <a href="#">ARO-9986-13-C</a>
	Max-Recovery CD Vial Center-draining	11 mm Snap or 9 mm Screw Thread	Glass	1.5 mL	< 2 µL	Vials (regular) Convenience Kits (certified)	34 36 36	<a href="#">ARO-3680-12</a> <a href="#">ARO-9987-13-C</a> <a href="#">ARO-9988-13-C</a>
	Insert Vial µVial i2V	11 mm Snap	Glass	500 µL	< 2 µL	Vials (regular)	34 34	<a href="#">ARO-3630-13</a> <a href="#">ARO-3631-13</a>
	Insert Vial µVial i3 (Qsert)	11 mm Snap or 9 mm Screw Thread	Glass	300 µL	< 4 µL	Convenience Kits (certified and regular)	34 34 37 37 36	<a href="#">ARO-9671-13</a> <a href="#">ARO-9672-13</a> <a href="#">ARO-9973-13</a> <a href="#">ARO-9974-13</a> <a href="#">ARO-9974-13-C</a>
	Insert Vial µVial i3 (Qsert)	11 mm Crimp or 11 mm Snap or 9 mm Screw Thread	Glass	475 µL	< 4 µL	Vials (regular)	34 33 33 37 37	<a href="#">ARO-3625-13</a> <a href="#">ARO-3725-13</a> <a href="#">ARO-3726-13</a> <a href="#">ARO-3920-13</a> <a href="#">ARO-3921-13</a>
	Insert Vial µVial i3 (Qsert)	10 mm Screw Thread	Glass	450 µL	< 2 µL	Vials (regular)	40 40	<a href="#">ARO-3020-13</a> <a href="#">ARO-3021-13</a>
	Plastic Vial	9 mm Screw Thread	Polypropylene	700 µL	< 5 µL	Convenience Kits (certified)	36 36	<a href="#">ARO-9993-13-C</a> <a href="#">ARO-9994-13-C</a>
	Plastic Vial	11 mm Snap or 9 mm Screw Thread	Polypropylene	300 µL	< 2 µL	Convenience Kits (certified and regular)  Vials (certified and regular)	34 34 37 37 36  34 37	<a href="#">ARO-9691-13-C</a> <a href="#">ARO-9692-13-C</a> <a href="#">ARO-9991-13</a> <a href="#">ARO-9992-13</a> <a href="#">ARO-9995-13-C</a>  <a href="#">ARO-36S0-13-C</a> <a href="#">ARO-39S0-13-C</a>
	Micro Vial with Tapered Base v-Vial	11 mm Crimp or 11 mm Snap or 9 mm Screw Thread or 10 mm Screw Thread	Glass	1.5 mL	< 4 µL	Vials (regular)	40 34 34 33 33 37 37	<a href="#">ARO-3040-13</a> <a href="#">ARO-3640-13</a> <a href="#">ARO-3641-12</a> <a href="#">ARO-3740-13</a> <a href="#">ARO-3741-13</a> <a href="#">ARO-3940-13</a> <a href="#">ARO-3941-13</a>

AUTOSAMPLER VIALS | VIALS - SAMPLE HANDLING



9-425 neck finish represents a vial with a diameter of 9 mm across the outside of the threads and a thread style of 425.



## 12 x 32 mm, 11 mm Crimp-Top Vial Products

### Crimp-Top Vials, 2.0 mL

- Cleaner vials eliminate ghost peaks and contaminants
- Used with most autosamplers, including Agilent®, Thermo Scientific®, Waters®
- Larger-opening “wide-mouth” style prevents broken needles and system downtime
- Precision neck improves crimping

#### Ordering Information

Description	1000/pk
<b>Standard Opening</b>	
Vial, Crimp, 2 mL Clear, No Patch	<a href="#">ARO-3700-13</a>
Vial, Crimp, 2 mL Clear, w/ Patch	<a href="#">ARO-3710-13</a>
Vial, Crimp, 2 mL Amber, w/ Patch	<a href="#">ARO-3711-13</a>
<b>Wide Mouth Opening</b>	
Vial, Crimp, 2 mL Wide Mouth, Clear, No Patch	<a href="#">ARO-37K0-13</a>
Vial, Crimp, 2 mL Wide Mouth, Clear, w/ Patch	<a href="#">ARO-37L0-13</a>
Vial, Crimp, 2 mL Wide Mouth, Amber, No Patch	<a href="#">ARO-37K1-13</a>
Vial, Crimp, 2 mL Wide Mouth, Amber, w/ Patch	<a href="#">ARO-37L1-13</a>



Download FREE  
Verex vials and caps poster guide at:  
[www.phenomenex.com/verex](http://www.phenomenex.com/verex)

### Limited Volume Specialty Crimp-Top Vials

- Microsampling (center-draining and fused-insert vials)

#### Ordering Information

Description	100/pk	1000/pk
Vial, Crimp, v-Vial Clear, No Patch*	<a href="#">ARO-3740-12</a>	<a href="#">ARO-3740-13</a>
Vial, Crimp, v-Vial Amber, No Patch*	—	<a href="#">ARO-3741-13</a>
Vial, Crimp, µVial i3 (Qsert), Clear, w/ Patch	<a href="#">ARO-3725-12</a>	<a href="#">ARO-3725-13</a>
Vial, Crimp, µVial i3 (Qsert), Amber, w/ Patch	<a href="#">ARO-3726-12</a>	<a href="#">ARO-3726-13</a>

\*51-Expansion glass.



### Seals / Closures for Crimp-Top Vials

- Excellent for volatile samples
- Extra clean to eliminate contamination
- Colored aluminum

#### Ordering Information

Description	1000/pk
Seal, 11 mm Diameter, Crimp, PTFE/Silicone, silver	<a href="#">ARO-5780-13</a>
Seal, 11 mm Diameter, Crimp, PTFE/Silicone/PTFE, silver	<a href="#">ARO-5760-13</a>
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, silver	<a href="#">ARO-5740-13</a>
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, blue	<a href="#">ARO-5742-13</a>
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, red	<a href="#">ARO-5741-13</a>
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, green	<a href="#">ARO-5743-13</a>
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, gold	<a href="#">ARO-5746-13</a>
Seal, 11 mm Diameter, Crimp, PTFE, silver	<a href="#">ARO-5710-13</a>



**Save Money.** Bulk discounts available. Timely delivery. Excellent support.



**Request a Quote.** Want to make sure you're getting the best pricing on vials? Visit: [www.phenomenex.com/Verex](http://www.phenomenex.com/Verex)



For Vial Inserts for Standard Opening Crimp-Top Vials, use 5 mm Diameter Inserts, see p. 39  
For Vial Inserts for Wide Mouth Crimp-Top Vials, use 6 mm Diameter Inserts, see p. 38

## 12 x 32 mm, 11 mm Snap-Top Vials and Kits

### Convenience Kits – Snap-Top Vials and Seals / Closures

- Precision formed for autosampler fit
- Larger-opening “wide-mouth” style prevents broken needles and system downtime
- Rigorous quality testing for consistent performance
- Precise vial depth provides consistent sample recoveries



#### Ordering Information†

Description	1000/pk
Vial Kit, Snap Cap, 2 mL Clear, w/ Patch + PTFE/Silicone	<a href="#">ARO-9721-13</a>
Vial Kit, Snap Cap, 2 mL Clear + PTFE/Silicone, preSlit	<a href="#">ARO-9727-13</a>
Cert+ Vial Kit, Snap Cap, PP, 300 µL + PTFE/Silicone**	<a href="#">ARO-9691-13-C</a>
Cert+ Vial Kit, Snap Cap, PP, 300 µL + PTFE/Silicone, preSlit**	<a href="#">ARO-9692-13-C</a>

†No write-on patch unless otherwise indicated \*\*Vial made of Polypropylene. \*\*\*Certified PLUS (Cert+) Level 2 Certification

### Convenience Kits – Limited Volume Specialty Snap-Top Vials and Seals / Closures

- Microsampling (fused-insert vials)
- Cleaner vials eliminate ghost peaks and contaminants



#### Ordering Information

Description	100/pk	1000/pk
Vial Kit, Snap, µVial i3 (Qsert), Clear w/ Patch + PTFE/Silicone	<a href="#">ARO-9671-12</a>	<a href="#">ARO-9671-13</a>
Vial Kit, Snap, µVial i3 (Qsert), Clear w/ Patch + PTFE/Silicone, preSlit	<a href="#">ARO-9672-12</a>	<a href="#">ARO-9672-13</a>

### Snap-Top Vials\*, 2.0 mL

- Great for less volatile samples or high-throughput labs
- Save time, without crimping or twisting



#### Ordering Information

Description	1000/pk
Vial, Snap, 2 mL Clear, No Patch	<a href="#">ARO-3600-13</a>
Vial, Snap, 2 mL Clear, w/ Patch	<a href="#">ARO-3610-13</a>
Vial, Snap, 2 mL Amber, w/ Patch	<a href="#">ARO-3611-13</a>
Vial, Snap, 2 mL Clear, w/ Patch, Silanized	<a href="#">ARO-3613-13</a>
Vial, Snap, 2 mL Amber, w/ Patch, Silanized	<a href="#">ARO-3614-13</a>

\*Vials can accept either snap or crimp-tops to effectively seal the vial.

### Limited Volume Specialty Snap-Top Vials

- For small volume microsamples (center-draining and fused-insert vials)
- One piece vial with fused-insert



#### Ordering Information

Description	100/pk	1000/pk
Vial, Snap, v-Vial i2V Clear, No Patch*	<a href="#">ARO-3640-12</a>	<a href="#">ARO-3640-13</a>
Vial, Snap, v-Vial i2V Amber, No Patch*	<a href="#">ARO-3641-12</a>	—
Vial, Snap, µVial i2V Clear, No Patch	<a href="#">ARO-3630-12</a>	<a href="#">ARO-3630-13</a>
Vial, Snap, µVial i2V Amber, No Patch	<a href="#">ARO-3631-12</a>	<a href="#">ARO-3631-13</a>
Vial, Snap, µVial i3 (Qsert), Clear, w/ Patch	<a href="#">ARO-3625-12</a>	<a href="#">ARO-3625-13</a>
Vial, Snap, Maximum Recovery (CD), Clear, No Patch	<a href="#">ARO-3680-12</a>	<a href="#">ARO-3680-13</a>
Cert+ Vial, Snap, PP, 300 µL, Clear, No Patch***	<a href="#">ARO-36S0-12-C</a>	<a href="#">ARO-36S0-13-C</a>

\*51-Expansion glass. \*\*Vial made of Polypropylene. \*\*\*Certified PLUS (Cert+) Level 2 Certification



For Vial Inserts for Snap-Top Vials, use 6 mm Diameter Inserts, see p. 38

## 12 x 32 mm, 11 mm Snap-Top Vials and Kits (cont'd)

### Seals / Closures for Snap-Top Vials

- Specially designed for secure fit
- Easily snap cap onto vial and pull cap off

#### Ordering Information

Description	1000/pk
<b>No-Slit</b>	
Seal, 11 mm Diameter, Snap, PTFE/Silicone, blue	<a href="#">ARO-5652-13</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone, Cert+, blue	<a href="#">ARO-5652-13-C</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone, natural	<a href="#">ARO-5656-13</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone, red	<a href="#">ARO-5651-13</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone, green	<a href="#">ARO-5653-13</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone, yellow	<a href="#">ARO-5654-13</a>
Seal, 11 mm Diameter, Snap, PTFE/Rubber, natural	<a href="#">ARO-5646-13</a>
Seal, 11 mm Diameter, Snap, PTFE, blue	<a href="#">ARO-5612-13</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone/PTFE, blue	<a href="#">ARO-5661-13</a>
<b>preSlit</b>	
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, blue	<a href="#">ARO-5672-13</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, natural	<a href="#">ARO-5676-13</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, red	<a href="#">ARO-5671-13</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, green	<a href="#">ARO-5673-13</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, yellow	<a href="#">ARO-5674-13</a>



Simply choose the vial closure convenience kit for your application and you'll also receive a free dispenser box!



## Make the Switch from your Current Vials and Caps to Verex!

### 2 Easy Steps:

- 1 Enter your current vial or cap part number
- 2 Order the recommended Verex part number

Finding the Verex replacement to your current vials and caps is EASY.

Use our online web tool to find the guaranteed Verex product match.



Visit: [www.phenomenex.com/VialFinder](http://www.phenomenex.com/VialFinder)

## 12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Kits

### Convenience Kits – Certified PLUS (Cert+) Mass Spec Quality (MSQ)

### 9mm Screw-Top Vials and Caps with Locked-Fit Septa

- For your most demanding analysis; high sensitive detectors
- HPLC and LC-MS tested and certified
- State-of-the-art design and manufacture



#### Ordering Information

Description	1000/pk
Cert+ MSQ Vial Kit, 9mm, 2 mL Clear w/ Patch + MSQ PTFE/Silicone	<a href="#">ARO-992A-13-M</a>
Cert+ MSQ Vial Kit, 9mm, 2 mL Amber w/ Patch + MSQ PTFE/Silicone	<a href="#">ARO-992B-13-M</a>

## Convenience Kits – Certified PLUS (Cert+) 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- Certified for cleanliness and enhanced quality
- Polyethylene-Starburst cap is an excellent choice for inertness



#### Ordering Information

Description	1000/pk
Cert+ Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Silicone cap	<a href="#">ARO-9921-13-C</a>
Cert+ Vial Kit, 9mm, 2 mL Clear w/ Patch + PE-Starburst cap	<a href="#">ARO-9927-13-C</a>
Cert+ Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit cap	<a href="#">ARO-9926-13-C</a>

## Convenience Kits – Certified PLUS (Cert+) Limited Volume Specialty 9mm Screw-Top Vials and Caps

- Kits for microsampling (center-draining and fused-insert vials)
- Lower trace contaminants for higher sensitivity work
- Inert polypropylene (PP) vials for biochromatography or pH-sensitive applications



#### Ordering Information\*

Description	100/pk	1000/pk
Cert+ Vial Kit, 9mm, Maximum Recovery (CD) Clear + PTFE/Silicone cap <sup>o</sup>	<a href="#">ARO-9987-12-C</a>	<a href="#">ARO-9987-13-C</a>
Cert+ Vial Kit, 9mm, Maximum Recovery (CD) Clear + PTFE/Silicone, preSlit cap <sup>o</sup>	<a href="#">ARO-9988-12-C</a>	<a href="#">ARO-9988-13-C</a>
Cert+ Vial Kit, 9mm, High Recovery (CD) Clear + PE-Starburst cap <sup>□</sup>	<a href="#">ARO-9985-12-C</a>	<a href="#">ARO-9985-13-C</a>
Cert+ Vial Kit, 9mm, High Recovery (CD) Amber + PE-Starburst cap <sup>□</sup>	<a href="#">ARO-9986-12-C</a>	<a href="#">ARO-9986-13-C</a>
Cert+ Vial Kit, 9mm, µVial i3(Qsert) Clear w/ Patch + PTFE/Silicone, preSlit cap <sup>o</sup>	<a href="#">ARO-9974-12-C</a>	<a href="#">ARO-9974-13-C</a>
Cert+ Vial Kit, 9mm, PP, 300 µL + PE-Starburst cap <sup>□**</sup>	<a href="#">ARO-9995-12-C</a>	<a href="#">ARO-9995-13-C</a>
Cert+ Vial Kit, 9mm, PP, 700 µL + PTFE/Silicone cap <sup>o**</sup>	<a href="#">ARO-9993-12-C</a>	<a href="#">ARO-9993-13-C</a>
Cert+ Vial Kit, 9mm, PP, 700 µL + PTFE/Silicone, preSlit cap <sup>o**</sup>	<a href="#">ARO-9994-12-C</a>	<a href="#">ARO-9994-13-C</a>

\*No write-on patch unless otherwise indicated \*\*Vial made of Polypropylene.  
<sup>o</sup>-B = Bonded-In Septa. <sup>□</sup> Cap is one piece, constructed of ultra-pure, medical-grade polyethylene.

## Convenience Kits – 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- Sample volume range from 0.2 to 1.5 mL



#### Ordering Information

Description	1000/pk
Vial Kit, 9mm, 2 mL Clear + PTFE/Silicone	<a href="#">ARO-9901-13</a>
Vial Kit, 9mm, 2 mL Clear + PTFE/Silicone, preSlit	<a href="#">ARO-9903-13</a>
Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Silicone	<a href="#">ARO-9921-13</a>
Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Silicone, Silanized	<a href="#">ARO-9921-13-D</a>
Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Silicone, preSlit	<a href="#">ARO-9925-13</a>
Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Silicone, preSlit, Silanized	<a href="#">ARO-9925-13-D</a>
Vial Kit, 9mm, 2 mL Clear + PTFE/Silicone/PTFE	<a href="#">ARO-9905-13</a>
Vial Kit, 9mm, 2 mL Clear + PTFE/Rubber	<a href="#">ARO-9907-13</a>
Vial Kit, 9mm, 2 mL Clear w/ Patch + PTFE/Rubber, preSlit	<a href="#">ARO-9914-13</a>
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone	<a href="#">ARO-9922-13</a>
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone, Silanized	<a href="#">ARO-9922-13-D</a>
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit	<a href="#">ARO-9926-13</a>
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit, Silanized	<a href="#">ARO-9926-13-D</a>
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Silicone/PTFE	<a href="#">ARO-9923-13</a>
Vial Kit, 9mm, 2 mL Amber w/ Patch + PTFE/Rubber	<a href="#">ARO-9912-13</a>



Learn More. For additional product selection and detailed information visit:  
[www.phenomenex.com/Verex](http://www.phenomenex.com/Verex)



## 12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Kits (cont'd)

### Convenience Kits – Limited Volume Specialty 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- Kits for microsampling (center-draining and fused-insert vials)
- CD and Qsert vials offer superior performance over vials with loose inserts
- Polypropylene (PP) vial kits for bio- or ion-chromatography, or pH-sensitive samples

#### Ordering Information\*

Description	100/pk	1000/pk
Vial Kit, 9 mm, High Recovery (CD) Clear + PTFE/Silicone	<a href="#">ARO-9981-12</a>	<a href="#">ARO-9981-13</a>
Vial Kit, 9 mm, High Recovery (CD) Clear + PTFE/Silicone, preSlit	<a href="#">ARO-9982-12</a>	<a href="#">ARO-9982-13</a>
Vial Kit, 9 mm, µVial i3 (Qsert) Clear w/ Patch + PTFE/Silicone	<a href="#">ARO-9973-12</a>	<a href="#">ARO-9973-13</a>
Vial Kit, 9 mm, µVial i3 (Qsert) Clear w/ Patch + PTFE/Silicone, preSlit	<a href="#">ARO-9974-12</a>	<a href="#">ARO-9974-13</a>
Vial Kit, 9 mm, PP, 300 µL + PTFE/Silicone**	<a href="#">ARO-9991-12</a>	<a href="#">ARO-9991-13</a>
Vial Kit, 9 mm, PP, 300 µL + PTFE/Silicone, preSlit**	<a href="#">ARO-9992-12</a>	<a href="#">ARO-9992-13</a>

\*No write-on patch unless otherwise indicated \*\*Vial made of Polypropylene.



### Convenience Kits – Assembled 9 mm Screw-Top Vials and Caps with Bonded-In Septa

- Cap and septa attached to vials
- Ready to use
- Save time and labor

#### Ordering Information

Description	1000/pk
Vial Kit, 9 mm, 2 mL Clear w/ Patch + PTFE/Silicone, preSlit	<a href="#">ARO-9925-13-A</a>
Vial Kit, 9 mm, 2 mL Amber w/ Patch + PTFE/Silicone, preSlit	<a href="#">ARO-9926-13-A</a>

\*-A = Assembled



### 9 mm Screw-Top Vials, 2.0 mL

- Used with most autosamplers, including Agilent®, Thermo Scientific®, Waters® and many others
- Performs as well as crimp or snap vials
- Offers improved cap convenience and accessibility (easy on, easy off)

#### Ordering Information

Description	1000/pk
Vial, 9 mm Screw, 2 mL Clear, No Patch	<a href="#">ARO-3900-13</a>
Vial, 9 mm Screw, 2 mL Amber, No Patch	<a href="#">ARO-3901-13</a>
Vial, 9 mm Screw, 2 mL Clear, w/ Patch	<a href="#">ARO-3910-13</a>
Vial, 9 mm Screw, 2 mL Amber, w/ Patch	<a href="#">ARO-3911-13</a>
Vial, 9 mm Screw, 2 mL Clear, w/ Patch, Silanized	<a href="#">ARO-3960-13</a>



Need help matching your current vials and caps to Verex? Visit: [www.phenomenex.com/VialFinder](http://www.phenomenex.com/VialFinder)

### Limited Volume Specialty 9 mm Screw-Top Vials

- Microsampling Qsert and v-Vial center-draining vials
- Qsert fused-insert vials ensure proper seating of the cap
- Extremely low residual volume

#### Ordering Information

Description	100/pk	1000/pk
Vial, 9 mm Screw, µVial i3 (Qsert) Clear, No Patch	<a href="#">ARO-3920-12</a>	<a href="#">ARO-3920-13</a>
Vial, 9 mm Screw, µVial i3 (Qsert) Amber, No Patch	<a href="#">ARO-3921-12</a>	<a href="#">ARO-3921-13</a>
Vial, 9 mm Screw, v-Vial Clear, No Patch®	<a href="#">ARO-3940-12</a>	<a href="#">ARO-3940-13</a>
Vial, 9 mm Screw, v-Vial Amber, No Patch®	<a href="#">ARO-3941-12</a>	<a href="#">ARO-3941-13</a>
Cert+ Vial, 9 mm, Screw, PP, 300 µL Clear, No Patch**	<a href="#">ARO-39S0-12-C</a>	<a href="#">ARO-39S0-13-C</a>

® 51-Expansion glass. \*\*Vial made of Polypropylene.



## 12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Kits (cont'd)

### Certified PLUS (Cert+) Mass Spec Quality (MSQ) Caps for 9 mm Screw-Top Vials

- HPLC and LC-MS tested and certified
- For your most demanding analysis; high sensitive detectors
- Locked-fit provides a positive physical septa lock into the cap



**MS Quality.** Constructed of virgin polymers, free of siloxanes and trace contaminants, these caps are the cleanest available from Phenomenex.

#### Ordering Information

Description	1000/pk
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone septa, blue	<a href="#">ARO-8952-13-M</a>
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone preSlit septa, blue	<a href="#">ARO-8972-13-M</a>



### Certified PLUS (Cert+) Caps for 9 mm Screw-Top Vials

- Certified ultra-clean
- High-grade, preconditioned raw materials
- Finished product inspected and LC-MS tested



#### Ordering Information

Description	1000/pk
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	<a href="#">ARO-8952-13-C</a>
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	<a href="#">ARO-8972-13-C</a>
Cert+ Cap (one-piece), 9 mm PE w/ Starburst preSlit, natural*	<a href="#">ARO-89P6-13-C</a>



\*Cap is one piece, constructed of ultra-pure, medical-grade polyethylene

### Bonded-In Caps for 9 mm Screw-Top Vials

- Bonded septa caps eliminate costly liner/septa fallout
- Prevents rework and wasted productivity with perfect-fit septa
- Saves instrument downtime



#### Ordering Information

Description	1000/pk
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, black	<a href="#">ARO-8957-13-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	<a href="#">ARO-8952-13-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, natural	<a href="#">ARO-8956-13-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, red	<a href="#">ARO-8951-13-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, green	<a href="#">ARO-8953-13-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, black	<a href="#">ARO-8977-13-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	<a href="#">ARO-8972-13-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, grey	<a href="#">ARO-8976-13-B</a>



For a more economical alternative, Press-Fit Caps are available. Contact your Phenomenex technical consultant or distributor.



Description	100/pk
<b>Poly/Steel Caps</b>	
Poly/Steel Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	<a href="#">ARO-895P-12-B</a>
Poly/Steel Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	<a href="#">ARO-897P-12-B</a>



### Inserts for 9 mm Screw-Top Vials

- For limited volume sampling in 2 mL sample vials
- Virtually no adsorption or pH effects
- Precisely centers and fits vial neck
- Offers maximum opening to sampling needle

#### Ordering Information<sup>a</sup>

Description	500/pk	1000/pk
Insert, 6 mm Diameter, Flat Bottom, 450 µL	<a href="#">ARO-4610-52</a>	—
Insert, 6 mm Diameter, Flat Bottom, 450 µL, Silanized	<a href="#">ARO-4615-52</a>	—
Insert, 6 mm Diameter, Conical Bottom, 350 µL	—	<a href="#">ARO-4620-13</a>
Insert, 6 mm Diameter, Conical Bottom, w/ bottom spring, 300 µL	—	<a href="#">ARO-4621-13</a>
Insert, 6 mm Diameter, Conical Bottom, w/ bottom spring, 300 µL, Silanized	—	<a href="#">ARO-4623-13</a>

<sup>a</sup>Approximate useable volume indicated in µL



## 12 x 32mm, 8mm (8-425) Screw-Top Vials

### 8mm Screw-Top Vials, 2.0mL

- Standard-neck vials for Agilent® and Shimadzu® autosamplers
- 33-Expansion clear glass (USP Type 1 borosilicate, Class A), 51A amber glass

#### Ordering Information

Description	1000/pk
Vial, 8mm Screw, 2mL Clear, No Patch	<a href="#">ARO-3800-13</a>
Vial, 8mm Screw, 2mL Clear, w/ Patch	<a href="#">ARO-3810-13</a>
Vial, 8mm Screw, 2mL Amber, No Patch	<a href="#">ARO-3801-13</a>
Vial, 8mm Screw, 2mL Amber, w/ Patch	<a href="#">ARO-3811-13</a>



### Caps / Closures for 8mm Screw-Top Vials

- Prevent rework and wasted productivity with perfect fit bonded-in septa
- Fewer trace contaminants for higher sensitivity work

#### Ordering Information

Description	1000/pk
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone septa, black*	<a href="#">ARO-8857-13-B</a>
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone preSlit septa, black*	<a href="#">ARO-8877-13-B</a>
Cap (pre-assembled), 8-425, w/ PTFE/Silicone septa, black**	<a href="#">ARO-8857-13</a>
Cap (pre-assembled), 8-425, w/ PTFE/Silicone preSlit septa, black**	<a href="#">ARO-8877-13</a>
Cap (pre-assembled), 8-425, w/ PTFE/Silicone septa, w/ flange, yellow	<a href="#">ARO-8834-13</a>
Cap (pre-assembled), 8-425, w/ PTFE/Silicone/PTFE septa, black**	<a href="#">ARO-8867-13</a>
Cap (pre-assembled), 8-425, w/ Open-top cap (w/o septa), black	<a href="#">ARO-8897-13</a>



\*-B = Bonded-in Septa  
 \*\*Press-Fit-Septa

### Septa for 8mm Screw Caps

- Preconditioned and tested
- For caps / closures without septa ([ARO-8897-13](#))

#### Ordering Information

Description	1000/pk
Septa, 8mm Diameter, PTFE/Silicone 0.060 in	<a href="#">ARO-6853-13</a>
Septa, 8mm Diameter, PTFE/Silicone/PTFE 0.060 in	<a href="#">ARO-6863-13</a>
Septa, 8mm Diameter, PTFE 0.010 in	<a href="#">ARO-6817-13</a>



Need help matching your current vials and caps to Verex? Visit: [www.phenomenex.com/VialFinder](http://www.phenomenex.com/VialFinder)

### Inserts for 8mm Screw-Top Vials

- For limited volume sampling
- Precisely centers and fits vial neck
- Transforms full capacity vials to micro sample vials

#### Ordering Information<sup>Δ</sup>

Description	500/pk	1000/pk
Insert, 5mm Diameter, Flat Bottom, 200 μL	<a href="#">ARO-4510-52</a>	<a href="#">ARO-4510-13</a>
Insert, 5mm Diameter, Conical Bottom, 100 μL	—	<a href="#">ARO-4520-13</a>
Insert, 5mm Diameter, Conical Bottom, w/ bottom spring, 175 μL	—	<a href="#">ARO-4521-13</a>

<sup>Δ</sup>Approximate useable volume indicated in μL



## 12 x 32 mm, 10 mm (10-425) Screw-Top Vials and Kits

### Convenience Kits

#### 10 mm Screw-Top Vials and Caps with Bonded-In Septa

- Available in assembled ready to use kits
- Offered with silanization

#### Ordering Information

Description	100/pk	1000/pk
Vial Kit, 10 mm, 2 mL Clear, No Patch + PTFE/Silicone, preSlit	—	<a href="#">ARO-9003-13</a>
Vial Kit, 10 mm, 2 mL Clear, No Patch + PTFE/Silicone, Silanized	<a href="#">ARO-9005-12</a>	—
Vial Kit, 10 mm, 2 mL Clear, No Patch + PTFE/Silicone, preSlit, Silanized	<a href="#">ARO-9006-12</a>	—
Vial Kit, 10 mm, 2 mL Clear, w/ Patch + PTFE/Silicone*	—	<a href="#">ARO-9021-13-A</a>
Vial Kit, 10 mm, 2 mL Amber, w/ Patch + PTFE/Silicone*	—	<a href="#">ARO-9022-13-A</a>

\*-A = Assembled



### 10 mm Screw-Top Vials, 2.0 mL

- Easy-to-fill wide-neck vials

#### Ordering Information

Description	1000/pk
Vial, 10 mm Screw, 2 mL Clear, No Patch	<a href="#">ARO-3000-13</a>
Vial, 10 mm Screw, 2 mL Clear, w/ Patch	<a href="#">ARO-3010-13</a>
Vial, 10 mm Screw, 2 mL Clear, No Patch, Silanized	<a href="#">ARO-3003-13</a>
Vial, 10 mm Screw, 2 mL Amber, No Patch	<a href="#">ARO-3001-13</a>
Vial, 10 mm Screw, 2 mL Amber, w/ Patch	<a href="#">ARO-3011-13</a>



### Limited Volume Specialty 10 mm Screw-Top Vials

- Microsampling Qsert and center-draining vial
- Extremely low residual volume

#### Ordering Information

Description	100/pk	1000/pk
Vial, 10 mm Screw, µVial i3 (Qsert) Clear, No Patch	<a href="#">ARO-3020-12</a>	<a href="#">ARO-3020-13</a>
Vial, 10 mm Screw, µVial i3 (Qsert) Amber, No Patch	<a href="#">ARO-3021-12</a>	<a href="#">ARO-3021-13</a>
Vial, 10 mm Screw, v-Vial, Clear, No Patch	<a href="#">ARO-3040-12</a>	<a href="#">ARO-3040-13</a>



### Caps / Closures for 10 mm Screw-Top Vials

- High quality preconditioned septa
- Bonded-in or press-fit
- Prevent rework and wasted productivity with perfect fit bonded-in septa

#### Ordering Information

Description	1000/pk
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone septa, black*	<a href="#">ARO-8057-13-B</a>
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone preSlit septa, black*	<a href="#">ARO-8077-13-B</a>
Cap (pre-assembled), 10-425, w/ PTFE/Silicone septa, black**	<a href="#">ARO-8057-13</a>
Cap (pre-assembled), 10-425, w/ PTFE/Silicone preSlit septa, black**	<a href="#">ARO-8077-13</a>

\*-B = Bonded-in Septa  
\*\*Press-fit Septa



### Inserts for 10 mm Screw-Top Vials

- For limited volume sampling
- Precisely centers and fits vial neck

#### Ordering Information<sup>Δ</sup>

Description	500/pk	1000/pk
Insert, 6 mm Diameter, Flat Bottom, 450 µL	<a href="#">ARO-4610-52</a>	—
Insert, 6 mm Diameter, Flat Bottom, 450 µL, Silanized	<a href="#">ARO-4615-52</a>	—
Insert, 6 mm Diameter, Conical Bottom, 350 µL	—	<a href="#">ARO-4620-13</a>
Insert, 6 mm Diameter, Conical Bottom, w/ bottom spring, 300 µL	—	<a href="#">ARO-4621-13</a>
Insert, 6 mm Diameter, Conical Bottom w/ bottom spring, 300 µL, Silanized	—	<a href="#">ARO-4623-13</a>

<sup>Δ</sup>Approximate useable volume indicated in µL





## 15 x 45 mm, 13 mm (13-425) Screw-Top Vials and Kits

### Convenience Kits – 13mm Screw-Top Vials and Caps

- Original Waters® 4 mL WISP™ autosampler vial
- General purpose sample / standard storage vial

#### Ordering Information

Description	1000/pk
Vial Kit, 4 mL Clear w/ Patch + screw caps 13-425, PTFE/Silicone* <sup>Δ</sup>	<a href="#">ARO-9321-13-A</a>
Vial Kit, 4 mL Amber w/Patch + screw caps 13-425, PTFE/Silicone*	<a href="#">ARO-9422-13-A</a>
Vial Kit, 4 mL Amber w/ Patch + screw caps 13-425, PTFE 0.01 in.*	<a href="#">ARO-9392-13-A</a>

\*-A = Assembled. <sup>Δ</sup> = Bonded-In Septa



### 13mm Screw-Top Vials, 4.0mL

#### Ordering Information

Description	1000/pk
Vial, 4 mL Screw Clear, No Patch	<a href="#">ARO-3300-13</a>
Vial, 4 mL Screw Clear, w/ Patch	<a href="#">ARO-3310-13</a>
Vial, 4 mL Screw Amber, No Patch	<a href="#">ARO-3301-13</a>



### Limited Volume Specialty 13mm Screw-Top Vials

- Center-draining bottom for low-volume samples

#### Ordering Information

Description	100/pk	1000/pk
Vial, 4 mL Screw High Recovery (CD) Clear, No Patch	<a href="#">ARO-3370-12</a>	<a href="#">ARO-3370-13</a>



### Caps / Closures for 13mm Screw Top Vials

- High quality, pre-conditioned septa
- Available with bonded-in septa

#### Ordering Information

Description	1000/pk
Cap (pre-assembled), 13-425, w/ Bonded-in PTFE/Silicone septa, black*	<a href="#">ARO-8357-13-B</a>
Cap (pre-assembled), 13-425, w/ PTFE/Silicone septa, black <sup>ΔΔ</sup>	<a href="#">ARO-8357-13</a>

\*-B = Bonded-in Septa. <sup>ΔΔ</sup> = Press-fit



### Shell Vials

- Original 1 mL and 4 mL shell vials for Waters® 96- and 48-position autosampler trays
- Kits include high-quality borosilicate glass vials with convenient push-in polyethylene cap

### Convenience Kits – Shell Vials, 1.0 and 4.0 mL

#### Ordering Information

Description	1000/pk
Shell Vial Kit, 8 x 40 mm, 1 mL Flat Bottom, Clear® + PE Cap	<a href="#">ARO-3110-13</a>
Shell Vial Kit, 15 x 45 mm, 4 mL Flat Bottom, Clear® + PE Cap	<a href="#">ARO-3170-13</a>

\* 51-Expansion glass.



### Convenience Kits – Certified PLUS (Cert+) Shell Vials, 1.0 mL

#### Ordering Information

Description	200/pk
Cert+ Shell Vial Kit, 8 x 40 mm, 1 mL Flat Bottom, Clear + PE Cap	<a href="#">ARO-3110-22-C</a>
Cert+ Shell Vial Kit, 8 x 40 mm, 1 mL Flat Bottom, Amber + PE Cap	<a href="#">ARO-3111-22-C</a>

## Headspace Vials

### Screw- and Crimp-Top Headspace Vials

- 10 and 20 mL screw- or crimp-top, with round or flat bottom
- Uniform glass thickness ensures even heating
- Lot traceable



#### Ordering Information

Description	1000/pk
<b>Crimp-Top</b>	
Headspace Vial, 22 x 38 mm, 6 mL Beveled Edge, Flat Bottom, Clear, No Patch	<a href="#">ARO-32F0-13</a>
Headspace Vial, 22 x 38 mm, 6 mL Square Rim, Flat Bottom, Clear, No Patch	<a href="#">ARO-32D0-13</a>
Headspace Vial, 22 x 38 mm, 6 mL Beveled Edge, Round Bottom, Clear, No Patch	<a href="#">ARO-32G0-13</a>
Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Flat Bottom, Clear, No Patch	<a href="#">ARO-3220-13</a>
Headspace Vial, 23 x 46 mm, 10 mL Square Rim, Flat Bottom, Clear, No Patch	<a href="#">ARO-32A0-13</a>
Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Round Bottom, Clear, No Patch	<a href="#">ARO-3230-13</a>
Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Flat Bottom, Clear, No Patch	<a href="#">ARO-3260-13</a>
Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Flat Bottom., Clear, No Patch, Silanized	<a href="#">ARO-3263-13</a>
Headspace Vial, 23 x 75 mm, 20 mL Square Rim, Flat Bottom, Clear, No Patch	<a href="#">ARO-3290-13</a>
Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Round Bottom, Clear, No Patch	<a href="#">ARO-3270-13</a>
<b>Screw-Top</b>	
Headspace Vial, 23 x 46 mm, 10 mL 18 mm Screw, Round Bottom, Clear, No Patch	<a href="#">ARO-32H0-13</a>
Headspace Vial, 23 x 46 mm, 10 mL 18 mm Screw, Round Bottom, Amber, No Patch	<a href="#">ARO-32H1-13</a>
Headspace Vial, 23 x 75 mm, 20 mL 18 mm Screw, Round Bottom, Clear, No Patch	<a href="#">ARO-3280-13</a>
Headspace Vial, 23 x 75 mm, 20 mL 18 mm Screw, Round Bottom, Amber, No Patch	<a href="#">ARO-3281-13</a>



#### Autosampler Compatibility

**Flat Bottom:** HP / Agilent, Carlo Erba, Shimadzu

**Round Bottom:** PerkinElmer, Tekmar, LEAP Technologies, Varian

AUTOSAMPLER VIALS | VIALS - SAMPLE HANDLING

## Headspace Screw- and Crimp-Top Seals / Closures

- Variety of styles for any application
- Magnetic and pressure-release caps available

#### Ordering Information

Description	1000/pk
<b>Crimp-Top</b>	
Seal, 20 mm Diameter, PTFE/Gray Butyl Rubber, magnetic cap	<a href="#">ARO-52C5-13</a>
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pharmafix Molded Septum, silver	<a href="#">ARO-52D0-13</a>
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pressure Release, Pharmafix Molded Septum, silver	<a href="#">ARO-52B0-13</a>
Seal, 20 mm Diameter, PTFE/Silicone, magnetic cap	<a href="#">ARO-5255-13</a>
Seal, 20 mm Diameter, PTFE/Silicone, silver	<a href="#">ARO-5250-13</a>
Seal, 20 mm Diameter, PTFE/Silicone Pressure Release, silver	<a href="#">ARO-5220-13</a>
<b>Screw-Top</b>	
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Butyl Rubber septa (red/grey)	<a href="#">ARO-814M-13</a>
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Silicone septa (red/white)	<a href="#">ARO-815M-13</a>
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Silicone septa (blue/white)	<a href="#">ARO-81AM-13</a>
Screw Cap, 18 mm, Magnetic, Silver, PTFE/Silicone septa (white/translucent blue)	<a href="#">ARO-81BM-13</a>



## VOA / ASE Assembled Vial Kits and Storage Vial Kits

- Convenience and assembled kits include vials with matching seals / closures
- Clear or amber, with open top or closed caps
- PTFE (Teflon®) faced 0.125 in. silicone septa or PTFE with foam urethane backing
- Lot numbered for traceability



### Ordering Information

Description	100/pk	1000/pk
<b>Storage Vial Kits</b>		
Vial Kit, Storage, 20 mL Screw, Clear w/ Caps 24-400 white PTFE/Foam Urethane liner, closed top	<a href="#">ARO-9559-12</a>	<a href="#">ARO-9559-13</a>
Vial Kit, Storage, 20 mL Screw, Amber w/ Caps 24-400 white PTFE/Foam Urethane liner, closed top	<a href="#">ARO-9551-12</a>	<a href="#">ARO-9551-13</a>
Vial Kit, Storage, 40 mL Screw, Clear w/ Caps 24-400 white PTFE/Foam Urethane, closed top	<a href="#">ARO-9542-12</a>	<a href="#">ARO-9542-13</a>
Vial Kit, Storage, 40 mL Screw, Amber w/Caps 24-400 white PTFE/Foam Urethane, closed top	<a href="#">ARO-9543-12</a>	<a href="#">ARO-9543-13</a>
<b>VOA/ASE Vial Kits</b>		
Vial Kit, VOA/ASE, 40 mL Screw, Clear w/Caps 24-400 white PTFE/Silicone, open top	<a href="#">ARO-9540-12</a>	<a href="#">ARO-9540-13</a>
Vial Kit, VOA/ASE, 40 mL Screw, Clear w/Caps 24-400 white PTFE/Silicone, (assembled), open top	<a href="#">ARO-9540-12-A</a>	<a href="#">ARO-9540-13-A</a>
Vial Kit, VOA/ASE, 40 mL Screw, Amber w/ Caps 24-400 white PTFE/Silicone, open top	<a href="#">ARO-9541-12</a>	—
Vial Kit, VOA/ASE, 20 mL Screw, Clear w/ Caps 24-400 white PTFE/Silicone (assembled)*, open top	<a href="#">ARO-9531-12-E</a>	<a href="#">ARO-9531-13-E</a>

\* EPA certified Class 100 vials, caps, and septa are assembled, without processing.  
ASE = Dionex Accelerated Solvent Extractor for pesticide analysis.

## VOA / ASE Vials and Caps (Separate)

### Ordering Information

Description	200/pk
<b>Vials</b>	
Vial, VOA/ASE, 40 mL Screw, Clear, 24-400 Threads (No Cap)	<a href="#">ARO-35V0-22</a>
Vial, VOA/ASE, 40 mL Screw, Amber, 24-400 Threads (No Cap)	<a href="#">ARO-35V1-22</a>
<b>Description</b>	
<b>Caps</b>	
Cap (pre-assembled), Screw (24-414), w/ Bonded-in PTFE/Silicone septa, white	<a href="#">ARO-8557-13-B</a>



Learn More. For additional product selection and detailed information visit: [www.phenomenex.com/Verex](http://www.phenomenex.com/Verex)

### Protect your HPLC/UHPLC and GC columns and equipment with Phenex Syringe Filters

Filtering your sample helps prevent column and frit blockage, undue wear on detectors, pumps, valves, injector seals, and abnormally high operating pressures. Non-filtered samples can also lead to non-reproducible results and significant instrument downtime.

See page 8 or Visit: [www.phenomenex.com/SFfinder](http://www.phenomenex.com/SFfinder)



Offered by Phenomenex in Europe only.

## Leading in Quality, Delivery, and Support

From start to finish, Verex-EU vial and cap products are manufactured to provide high quality, state-of-the-art solutions for your most challenging, sensitive applications.

## Certified

The highest quality materials combine with tightly controlled manufacturing processes to produce uniform, trouble-free products you can rely on.

## 100 % Defect-Free

No product is placed in inventory without passing cleanliness and performance testing for consistent results.

## Clear and Amber Glass

Verex-EU vials use 51A-Expansion glass (USP Type 1 borosilicate, Class B) for both clear and amber glass vials.



**Learn More.** For additional product selection and detailed information visit: [www.phenomenex.com/Verex](http://www.phenomenex.com/Verex)

## 12 x 32 mm, 11 mm Crimp-Top Vials and Seals

### Ordering Information

Description	100/pk
Verex-EU Vial, Crimp, 2 mL Clear, w/ Patch	<a href="#">AR1-3710-12</a>
Verex-EU Vial, Crimp, 2 mL Amber, w/ Patch	<a href="#">AR1-3711-12</a>



## Seals / Closures for Crimp-Top Vials

### Ordering Information

Description	100/pk
Seal, 11 mm Diameter, Crimp, PTFE/Silicone, silver	<a href="#">AR0-5780-12</a>
Seal, 11 mm Diameter, Crimp, PTFE/Silicone/PTFE, silver	<a href="#">AR0-5760-12</a>
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, silver	<a href="#">AR1-5740-12</a>
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, blue	<a href="#">AR1-5742-12</a>
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, red	<a href="#">AR1-5741-12</a>
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, green	<a href="#">AR0-5743-12</a>
Seal, 11 mm Diameter, Crimp, PTFE/Rubber, gold	<a href="#">AR0-5746-12</a>
Seal, 11 mm Diameter, Crimp, PTFE, silver	<a href="#">AR0-5710-12</a>



## 12 x 32 mm, 11 mm Snap-Top Vials and Caps

### Ordering Information

Description	100/pk
Verex-EU Vial, Snap, 2 mL Clear, w/ Patch	<a href="#">AR1-3610-12</a>
Verex-EU Vial, Snap, 2 mL Amber, w/ Patch	<a href="#">AR1-3611-12</a>



## Seals / Closures for Snap-Top Vials

### Ordering Information

Description	100/pk
Seal, 11 mm Diameter, Snap, PTFE/Silicone, blue	<a href="#">AR1-5652-12</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone, natural	<a href="#">AR1-5656-12</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, blue	<a href="#">AR1-5672-12</a>
Seal, 11 mm Diameter, Snap, PTFE/Silicone preSlit, natural	<a href="#">AR0-5676-12</a>
Seal, 11 mm Diameter, Snap, PTFE/Rubber, natural	<a href="#">AR0-5646-12</a>
Seal, 11 mm Diameter, Snap, PTFE, blue	<a href="#">AR0-5612-12</a>



## 12 x 32 mm, 13 mm (13-425) Screw-Top Vials and Caps

### Ordering Information

Description	100/pk
Verex-EU Vial, 4 mL Screw Clear, w/ Patch	<a href="#">AR1-3310-12</a>



## Caps / Closures for 13 mm Screw Top Vials

### Ordering Information

Description	100/pk
Cap (pre-assembled), 13-425, w/ Bonded-in PTFE/Silicone septa, black <sup>□</sup>	<a href="#">AR0-8357-12-B</a>
Cap (pre-assembled), 13-425, w/ PTFE/Silicone septa, black <sup>□□</sup>	<a href="#">AR0-8357-12</a>



<sup>□</sup>-B = Bonded-in Septa. <sup>□□</sup> Press-Fit Septa



# Verex™ -EU Vial Products

Offered by Phenomenex in Europe only.



**MS Quality.** Constructed of virgin polymers, free of siloxanes and trace contaminants, these caps are the cleanest available from Phenomenex.

## 12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Caps

### Ordering Information

Description	100/pk
Verex-EU Vial, 9 mm Screw, 2 mL Clear, w/ Patch	<a href="#">AR1-3910-12</a>
Verex-EU Vial, 9 mm Screw, 2 mL Amber, w/ Patch	<a href="#">AR1-3911-12</a>



### Caps for 9 mm Screw-Top Vials

### Ordering Information

Description	100/pk
<b>Certified PLUS (Cert+) Mass Spec Quality (MSQ) Caps for 9-425 Screw-Top Vials</b>	
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone septa, blue	<a href="#">AR0-8952-12-M</a>
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone preSlit septa, blue	<a href="#">AR0-8972-12-M</a>
<b>Certified PLUS (Cert+) Caps for 9-425 Screw-Top Vials</b>	
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	<a href="#">AR0-8952-12-C</a>
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	<a href="#">AR0-8972-12-C</a>
Cert+ Cap (one-piece), 9 mm PE w/ Starburst preSlit, natural*	<a href="#">AR0-89P6-12-C</a>
<b>Bonded-In Caps for 9-425 Screw-Top Vials</b>	
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, black	<a href="#">AR0-8957-12-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	<a href="#">AR1-8952-12-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, natural	<a href="#">AR1-8956-12-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, red	<a href="#">AR1-8951-12-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, black	<a href="#">AR0-8977-12-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	<a href="#">AR0-8972-12-B</a>



\* Cap is one piece, constructed of ultra-pure, medical-grade polyethylene

## 12 x 32 mm, 8 mm (8-425) Screw-Top Vials and Caps

### Ordering Information

Description	100/pk
Verex-EU Vial, 8 mm Screw, 2 mL Clear, w/ Patch	<a href="#">AR1-3810-12</a>
Verex-EU Vial, 8 mm Screw, 2 mL Amber, w/ Patch	<a href="#">AR1-3811-12</a>



### Caps / Closures for 8 mm Screw-Top Vials

### Ordering Information

Description	100/pk
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone septa, black <sup>□</sup>	<a href="#">AR0-8857-12-B</a>
Cap (pre-assembled), 8-425, w/ Bonded-in PTFE/Silicone preSlit septa, black <sup>□□</sup>	<a href="#">AR0-8877-12-B</a>
Cap (pre-assembled), 8-425, w/ PTFE/Silicone septa, black <sup>□□□</sup>	<a href="#">AR0-8857-12</a>
Cap (pre-assembled), 8-425, w/ PTFE/Silicone preSlit septa, black <sup>□□□</sup>	<a href="#">AR0-8877-12</a>
Cap (pre-assembled), 8-425, w/ PTFE/Silicone/PTFE septa, black <sup>□□□</sup>	<a href="#">AR0-8867-12</a>
Cap (pre-assembled), 8-425, w/ Open-top cap (w/o septa)	<a href="#">AR0-8897-12</a>

<sup>□</sup>-B = Bonded-in Septa. <sup>□□□</sup> Press-Fit Septa



### Septa for 8 mm Screw Caps

### Ordering Information

Description	100/pk
Septa, 8 mm Diameter, PTFE/Silicone 0.060 in.	<a href="#">AR0-6853-12</a>
Septa, 8 mm Diameter, PTFE 0.010 in.	<a href="#">AR0-6817-12</a>



Need help matching your current vials and caps to Verex? Visit: [www.phenomenex.com/VialFinder](http://www.phenomenex.com/VialFinder)

SAMPLE HANDLING - VIALS | AUTOSAMPLER VIALS

# Verex™ -EU Vial Products

Offered by Phenomenex in Europe only.

## 12 x 32 mm, 10 mm (10-425) Screw-Top Vials and Caps

### Ordering Information

Description	100/pk
Verex-EU Vial, 10 mm Screw, 2 mL Clear, w/ Patch	<a href="#">AR1-3010-12</a>
Verex-EU Vial, 10 mm Screw, 2 mL Amber, w/ Patch	<a href="#">AR1-3011-12</a>



## Caps/ Closures for 10 mm Screw-Top Vials

### Ordering Information

Description	100/pk
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone septa, black <sup>□</sup>	<a href="#">ARO-8057-12-B</a>
Cap (pre-assembled), 10-425, w/ Bonded-in PTFE/Silicone preSlit septa, black <sup>□</sup>	<a href="#">ARO-8077-12-B</a>
Cap (pre-assembled), 10-425, w/ PTFE/Silicone septa, black <sup>□□</sup>	<a href="#">ARO-8057-12</a>
Cap (pre-assembled), 10-425, w/ PTFE/Silicone preSlit septa, black <sup>□□</sup>	<a href="#">ARO-8077-12</a>



<sup>□</sup>-B = Bonded-in Septa. <sup>□□</sup> Press-Fit Septa

## Headspace Vials and Caps

### Ordering Information

Description	100/pk
Verex-EU Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Flat Bottom, Clear, No Patch	<a href="#">AR1-3220-12</a>
Verex-EU Headspace Vial, 23 x 46 mm, 10 mL Beveled Edge, Round Bottom, Clear, No Patch	<a href="#">AR1-3230-12</a>
Verex-EU Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Flat Bottom, Clear, No Patch	<a href="#">AR1-3260-12</a>
Verex-EU Headspace Vial, 23 x 75 mm, 20 mL Beveled Edge, Round Bottom, Clear, No Patch	<a href="#">AR1-3270-12</a>



## Headspace Crimp-Top Seals / Closures

### Ordering Information

Description	100/pk
Seal, 20 mm Diameter, PTFE/Gray Butyl Rubber, magnetic cap	<a href="#">ARO-52C5-12</a>
Seal, 20 mm Diameter, PTFE/Gray Butyl Rubber, Pressure Release, silver	<a href="#">ARO-52A0-12</a>
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pharmafix Molded Septum, silver	<a href="#">ARO-52D0-12</a>
Seal, 20 mm Diameter, PTFE/Butyl Rubber Pressure Release, Pharmafix Molded Septum, silver	<a href="#">ARO-52B0-12</a>
Seal, 20 mm Diameter, PTFE/Silicone, magnetic cap	<a href="#">ARO-5255-12</a>
Seal, 20 mm Diameter, PTFE/Silicone, silver	<a href="#">AR1-5250-12</a>
Seal, 20 mm Diameter, PTFE/Silicone Pressure Release, silver	<a href="#">ARO-5220-12</a>



## VOA Vials and Caps

### Ordering Information

Description	100/pk
Verex-EU Vial 40 mL Clear 24-414 Screw 28 x 95 mm	<a href="#">AR1-35V0-12</a>
Verex-EU Vial 60 mL Clear 24-414 Screw 28 x 140 mm	<a href="#">AR1-35A0-12</a>
Verex-EU Vial 60 mL Amber 24-414 Screw 28 x 140 mm	<a href="#">AR1-35A1-12</a>



## VOA Vial Caps

### Ordering Information

Description	100/pk
Verex Cap (pre-assembled), 24-414, w/ Bonded-in PTFE/Silicone septa, white	<a href="#">ARO-8557-12-B</a>



For Vial Inserts for 8 mm Screw-Top Vials, see p. 39  
 For Vial Inserts for 9 mm Screw-Top Vials, see p. 38  
 For Vial Inserts for 10 mm Screw-Top Vials, see p. 40

# Verex™ -IN Vial Products

Offered by Phenomenex in India only.

## Leading in Quality, Delivery, and Support

Verex-IN products are engineered to exact specification because uniform, high-purity vials are essential to accurate, reproducible chromatographic results.

## Certified

High quality materials combined with tightly controlled manufacturing processes produce uniform, trouble-free products you can rely on.

## 100 % Defect-Free

Machine vision cameras and gauges inspect critical dimensions and tolerances to produce uniform, defect-free products.



**Learn More.** For additional product selection and detailed information visit: [www.phenomenex.com/Verex](http://www.phenomenex.com/Verex)

## 12 x 32 mm, 9 mm (9-425) Screw-Top Vials and Caps

### Ordering Information

Description	100/pk
Verex-IN Vial, 9 mm Screw, 2 mL Clear, w/ Patch	<a href="#">AR4-3910-12</a>



## Caps for 9 mm Screw-Top Vials

### Ordering Information

Description	100/pk
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, black	<a href="#">AR4-8957-12-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, black	<a href="#">AR4-8977-12-B</a>



## Need Additional Cap Colors?

## Caps for 9 mm Screw-Top Vials

### Ordering Information

Description	100/pk
<b>Certified PLUS (Cert+) Mass Spec Quality (MSQ) Caps for 9-425 Screw-Top Vials</b>	
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone septa, blue	<a href="#">AR0-8952-12-M</a>
Cert+ MSQ Cap (pre-assembled), 9 mm, w/ Locked-fit PTFE/Silicone preSlit septa, blue	<a href="#">AR0-8972-12-M</a>
<b>Certified PLUS (Cert+) Caps for 9-425 Screw-Top Vials</b>	
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	<a href="#">AR0-8952-12-C</a>
Cert+ Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	<a href="#">AR0-8972-12-C</a>
Cert+ Cap (one-piece), 9 mm PE w/ Starburst preSlit, natural*	<a href="#">AR0-89P6-12-C</a>
<b>Bonded-In Caps for 9-425 Screw-Top Vials</b>	
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, blue	<a href="#">AR1-8952-12-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, natural	<a href="#">AR1-8956-12-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone septa, red	<a href="#">AR1-8951-12-B</a>
Cap (pre-assembled), 9 mm, w/ Bonded-in PTFE/Silicone preSlit septa, blue	<a href="#">AR0-8972-12-B</a>



\* Cap is one piece, constructed of ultra-pure, medical-grade polyethylene



For Vial Inserts for 9 mm Screw-Top Vials, see p. 38

## Make the Switch to Verex!



### Easily Find Your Vial Online

#### 2 Easy Steps:

- 1 Enter your current vial or cap part number
- 2 Order the recommended Verex part number

Visit: [www.phenomenex.com/VialFinder](http://www.phenomenex.com/VialFinder)

### Download FREE Verex Autosampler Compatibility Chart

Verex™ Vials Autosampler Compatibility Chart				
Manufacturer	Model	Oring	Seal	Screw
Vial (Diameter (mm))	11	11	8	8
	12 x 32	12 x 32	12 x 32	12 x 32
	Bottom	Flat Bottom, Tapered Base	Flat Bottom, Tapered Base	Flat Bottom
D.I. Analytical	1020A			
	1068			
	1068+			
	4551A			
PerkinElmer	Series 200, 85 vial tray	X		
	Series 200, 81/100 vial tray	X		
	Series 200, 205 vial tray	X		
	Series 200, 205 vial tray	X		

Quick reference chart for selecting Verex vial products for your specific autosampler.

Visit: [www.phenomenex.com/verex](http://www.phenomenex.com/verex)

### Download FREE Verex Vials and Caps Poster Guide

Vial Volume	Vial Diameter	Vial Height	Cap Type
1.5 mL	12 x 32 mm	13 mm	ARO-3000-13
2 mL	12 x 32 mm	13 mm	ARO-3010-13
4 mL	15 x 45 mm	13 mm	ARO-3011-13
15 x 45 mm	10 mm	13 mm	ARO-3010-13
15 x 45 mm	10 mm	13 mm	ARO-3011-13
15 x 45 mm	10 mm	13 mm	ARO-3012-13
15 x 45 mm	10 mm	13 mm	ARO-3013-13
15 x 45 mm	10 mm	13 mm	ARO-3014-13
15 x 45 mm	10 mm	13 mm	ARO-3015-13
15 x 45 mm	10 mm	13 mm	ARO-3016-13
15 x 45 mm	10 mm	13 mm	ARO-3017-13
15 x 45 mm	10 mm	13 mm	ARO-3018-13
15 x 45 mm	10 mm	13 mm	ARO-3019-13
15 x 45 mm	10 mm	13 mm	ARO-3020-13
15 x 45 mm	10 mm	13 mm	ARO-3021-13
15 x 45 mm	10 mm	13 mm	ARO-3022-13
15 x 45 mm	10 mm	13 mm	ARO-3023-13
15 x 45 mm	10 mm	13 mm	ARO-3024-13
15 x 45 mm	10 mm	13 mm	ARO-3025-13
15 x 45 mm	10 mm	13 mm	ARO-3026-13
15 x 45 mm	10 mm	13 mm	ARO-3027-13
15 x 45 mm	10 mm	13 mm	ARO-3028-13
15 x 45 mm	10 mm	13 mm	ARO-3029-13
15 x 45 mm	10 mm	13 mm	ARO-3030-13
15 x 45 mm	10 mm	13 mm	ARO-3031-13
15 x 45 mm	10 mm	13 mm	ARO-3032-13
15 x 45 mm	10 mm	13 mm	ARO-3033-13
15 x 45 mm	10 mm	13 mm	ARO-3034-13
15 x 45 mm	10 mm	13 mm	ARO-3035-13
15 x 45 mm	10 mm	13 mm	ARO-3036-13
15 x 45 mm	10 mm	13 mm	ARO-3037-13
15 x 45 mm	10 mm	13 mm	ARO-3038-13
15 x 45 mm	10 mm	13 mm	ARO-3039-13
15 x 45 mm	10 mm	13 mm	ARO-3040-13
15 x 45 mm	10 mm	13 mm	ARO-3041-13
15 x 45 mm	10 mm	13 mm	ARO-3042-13
15 x 45 mm	10 mm	13 mm	ARO-3043-13
15 x 45 mm	10 mm	13 mm	ARO-3044-13
15 x 45 mm	10 mm	13 mm	ARO-3045-13
15 x 45 mm	10 mm	13 mm	ARO-3046-13
15 x 45 mm	10 mm	13 mm	ARO-3047-13
15 x 45 mm	10 mm	13 mm	ARO-3048-13
15 x 45 mm	10 mm	13 mm	ARO-3049-13
15 x 45 mm	10 mm	13 mm	ARO-3050-13
15 x 45 mm	10 mm	13 mm	ARO-3051-13
15 x 45 mm	10 mm	13 mm	ARO-3052-13
15 x 45 mm	10 mm	13 mm	ARO-3053-13
15 x 45 mm	10 mm	13 mm	ARO-3054-13
15 x 45 mm	10 mm	13 mm	ARO-3055-13
15 x 45 mm	10 mm	13 mm	ARO-3056-13
15 x 45 mm	10 mm	13 mm	ARO-3057-13
15 x 45 mm	10 mm	13 mm	ARO-3058-13
15 x 45 mm	10 mm	13 mm	ARO-3059-13
15 x 45 mm	10 mm	13 mm	ARO-3060-13
15 x 45 mm	10 mm	13 mm	ARO-3061-13
15 x 45 mm	10 mm	13 mm	ARO-3062-13
15 x 45 mm	10 mm	13 mm	ARO-3063-13
15 x 45 mm	10 mm	13 mm	ARO-3064-13
15 x 45 mm	10 mm	13 mm	ARO-3065-13
15 x 45 mm	10 mm	13 mm	ARO-3066-13
15 x 45 mm	10 mm	13 mm	ARO-3067-13
15 x 45 mm	10 mm	13 mm	ARO-3068-13
15 x 45 mm	10 mm	13 mm	ARO-3069-13
15 x 45 mm	10 mm	13 mm	ARO-3070-13
15 x 45 mm	10 mm	13 mm	ARO-3071-13
15 x 45 mm	10 mm	13 mm	ARO-3072-13
15 x 45 mm	10 mm	13 mm	ARO-3073-13
15 x 45 mm	10 mm	13 mm	ARO-3074-13
15 x 45 mm	10 mm	13 mm	ARO-3075-13
15 x 45 mm	10 mm	13 mm	ARO-3076-13
15 x 45 mm	10 mm	13 mm	ARO-3077-13
15 x 45 mm	10 mm	13 mm	ARO-3078-13
15 x 45 mm	10 mm	13 mm	ARO-3079-13
15 x 45 mm	10 mm	13 mm	ARO-3080-13
15 x 45 mm	10 mm	13 mm	ARO-3081-13
15 x 45 mm	10 mm	13 mm	ARO-3082-13
15 x 45 mm	10 mm	13 mm	ARO-3083-13
15 x 45 mm	10 mm	13 mm	ARO-3084-13
15 x 45 mm	10 mm	13 mm	ARO-3085-13
15 x 45 mm	10 mm	13 mm	ARO-3086-13
15 x 45 mm	10 mm	13 mm	ARO-3087-13
15 x 45 mm	10 mm	13 mm	ARO-3088-13
15 x 45 mm	10 mm	13 mm	ARO-3089-13
15 x 45 mm	10 mm	13 mm	ARO-3090-13
15 x 45 mm	10 mm	13 mm	ARO-3091-13
15 x 45 mm	10 mm	13 mm	ARO-3092-13
15 x 45 mm	10 mm	13 mm	ARO-3093-13
15 x 45 mm	10 mm	13 mm	ARO-3094-13
15 x 45 mm	10 mm	13 mm	ARO-3095-13
15 x 45 mm	10 mm	13 mm	ARO-3096-13
15 x 45 mm	10 mm	13 mm	ARO-3097-13
15 x 45 mm	10 mm	13 mm	ARO-3098-13
15 x 45 mm	10 mm	13 mm	ARO-3099-13
15 x 45 mm	10 mm	13 mm	ARO-3100-13

Visit: [www.phenomenex.com/verex](http://www.phenomenex.com/verex)



# Sample Preparation



Sample Preparation Solutions and Formats .....	50
Novum and Novum PRO Simplified Liquid Extraction (SLE).....	51-53
Strata DE Diatomaceous Earth SLE .....	54-55
β-Gone β-Glucuronidase Removal Products .....	56
Impact Protein Precipitation Plates .....	57
Phree Phospholipid Removal Solutions .....	58-59
Strata-X PRO Rapid Solid Phase Extraction Solution.....	60
Strata-X Polymeric Solid Phase Extraction (SPE) .....	61-69
Strata SPE .....	70-77
Biozen Biological Sample Clean-up	
MagBeads .....	78
N-Glycan Clean-up .....	78
Sample Preparation Accessories	
Presston 1000 Positive Pressure Manifold .....	79
Vacuum Manifolds and Collection Plates .....	80-82
roQu QuEChERS Kits .....	83-85
Sample Preparation Resources .....	86















“ Strata-X is an excellent all-around sorbent and we obtain high breakthrough volumes necessary to improve method quantitation limits. ”

**Pedro A. Segura**  
Université de Montreal

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

# Sample Preparation

## Choose Your Sample Preparation Solution

		Increase Column Lifetime	Remove Particulates	Remove Proteins	Remove Phospholipids	De-salt	Solvent Switching	Specifically Extract Target Analyte	Concentrate	
 Filtration		•	•							VEREX Certified Filter Vials PHENEX
 Protein Precipitation		•	•	•						Impact™
 β-Glucuronidase Removal		•	•	•						β-Gone™
 Phospholipid Removal + Protein Precipitation		•	•	•	•					iPhree™
 QuEChERS		•	•	•						roQ QuEChERS Kits
 Supported Liquid Extraction (SLE)		•	•	•	•	•	•			strata DE novum
 Solid Phase Extraction (SPE)		•	•	•	•	•	•	•	•	strata STRATA strata PRO

Product Recommendation

### Available Formats

	96-Well Plates	Microelution Plates	1, 3, and 6mL Tubes	Giga™ Tubes (12 mL - 150 mL)	On-line Extraction Cartridge	Bulk Sorbent
Strata-X PRO SPE	X	X	X			
Strata-X Polymeric SPE	X	X	X	X	X	X
Strata Traditional SPE	X		X	X	X	X
Novum SLE	X		X			
Strata DE SLE	X			X		
Phree Phospholipid Removal Solutions	X		X			
Impact Protein Precipitation Plates	X					
β-Gone β-Glucuronidase Removal	X		X			

96-Well Plates

Microelution Plates


1, 3, and 6mL Tubes


Giga Tubes (12 mL - 150 mL)

On-line Extraction Columns and Cartridges

Bulk Sorbent



 Don't see the format you want? Contact Phenomenex or your local Phenomenex distributor for custom packed SPE phases

 For Septra™ Bulk Sorbent Material Characteristics and Ordering Information, see p. 401

Patent Pending

## Faster, Easier, and More Reliable than Liquid-Liquid Extraction

- Avoid inferior results due to emulsions
- Eliminate interferences from your samples
- Increase throughput with automatable formats

**Slow and Laborious**

- Dilute sample 1:1 with buffer or water and add extraction solvent
- Mix for 10 minutes
- Centrifuge for 10 minutes
- Pour off or freeze supernatant

**Traditional Liquid-Liquid Extraction<sup>1</sup>**  
 Estimated Time Required = **25 minutes**

1. Russell Grant, Matthew Crawford, Brian Rappold, and Stacy Dee. Errors in Bioanalysis Due to Phospholipids – Definitive Measurement, Mechanism, and Management. ASMS 2011.

**NEW Novum PRO available.**  
See pp. 52-53



## A Simplified Liquid Extraction

Novum SLE will instantly increase your throughput by eliminating time consuming steps and reducing the risk of analyte loss. If further time savings are necessary, Novum SLE can be easily automated for rapid, hands free sample cleanup.

**Fast and Easy**

- Dilute sample 1:1 with buffer or water and load onto Novum SLE sorbent using 2–15 seconds of vacuum
- Wait 5 minutes
- Apply elution solvent and allow to elute via gravity. Complete elution with 10 seconds of vacuum.

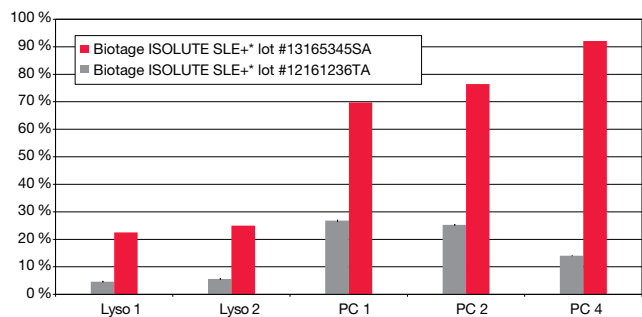
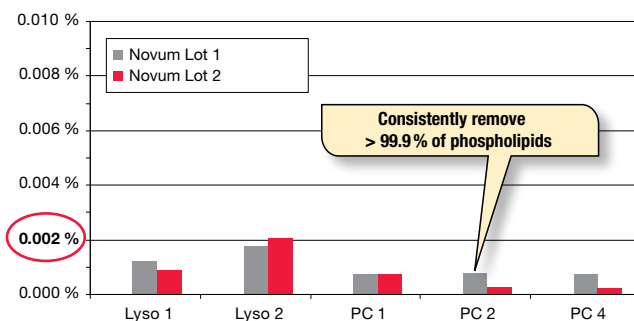
**Novum Simplified Liquid Extraction (SLE)**  
 Estimated Time Required = **<15 minutes**

- Rapid, automatable method for high-throughput cleanup
- Stop worrying about analyte loss due to emulsions

## Consistent Cleanup from Lot-to-Lot

As a unique, synthetic SLE sorbent you can expect Novum to provide reliable, more consistent cleanup from lot-to-lot as compared to traditional diatomaceous earth SLE.

### Lot-to-Lot Phospholipid Breakthrough: Novum SLE vs. Biotage® ISOLUTE® SLE



- Lyso 1:** 1-Palmitoyl-2-OH-sn-glycero-phosphocholine (m/z 496-184)
- Lyso 2:** 1-Oleoyl-2-OH-sn-glycero-phosphocholine (m/z 522-184)
- PC 1:** 1-Palmitoyl-2-Oleoyl-sn-glycero-phosphocholine (m/z 761-184)
- PC 2:** 1-Stearoyl-2-Lindoleoyl-sn-glycero-phosphocholine (m/z 787-184)
- PC 4:** 1-Oleoyl-2-Lindoleoyl-sn-glycero-phosphocholine (m/z 784-184)

Plasma extractions were performed using 200µL plates and ethyl acetate as an elution solvent. The recommended protocol provided with each product was followed. Comparative separations may not be representative of all applications.

\*Phenomenex is in no way affiliated with Biotage.

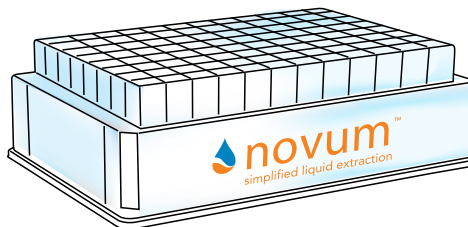
For buffer and elution solvent recommendations, technical notes, demonstration videos, and more, visit: [www.phenomenex.com/Novum](http://www.phenomenex.com/Novum)

Patent Pending

## Get Down to the Lowest Extraction Levels with Novum PRO SLE

Offers the same reliable synthetic sorbent as Novum with additional clean manufacturing steps to reach low levels of detection for sensitive MS applications, with the same quality reproducibility for high-throughput samples.

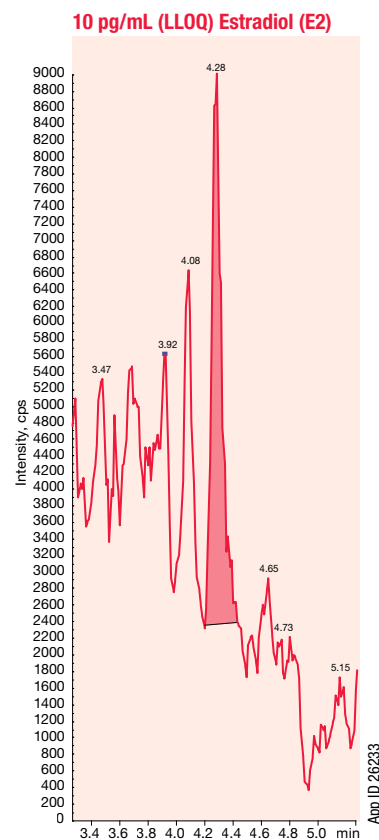
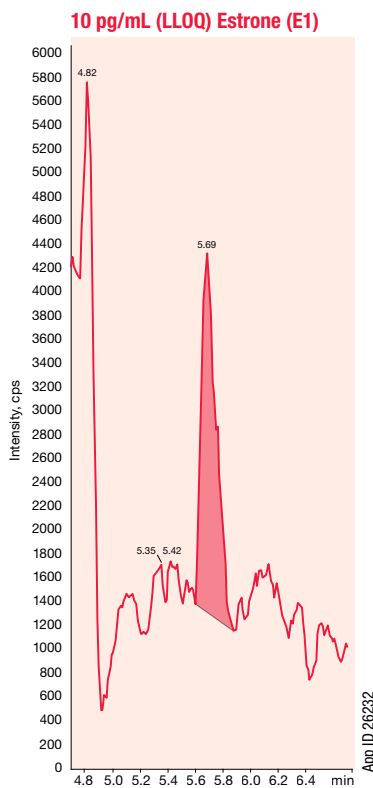
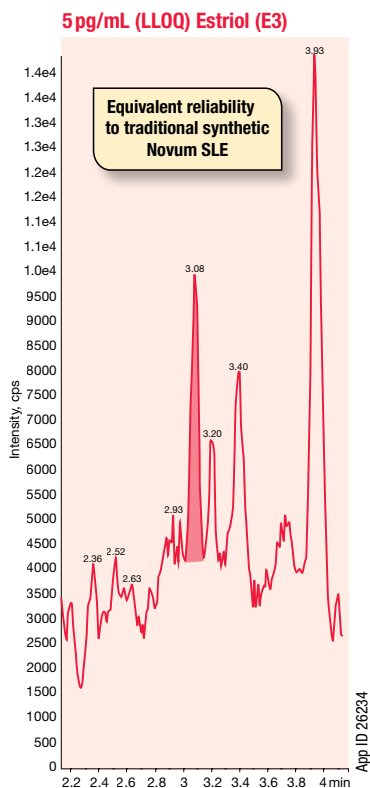
- Specific manufacture capabilities to improve matrix factor response and reduce noisy baselines for low level testing of biological samples
- API 6500+ fit for purpose testing to ensure clean baseline with each batch
- Available in both MINI and MAX 96-well plate formats for high-throughput applications



### Low Level Detection

- Applications that require low levels of detection and sensitivity can now be met by Novum PRO SLE

NOVUM PRO SLE | SAMPLE PREPARATION



For more applications and information about Novum PRO SLE, visit [www.phenomenex.com/NovumPRO](http://www.phenomenex.com/NovumPRO)



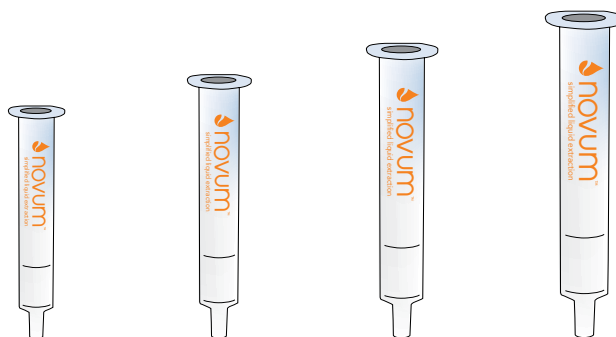
# Novum™ Simplified Liquid Extraction (SLE)

Patent Pending

## A Variety of Formats to Fit Your Sample and Throughput Requirements

### Tubes

Process samples as small as 200 µL or as large as 2 mL using Novum SLE tubes. Ideal for all types of applications including Bioanalytical, Food Safety, and Environmental.

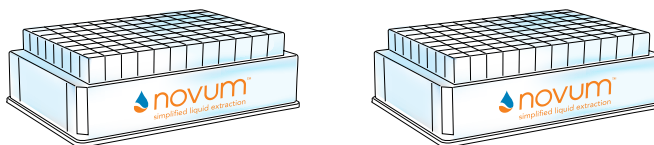


#### Ordering Information

Novum Simplified Liquid Extraction (SLE) Tubes				
Novum SLE Tubes	1 cc	3 cc	6 cc	12 cc
Maximum Sample Volume (after dilution)	200 µL	400 µL	1 mL	2 mL
Recommended Elution Volume	2x 600 µL	2x 900 µL	2x 2.5 mL	2x 5mL
Part No.	<a href="#">8B-S138-FAK</a>	<a href="#">8B-S138-5BJ</a>	<a href="#">8B-S138-JCH</a>	<a href="#">8B-S138-KDG</a>
Unit	100/pk	50/pk	30/pk	20/pk


### 96-Well Plates

Process 96 samples at once in an easily automatable 96-well plate. Perfect for high-throughput applications.



#### Ordering Information

Novum Simplified Liquid Extraction (SLE) 96-Well Plates				
Novum SLE 96-Well Plates	MINI	MAX	PRO MINI	PRO MAX
Maximum Sample Volume (after dilution)	300 µL	400 µL	300 µL	400 µL
Recommended Elution Volume	1x 1 mL	2x 900 µL	1x 1 mL	2x 900 µL
Part No.	<a href="#">8E-S138-FGA</a>	<a href="#">8E-S138-5GA</a>	<a href="#">8E-S539-FGA</a>	<a href="#">8E-S539-5GA</a>
Unit	1/pk	1/pk	1/pk	1/pk

 For accessories that are compatible with Novum Simplified Liquid Extraction (SLE) Products, see pp. 79-82

 For more information about Phenomenex sample preparation products, visit [www.phenomenex.com/sampleprepinfo](http://www.phenomenex.com/sampleprepinfo)

## A Cost Effective Supported Liquid Extraction (SLE) Solution

Quickly and easily improve your liquid-liquid extractions by following a short, automatable two step extraction process. Packed with Diatomaceous Earth, Strata DE is a great alternative to traditional SLE products such as Biotage® ISOLUTE® SLE+, Thermo HyperSep™ SLE, and Agilent® Chem Elut® SLE.

### SLE Protocol

<b>Pre-treatment:</b>	Combine 100 µL of spiked urine, 15 µL Campbell Beta-Glucuronidase (part number: DR2102), 35 µL 100 mM Ammonium Acetate (pH 4), and 150 µL of 100 mM Ammonium Bicarbonate (pH 10).
<b>96-Well Plates:</b>	Strata DE 400 µL Biotage ISOLUTE SLE+ 400 µL
<b>Part No.:</b>	<a href="#">8E-S325-5GB</a> (Strata DE)
<b>Load:</b>	300 µL pre-treated urine sample onto plate (apply vacuum or positive pressure to pull/push sample into sorbent if necessary)
<b>Wait:</b>	6 minutes
<b>Elute:</b>	3x 600 µL Dichloromethane/IPA (95:5)
<b>Apply:</b>	Vacuum or apply positive pressure at 5-10" Hg for 10 seconds
<b>Dry:</b>	Sample under slow stream of Nitrogen at 30 °C
<b>Reconstitute:</b>	100 µL 0.1% Formic Acid/Methanol (4:1) with internal standard

### Recovery Values and % CVs: Strata DE vs. Biotage ISOLUTE SLE+

Analyte	Strata DE		Biotage ISOLUTE SLE+	
	% Recovery	%CV (n=8)	% Recovery	%CV (n=8)
6-MAM	98	9	88	16
Alprazolam	104	10	98	11
Benzoylcegonine	88	6	98	11
Buprenorphine	93	7	102	15
Codeine	99	12	93	9
Diazepam	107	7	104	6
Fentanyl	85	5	94	8
Hydrocodone	104	11	93	11
Hydromorphone	95	9	93	11
Lorazepam	94	8	98	8
Methamphetamine	92	16	102	8
Morphine	98	12	94	12
Norbuprenorphine	101	11	92	11
Nordiazepam	100	9	92	8
Norfentanyl	113	7	110	11
Oxycodone	97	5	93	11
PCP	90	7	98	6

STRATA DE DIATOMACEOUS EARTH SLE | SAMPLE PREPARATION

## A Fast Extraction of 25-OH Vitamin D<sub>2</sub>/D<sub>3</sub> from Serum

Strata DE provides a simple extraction method with time and cost savings across all 3 QC levels.

### SLE Protocol

<b>Pre-treatment:</b>	Dilute 200 µL of human serum* with 100 µL of 5% Ammonium hydroxide (w/v), add 25 µL of 25-OH Vitamin-D <sub>3</sub> - <sup>2</sup> H <sub>6</sub> (1 µg/mL) and mix.
<b>96-Well Plate:</b>	Strata DE 400 µL
<b>Part No.:</b>	<a href="#">8E-S325-5GB</a>
<b>Load:</b>	Pre-treated sample and wait for 5 minutes
<b>Elute:</b>	Sample with 600 µL MTBE by gravity, wait for 5 minutes
<b>Repeat:</b>	Elution step twice by gravity, and after the final elution, apply 5-10 Hg vacuum to finish elution
<b>Dry:</b>	40 °C under N <sub>2</sub>
<b>Reconstitute:</b>	200 µL 0.1% Formic acid in Water/0.1% Formic acid in Methanol (30:70)

### Accuracy and Precision

	QCL	QCM	QCH
<b>Target Conc. (ng/mL)</b>	6	50	80
	<b>25-OH-D<sub>2</sub></b>		
<b>Mean Conc. Found</b>	5.92	53.0	80.8
<b>STDV</b>	4.09	2.21	5.55
<b>CV%</b>	6.90	4.18	6.86
<b>Accuracy (%)</b>	98.7	106	101
<b>n</b>	6	6	6
	<b>25-OH-D<sub>3</sub></b>		
<b>Mean Conc. Found (ng/mL)</b>	6.59	52.7	87.2
<b>STDV</b>	0.50	1.74	5.50
<b>CV%</b>	7.62	3.30	6.31
<b>Accuracy (%)</b>	110	105	109
<b>n</b>	6	6	6

\* Double Charcoal-stripped human serum was used to prepare all standards and QCs

# Strata® DE Diatomaceous Earth SLE

## Available for Large Volume Samples and High-throughput Cleanups

### Tubes

Ideal for large volume cleanups such as Food and Environmental applications.

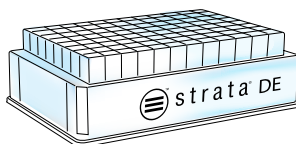


#### Ordering Information

Strata DE (Diatomaceous Earth SLE Tubes)		
Strata DE Tube	2 mL Capacity, 12 cc	20 mL Capacity, 60 cc
Maximum Sample Volume (after dilution)	2 mL	17 mL
Recommended Elution Volume	2x 5 mL	3x 20 mL
Part No.	<a href="#">8B-S325-KDG</a>	<a href="#">8B-S325-VFF</a>
Unit	20/pk	16/pk


### 96-Well Plates

Ideal for smaller volume, high-throughput cleanups such as Bioanalytical samples.



#### Ordering Information

Strata DE (Diatomaceous Earth SLE) 96-Well Plates		
Strata DE 96-Well Plates	200 µL	400 µL
Maximum Sample Volume (after dilution)	200 µL	300 µL
Recommended Elution Volume	2x 600 µL	3x 600 µL
Part No.	<a href="#">8E-S325-FGB</a>	<a href="#">8E-S325-5GB</a>
Unit	2/pk	2/pk

 For accessories that are compatible with Strata DE Supported Liquid Extraction (SLE) Products, see pp. 79-82

 For more information on Strata DE, visit [www.phenomenex.com/stratade](http://www.phenomenex.com/stratade)

Recommended volumes are the expected loadability for most samples, however, it may be possible to load more than the stated capacity without breakthrough of the sample.

Comparative separations may not be representative of all applications.

## Rapid Cleanup of Hydrolyzed Urine

$\beta$ -Gone  $\beta$ -Glucuronidase Removal Products are designed to target and remove  $\beta$ -glucuronidase from hydrolyzed urine samples without requiring additional time or method development. In a single step and in less than 1 minute, your hydrolyzed samples are ready for analysis.

- Increase HPLC/UHPLC column lifetime
- Reduce mass spec maintenance
- Maintain the selectivity of your HPLC/UHPLC column
- Perform the pre-treatment step inside the 96-well plate with  $\beta$ -Gone Plus

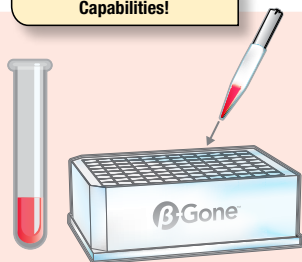
### $\beta$ -Gone Plus Steps

Now In-Well Hydrolysis Capabilities!

**1**

#### Load

Load urine and hydrolysis solution in  $\beta$ -Gone Plus 96-well plate, incubate

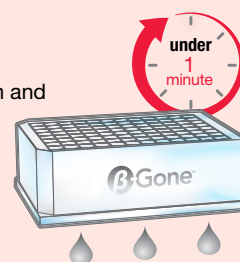


Skip the Transfer Step

**2**

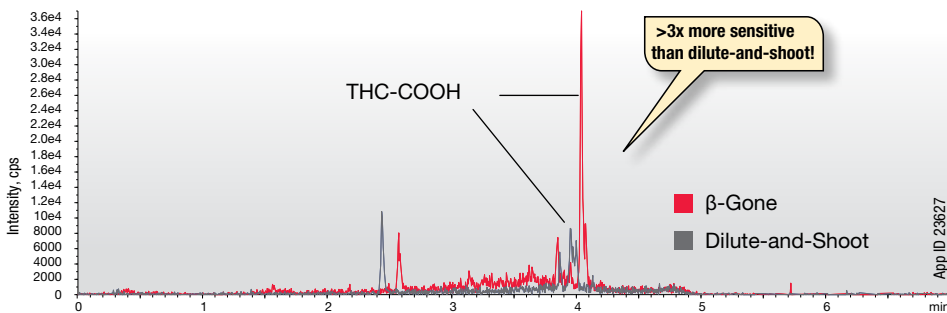
#### Collect

Initiate vacuum and collect eluate



## Increase Your Sensitivity:

$\beta$ -Gone vs. Dilute-and-Shoot



$\beta$ -Gone Procedure: To 200  $\mu$ L spiked urine (spiked at 100 ng/mL), add 133  $\mu$ L 0.1 % Formic acid in Methanol. Pass through  $\beta$ -Gone tube or 96-well plate and collect eluent. Dilute-and-Shoot Procedure: Dilute spiked urine (spiked at 100 ng/mL) 10-fold with 0.1 % Formic acid in Water.

**Column:** Kinetex® 2.6  $\mu$ m Biphenyl  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4622-AN](#)  
**Mobile Phase:** A: 0.1 % Formic acid in Water  
 B: 0.1 % Formic acid in Acetonitrile  
**Gradient:**

Time (min)	% B
0	5
3	95
4	95
4.1	5

  
**Flow Rate:** 500  $\mu$ L/min  
**Temperature:** Ambient  
**Detection:** MS/MS (SCIEX® API 4000™)

### Ordering Information

#### $\beta$ -Gone $\beta$ -Glucuronidase Removal Products

Part No.	Description	Unit
<a href="#">8B-S139-TAK</a>	1 mL Tubes, Recombinant Enzyme	100/Box
<a href="#">8B-S322-DAK</a>	1 mL Tubes, Non-Recombinant Enzyme	100/Box
<a href="#">8E-S139-TGA</a>	96-Well Plate, Recombinant Enzyme	1/Box
<a href="#">8E-S322-DGA</a>	96-Well Plate, Non-Recombinant Enzyme	1/Box
<a href="#">8E-S323-TGA</a>	96-Well Plate Plus 30 mg/well, Recombinant/Non-Recombinant Enzyme	1/Box
<a href="#">8E-S323-UGA</a>	96-Well Plate Plus 60 mg/well, Recombinant/Non-Recombinant Enzyme	1/Box
<a href="#">8N-S323-TUK</a>	2 mL Centrifuge Tubes, Recombinant and Non-Recombinant Enzyme	100/Box



#### Watch the Webinar

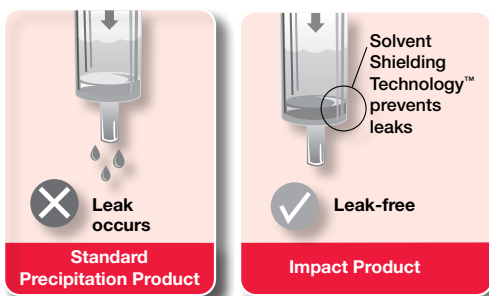
Learn how to instantly improve your sensitivity without introducing extra steps into your workflow!

[www.phenomenex.com/BetaGone](http://www.phenomenex.com/BetaGone)



## Rapid Protein Precipitation

- Quickly cleanup sample by passing biological samples through the Impact filter
- Increase sensitivity of your analysis by eliminating proteins which contribute to baseline noise
- Increase reproducibility with the leak-free membrane, preventing premature sample breakthrough and incomplete protein precipitation

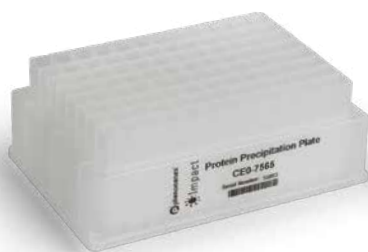


Can retain acetonitrile with no leaks for up to 25 minutes

Compatible Solvents	Solvent : Sample Ratio
Acetonitrile	3:1 to 4:1
Methanol	4:1
<b>Maximum Total Combined Liquid Volume (Organic Solvent plus Biological Sample)</b>	
96-well plates	1.6 mL
<b>Recommended Biological Sample Volumes</b>	
96-well plates	25-400 µL
<b>Leak Resistant Time</b>	
96-well plates	Up to 25 minutes with no vacuum/pressure

### Ordering Information

Impact Precipitation Products		
Part No.	Description	Unit
<b>Impact Precipitation Products</b>		
<a href="#">CE0-7565</a>	Impact Protein Precipitation, Square Well, Filter Plate, 2 mL	2/pk
<a href="#">CE0-7566</a>	Impact Protein Precipitation, Square Well, Long Drip, Filter Plate, 2 mL	2/pk
<b>Impact Starter Kit for Protein Precipitation</b>		
<a href="#">CE0-8201</a>	Impact Protein Precipitation Plate ( <a href="#">CE0-7565</a> ) (2 ea) Collection Plate 2 mL (2 ea) Sealing Mat, Santoprene™ ( <a href="#">AH0-8199</a> ) (2 ea)	ea



For Accessories, see pp. 79-82

## General Protocol



### Dispense

Organic solvent into the wells of the Impact plate in a volume of 3 - 4x the volume of the intended plasma or tissue homogenate sample. Recommended solvents and maximum volume of sample and precipitation solvent are listed on this page.



### Add†

Plasma or tissue homogenate directly and forcefully into the organic solvent, maintain a final ratio of 3:1 to 4:1 organic solvent:sample. Recommended sample volumes are listed on this page.



### Vortex†

2 minutes at maximum possible speed, taking care not to allow solvent spillage. Sample can stand for up to 25 minutes.



### Filter

#### Centrifuge:

Place the Impact plate on top of a collection plate and centrifuge at 500 g for 5 minutes or until filtrate is collected.

#### Vacuum:

Place the Impact plate onto a suitable 96-well sample manifold or robot. Ensure that a 96-well collection plate is positioned inside the manifold or under the Impact plate. Vacuum at 2 - 7 inch Hg for up to 5 minutes or until filtrate is collected.

#### Positive Pressure:

Place the Impact plate on top of a collection plate and apply 2 - 5 psi using a positive pressure manifold.

\* A 3:1 v/v ratio of organic solvent to biological sample will dilute your sample less. In contrast, a 4:1 v/v ratio of organic solvent to biological sample will ensure a more complete precipitation. A 4:1 v/v ratio is recommended when using methanol.

† When used with a liquid-handling instrument or automation, aspirate/dispense cycles may be used to promote in-tip mixing and precipitation. This will ensure complete precipitation and filtration. Vortexing is not necessary when in-tip precipitation is performed.

2013 R&D 100 Award Recipient



## Eliminate Ion Suppression with Phree

- Consistently remove > 99% of phospholipids to increase LC-MS sensitivity
- Simultaneously remove interfering proteins
- No additional time required, the Phree method can be performed in the same amount of time as a protein precipitation procedure
- Skip the method development; one method for acids, bases, and neutrals

### How it Works:

**1**

#### Remove Proteins

Solvent Shielding Technology™ prevents dripping of organic solvent, allowing for protein precipitation within the wells of the Phree Phospholipid Removal Product.

**2**

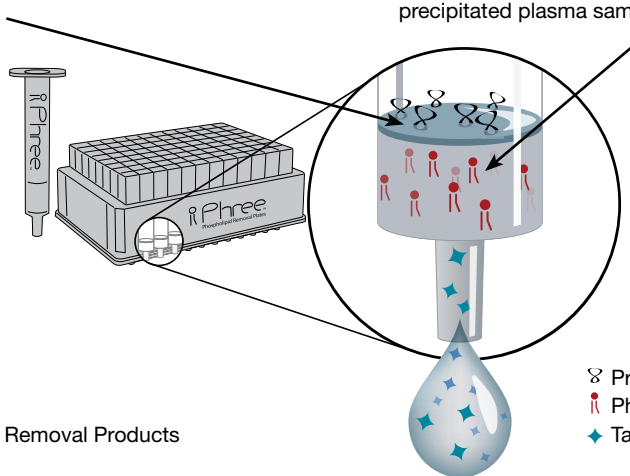
#### Eliminate Phospholipids

The Phree sorbent selectively removes phospholipids from precipitated plasma samples.

**3**

#### No Method Development

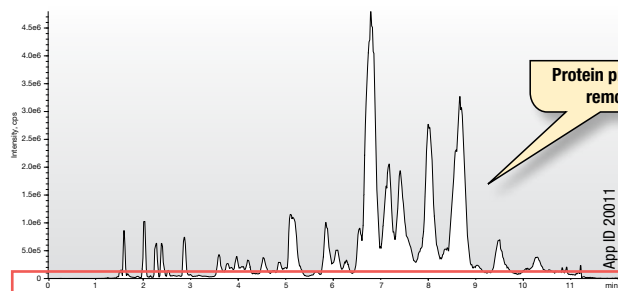
One method for acids, bases, and neutrals.



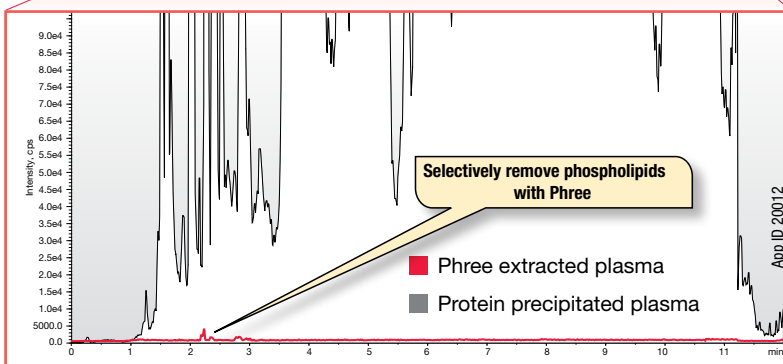
- ⊗ Proteins
- ⊙ Phospholipids
- ◆ Target Analyte

### Total Phospholipid Profile

Protein Precipitation vs. Phree Phospholipid Removal Products



~ 50x Zoom



Phospholipid profile monitored using m/z 184-184

**Plasma Cleanup:** 100  $\mu$ L plasma plus 300  $\mu$ L Acetonitrile with 1% Formic acid  
**Column:** Kinetex® 2.6  $\mu$ m C18 100Å  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4462-AN](#)  
**Mobile Phase:** A: 0.1% Formic acid in Water  
 B: 0.1% Formic acid in Methanol  
**Gradient:**

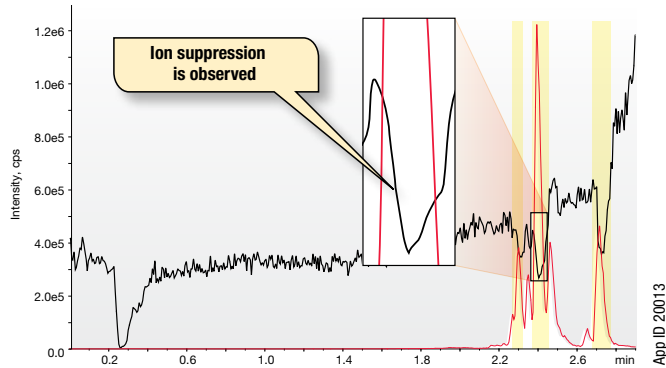
Time (min)	% B
0	60
0.5	95
15.5	95
15.51	60
19.5	60

**Flow Rate:** 0.4 mL/min  
**Detection:** Mass Spectrometer (MS) @ 425 °C; 184 amu  
**Temperature:** 22 °C

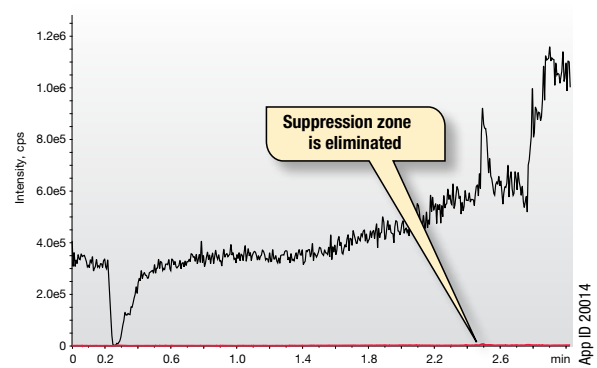
## Reduce Ion Suppression

The presence of phospholipids in plasma samples produces zones of ion suppression that correlate exactly with the phospholipid elution profile when analyzed via mass spectrometer (MS).

### Protein Precipitated Plasma



### Phree Extracted Plasma



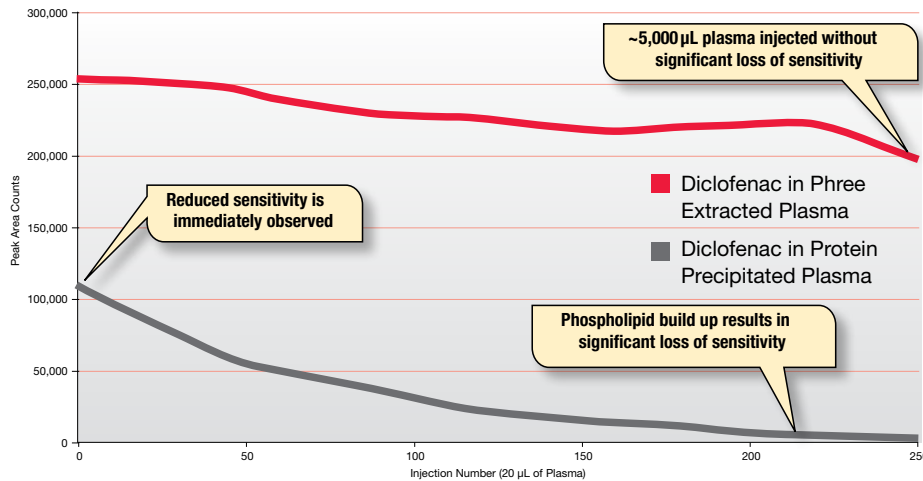
- Suppression Zone
- Phospholipids m/z 184-184
- Amoxapine m/z 314-271

Amoxapine was infused post-column to establish an ion suppression/enhancement profile with both protein precipitated plasma (left) and Phree extracted plasma (right), showing that Phree can successfully reduce ion suppression.

## Maximize Sensitivity and Column Lifetime

Phospholipids reduce the sensitivity of the MS signal and shorten column lifetime when they build up over time.

### Column Sensitivity after 250 Injections



To assess the effect of phospholipid build up, repetitive 20µL injections of diclofenac in protein precipitated plasma versus diclofenac in Phree extracted plasma were made.

### Ordering Information

#### Phree Phospholipid Removal Products

Part No.	Description	Unit
<a href="#">8B-S133-TAK</a>	Phree Phospholipid Removal Tabbed 1 mL Tubes	100/pk
<a href="#">8E-S133-TGB</a>	Phree Phospholipid Removal 96-Well Plates	2/pk



For accessories that are compatible with Phree Phospholipid Removal Products, see pp. 79-82

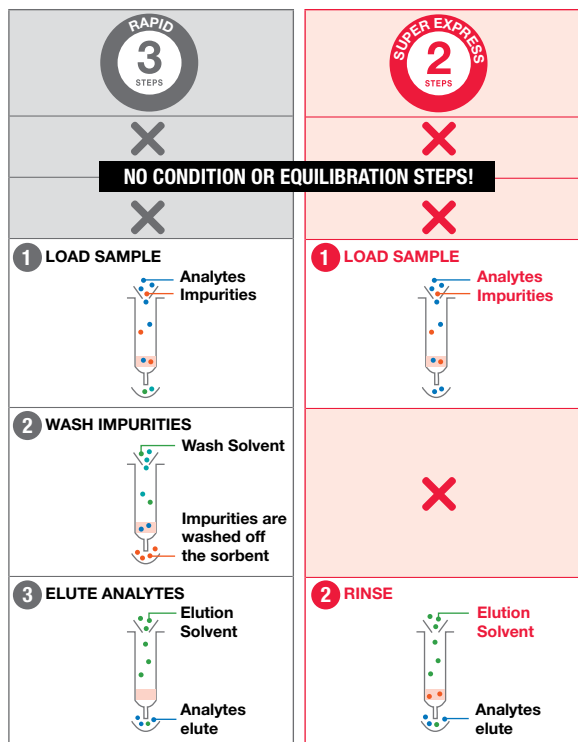
## Polymeric Sorbent with Matrix Removal Technology

Strata-X PRO works to eliminate phospholipids and harmful particulates in the sample while targeting analytes. Strata-X PRO provides high recoveries, especially for polar analytes, and less matrix effects that could result in ion suppression or enhancement when compared to traditional polymeric SPE.

- Reversed phase polymeric sorbent designed to be water wettable
- Reduce protocol time by at least 40% with 3-Step and 2-Step SPE
- High recoveries without conditioning or equilibration

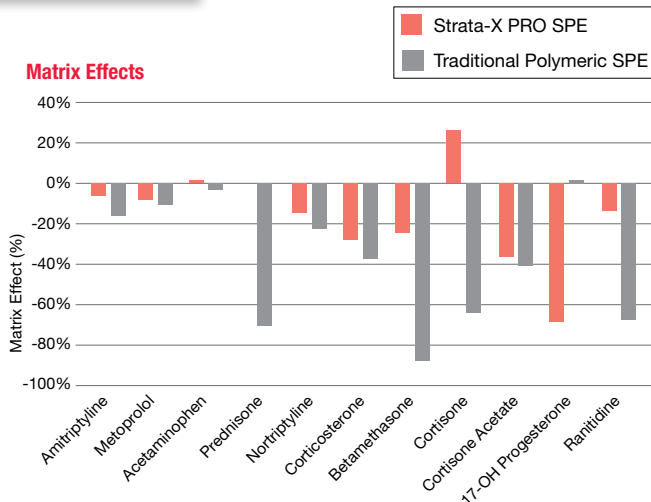
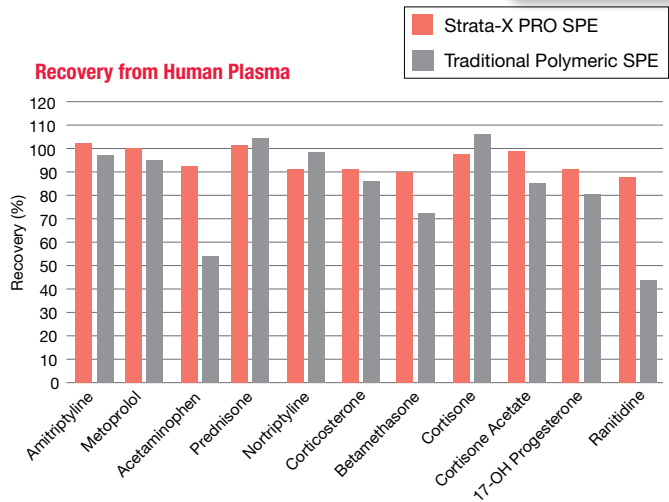
### SPE Protocol

**96-Well Plate:** Strata-X PRO, 30 mg/well  
**Part No.:** [8E-S536-TGA](#)  
**Load:** 400 µL Plasma/0.1 % Formic acid in Water (1:1)  
**Wash:** 1 mL 5 % Methanol in Water  
**Dry:** 1 minute at 5" Hg  
**Elute:** 1 mL 0.1 % Formic acid in Acetonitrile/ Methanol (90/10)  
**Dry Down:** 1 minute at 5" Hg  
**Reconstitute:** 200 µL 5 % Methanol in Water



Consistently high recoveries, with less variation between samples and less matrix effects using Strata-X PRO.

STRATA-X PRO POLYMERIC SPE | SAMPLE PREPARATION



## Strata-X PRO SPE

### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	10 mg	<a href="#">8B-S536-AAK</a>	1 mL (100/box)
	30 mg	<a href="#">8B-S536-TAK</a>	1 mL (100/box)
	30 mg	<a href="#">8B-S536-TBJ</a>	3 mL (50/box)
	60 mg	<a href="#">8B-S536-UBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S536-FBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S536-FCH</a>	6 mL (30/box)
	200 mg	<a href="#">8B-S536-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S536-HCH</a>	6 mL (30/box)

Format	Sorbent Mass	Part Number	Unit
<b>96-Well Plate</b>			
	10 mg/well	<a href="#">8E-S536-AGA</a>	ea
	30 mg/well	<a href="#">8E-S536-TGA</a>	ea
	60 mg/well	<a href="#">8E-S536-UGA</a>	ea
<b>96-Well Microelution Plate</b>			
	2 mg/well	<a href="#">8M-S536-4GA</a>	ea

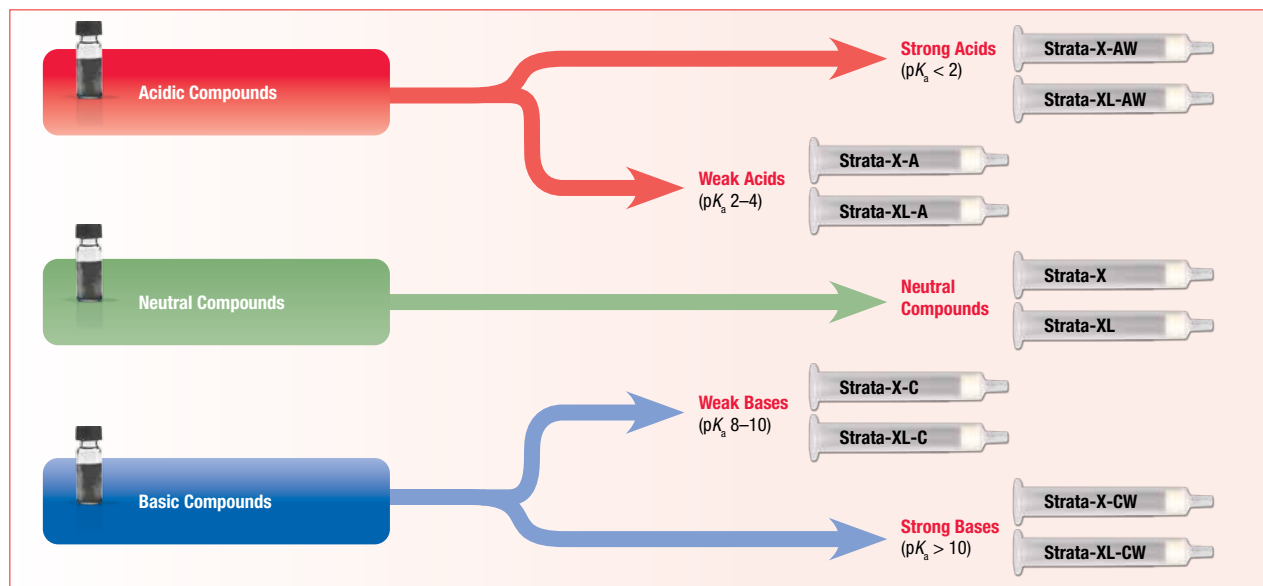


U.S. Patent No. 7,119,145

## Strata-X

### Step 1. Select a Sorbent

Compound-Directed Phase Selection



Specialty Sorbents	Application	Phase Description
Strata-X-Drug B	Basic Drugs of Abuse	Proprietary strong cation-exchange sorbent that eliminates the need to condition / equilibrate the sorbent. *Now available with in-well hydrolysis capabilities
Strata-X-Drug N	Neutral Drugs of Abuse	Proprietary reversed phase sorbent that eliminates the need to condition / equilibrate the sorbent.

### Step 2. Select a Sorbent Mass

Loading Capacity Chart

Strata-X Phase	Plasma /Serum	Urine	Filtered Tissue Homogenates	Water (particulate-free)	Water (particulate-laden)	Mass (mg in tube)
Strata-X, X-C, X-CW, X-A, X-AW	100 µL	250 µL	10 mg	N.A.	N.A.	10 mg
	250 µL	1 mL	50 mg	N.R.	N.R.	30 mg
	500 µL	2 mL	100 mg	N.R.	N.R.	60 mg
	1 mL	4 mL	150 mg	50 mL	25 mL	100 mg
	N.A.	8 mL	300 mg	100 mL	50 mL	200 mg
	N.A.	20 mL	500 mg	500 mL	100 mL	500 mg
Strata-XL, XL-C, XL-CW, XL-A, XL-AW	50 µL	125 µL	5 mg	N.A.	N.A.	10 mg
	125 µL	500 µL	25 mg	N.R.	N.R.	30 mg
	250 µL	1 mL	50 mg	N.R.	N.R.	60 mg
	500 µL	2 mL	75 mg	25 mL	13 mL	100 mg
	N.A.	4 mL	150 mg	50 mL	25 mL	200 mg
	N.A.	10 mL	250 mg	250 mL	50 mL	500 mg

N.A. = Not Applicable (not commonly used)  
N.R. = Not Recommended (may not provide expected results)



See the following pages for specific phase details and general extraction protocols.

## General Extraction Protocols

Bases

### Strata-X-C / Strata-XL-C

Strong Cation-Exchange & Reversed Phase

for Bases with  $pK_a \leq 10.5$



**Condition**

1 mL Methanol

**Equilibrate**

1 mL Acidified Water

**Load**

Diluted Acidified Sample

**Wash**

1 mL 0.1 N HCl in water (collect this fraction to analyze Polar Neutrals)

**Wash**

1 mL 0.1 N HCl in Methanol (collect this fraction to analyze Neutrals/Acids)

**Elute Bases**

2x 500  $\mu$ L 5 %  $NH_4OH$  in Methanol

### Strata-X-CW / Strata-XL-CW

Weak Cation-Exchange & Reversed Phase

for Bases with  $pK_a > 8$



**Condition**

1 mL Methanol

**Equilibrate**

1 mL Water, pH 6-7

**Load**

Diluted Sample, pH 6-7

**Wash**

1 mL Water, pH 6-7

**Wash**

1 mL Methanol (collect this fraction to analyze Neutrals/Acids)

**Elute Any Base**

2x 500  $\mu$ L 5 % Formic Acid in Methanol

**Elute Weak Bases**

2x 500  $\mu$ L 5 %  $NH_4OH$  in Methanol

STRATA-X POLYMERIC SPE | SAMPLE PREPARATION

Neutrals

### Strata-X / Strata-XL

Reversed Phase

for Neutral Compounds



**Condition**

1 mL Methanol

**Equilibrate**

1 mL Water

**Load**

Diluted Sample

**Wash**

1 mL 5-60 % Methanol

**Elute**

2x 500  $\mu$ L 2 % Formic Acid in Methanol/Acetonitrile

Acids

### Strata-X-A / Strata-XL-A

Strong Anion-Exchange & Reversed Phase

for Acids with  $pK_a > 2$



**Condition**

1 mL Methanol

**Equilibrate**

1 mL Water, pH 6-7

**Load**

Diluted Sample, pH 6-7

**Wash**

1 mL 25 mM Ammonium Acetate Buffered, pH 6-7

**Wash**

1 mL Methanol (collect this fraction to analyze Neutral/Bases)

**Elute Acids**

2x 500  $\mu$ L 5 % Formic Acid in Methanol

### Strata-X-AW / Strata-XL-AW

Weak Anion-Exchange & Reversed Phase

for Acids with  $pK_a \leq 5$



**Condition**

1 mL Methanol

**Equilibrate**

1 mL Water, pH 6-7

**Load**

Diluted Sample, pH 6-7

**Wash**

1 mL 25 mM Ammonium Acetate Buffered, pH 6-7

**Wash**

1 mL Methanol

**Elute Any Acid**

2x 500  $\mu$ L 5 %  $NH_4OH$  in Methanol

**Elute Weak Acids**

2x 500  $\mu$ L 5 % Formic Acid in Methanol

\*Based on 30 mg/1 mL sorbent mass.  
The above is a convenient starting point for SPE method development.  
Further optimization may be required to tailor the method to your specific needs.

# Strata®-X Polymeric SPE

U.S. Patent No. 7,119,145

## Microelution SPE

**Successful bioanalytical sample preparation without the dry down**

- Save 30 or more minutes per 96-well plate!
- At least 8x more sensitive than traditional 10mg SPE
- Elution volumes as low as 25 µL



For ordering information, go to pages 64-68

## Strata-X Microelution Method Development and Peptide Screening

Test different SPE chemistries using a single 96-well plate

### Ordering Information

#### Strata-X Microelution Peptide Screening 96-Well Plates


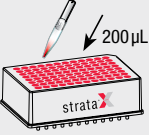
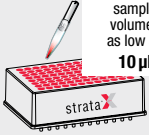

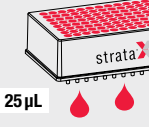
Part No.	Description	Unit
<a href="#">KS0-9528</a>	Strata-X-CW 2 mg/well (6 rows) Strata-X-A 2 mg/well (6 rows)	ea

#### Strata-X Microelution Method Development 96-Well Plates

Part No.	Description	Unit
<a href="#">KS0-9529</a>	Strata-X-C 2 mg/well (3 rows) Strata-X-AW 2 mg/well (3 rows) Strata-X-CW 2 mg/well (3 rows) Strata-X-A 2 mg/well (3 rows)	ea

### A Faster SPE Solution

Save 30 or more minutes per 96-well plate by eliminating lengthy dry down and reconstitution steps.

<b>Step 1</b>		<b>Condition</b>
<b>Step 2</b>		<b>Equilibrate</b>
<b>Step 3</b>		<b>Load Sample</b>
<b>Step 4</b>		<b>Wash</b>
<b>Step 5</b>		<b>Elute</b> At least 8x more sensitive than traditional 10 mg SPE!
<b>Step 6</b>	<b>NOT REQUIRED</b>	<b>Dry Down and Reconstitute</b> Save 30 or more minutes per 96-well plate! Save on labor costs, do more in less time.
<b>Total Processing Time</b>		
<b>30 Minutes</b>		
<b>No Dry Down!</b>		
<b>Throughput (in 8 hours)</b>		
<b>DOUBLE</b> your throughput!*		
<b>REDUCE</b> Cost per Sample!*		

\* When compared to traditional SPE methods



Download starting methods at:  
[www.phenomenex.com/microelution](http://www.phenomenex.com/microelution)

# Strata<sup>®</sup>-X Polymeric SPE

U.S. Patent No. 7,119,145

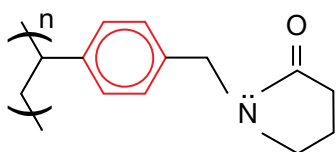
## Strata-X and Strata-XL

A reversed phase functionalized polymeric sorbent that gives strong retention of neutral, acidic, or basic compounds under aggressive, high organic wash conditions.

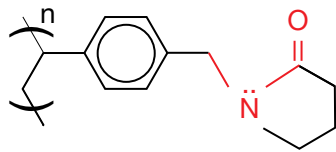
	Strata-X, 33 µm, 85 Å	Strata-XL, 100 µm, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

### 3 Mechanisms of Retention

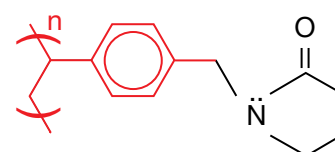
π-π Bonding



Hydrogen Bonding Dipole-Dipole Interactions



Hydrophobic Interaction



## Strata-X

### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	30 mg	<a href="#">8B-S100-TAK**</a>	1 mL (100/box)
	30 mg	<a href="#">8B-S100-TBJ</a>	3 mL (50/box)
	60 mg	<a href="#">8B-S100-UBJ**</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S100-EBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S100-ECH</a>	6 mL (30/box)
	200 mg	<a href="#">8B-S100-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S100-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S100-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S100-HCH</a>	6 mL (30/box)
<b>Giga<sup>™</sup> Tube</b>			
	500 mg	<a href="#">8B-S100-HDG</a>	12 mL (20/box)
	1 g	<a href="#">8B-S100-JDG</a>	12 mL (20/box)
	1 g	<a href="#">8B-S100-JEG</a>	20 mL (20/box)
	2 g	<a href="#">8B-S100-KEG</a>	20 mL (20/box)
	5 g	<a href="#">8B-S100-LFF</a>	60 mL (16/box)
<b>Teflon<sup>®</sup> Tube</b>			
	200 mg	<a href="#">8B-S100-FBJ-T</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S100-FDJ-T</a>	12 mL (20/box)
<b>96-Well Plate</b>			
	10 mg	<a href="#">8E-S100-AGB</a>	2 Plates/Box
	30 mg	<a href="#">8E-S100-TGB</a>	2 Plates/Box
	60 mg	<a href="#">8E-S100-UGB</a>	2 Plates/Box
<b>96-Well Microelution Plate</b>			
	2 mg	<a href="#">8M-S100-4GA</a>	ea

### On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata-X on-line extraction cartridge, 20 x 2.0 mm	<a href="#">00M-S033-B0-CB</a>	ea
Cartridge holder, 20 mm	<a href="#">CH0-5845</a>	ea

\*\*Tab-less tubes available. Contact Phenomenex for details.



For Large Volume Cleanup use Giga Tubes  
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

## Strata-XL

### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	30 mg	<a href="#">8B-S043-TAK</a>	1 mL (100/box)
	60 mg	<a href="#">8B-S043-UBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S043-EBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S043-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S043-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S043-HCH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	2 g	<a href="#">8B-S043-KDG</a>	12 mL (20/box)
	2 g	<a href="#">8B-S043-KEG</a>	20 mL (20/box)
	5 g	<a href="#">8B-S043-LEG</a>	20 mL (20/box)
	5 g	<a href="#">8B-S043-LFF</a>	60 mL (16/box)
	10 g	<a href="#">8B-S043-MFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	30 mg	<a href="#">8E-S043-TGB</a>	2 Plates/Box

\* To control flow rate with Strata-XL, use a stopcock ([AH0-6048](#)) when processing samples with a vacuum manifold.



Create a customized SPE method in under 1 minute.  
[www.phenomenex.com/mdtool](http://www.phenomenex.com/mdtool)



# Strata<sup>®</sup>-X Polymeric SPE

U.S. Patent No. 7,119,145

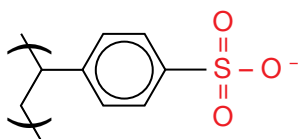
## Strata-X-C and Strata-XL-C

A strong cation-exchange functionalized polymeric sorbent that allows for complete retention of basic compounds with a  $pK_a$  less than 10.5, making 100% organic wash conditions possible.

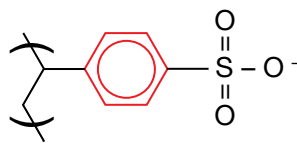
	Strata-X-C, 33 $\mu$ m, 85 Å	Strata-XL-C, 100 $\mu$ m, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

### 3 Mechanisms of Retention

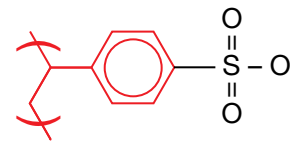
Strong Cation-Exchange



$\pi$ - $\pi$  Bonding



Hydrophobic Interaction



### Strata-X-C

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	30 mg	<a href="#">8B-S029-TAK**</a>	1 mL (100/box)
	30 mg	<a href="#">8B-S029-TBJ</a>	3 mL (50/box)
	60 mg	<a href="#">8B-S029-UBJ**</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S029-EBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S029-ECH</a>	6 mL (30/box)
	200 mg	<a href="#">8B-S029-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S029-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S029-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S029-HCH</a>	6 mL (30/box)
<b>Giga<sup>™</sup> Tube</b>			
	500 mg	<a href="#">8B-S029-HDG</a>	12 mL (20/box)
	1 g	<a href="#">8B-S029-JDG</a>	12 mL (20/box)
	1 g	<a href="#">8B-S029-JEG</a>	20 mL (20/box)
	2 g	<a href="#">8B-S029-KEG</a>	20 mL (20/box)
	5 g	<a href="#">8B-S029-LFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	10 mg	<a href="#">8E-S029-AGB</a>	2 Plates/Box
	30 mg	<a href="#">8E-S029-TGB</a>	2 Plates/Box
	60 mg	<a href="#">8E-S029-UGB</a>	2 Plates/Box
<b>96-Well Microelution Plate</b>			
	2 mg	<a href="#">8M-S029-4GA</a>	ea

#### On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata-X-C on-line extraction cartridge, 20 x 2.0 mm	<a href="#">00M-S048-BO-CB</a>	ea
Cartridge holder, 20 mm	<a href="#">CHO-5845</a>	ea

\*\*Tab-less tubes available. Contact Phenomenex for details.



For Large Volume Cleanup use Giga Tubes  
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

### Strata-XL-C

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	30 mg	<a href="#">8B-S044-TAK</a>	1 mL (100/box)
	60 mg	<a href="#">8B-S044-UBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S044-EBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S044-ECH</a>	6 mL (30/box)
	200 mg	<a href="#">8B-S044-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S044-FCH**</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S044-HCH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	2 g	<a href="#">8B-S044-KEG</a>	20 mL (20/box)
	5 g	<a href="#">8B-S044-LEG</a>	20 mL (20/box)
	5 g	<a href="#">8B-S044-LFF</a>	60 mL (16/box)
	10 g	<a href="#">8B-S044-MFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	30 mg	<a href="#">8E-S044-TGB</a>	2 Plates/Box

**96-Well Plate**

30 mg

[8E-S044-TGB](#)

2 Plates/Box

SAMPLE PREPARATION | STRATA-X POLYMERIC SPE



Create a customized SPE method in under 1 minute.  
[www.phenomenex.com/mdtool](http://www.phenomenex.com/mdtool)

# Strata<sup>®</sup>-X Polymeric SPE

U.S. Patent No. 7,119,145

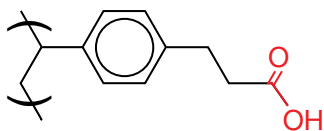
## Strata-X-CW and Strata-XL-CW

A weak cation-exchange functionalized polymeric sorbent that allows for complete retention of basic compounds with a  $pK_a$  greater than 8, including quaternary amines, making 100% organic wash conditions possible.

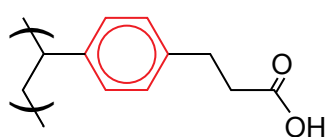
	Strata-X-CW, 33 $\mu$ m, 85 Å	Strata-XL-CW, 100 $\mu$ m, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

### 3 Mechanisms of Retention

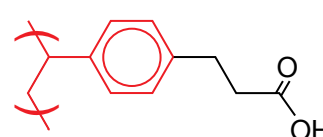
Weak Cation-Exchange



$\pi$ - $\pi$  Bonding



Hydrophobic Interaction



### Strata-X-CW

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	30 mg	<a href="#">8B-S035-TAK**</a>	1 mL (100/box)
	30 mg	<a href="#">8B-S035-TBJ</a>	3 mL (50/box)
	60 mg	<a href="#">8B-S035-UBJ**</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S035-ECH</a>	6 mL (30/box)
	200 mg	<a href="#">8B-S035-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S035-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S035-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S035-HCH</a>	6 mL (30/box)
<b>Giga™ Tube</b>			
	1 g	<a href="#">8B-S035-JDG</a>	12 mL (20/box)
	1 g	<a href="#">8B-S035-JEG</a>	20 mL (20/box)
	2 g	<a href="#">8B-S035-KEG</a>	20 mL (20/box)
	5 g	<a href="#">8B-S035-LFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	10 mg	<a href="#">8E-S035-AGB</a>	2 Plates/Box
	30 mg	<a href="#">8E-S035-TGB</a>	2 Plates/Box
	60 mg	<a href="#">8E-S035-UGB</a>	2 Plates/Box
<b>96-Well Microelution Plate</b>			
	2 mg	<a href="#">8M-S035-4GA</a>	ea

### Strata-XL-CW

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	30 mg	<a href="#">8B-S052-TAK</a>	1 mL (100/box)
	60 mg	<a href="#">8B-S052-UBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S052-EBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S052-ECH</a>	6 mL (30/box)
	200 mg	<a href="#">8B-S052-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S052-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S052-HCH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	2 g	<a href="#">8B-S052-KEG</a>	20 mL (20/box)
<b>96-Well Plate</b>			
	30 mg	<a href="#">8E-S052-TGB</a>	2 Plates/Box

### On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata-X-CW on-line extraction cartridge, 20 x 2.0 mm	<a href="#">00M-S036-B0-CB</a>	ea
Cartridge holder, 20 mm	<a href="#">CH0-5845</a>	ea

\*\*Tab-less tubes available. Contact Phenomenex for details.



For Large Volume Cleanup use Giga Tubes  
For SPE Vacuum Manifolds and Accessories, see pp. 79-82



Create a customized SPE method in under 1 minute.  
[www.phenomenex.com/mdtool](http://www.phenomenex.com/mdtool)

# Strata®-X Polymeric SPE

U.S. Patent No. 7,119,145

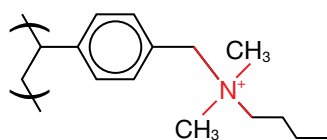
## Strata-X-A and Strata-XL-A

A strong anion-exchange functionalized polymeric sorbent that allows for complete retention of weakly acidic compounds with  $pK_a$  greater than 2, making 100% organic wash conditions possible.

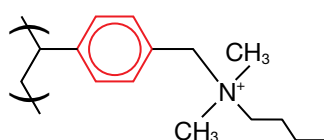
	Strata-X-A, 33 $\mu$ m, 85 Å	Strata-XL-A, 100 $\mu$ m, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

### 3 Mechanisms of Retention

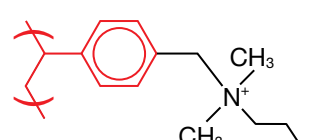
Strong Anion-Exchange



$\pi$ - $\pi$  Bonding



Hydrophobic Interaction



## Strata-X-A

### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	30 mg	<a href="#">8B-S123-TAK**</a>	1 mL (100/box)
	30 mg	<a href="#">8B-S123-TBJ</a>	3 mL (50/box)
	60 mg	<a href="#">8B-S123-UBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S123-FBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S123-ECH</a>	6 mL (30/box)
	200 mg	<a href="#">8B-S123-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S123-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S123-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S123-HCH</a>	6 mL (30/box)
<b>Giga™ Tube</b>			
	500 mg	<a href="#">8B-S123-HDG</a>	12 mL (20/box)
	1 g	<a href="#">8B-S123-JDG</a>	12 mL (20/box)
	1 g	<a href="#">8B-S123-JEG</a>	20 mL (20/box)
	2 g	<a href="#">8B-S123-KEG</a>	20 mL (20/box)
	5 g	<a href="#">8B-S123-LFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	10 mg	<a href="#">8E-S123-AGB</a>	2 Plates/Box
	30 mg	<a href="#">8E-S123-TGB</a>	2 Plates/Box
	60 mg	<a href="#">8E-S123-UGB</a>	2 Plates/Box
<b>96-Well Microelution Plate</b>			
	2 mg	<a href="#">8M-S123-4GA</a>	ea

## Strata-XL-A

### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	30 mg	<a href="#">8B-S053-TAK</a>	1 mL (100/box)
	60 mg	<a href="#">8B-S053-UBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S053-EBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S053-FBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S053-ECH</a>	6 mL (30/box)
	200 mg	<a href="#">8B-S053-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S053-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S053-HCH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	2 g	<a href="#">8B-S053-KEG</a>	20 mL (20/box)
	5 g	<a href="#">8B-S053-LFF</a>	60 mL (16/box)
	10 g	<a href="#">8B-S053-MFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	30 mg	<a href="#">8E-S053-TGB</a>	2 Plates/Box

\*\*Tab-less tubes available. Contact Phenomenex for details.



For Large Volume Cleanup use Giga Tubes  
For SPE Vacuum Manifolds and Accessories, see pp. 79-82



Create a customized SPE method in under 1 minute.  
[www.phenomenex.com/mdtool](http://www.phenomenex.com/mdtool)

# Strata<sup>®</sup>-X Polymeric SPE

U.S. Patent No. 7,119,145

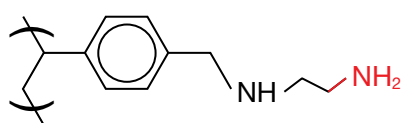
## Strata-X-AW and Strata-XL-AW

A weak anion-exchange functionalized polymeric sorbent that allows for complete retention of acidic compounds with  $pK_a$  less than 5, making 100% organic wash conditions possible.

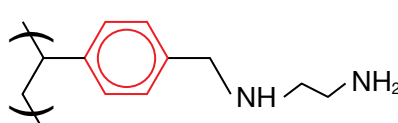
	Strata-X-AW, 33 $\mu$ m, 85 Å	Strata-XL-AW, 100 $\mu$ m, 300 Å
High Concentration Samples	X	
Small Target Analytes (< 10 kDa)	X	
Large Target Analytes (> 10 kDa)		X
Large Volume Samples		X
Viscous Samples		X

### 3 Mechanisms of Retention

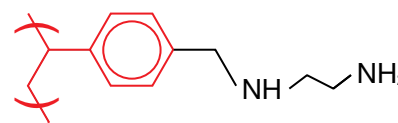
Weak Anion-Exchange



$\pi$ - $\pi$  Bonding




















Hydrophobic Interaction









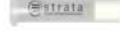

### Strata-X-AW

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	30 mg	<a href="#">8B-S038-TAK**</a>	1 mL (100/box)
	30 mg	<a href="#">8B-S038-TBJ</a>	3 mL (50/box)
	60 mg	<a href="#">8B-S038-UBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S038-EBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S038-ECH</a>	6 mL (30/box)
	200 mg	<a href="#">8B-S038-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S038-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S038-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S038-HCH</a>	6 mL (30/box)
<b>Giga<sup>™</sup> Tube</b>			
	500 mg	<a href="#">8B-S038-HDG</a>	12 mL (20/box)
	1 g	<a href="#">8B-S038-JDG</a>	12 mL (20/box)
	1 g	<a href="#">8B-S038-JEG</a>	20 mL (20/box)
	5 g	<a href="#">8B-S038-LFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	10 mg	<a href="#">8E-S038-AGB</a>	2 Plates/Box
	30 mg	<a href="#">8E-S038-TGB</a>	2 Plates/Box
	60 mg	<a href="#">8E-S038-UGB</a>	2 Plates/Box
<b>96-Well Microelution Plate</b>			
	2 mg	<a href="#">8M-S038-4GA</a>	ea

### Strata-XL-AW

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	30 mg	<a href="#">8B-S051-TAK</a>	1 mL (100/box)
	60 mg	<a href="#">8B-S051-UBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S051-EBJ</a>	3 mL (50/box)
	100 mg	<a href="#">8B-S051-ECH</a>	6 mL (30/box)
	200 mg	<a href="#">8B-S051-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S051-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S051-HCH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	2 g	<a href="#">8B-S051-KEG</a>	20 mL (20/box)

STRATA-X POLYMERIC SPE | SAMPLE PREPARATION

\*\*Tab-less tubes available. Contact Phenomenex for details.



For Large Volume Cleanup use Giga Tubes  
For SPE Vacuum Manifolds and Accessories, see pp. 79-82



Create a customized SPE method in under 1 minute.  
[www.phenomenex.com/mdtool](http://www.phenomenex.com/mdtool)



# Strata<sup>®</sup>-X Polymeric SPE

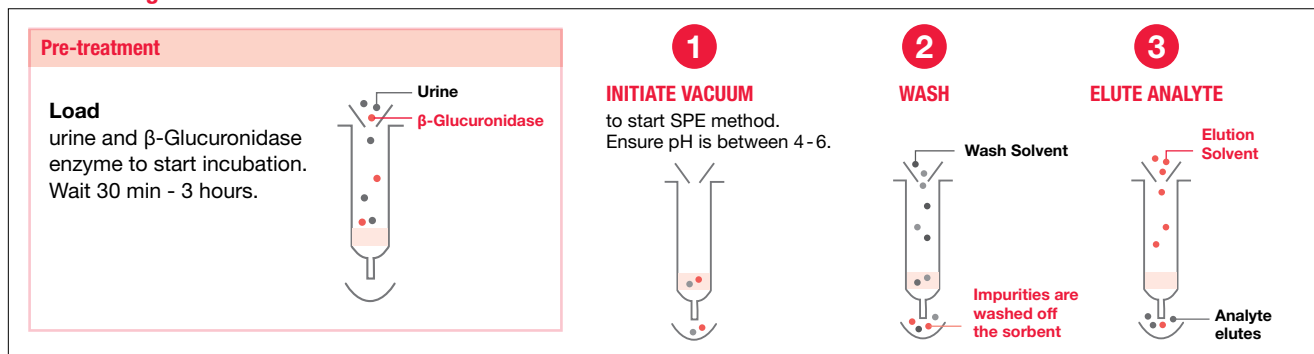
U.S. Patent No. 7,119,145

## Strata-X-Drug B and Strata-X-Drug N

Proprietary sorbents that are designed and quality controlled for basic and neutral drugs of abuse analysis. These sorbents do not require a conditioning/equilibrating step.

Now In-Well Hydrolysis Capabilities!

### Strata-X-Drug B Plus Protocol



### Strata-X-Drug B Starting Methods

	1	2	3
<b>Condition</b>	Opiates, 6-MAM, PCP, Amphetamines, Methadone, Healthcare Opiates, and Propoxyphene*	Marijuana Metabolites	Cocaine Metabolites
<b>Load</b>	Pre-treated urine sample	Pre-treated urine sample	Pre-treated urine sample
<b>Wash 1</b>	600 $\mu$ L of 100 mM Sodium acetate buffer (pH 5.0)	600 $\mu$ L of 100 mM Sodium acetate buffer (pH 5.0)	600 $\mu$ L of 0.1 N Hydrochloric acid
<b>Wash 2</b>	600 $\mu$ L Methanol	600 $\mu$ L of Acetonitrile/100 mM Sodium acetate buffer (pH 5.0) (30:70)	600 $\mu$ L Methanol
<b>Dry</b>	10 minutes under full vacuum	15 minutes under full vacuum	10 minutes under full vacuum
<b>Elute</b>	2x 300 $\mu$ L of Ethyl acetate/ Isopropanol/ Ammonium hydroxide (70:20:10)	2x 300 $\mu$ L of Ethyl acetate/Isopropanol (85:15)	2x 300 $\mu$ L of Ethyl acetate/Isopropanol/ Ammonium hydroxide (70:20:10)

\* Opiates, 6-MAM, PCP, Amphetamines, Methadone, Healthcare Opiates, and Propoxyphene can be extracted simultaneously or separately using the same SPE methodology.

Methods are written for 30 mg/well Strata-X-Drug B 96-well plate; however they can be scaled to accommodate smaller or larger sample sizes and sorbent masses.











### Strata-X-Drug N Starting Methods

	1	2
<b>Condition</b>	Barbiturates	Benzodiazepines
<b>Load</b>	Pre-treated urine sample	Pre-treated urine sample
<b>Wash 1</b>	600 $\mu$ L of 0.1 N Hydrochloric acid (HCl)	600 $\mu$ L of Acetonitrile/Water (20:80)
<b>Wash 2</b>	2x 600 $\mu$ L of Methanol/ 0.1 N HCl (30:70)	—
<b>Dry</b>	10 minutes under full vacuum	10 minutes under full vacuum
<b>Elute</b>	2x 300 $\mu$ L of Ethyl acetate/ Isopropanol (85:15)	2x 300 $\mu$ L of Ethyl acetate/ Isopropanol (85:15)

Methods are written for 30 mg/well Strata-X-Drug N 96-well plate; however they can be scaled to accommodate smaller or larger sample sizes and sorbent masses.



### Strata-X-Drug B

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	10 mg	<a href="#">8B-S128-AAK</a>	1 mL (100/box)
	30 mg	<a href="#">8B-S128-TAK</a>	1 mL (100/box)
	30 mg	<a href="#">8B-S128-TBJ</a>	3 mL (50/box)
	60 mg	<a href="#">8B-S128-UBJ</a>	3 mL (50/box)
	60 mg	<a href="#">8B-S128-UCH</a>	6 mL (30/box)
	60 mg	<a href="#">8B-S128-UCL</a>	6 mL (200/bag)
<b>Giga<sup>™</sup> Tube</b>			
	100 mg	<a href="#">8B-S128-EDG</a>	12 mL (20/box)
<b>96-Well Plate</b>			
	10 mg	<a href="#">8E-S128-AGB</a>	2 Plates/box
	30 mg	<a href="#">8E-S128-TGB</a>	2 Plates/box
	60 mg	<a href="#">8E-S128-UGB</a>	2 Plates/box









### Strata-X-Drug B Plus

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>96-Well Plate</b>			
	10 mg	<a href="#">8E-S128-AGB-P</a>	2 Plates/box
	30 mg	<a href="#">8E-S128-TGB-P</a>	2 Plates/box

### Strata-X-Drug N

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	30 mg	<a href="#">8B-S129-TAK</a>	1 mL (100/box)
	30 mg	<a href="#">8B-S129-TBJ</a>	3 mL (50/box)
	60 mg	<a href="#">8B-S129-UBJ</a>	3 mL (50/box)
	60 mg	<a href="#">8B-S129-UCH</a>	6 mL (30/box)
	60 mg	<a href="#">8B-S129-UCL</a>	6 mL (200/bag)
	100 mg	<a href="#">8B-S129-ECH</a>	6 mL (30/box)
<b>96-Well Plate</b>			
	10 mg	<a href="#">8E-S129-AGB</a>	2 Plates/box
	30 mg	<a href="#">8E-S129-TGB</a>	2 Plates/box

SAMPLE PREPARATION | STRATA-X-POLYMERIC SPE

## Strata Traditional Solid Phase Extraction (SPE) Sorbents

### Material Characteristics

Phase	Particle Size (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	Bonding	End Capping	Ionic Capacity (meq/g)
<b>Reversed Phase</b>							
C18-E	55	70	500	18.0	trifunctional	Yes	—
C18-U	55	70	500	17.0	trifunctional	No	—
C18-T	55	140	300	15.0	trifunctional	Yes	—
C8	55	70	500	10.5	trifunctional	Yes	—
Phenyl	55	70	500	10.5	trifunctional	Yes	—
<b>Normal Phase</b>							
CN	55	70	500	10.0	trifunctional	No	—
NH <sub>2</sub>	50	60	490	6.5	trifunctional	No	1.3
Silica (Si-1)	60	70	490	0.0	—	—	—
<b>Ion-Exchange</b>							
SCX	60	70	500	6.0	trifunctional	No	0.2
WCX	55	70	500	8.0	trifunctional	No	0.8
SAX	55	70	500	6.5	trifunctional	No	0.9
<b>Mixed-Mode</b>							
Screen-C GF	200	70	500	proprietary	trifunctional	—	—
Screen-C	55	70	500	proprietary	trifunctional	—	—
Basic Screen Large Reservoir Cartridge (LRC)	50	60	600	proprietary	trifunctional	—	—
Screen-A	55	70	500	proprietary	trifunctional	—	—
ABW	55	70	500	7.0	—	—	—
<b>Specialty</b>							
FL (Florisil®)	170	80	300	0.0	—	—	—
EPH (Extractable Petroleum Hydrocarbon)	120	30	proprietary	0.0	—	—	—
AL-N (Alumina-Neutral)	120	60	165	—	—	—	—
SDB-L	100	260	500	—	—	—	—
Eco-Screen	proprietary	proprietary	proprietary	—	—	—	—
Melamine	proprietary	proprietary	proprietary	proprietary	—	—	—
PAH	proprietary	proprietary	proprietary	proprietary	—	—	—
GCB (Graphitized Carbon Black)	proprietary	proprietary	70-100	proprietary	proprietary	proprietary	proprietary
PFAS (WAX/GCB)	proprietary	proprietary	proprietary	proprietary	proprietary	proprietary	proprietary

### Determine the Correct Sorbent Mass

<b>Silica-Based Sorbents</b> (Strata C18-E, C8, SCX, SAX, WCX, NH <sub>2</sub> , etc.)	
Sample Matrix	Sorbent Mass
Blood, serum, plasma	50 mg sorbent per 250 µL
Urine	50 mg sorbent per 500 µL
Filtered tissue homogenates	100 mg sorbent per 100 mg tissue
Environmental Samples	Sorbent Mass
Water (particulate-free) drinking	500 mg/100 mL - 500 mL sample
Water (particulate-laden) rivers, runoff, etc.	1 g/100 mL - 500 mL sample
Soil Extracts	1 g/100 g of soil extract

### Determine the Correct Sorbent Wash and Elution Volumes

Silica-Based Sorbent Mass	10 mg	50 mg	100 mg	150 mg	200 mg	500 mg	1 g	2 g	5 g	10 g
	Practical Minimum Wash and Elution Volume <b>4 bed volumes</b>	60 µL	300 µL	600 µL	900 µL	1.2 mL	3 mL	6 mL	12 mL	30 mL
Recommended Wash and Elution Volume <b>8 bed volumes</b>	120 µL	600 µL	1.2 mL	1.8 mL	2.4 mL	6 mL	12 mL	24 mL	60 mL	120 mL

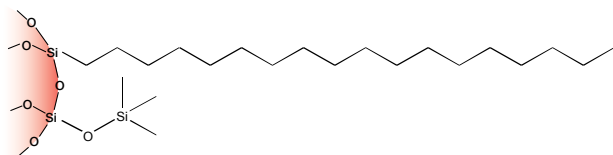


Create a customized SPE method in under 1 minute.  
[www.phenomenex.com/mdtool](http://www.phenomenex.com/mdtool)




## Reversed Phase Sorbents

### C18-E

End-capped C18 sorbent that offers strong hydrophobic retention with negligible secondary polar interactions from active silanol groups.



#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	50 mg	<a href="#">8B-S001-DAK</a>	1 mL (100/box)
	100 mg	<a href="#">8B-S001-EAK**</a>	1 mL (100/box)
	100 mg	<a href="#">8B-S001-EBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S001-FBJ**</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S001-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S001-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S001-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S001-JEG</a>	20 mL (20/box)
<b>Giga™ Tube</b>			
	500 mg	<a href="#">8B-S001-HDG</a>	12 mL (20/box)
	2 g	<a href="#">8B-S001-KDG</a>	12 mL (20/box)
	5 g	<a href="#">8B-S001-LEG</a>	20 mL (20/box)
	10 g	<a href="#">8B-S001-MFF</a>	60 mL (16/box)
	20 g	<a href="#">8B-S001-VFF</a>	60 mL (16/box)
	50 g	<a href="#">8B-S001-YSN</a>	150 mL (8/box)
	70 g	<a href="#">8B-S001-ZSN</a>	150 mL (8/box)
<b>96-Well Plate</b>			
	25 mg	<a href="#">8E-S001-CGB</a>	2 Plates/Box
	50 mg	<a href="#">8E-S001-DGB</a>	2 Plates/Box
	100 mg	<a href="#">8E-S001-EGB</a>	2 Plates/Box

#### On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata C18-E on-line extraction cartridge, 20 x 2.0 mm	<a href="#">00M-S039-B0-CB</a>	ea
Cartridge holder, 20 mm	<a href="#">CH0-5845</a>	ea

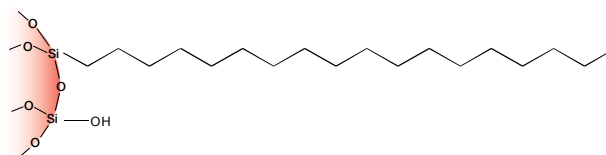
\*\*Tab-less tubes available. Contact Phenomenex for details.





For Large Volume Cleanup use Giga Tubes  
For SPE Vacuum Manifolds and Accessories, see pp. 79-82

### C18-U

C18 sorbent with no end-capping, giving the phase moderate hydrophobic selectivity with slight polar selectivity due to the active silanol groups.

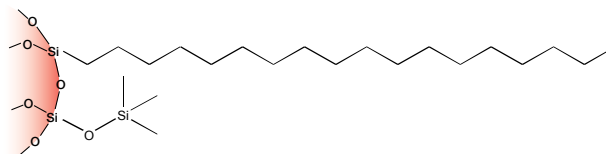


#### Ordering Information



Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S002-EAK</a>	1 mL (100/box)
	200 mg	<a href="#">8B-S002-FBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S002-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S002-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S002-JCH</a>	6 mL (30/box)
<b>96-Well Plate</b>			
	50 mg	<a href="#">8E-S002-DGB</a>	2 Plates/Box
	100 mg	<a href="#">8E-S002-EGB</a>	2 Plates/Box

### C18-T

A wide-pore C18 sorbent that offers strong hydrophobic selectivity and accommodates molecules up to 75 kD in size.



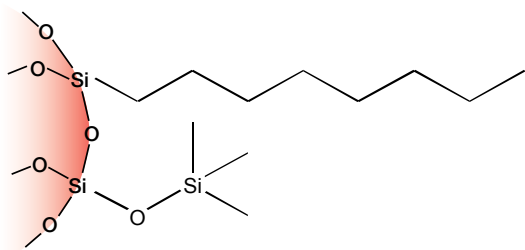
#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S004-EAK</a>	1 mL (100/box)
	200 mg	<a href="#">8B-S004-FBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S004-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S004-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S004-JCH</a>	6 mL (30/box)
<b>96-Well Plate</b>			
	50 mg	<a href="#">8E-S004-DGB</a>	2 Plates/Box

## Reversed Phase Sorbents

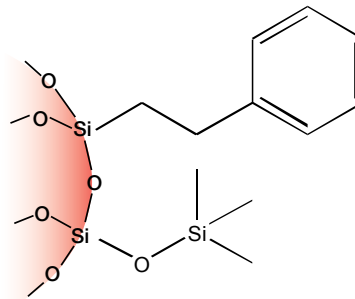
### C8

An end-capped C8 sorbent that offers moderate hydrophobic retention with negligible secondary polar interactions from active silanol groups.






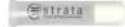
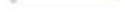




### Phenyl

A short alkyl chain with a phenyl group provides moderate hydrophobic selectivity and aromatic selectivity through  $\pi$ - $\pi$  interactions.










#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S005-EAK</a>	1 mL (100/box)
	200 mg	<a href="#">8B-S005-FBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S005-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S005-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S005-JCH</a>	6 mL (30/box)
<b>Giga™ Tube</b>			
	2 g	<a href="#">8B-S005-KDG</a>	12 mL (20/box)
	5 g	<a href="#">8B-S005-LEG</a>	20 mL (20/box)
	10 g	<a href="#">8B-S005-MFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	25 mg	<a href="#">8E-S005-CGB</a>	2 Plates/Box

#### On-line Extraction Cartridge

Description	Part Number	Unit/Box
Strata C8 on-line extraction cartridge, 20 x 2.0 mm	<a href="#">00M-S101-B0-CB</a>	ea
Cartridge holder, 20 mm	<a href="#">CH0-5845</a>	ea

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S006-EAK</a>	1 mL (100/box)
	200 mg	<a href="#">8B-S006-FBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S006-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S006-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S006-JCH</a>	6 mL (30/box)
<b>96-Well Plate</b>			
	25 mg	<a href="#">8E-S006-CGB</a>	2 Plates/Box
	100 mg	<a href="#">8E-S006-EGB</a>	2 Plates/Box

### RP (proprietary reversed phase on-line extraction column)

#### On-line Extraction Column

Description	Part Number	Unit/Box
50 x 1.0 mm	<a href="#">00B-S326-A0</a>	ea
50 x 0.5 mm	<a href="#">00B-S326-AF</a>	ea

#### On-line Extraction Cartridge

Description	Part Number	Unit/Box
20 x 2.1 mm	<a href="#">00M-S326-AN</a>	ea
Cartridge holder, 20 mm	<a href="#">CH0-5845</a>	ea



For Large Volume Cleanup use Giga Tubes  
For SPE Vacuum Manifolds and Accessories, see pp. 79-82



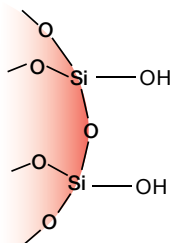
Don't see the size or format you want? Contact Phenomenex or your local distributor for other dimensions, Giga tubes, and bulk sorbent pricing, and part numbers.
















## Normal Phase Sorbents

### Silica (Si-1)

Unbonded silica particle that offers strong polar selectivity.



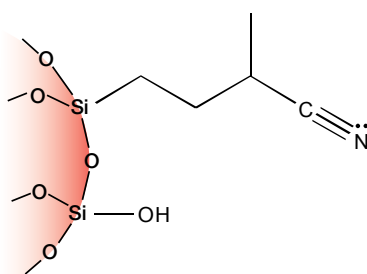
#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S012-EAK**</a>	1 mL (100/box)
	200 mg	<a href="#">8B-S012-FBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S012-HBJ**</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S012-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S012-JCH**</a>	6 mL (30/box)
<b>Giga™ Tube</b>			
	500 mg	<a href="#">8B-S012-HDG</a>	12 mL (20/box)
	1 g	<a href="#">8B-S012-JDG</a>	12 mL (20/box)
	2 g	<a href="#">8B-S012-KDG</a>	12 mL (20/box)
	5 g	<a href="#">8B-S012-LEG</a>	20 mL (20/box)
	10 g	<a href="#">8B-S012-MFF</a>	60 mL (16/box)
	20 g	<a href="#">8B-S012-VFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	50 mg	<a href="#">8E-S012-DGB</a>	2 Plates/Box
	100 mg	<a href="#">8E-S012-EGB</a>	2 Plates/Box

\*\*Tab-less tubes available. Contact Phenomenex for details.

### Cyano (CN)

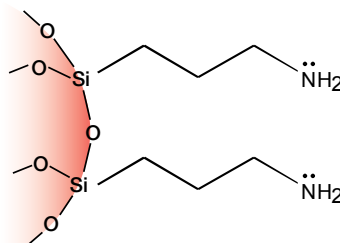
A polar phase with slight hydrophobic selectivity in reversed phase mode and moderate polar selectivity in normal phase mode.
















Phenomenex

### NH<sub>2</sub>/WAX






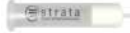

This amino phase offers strong polar selectivity and hydrogen bonding under normal phase conditions or can be used as a weak anion-exchange sorbent.



#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S009-EAK</a>	1 mL (100/box)
	200 mg	<a href="#">8B-S009-FBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S009-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S009-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S009-JCH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	500 mg	<a href="#">8B-S009-HDG</a>	12 mL (20/box)
	2 g	<a href="#">8B-S009-KDG</a>	12 mL (20/box)
	5 g	<a href="#">8B-S009-LEG</a>	20 mL (20/box)
	10 g	<a href="#">8B-S009-MFF</a>	60 mL (16/box)
	20 g	<a href="#">8B-S009-VFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	25 mg	<a href="#">8E-S009-CGB</a>	2 Plates/Box
	50 mg	<a href="#">8E-S009-DGB</a>	2 Plates/Box
	100 mg	<a href="#">8E-S009-EGB</a>	2 Plates/Box

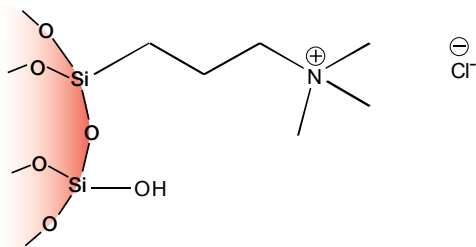
#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S007-EAK</a>	1 mL (100/box)
	200 mg	<a href="#">8B-S007-FBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S007-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S007-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S007-JCH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	2 g	<a href="#">8B-S007-KDG</a>	12 mL (20/box)
<b>96-Well Plate</b>			
	50 mg	<a href="#">8E-S007-DGB</a>	2 Plates/Box







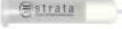






## Ion-Exchange Sorbents

### SAX (strong anion-exchange)

The quaternary amine phase remains positively charged under all conditions, giving a strong anion-exchange mechanism of retention.

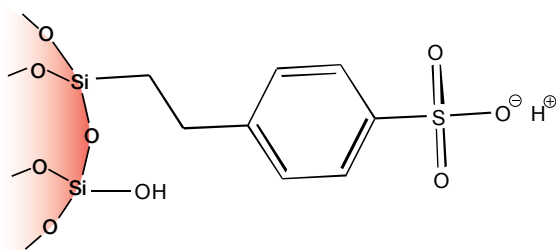


#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S008-EAK</a>	1 mL (100/box)
	100 mg	<a href="#">8B-S008-EBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S008-FBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S008-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S008-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S008-JCH</a>	6 mL (30/box)
<b>Giga™ Tube</b>			
	500 mg	<a href="#">8B-S008-HDG</a>	12 mL (20/box)
	2 g	<a href="#">8B-S008-KDG</a>	12 mL (20/box)
	5 g	<a href="#">8B-S008-LEG</a>	20 mL (20/box)
	20 g	<a href="#">8B-S008-VFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	25 mg	<a href="#">8E-S008-CGB</a>	2 Plates/Box
	50 mg	<a href="#">8E-S008-DGB</a>	2 Plates/Box
	100 mg	<a href="#">8E-S008-EGB</a>	2 Plates/Box

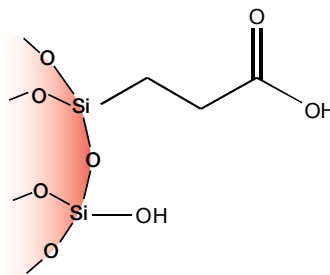
### SCX (strong cation-exchange)

A benzene sulfonic acid group is bonded to the surface of the silica particle, giving strong cation-exchange selectivity.












### WCX (weak cation-exchange)







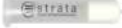






A carboxylic acid group is bonded to the surface of the silica particle, giving a weak cation-exchange selectivity.



#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S027-EAK</a>	1 mL (100/box)
	200 mg	<a href="#">8B-S027-FBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S027-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S027-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S027-JCH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	2 g	<a href="#">8B-S027-KDG</a>	12 mL (20/box)
	5 g	<a href="#">8B-S027-LEG</a>	20 mL (20/box)
<b>96-Well Plate</b>			
	25 mg	<a href="#">8E-S027-CGB</a>	2 Plates/Box
	50 mg	<a href="#">8E-S027-DGB</a>	2 Plates/Box

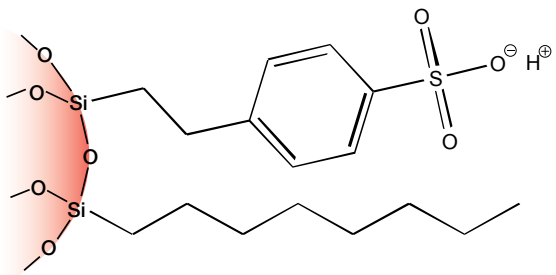
#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S010-EAK</a>	1 mL (100/box)
	100 mg	<a href="#">8B-S010-EBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S010-FBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S010-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S010-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S010-JCH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	2 g	<a href="#">8B-S010-KDG</a>	12 mL (20/box)
	5 g	<a href="#">8B-S010-LEG</a>	20 mL (20/box)
	10 g	<a href="#">8B-S010-MFE</a>	60 mL (16/box)
	20 g	<a href="#">8B-S010-VFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	25 mg	<a href="#">8E-S010-CGB</a>	2 Plates/Box
	50 mg	<a href="#">8E-S010-DGB</a>	2 Plates/Box
	100 mg	<a href="#">8E-S010-EGB</a>	2 Plates/Box

## Mixed-Mode Sorbents

### Screen-C

Incorporates the hydrophobic selectivity of a C8 phase and strong cation-exchange for the extraction of basic drugs from biological matrices.



#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S016-EAK**</a>	1 mL (100/box)
	100 mg	<a href="#">8B-S016-EBJ</a>	3 mL (50/box)
	150 mg	<a href="#">8B-S016-SBJ</a>	3 mL (50/box)
	150 mg	<a href="#">8B-S016-SCH</a>	6 mL (30/box)
	200 mg	<a href="#">8B-S016-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S016-FCH</a>	6 mL (30/box)
	300 mg	<a href="#">8B-S016-RBJ</a>	3 mL (50/box)
	300 mg	<a href="#">8B-S016-RCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S016-HCH</a>	6 mL (30/box)

#### 96-Well Plate

	50 mg	<a href="#">8E-S016-DGB</a>	2 Plates/Box
--	-------	-----------------------------	--------------

### Screen-C GF

Offers the selectivity of Screen-C in a gravity flow particle size for viscous samples.

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	500 mg	<a href="#">8B-S026-HBJ</a>	3 mL (50/box)

### Basic Screen Large Reservoir Cartridge (LRC)

Improved recovery of basic drugs from biological samples in a funnel shaped tube ideal for large sample volumes with minimal extraction solvents.

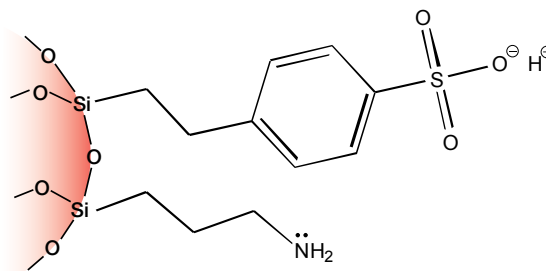
#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
Large Reservoir Cartridge	200 mg	<a href="#">8B-S327-FTH</a>	10 mL (30/box)

\*\*Tab-less tubes available. Contact Phenomenex for details.

### ABW

Offers a strong cation-exchange group and a weak anion-exchange group for the extraction or fractionation of complex mixtures.

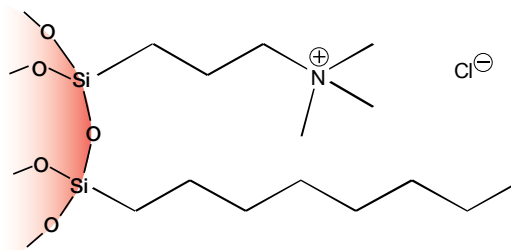


#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	200 mg	<a href="#">8B-S030-FBJ</a>	3 mL (50/box)
	1 g	<a href="#">8B-S030-JCH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	2 g	<a href="#">8B-S030-KDG</a>	12 mL (20/box)
	5 g	<a href="#">8B-S030-LEG</a>	20 mL (20/box)

### Screen-A

Incorporates the hydrophobic selectivity of a C8 phase and strong anion-exchange for the extraction of acidic drugs from biological matrices.



#### Ordering Information



Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S019-EAK</a>	1 mL (100/box)
	200 mg	<a href="#">8B-S019-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S019-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S019-HCH</a>	6 mL (30/box)

## Specialty Sorbents

### Alumina-N (AL-N)

A polar phase that allows for the extraction of polar compounds from food and environmental samples.


#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	500 mg	<a href="#">8B-S313-HBJ</a>	3 mL (50/box)
	1 g	<a href="#">8B-S313-JCH</a>	6 mL (30/box)
<b>Giga™ Tube</b>			
	2 g	<a href="#">8B-S313-KDG</a>	12 mL (20/box)

### Eco-Screen

This proprietary normal phase sorbent is topped with sodium sulfate to remove any excess water and used for the extraction of hydrocarbons from environmental samples, resulting in high recoveries of naphthalene.


#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	1 g	<a href="#">8B-S046-JBJ</a>	3 mL (50/box)

### GCB (graphitized carbon black)

This high quality non-porous graphitized carbon offers better retention of polar compounds compared to C8 or C18 silica products making it ideal for pesticide and PFAS extraction or pigment clean-up.



#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	200 mg	<a href="#">8B-S528-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S528-HCH</a>	6 mL (30/box)

### Florisol® (FL)

A modified silica sorbent that contains a magnesium ion, allowing for the retention of polar and halogenated compounds, like pesticides, from environmental samples.


#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	500 mg	<a href="#">8B-S013-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S013-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S013-JCH</a>	6 mL (30/box)
	2.5 g	<a href="#">8B-S013-8CH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	2 g	<a href="#">8B-S013-KDG</a>	12 mL (20/box)
	5 g	<a href="#">8B-S013-LEG</a>	20 mL (20/box)
	10 g	<a href="#">8B-S013-MFF</a>	60 mL (16/box)

### Melamine

A proprietary phase that allows for the simultaneous extraction of melamine and cyanuric acid out of food and biological samples.

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S049-EBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S049-FBJ</a>	3 mL (50/box)

### PFAS (WAX/GCB)

Consists of a stacked single cartridge solution filled with polymeric WAX (200 mg) and GCB sorbents (50 mg) that functions to meet the DOD guidelines for PFAS testing. It is ideal for complex biota matrices and reduces the need for multiple extraction tubes.

#### Ordering Information

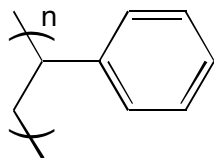
Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	200 mg / 50 mg	<a href="#">CS0-9207</a>	6 mL (30/box)
	500 mg / 50 mg	<a href="#">CS0-9208</a>	6 mL (200/box)









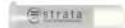

## Specialty Sorbents

### SDB-L (styrene-divinylbenzene)

A rugged polymer sorbent that is pH stable from 1-14 and offers hydrophobic and aromatic selectivity for reversed phase applications.






#### Ordering Information


Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	100 mg	<a href="#">8B-S014-EAK</a>	1 mL (100/box)
	200 mg	<a href="#">8B-S014-FBJ</a>	3 mL (50/box)
	200 mg	<a href="#">8B-S014-FCH</a>	6 mL (30/box)
	500 mg	<a href="#">8B-S014-HBJ</a>	3 mL (50/box)
	500 mg	<a href="#">8B-S014-HCH</a>	6 mL (30/box)
	1 g	<a href="#">8B-S014-JCH</a>	6 mL (30/box)
<b>Giga<sup>™</sup> Tube</b>			
	10 g	<a href="#">8B-S014-MFF</a>	60 mL (16/box)
<b>96-Well Plate</b>			
	50 mg	<a href="#">8E-S014-DGB</a>	2 Plates/Box

### PAH (Polycyclic Aromatic Hydrocarbons)

This proprietary sorbent was designed to provide high recoveries of polycyclic aromatic hydrocarbons from water (as specified in EPA Method 550.1) while simultaneously removing humic acids from the extract.

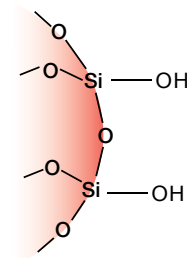
#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	750 mg	<a href="#">8B-S130-WCH</a>	6 mL (30/box)
	1.5 g	<a href="#">8B-S130-7CH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	5 g	<a href="#">8B-S124-LEG</a>	20 mL (20/box)


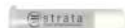

 Don't see the size or format you want? Contact Phenomenex or your local distributor for other dimensions, Giga tubes, and bulk sorbent pricing and part numbers.

### EPH (Extractable Petroleum Hydrocarbons)

This specialty normal phase sorbent was developed for the fractionation of aliphatic and aromatic hydrocarbons from environmental samples.




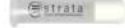
#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	500 mg	<a href="#">8B-S031-HBJ</a>	3 mL (50/box)
<b>Giga Tube</b>			
	5 g	<a href="#">8B-S031-LEG</a>	20 mL (20/box)
<b>Teflon<sup>®</sup> Giga Tube</b>			
	5 g	<a href="#">8B-S031-LEG-T</a>	20 mL (20/box)

### Sodium Sulfate

A specialized sorbent that is used for the removal of aqueous residues from organic solutions in an effort to reduce blow-down time.

#### Ordering Information

Format	Sorbent Mass	Part Number	Unit
<b>Tube</b>			
	1 g	<a href="#">8B-S124-JCH</a>	6 mL (30/box)
<b>Giga Tube</b>			
	5 g	<a href="#">8B-S124-LEG</a>	20 mL (20/box)

## Biozen MagBeads

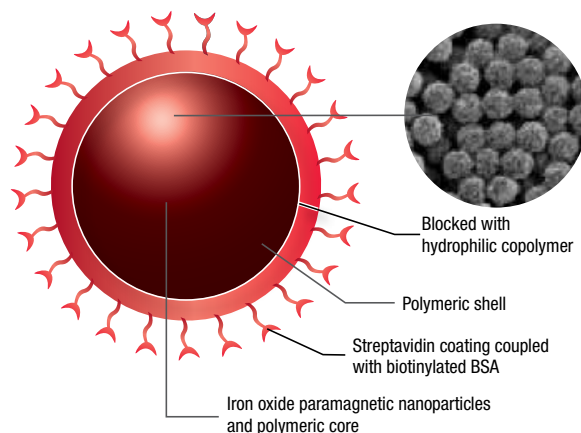
### Streptavidin Coated

Uniform and efficient magnetic particles result in faster and reliable purification, clean-up, and isolation of proteins and peptide molecules.

- Excellent for binding biotinylated capture antibodies
- 1.0µm Streptavidin coated magnetic beads
- Available in 25 mg, 50 mg, and 500 mg formats

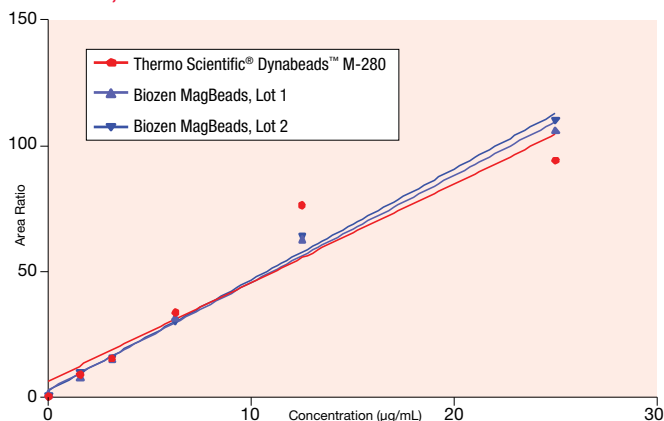
### Material Characteristics

Bead Type	Bead Diameter	Outside Coating Type	Biotin Binding Capacity	Coating Specification	Concentration	Available Formats
Iron coated	1 µm	Streptavidin	> 200 pmol Biotin/mg	Tosyl-activated, blocked with hydrophilic copolymer	20 mg/mL	25 mg, 50 mg, 500 mg



Immunocapture Bead	Correlation Coefficient
M-280	0.9176
Biozen MagBeads, Lot 1	0.9914
Biozen MagBeads, Lot 2	0.9941

Area Ratio, Rituximab



### Ordering Information

Product	Coating	Formats	Part No.	Concentration	Bead Size
Biozen MagBeads	Streptavidin	25 mg (1.25 mL)	<a href="#">KS0-9531</a>	20 mg/mL	0.95-1.15 µm
		50 mg (2.5 mL)	<a href="#">KS0-9532</a>		
		500 mg (25 mL)	<a href="#">KS0-9533</a>		



Learn More: [www.phenomenex.com/BiozenMagBeads](http://www.phenomenex.com/BiozenMagBeads)

## N-Glycan Clean-Up

### HILIC Solid Phase Extraction (SPE)

High recovery of labeled released N-glycans in a microelution format allowing for streamlined processing and clean-up of small sample volumes.



### Ordering Information

Biozen Solid Phase Extraction	Format	Sorbent Mass	Part No.	Unit
Biozen N-Glycan Clean-Up	Microelution 96-Well Plate	5 mg/well	<a href="#">8M-S009-NGA</a>	1/box

## Presston 1000 Positive Pressure Manifold

### Your Newest Solution to Increased Productivity

Presston 1000 is a positive pressure manifold designed to make sample preparation processing easy and consistent. It applies pressure from above to push liquid through sample preparation sorbents to provide uniform flow rates when processing samples. Presston 1000 is compatible with standard 96-well plates, including microelution plates, and can even be used with 1 mL tubes with the addition of a tabless tube holder (Part No.: [AH0-9055](#)).

- **Pneumatic Handling**
- **Consistent Flow Rates**
- **Safe and Easy-to-Use**

### Do More with Presston 1000

Streamline your 96-well plate processing for easier sample preparation with a pneumatic positive pressure manifold.

**Compatible with:**



#### Sleek, Low Profile Design

Width: 11.8", Depth: 15", Height: 14.8"

#### Never Lose Pressure

Always maintain a tight seal between the manifold and 96-well plate

#### Easily Load Samples

Moveable locator plate makes sample loading and cleaning easy



#### Safer Lab Environment

Use both hands to move manifold shield, ensuring enhanced safety



#### Simple to Use

Pneumatic manifold movement reduces manual labor with more reliable extractions

#### Determine Your Operating Pressure

Conveniently monitor and maintain a consistent pressure

#### Know your Step

Simply move the "SPE Procedure Indicator" to the correct step to stay on track of your extraction.



#### Ensure Reliability

Phenomenex warrants the Presston 1000 Positive Pressure Manifold against defects in materials and workmanship under normal installation, use, and maintenance for a period of 12 months following delivery. Please visit [www.phenomenex.com/presstonwarranty](http://www.phenomenex.com/presstonwarranty) for complete warranty information.

#### Ordering Information

Part No.	Description	Unit
<b>Presston 1000 Positive Pressure Manifold</b>		
<a href="#">AH1-7033</a>	SPE Positive Pressure Manifold, 96-Well Plate, complete assembly	ea

# Sample Preparation Accessories

## Vacuum Manifolds

### SPE Tube Vacuum Manifold

- Process up to 12 or 24 samples at one time
- Process up to 10 large volume samples at one time
- Female Luer inlets fit all male Luer tipped SPE tubes and cartridges

#### Ordering Information

Part No.	Description	Unit
<b>24 – Position Vacuum Manifold*</b>		
<a href="#">VM24</a>	SPE 24-Position Vacuum Manifold Set, complete assembly	ea
<b>24 – Position Vacuum Manifold Replacement Parts</b>		
<a href="#">A82404</a>	SPE Gasket	ea
<a href="#">VM24-J</a>	SPE Collection Rack	ea
<a href="#">A82411</a>	SPE 24-Position Vacuum Waste Container, polypropylene	ea
<a href="#">A81213</a>	SPE Luer Stopcocks	12/pk
<b>12 – Position Vacuum Manifold*</b>		
<a href="#">VM12</a>	SPE 12-Position Vacuum Manifold Set, complete assembly	ea
<b>12 – Position Vacuum Manifold Replacement Parts</b>		
<a href="#">A80106</a>	SPE Gasket	ea
<a href="#">A81216</a>	SPE Collection Rack Assembly, including plates, legs and clips	ea
<a href="#">A81215</a>	SPE 12-Position Vacuum Waste Container, polypropylene	ea
<a href="#">A81213</a>	SPE Luer Stopcocks	12/pk

Labels in diagram: Stopcock, Glass Chamber, Collection Rack, Vacuum Gauge, Valve Assembly, Space for collection tubes.

- Fits 13 mm and 16 mm test tubes up to 125 mm in height.
- A flow rate of 1 – 3 drops per second (1 – 3 mL /min) is recommended during the loading and elution steps for typical small volume samples (< 5 mL). At these critical steps the analytes are chemically interacting with the sorbent.
- Large volume samples (> 100 mL) in large cartridges (>1 gram) may be processed at flow rates between 5 – 10 mL/minute.
- Conditioning and Wash steps are generally not flow critical.
- Individual stopcocks are typically not needed when using the Strata-X family of sorbents. They are very forgiving of improper flow rates and are truly resistant to deconditioning effects caused by excessive drying during the method.
- Reversed phase methods are more forgiving of fast flow rates than ion-exchange or normal phase.

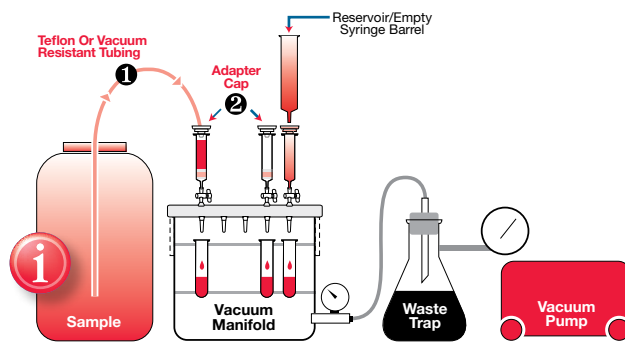
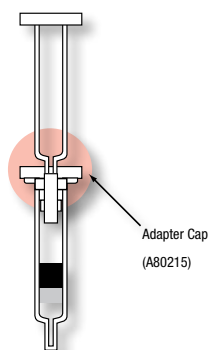
**Compatible with:**

ACCESSORIES | SAMPLE PREPARATION

## Processing Large Sample Volumes

### Have Large Sample Volume but Need a Small Bed Mass?

Use an adapter cap to attach another SPE tube, which can be used to increase the reservoir size for washing or eluting solvents.



Description	Part No.
① Teflon or Vacuum Resistant Tubing (1/8 inch O.D.)	<a href="#">AT0-2956</a>
② Adapter Cap	<a href="#">A80215</a>



\* Manifolds include: Vacuum-tight glass chamber, vacuum gauge assembly, polypropylene lid with gasket, male and female luers and yellow end plugs, stopcock valves, collection rack assemblies, polypropylene needles, lid support legs. Waste container included with 12-position manifold.

# Sample Preparation Accessories

## Vacuum Manifolds

### 96-Well Plate Vacuum Manifold

- Includes vacuum valve attachment and two collection plate spacer inserts
- Made of durable acrylic
- Designed to accommodate 96-well plates, collection plates, protein precipitation plates, and filtration plates

#### Ordering Information


##### 96-Well Plate Manifold\*\*

Part No.	Description	Unit
<a href="#">AH0-8950</a>	96-Well Plate Manifold, Universal w/vacuum gauge	ea

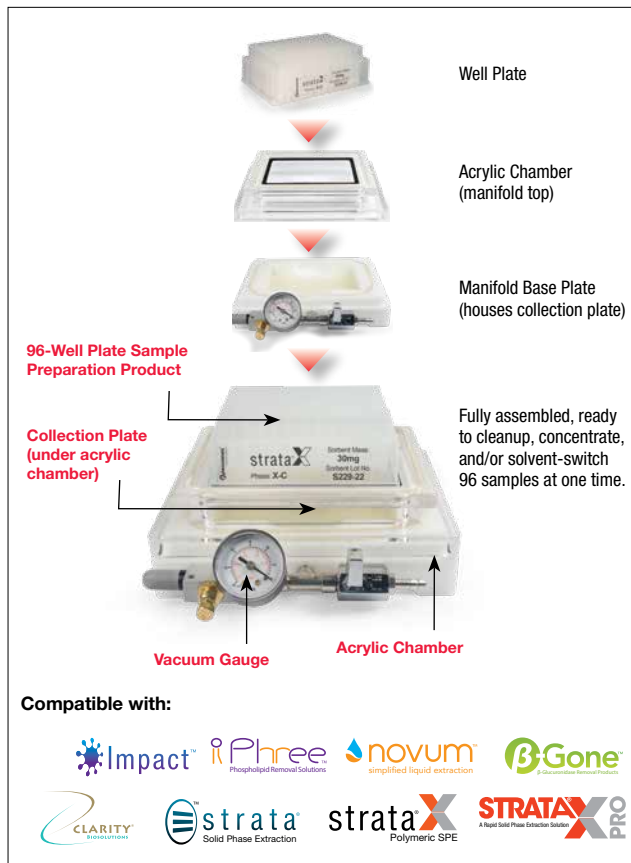
#### Replacement Parts

Part No.	Description	Unit
<a href="#">AH0-7285</a>	96-Well Plate Manifold Replacement Gasket, Flat (to fit between acrylic chamber and 96-well plate), black	ea
<a href="#">AH0-7198</a>	96-Well Plate Manifold Replacement Gasket, Profile, (to fit between acrylic chamber and manifold base), white	ea
<a href="#">AH0-8637</a>	Reservoir, Single Well, High Profile, 96 Bottom Troughs	25/pk

\*\*Manifold, compatible with 2 mL Impact plate, Novum SLE 96-well plate, Phree Phospholipid Removal plate, Strata, and Strata-X 96-well plate formats.

 Collection plate spacers accommodate various collection plate heights.

## Vacuum Manifold Accessories for Tube and 96-Well Plates



#### Compatible with:



#### Ordering Information

##### General Vacuum Manifold Accessories

Part No.	Description	Unit
<a href="#">A80215</a>	Adapter Caps for 1, 3 and 6 mL SPE tubes, polyethylene, with Luer tip	12/pk
<a href="#">A80100</a>	SPE Manifold Needles, polypropylene	12/pk
<a href="#">A80102</a>	SPE Manifold Needles, stainless steel	12/pk
<a href="#">A80104</a>	Female Luer Fittings	12/pk
<a href="#">A80105</a>	Male Luer Fittings	12/pk
<a href="#">A01003</a>	Vacuum Gauge and Valve Assembly	ea
<a href="#">A80111</a>	Retaining Clips	12/pk
<a href="#">A80117</a>	Plugs/ Dust Caps	12/pk
<a href="#">A81213</a>	Stopcocks	12/pk

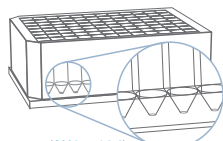


# Sample Preparation Accessories

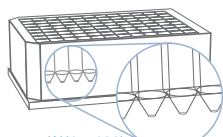
## Collection Plates

- Available in conical V- and round-bottom formats
- Made of chemically inert polypropylene
- Available in 350 µL, 1 and 2 mL volumes

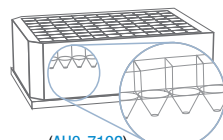
Conical V- and round-bottom for maximized sample delivery



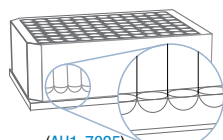
(AH0-7194)  
2 mL Square Well



(AH0-7193)  
1 mL Square Well



(AH0-7192)  
350 µL Square Well



(AH1-7025)  
1 mL Round Well

### Ordering Information Collection Plates\*

Part No.	Description	Unit
<a href="#">AH0-7192</a>	350 µL/well 96-Square Well Conical V-bottom Collection Plate	50/pk
<a href="#">AH0-7193</a>	1 mL/well 96-Square Well Conical V-bottom Collection Plate	50/pk
<a href="#">AH1-7025</a>	1 mL/well 96-Round Well Round Bottom 7 mm Collection Plate	50/pk
<a href="#">AH0-7194</a>	2 mL/well 96-Square Well Conical V-bottom Collection Plate	50/pk
<a href="#">AH0-8636</a>	2 mL/well 96-Round Well Round Bottom 8 mm Collection Plate	50/pk
<a href="#">AH0-9332</a>	1.2 mL/well 96-Round Well Round Bottom Collection Plate	50/pk
<a href="#">AH0-9333</a>	0.5 mL/well 96-Round Well V-Bottom, 7 mm Collection Plate, Sterile	50/pk
<a href="#">AH0-9341</a>	0.5 mL/well 96-Round Well Conical Bottom 7 mm Collection Plate	50/pk
<a href="#">AH1-7036</a>	2 mL/well Low-Bind 96-Round Well Conical Bottom (deep well, polypropylene, glass lined) Collection Plate	120/pk

## Filtration Plate

- Available in 0.7 µm membrane porosity
- Inert surface eliminates non-specific binding for maximized results
- Cost effective solution to meet all filtration goals

### Ordering Information

#### Filtration Plates

Part No.	Description	Unit/Box
<a href="#">AF0-8300</a>	0.7 µm Glass Fiber 96-Well Filtration Plate	2

## Sealing Mats and Tape

- Fits all Phenomenex 96-well plates, square-well collection plates, round-well collection plates, protein precipitation plates, and filtration plates
- Pierceable and Pre-Slit available



(AH0-7195)

### Ordering Information

#### Sealing Mats\*

Part No.	Description	Unit
<a href="#">AH0-8597</a>	Sealing Mats, Pierceable, 96-Square Well, Silicone	50/pk
<a href="#">AH0-8598</a>	Sealing Mats, Pre-Slit, 96-Square Well, Silicone	50/pk
<a href="#">AH0-8631***</a>	Sealing Mats, Pierceable, 96-Round Well 7 mm, Silicone	50/pk
<a href="#">AH0-8632***</a>	Sealing Mats, Pre-Slit, 96-Round Well 7 mm, Silicone	50/pk
<a href="#">AH0-8633**</a>	Sealing Mats, Pierceable, 96-Round Well 8 mm, Silicone	50/pk
<a href="#">AH0-8634**</a>	Sealing Mats, Pre-Slit, 96-Round Well 8 mm, Silicone	50/pk
<a href="#">AH0-8199</a>	Sealing Mats, Pierceable, 96 Square Well, Santoprene™	100/pk
<a href="#">AH0-7195</a>	Sealing Mats, Pierceable, 96-Square Well, Ethylene Vinyl Acetate (EVA)	50/pk
<a href="#">AH0-7362</a>	Sealing Tape Pad	10/pk

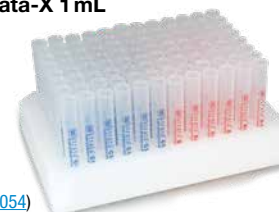
\*Square well sealing mats compatible with 2 mL Impact plates, Novum SLE 96-well plate, Phree Phospholipid Removal plate, Strata and Strata-X 96-well plates, and 96 square well collection plates.

\*\*8 mm round-well sealing mats compatible with 2 mL round-well 8 mm collection plates ([AH0-8636](#))

\*\*\*7 mm round-well sealing mats compatible with 1 mL round-well 7 mm collection plates ([AH0-7279](#))

## 96-Well Tab-less Tube Holders

- Easily process partial plates
- Arrange multiple SPE sorbents in one plate
- Easily replace a single SPE tube
- Compatible with Strata® and Strata-X 1 mL tab-less SPE tubes



(AH0-9054)

### Ordering Information

#### 96-Well Tab-less Tube Holders

Part No.	Description	Unit
<a href="#">AH0-9054</a>	96-Well 1 mL Tab-less Tube Holder for use with the 96-Well plate vacuum manifold ( <a href="#">AH0-8950</a> )	ea
<a href="#">AH0-9055</a>	96-Well 1 mL Tab-less Tube Holder for use with positive pressure manifolds	ea

## Why Choose roQ QuEChERS?

Improved with you in mind, roQ picks up where other QuEChERS kits fail. The unique design of the roQ QuEChERS kits eliminates common problems seen with current QuEChERS kits on the market.



### Ease of Use

#### Built-in Removable Rack\*



#### Stand Alone Extraction Tubes



#### Easy Pour Salt Packets



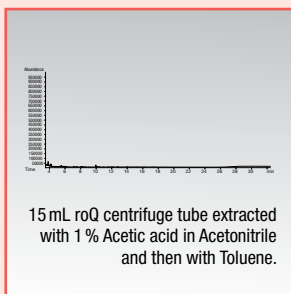
\*Applies to roQ Extraction Kits (excludes dSPE Kits)

### Quality

#### Leak-Free Tubes



#### Low Leachate Tubes



#### Quality Management System Certified

- Validates processes to be fully established, functional, and meet international standards
- MSDS and Certificate of Analysis (CoA) available for all kits
- roQ QuEChERS kits are guaranteed for quality

QUALITY  
MANAGEMENT SYSTEM  
CERTIFIED BY DNV GL  
= 9001:2015 =

\*Applies to roQ Extraction Kits (excludes dSPE Kits)

### Technical Support



#### Sample Preparation Support at Your Fingertips

- Dedicated sample preparation team available to assist your method development needs
- Expertise in sample preparation and solid phase extraction
- Access to up-to-date sample preparation applications

#### Free Method Development Services

- Let our specialists help you with new method development, method optimization, and validation, including FDA compliant and GMP compliant validation.

For more details on roQ QuEChERS Kits:  
[www.phenomenex.com/roQ](http://www.phenomenex.com/roQ)

## Select Your roQ QuEChERS Kit ( Quick - Easy - Cheap - Effective - Rugged - Safe )

### Step 1

#### Extraction\*

QuEChERS can be performed by following 3 different methods: The AOAC 2007.01 Method, the EN 15662 Method, or the Original Non-Buffered Method.

#### Select Your roQ Extraction Kit

AOAC 2007.01 Method	Original Non-Buffered Method	EN 15662 Method
6.0 g MgSO <sub>4</sub> , 1.5 g NaOAc <a href="#">KS0-8911</a>	4.0 g MgSO <sub>4</sub> , 1.0 g NaCl <a href="#">KS0-8910</a>	4.0 g MgSO <sub>4</sub> , 1.0 g NaCl, 1.0 g SCTD, 0.5 g SCDS <a href="#">KS0-8909</a>
	6.0 g MgSO <sub>4</sub> , 1.5 g NaCl <a href="#">KS0-8912</a>	

### Step 2

#### Clean Up/dSPE\*\*

	AOAC 2007.01		EN 15662	
	1 mL	8 mL	1 mL	6 mL
<b>General</b> 	150 mg MgSO <sub>4</sub> 50 mg PSA <a href="#">KS0-9511</a>	1200 mg MgSO <sub>4</sub> 400 mg PSA <a href="#">KS0-9515</a>	150 mg MgSO <sub>4</sub> 25 mg PSA <a href="#">KS0-9503</a>	900 mg MgSO <sub>4</sub> 150 mg PSA <a href="#">KS0-9507</a>
<b>Fats and Waxes</b> 	150 mg MgSO <sub>4</sub> 50 mg PSA 50 mg C18E <a href="#">KS0-9512</a>	1200 mg MgSO <sub>4</sub> 400 mg PSA 400 mg C18E <a href="#">KS0-9516</a>	150 mg MgSO <sub>4</sub> 25 mg PSA 25 mg C18E <a href="#">KS0-9504</a>	900 mg MgSO <sub>4</sub> 150 mg PSA 150 mg C18E <a href="#">KS0-9508</a>
<b>Pigmented</b> 	150 mg MgSO <sub>4</sub> 50 mg PSA 50 mg GCB <a href="#">KS0-9513</a>	1200 mg MgSO <sub>4</sub> 400 mg PSA 400 mg GCB <a href="#">KS0-9517</a>	150 mg MgSO <sub>4</sub> 25 mg PSA 2.5 mg GCB <a href="#">KS0-9505</a>	900 mg MgSO <sub>4</sub> 150 mg PSA 15 mg GCB <a href="#">KS0-9509</a>
<b>Highly Pigmented</b> 	—	—	150 mg MgSO <sub>4</sub> 25 mg PSA 7.5 mg GCB <a href="#">KS0-9506</a>	900 mg MgSO <sub>4</sub> 150 mg PSA 45 mg GCB <a href="#">KS0-9510</a>
<b>Pigments and Fats</b> 	150 mg MgSO <sub>4</sub> 50 mg PSA 50 mg GCB 50 mg C18E <a href="#">KS0-9514</a>	1200 mg MgSO <sub>4</sub> 400 mg PSA 400 mg GCB 400 mg C18E <a href="#">KS0-9518</a>	—	—

\*All roQ Extraction kits contain fifty easy-pour salt packets and fifty 50 mL stand-alone centrifuge tubes.

\*\*All roQ dSPE kits contain pre-weighed sorbents/salts inside 2 mL or 15 mL centrifuge tubes.

#### Salts and Sorbents used in roQ Kits

##### Extraction:

- Magnesium Sulfate (MgSO<sub>4</sub>)
- Sodium Acetate (NaOAc)
- Sodium Chloride (NaCl)
- Sodium Citrate Tribasic Dihydrate (SCTD)
- Sodium Citrate Dibasic Sesquihydrate (SCDS)

##### Clean Up/dSPE:

- Magnesium Sulfate (MgSO<sub>4</sub>)
- Primary/Secondary Amine (PSA)
- Endcapped C18 Sorbent (C18E)
- Graphitized Carbon Black (GCB)

### roQ™ Extraction Kits

Extraction kits contain fifty easy-pour salt packets and fifty 50 mL stand-alone centrifuge tubes

#### Ordering Information

Description	Unit	Part No.
<b>AOAC 2007.01 Method Extraction Kits</b>		
6.0 g MgSO <sub>4</sub> , 1.5 g NaOAc	50/pk	<a href="#">KSO-8911*</a>
<b>EN 15662 Method Extraction Kits</b>		
4.0 g MgSO <sub>4</sub> , 1.0 g NaCl, 1.0 g SCTD, 0.5 g SCDS	50/pk	<a href="#">KSO-8909*</a>
<b>Original Non-Buffered Method Extraction Kits</b>		
4.0 g MgSO <sub>4</sub> , 1.0 g NaCl	50/pk	<a href="#">KSO-8910</a>
6.0 g MgSO <sub>4</sub> , 1.5 g NaCl	50/pk	<a href="#">KSO-8912</a>

\*AOAC and EN Extraction Kits also available in traditional non-collared 50 mL centrifuge tubes, Part No.: [KSO-8911-NC](#) and [KSO-8909-NC](#)

### roQ dSPE Kits

dSPE kits contain pre-weighed sorbents/salts inside 2 mL or 15 mL centrifuge tubes

#### Ordering Information

Description	Unit	Part No.
<b>2 mL dSPE Kits</b>		
150 mg MgSO <sub>4</sub> , 25 mg PSA, 25 mg C18E	100/pk	<a href="#">KSO-9504</a>
150 mg MgSO <sub>4</sub> , 25 mg PSA, 2.5 mg GCB	100/pk	<a href="#">KSO-9505</a>
150 mg MgSO <sub>4</sub> , 25 mg PSA, 7.5 mg GCB	100/pk	<a href="#">KSO-9506</a>
150 mg MgSO <sub>4</sub> , 25 mg PSA	100/pk	<a href="#">KSO-9503</a>
150 mg MgSO <sub>4</sub> , 50 mg PSA, 50 mg C18E, 50 mg GCB	100/pk	<a href="#">KSO-9514</a>
150 mg MgSO <sub>4</sub> , 50 mg PSA, 50 mg C18E	100/pk	<a href="#">KSO-9512</a>
150 mg MgSO <sub>4</sub> , 50 mg PSA, 50 mg GCB	100/pk	<a href="#">KSO-9513</a>
150 mg MgSO <sub>4</sub> , 50 mg PSA	100/pk	<a href="#">KSO-9511</a>
<b>15 mL dSPE Kits</b>		
900 mg MgSO <sub>4</sub> , 150 mg PSA, 150 mg C18E	100/pk	<a href="#">KSO-9508</a>
900 mg MgSO <sub>4</sub> , 150 mg PSA, 15 mg GCB	100/pk	<a href="#">KSO-9509</a>
900 mg MgSO <sub>4</sub> , 150 mg PSA, 45 mg GCB	100/pk	<a href="#">KSO-9510</a>
900 mg MgSO <sub>4</sub> , 150 mg PSA	100/pk	<a href="#">KSO-9507</a>
1200 mg MgSO <sub>4</sub> , 400 mg PSA, 400 mg C18E, 400 mg GCB	100/pk	<a href="#">KSO-9518</a>
1200 mg MgSO <sub>4</sub> , 400 mg PSA, 400 mg C18E	100/pk	<a href="#">KSO-9516</a>
1200 mg MgSO <sub>4</sub> , 400 mg PSA, 400 mg GCB	100/pk	<a href="#">KSO-9517</a>
1200 mg MgSO <sub>4</sub> , 400 mg PSA	100/pk	<a href="#">KSO-9515</a>

### roQ Extraction Salt Packets

Salt packets only. Centrifuge tubes not included.


#### Ordering Information

Description	Unit	Part No.
<b>AOAC 2007.01 Method Extraction Packets</b>		
6.0 g MgSO <sub>4</sub> , 1.5 g NaOAc	50/pk	<a href="#">AHO-9043</a>
<b>EN 15662 Method Extraction Packets</b>		
4.0 g MgSO <sub>4</sub> , 1.0 g NaCl, 1.0 g SCTD, 0.5 g SCDS	50/pk	<a href="#">AHO-9041</a>
<b>Original Non-Buffered Method Extraction Packets</b>		
4.0 g MgSO <sub>4</sub> , 1.0 g NaCl	50/pk	<a href="#">AHO-9042</a>
6.0 g MgSO <sub>4</sub> , 1.5 g NaCl	50/pk	<a href="#">AHO-9044</a>

### Bulk roQ QuEChERS Sorbents

#### Ordering Information

Phase	10 g	100 g
C18-E	—	<a href="#">04G-4348</a>
GCB (Graphitized Carbon Black)	<a href="#">04D-4615</a>	<a href="#">04G-4615</a>
PSA	—	<a href="#">04G-4610</a>

 We're here to help!  
Speak with your Sample Preparation Specialist

For Additional Food Resources Visit:  
[www.phenomenex.com/food](http://www.phenomenex.com/food)

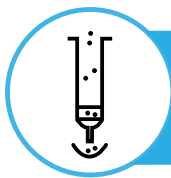
[www.phenomenex.com/roQ](http://www.phenomenex.com/roQ)

- Applications
- Technical Notes
- Tutorials and Webinars
- Tools
- And More



# Sample Preparation Resources

## Resources



### SPE Basics Overview

A Simple Approach to Fast and Practical Solid Phase Extraction (SPE) Method Development



### Search Hundreds of Applications

Know the name of your analyte? Then start here. Immediately find key Sample Prep applications for small molecules and biomolecules by entering the name or the synonym of the analyte.



### SPE Method Development Tool

Develop SPE methods for sample cleanup and concentration in under a minute



### Syringe Filter Finder

3-step tool designed to help you find the appropriate syringe filter to help you successfully remove particulates from your sample matrix

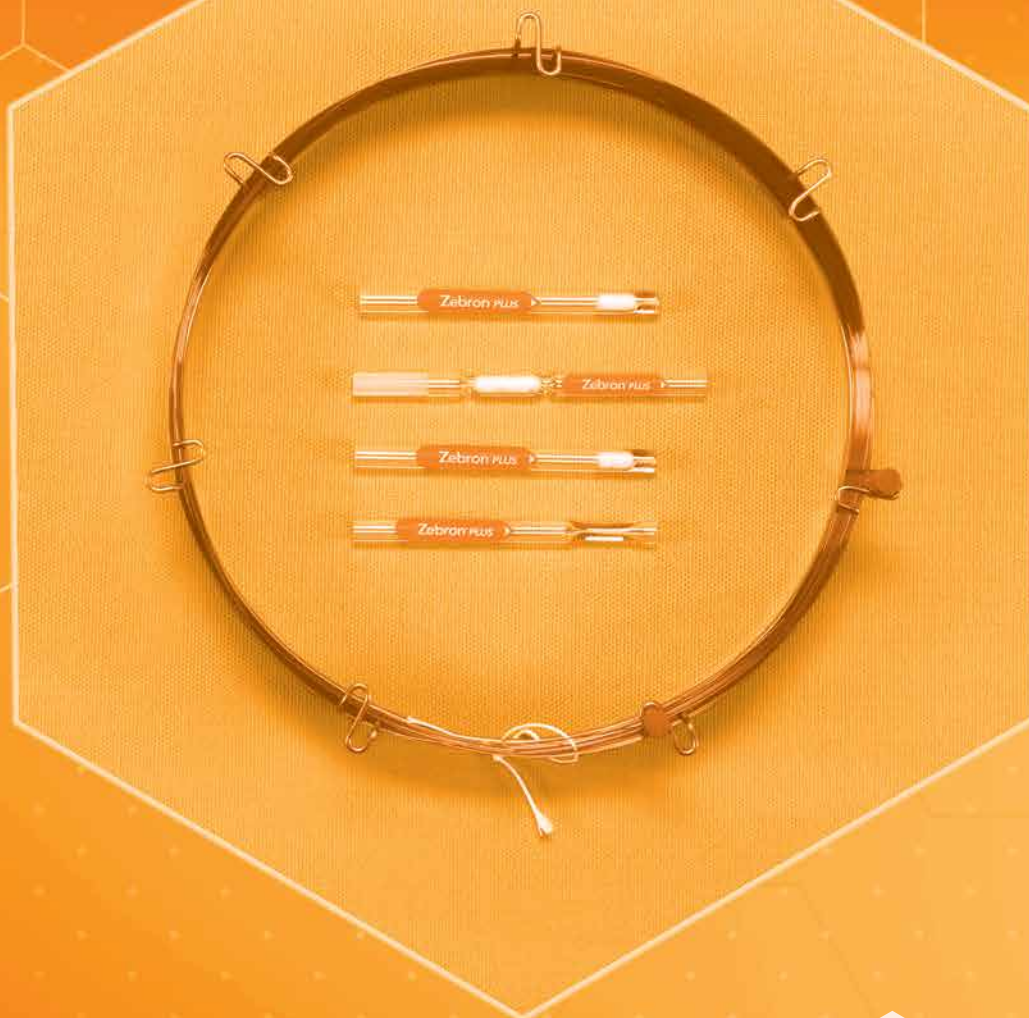


### Sample Preparation Support at Your Fingertips

Dedicated sample preparation team available to assist your method development needs

Visit: [www.phenomenex.com/SamplePrep](http://www.phenomenex.com/SamplePrep)





87 - 185

## GC Column Selection Guidelines

The Master Resolution Equation.....	88
Choosing Your Selectivity.....	88-90
Choosing Your Dimensions.....	91-92
Column Selection Charts.....	93-99

## Zebtron GC Columns

Meet Your GC Column Family.....	101
Zebtron Unlimited.....	102-131
Zebtron PLUS.....	132-143
Zebtron Inferno™.....	144-151
Zebtron Essentials.....	152-162
Zebtron Guard Columns.....	163-164

## GC Accessories

Inlet Supplies.....	165-180
Column Unions & Splitters.....	181
Gas Management.....	182-183
Gas & Moisture Traps.....	184
Tools & Maintenance Kits.....	184
GC Column Check Mixes.....	185

“The chromatography quality and performance are excellent [with Zebtron]. Column bleed is minimal at 320 °C. Peak quality remains good for 5 to 6 months averaging 40 injections in a 24 hour period, 6 to 7 days per week.”

**Kevin Walkup**  
Specialized Assays, Inc.

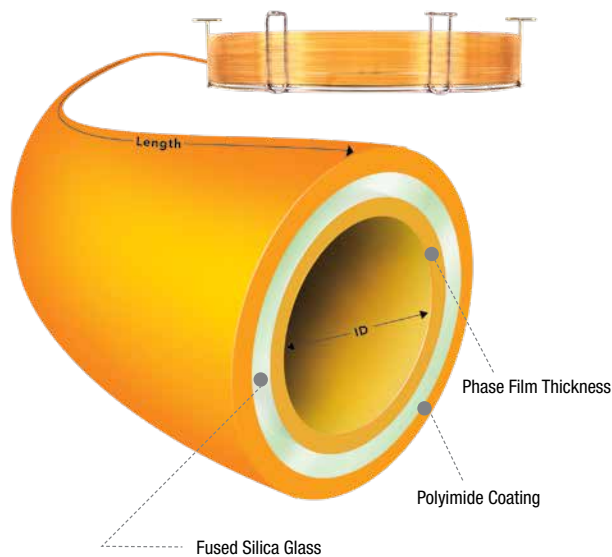
The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

## The Basic Principle of Column Selection

How do you choose a column? Do you reach into a cabinet of mystery columns, look to your favorite 5% phenyl phase, or borrow one from a colleague? Understanding how column parameters impact key elements of the master resolution equation will help you quickly make the right column selection for successful separations.

$$R_s = \left[ \frac{\sqrt{N}}{4} \right] \times \left[ \frac{\alpha - 1}{\alpha} \right] \times \left[ \frac{k}{k + 1} \right]$$

	Efficiency Term	Selectivity Term	Retention Term
<b>Relates to:</b>	Column Length Column ID	Column Phase	Column ID Film Thickness
<b>Other Considerations:</b>	Carrier Gas Linear Velocity	Temperature	Temperature



## Selectivity Has the Biggest Impact on Resolution

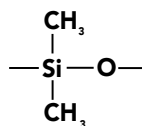
Resolution between two analytes is mainly determined by the selectivity of the stationary phase. By increasing the resolution between two compounds, the total analysis time can often be reduced significantly!

### Selectivity vs. Polarity

Polarity gives a general guideline for sample capacity and separation, which can affect peak shape and resolution. However, two columns may have similar polarity but show different separation profiles due to dissimilar phase chemistries. For example, ZB-35 and ZB-1701 are close in polarity, but the cyanopropyl group makes ZB-1701 very different from ZB-35 in terms of selectivity.

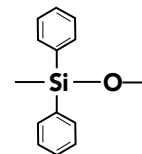
#### ZB-35

Polarity: 18



**65 %**

Dimethylpolysiloxane

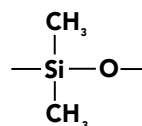


**35 %**

Phenyl

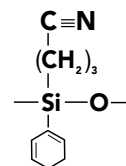
#### ZB-1701

Polarity: 19



**86 %**

Dimethylpolysiloxane



**14 %**

Cyanopropylphenyl

# Choosing Your Selectivity (cont'd)

## The 3 Most Prevalent GC Interactions

The following selection guidelines can be a starting point for choosing Zebron™ columns in common selectivities. Please contact your Phenomenex representative for additional assistance.

### Dispersive Forces (Van der Waals Interactions)

- Weakest of all intermolecular forces and occurs between non-polar compounds
- Separation is based on boiling point (classic example – hydrocarbon separation in SimDist analysis)

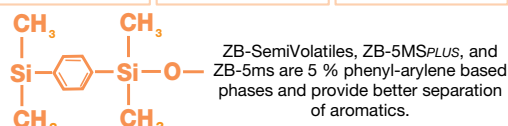
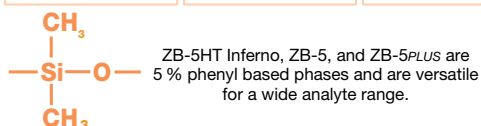
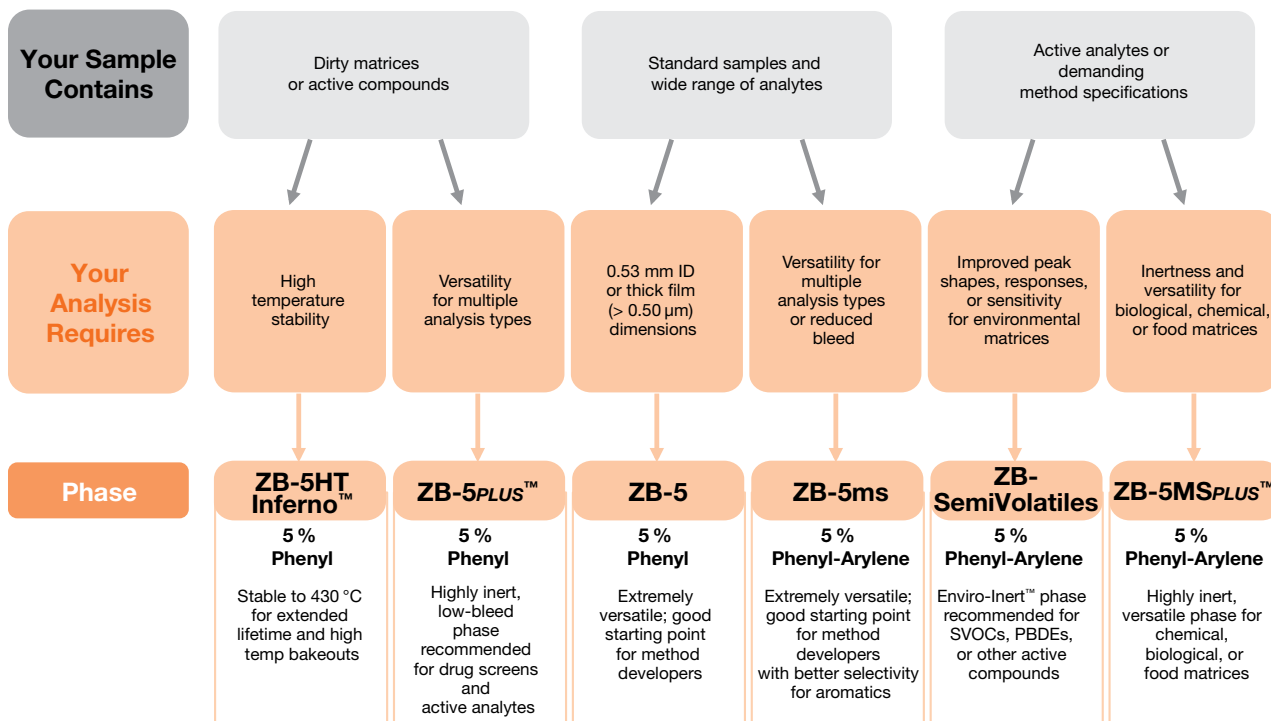
### Dipole-Dipole Interactions

- Either permanently present or induced by analyte-stationary phase interactions
- Higher dipole-dipole interaction can help separate compounds with similar boiling points, but different chemical structures

### Hydrogen Bonding (Acid-Base Interactions)

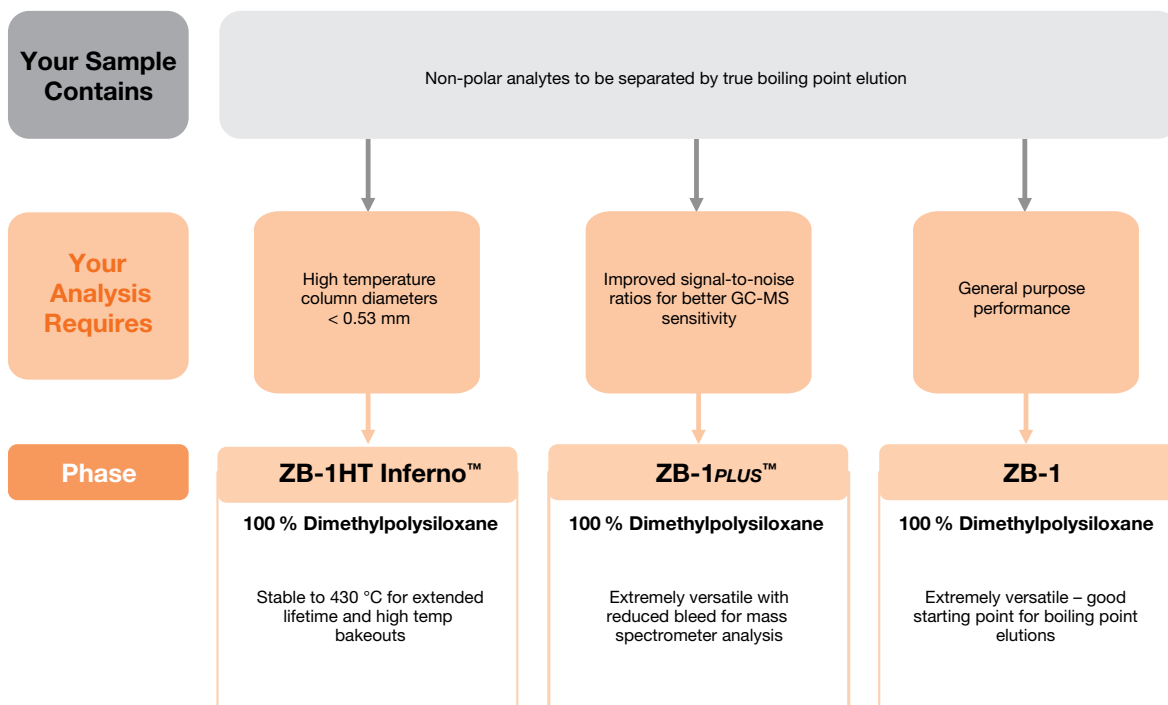
- Can cause poor peak shape or irreversible binding to the inlet liner or to the column itself
- Zebron columns are specially deactivated to minimize these interactions

## Choosing A “5” Phase

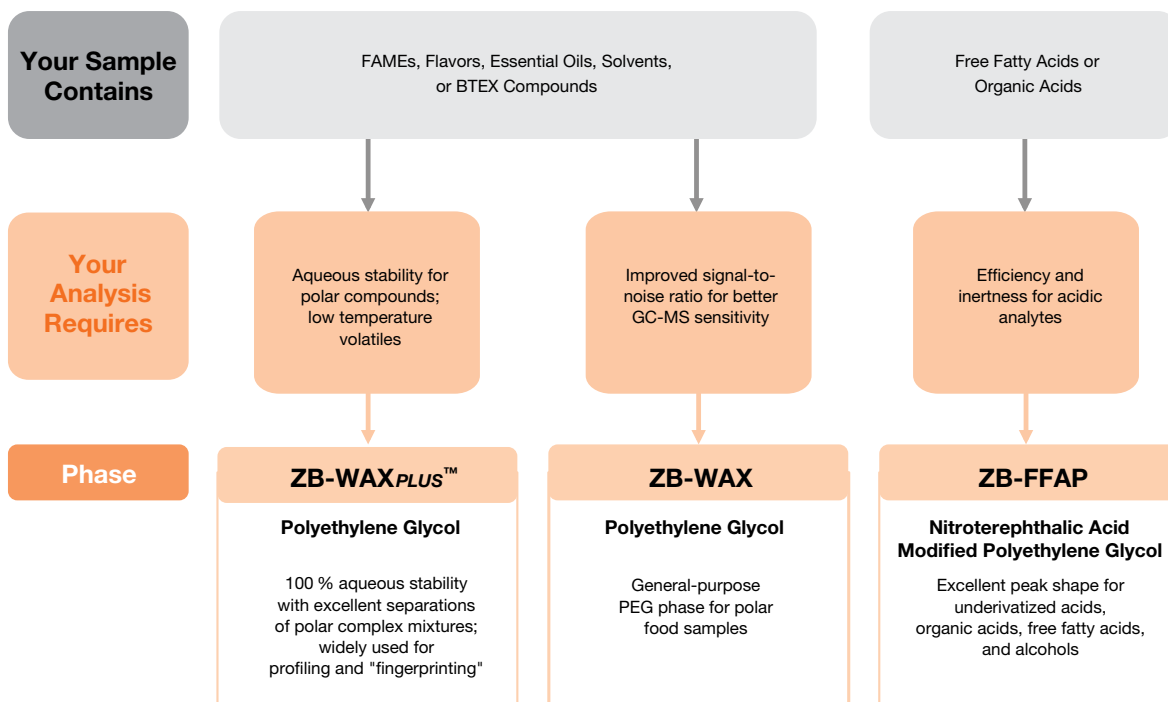


# Choosing Your Selectivity (cont'd)

## Choosing A "1" Phase



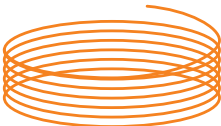
## Choosing A "PEG" Phase



# Choosing Your Dimensions

## Length

Longer columns can improve resolution, but they will also increase run times. Under isothermal conditions, doubling column length only increases resolution by 41 %, but doubles the run time! Choose a column length that balances efficiency with acceptable run times.

Short	Good Starting Length	Long
15 m or less	30 m	60 m or more
<p><b>Applications</b></p> <ul style="list-style-type: none"><li>• High boilers</li><li>• GC-MS applications</li></ul> <p><b>Advantages</b></p> <ul style="list-style-type: none"><li>• Faster run times</li><li>• Higher temp. limits</li><li>• Lower bleed</li><li>• Higher efficiency</li></ul> <p><b>Disadvantages</b></p> <ul style="list-style-type: none"><li>• Less inert</li><li>• Limited retention</li></ul>	<p><b>30 m</b></p> 	<p><b>Applications</b></p> <ul style="list-style-type: none"><li>• Complex samples with closely eluting peaks</li><li>• Low boilers</li><li>• Less active samples</li><li>• Complex temperature ramps</li></ul> <p><b>Advantages</b></p> <ul style="list-style-type: none"><li>• Better resolution</li></ul> <p><b>Disadvantages</b></p> <ul style="list-style-type: none"><li>• Slow run times</li></ul>

## Try The GC Column Finder!

Easily select a column by part number, manufacturer, industry, application, or official method **in under 1 minute.**



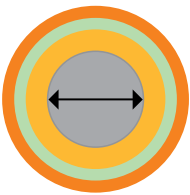
[www.phenomenex.com/FindGC](http://www.phenomenex.com/FindGC)



# Choosing Your Dimensions *(cont'd)*

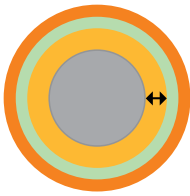
## Internal Diameter

Column internal diameter (ID) has a major impact on both resolution and sample capacity. Unlike column length, using smaller ID columns can actually lead to faster run times, because the column length required with a small ID is often shorter due to increased efficiency.

Narrow	Good Starting ID	Wide
0.10, 0.18, 0.20 mm	0.25 mm	0.32, 0.53 mm
<p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Complex samples</li> </ul> <p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Faster run times</li> <li>• Better resolution</li> </ul> <p><b>Disadvantages</b></p> <ul style="list-style-type: none"> <li>• Lower sample capacity</li> <li>• Easily overloaded</li> </ul>		<p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Dirty samples</li> <li>• Highly concentrated samples</li> </ul> <p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Increased sample capacity</li> <li>• Good for on-column injections</li> </ul> <p><b>Disadvantages</b></p> <ul style="list-style-type: none"> <li>• Decreased efficiency</li> <li>• May need higher flow rates</li> <li>• Not compatible with most GC-MS</li> </ul>

## Film Thickness

Film thickness determines solute retention and plays an important role in column sample capacity. Thin film columns are faster and provide higher resolution, but lower sample capacity. In most instances, choose the thinnest film possible that still provides adequate retention. When working with active samples, using a slightly thicker film can significantly improve peak shape.

Thin	Good Starting Film	Thick
0.10, 0.18 $\mu$ m	0.25 $\mu$ m	0.50 $\mu$ m or more
<p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• High boilers</li> <li>• GC-MS applications</li> </ul> <p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Faster run times</li> <li>• Higher temp. limits</li> <li>• Lower bleed</li> <li>• Higher efficiency</li> </ul> <p><b>Disadvantages</b></p> <ul style="list-style-type: none"> <li>• Less inert</li> <li>• Limited retention</li> </ul>		<p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Low boilers</li> <li>• Gases, solvents, purgeables, volatiles</li> <li>• Purity testing</li> </ul> <p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Better inertness</li> <li>• Higher capacity</li> </ul> <p><b>Disadvantages</b></p> <ul style="list-style-type: none"> <li>• Slow run times</li> <li>• Lower temp. limits</li> <li>• Higher bleed</li> </ul>

# Cross-Reference by Manufacturer

## Upgrade to Zebron!

Our commitment to quality and innovation is what makes Zebron GC columns well-suited for any application. Performance is GUARANTEED.

Zebron Phase	Zebron Composition	Restek®	Agilent®	Supelco®	SGE®	OV
ZB-1	100% Dimethylpolysiloxane	Rtx®-1, Rtx-1PONA, Rtx-1 F&F	DB®-1, DB-2887, DB-1 EVDX, HP-1, HP-101, HP-PONA,Ultra 1, CP-Sil 5 CB	SPB®-1, SPB-1 TG, SE-30, MET-1, SPB-1 Sulfur, SPB-HAP	BP1, BP1-PONA, BPX1-SimD	OV-1
ZB-DHA-PONA	100% Dimethylpolysiloxane	Rtx-DHA	HP-PONA, DB-PETRO, CP-Sil PONA CB	Petrocol®-DH		
ZB-1 PLUS™	100% Dimethylpolysiloxane	Rtx-1ms, Rxi®-1ms	DB-1ms, DB-1ms Ultra Inert, HP-1ms, HP-1ms Ultra Inert, CP-Sil 5 CB MS, VF-1ms	MDN-1, Equity®-1	SolGel-1ms™	
ZB-1HT Inferno™	100% Dimethylpolysiloxane	Rxi-1HT	DB-1ht, CP-SimDist	Petrocol 2887		
ZB-1XT SimDist	100% Dimethylpolysiloxane	MXT®-1HT SimDist, MXT-1, MXT-1 SimDist, MXT-2887	CP-SimDist UltiMetal, CP-Sil 8 CB UltiMetal, BPX1-SimD, DB-PS1, DB-HT SimDis, DB-PS2887			
ZB-5	5% Phenyl 95% Dimethylpolysiloxane	Rtx-5	DB-5, HP-5, Ultra 2, HP-PAS-5, CP-Sil 8 CB, HP-5ms Ultra Inert	MDN-5, SPB-5, PTE-5, SE-54, PTA-5, Equity-5, Sac-5	BP5, BPX5	OV-5
ZB-5 PLUS™	5% Phenyl 95% Dimethylpolysiloxane	Rtx-5ms, Rxi-5ms, Rtx-5Amine	DB-5, HP-5ms, HP-5msi	MDN-5S		
ZB-5HT Inferno	5% Phenyl 95% Dimethylpolysiloxane	Rxi-5HT, Rtx-5HT Stx®-5HT, XTI®-5HT	DB-5ht, VF-5ht	HT-5		
ZB-5ms	5% Phenyl-Arylene 95% Dimethylpolysiloxane	Rtx-5Sil MS, Rxi-5Sil MS	DB-5ms, DB-5.625, VF-5ms, DB-5ms EVDX, CP-Sil 8 CB MS			
ZB-5MS PLUS™	5% Phenyl-Arylene 95% Dimethylpolysiloxane	Rxi-5Sil MS	DB-5ms Ultra Inert, HP-5ms Ultra Inert, DB-5ms, VF-5ms	SLB®-5ms		
ZB-SemiVolatiles	5% Phenyl-Arylene 95% Dimethylpolysiloxane	Rxi-5Sil MS, Rxi-5ms	DB-5ms Ultra Inert	SLB-5ms		
ZB-35	35% Phenyl 65% Dimethylpolysiloxane	Rtx-35, Rtx-35ms	DB-35, DB-35ms, HP-35, HP-35ms	MDN-35, SPB-35, SPB-608	BPX35, BPX608	OV-11
ZB-35HT Inferno	35% Phenyl 65% Dimethylpolysiloxane			Phenomenex Exclusive		
ZB-50	50% Phenyl 50% Dimethylpolysiloxane	Rtx-50	DB-17, DB-17HT, DB-17ms, HP-50+, DB-17 EVDX, CP-Sil 24 CB	SP-2250, SPB-17, SPB-50	BPX50	OV-17
ZB-624	6% Cyanopropylphenyl 94% Dimethylpolysiloxane	Rtx-1301, Rtx-624	DB-1301, DB-624, DB-VRX, HP-VOC, CP-1301, CP-Select 624 CB	SPB-1301, SPB-624	BP624	OV-624
ZB-624 PLUS™	Proprietary	Rxi-624Sil MS	CP-Select 624 CB, DB-624UI Ultra Inert			
ZB-1701	14% Cyanopropylphenyl 86% Dimethylpolysiloxane	Rtx-1701	DB-1701, CP-Sil 19 CB	SPB-1701, Equity-1701	BP10	OV-1701
ZB-1701P	14% Cyanopropylphenyl 86% Dimethylpolysiloxane		DB-1701P			
ZB-FAME	High Cyanopropyl		CP-Sil 88, HP-88, DB-23	SP®-2560, SP-2380		
ZB-WAX	Polyethylene Glycol	Rtx-WAX, Famewax, Stabilwax-DB	DB-WAXetr, HP-INNOWax, CP-Wax 57 CB	MET-Wax, Omegawax	SolGel-WAX™	
ZB-WAX PLUS™	Polyethylene Glycol	Stabilwax®	DB-WAX, CAM, HP-20M, Carbowax 20M, CP-Wax 52 CB	SUPELCOWAX® 10	BP20	Carbowax 20M
ZB-FFAP	Nitroterephthalic Acid Modified Polyethylene Glycol	Stabilwax-DA	DB-FFAP, HP-FFAP, CP-FFAP CB CP-Wax 58 FFAP CB	Nukol, SPB-1000	BP21	OV-351
ZB-MultiResidue™-1	Proprietary	Rtx-CLPesticides, Stx-CLPesticides				
ZB-MultiResidue-2	Proprietary	Rtx-CLPesticides2, Stx-CLPesticides2				
ZB-CLPesticides-1	Proprietary	Rtx-CLPesticides, Stx-CLPesticides				
ZB-CLPesticides-2	Proprietary	Rtx-CLPesticides2, Stx-CLPesticides2				
ZB-XLB	Proprietary	Rtx-XLB, Rxi-XLB	DB-XLB, VF-XMS	MDN-12		
ZB-XLB-HT Inferno	Proprietary			Phenomenex Exclusive		
ZB-Drug-1	Proprietary			Phenomenex Exclusive		
ZB-BAC-1	Proprietary	Rtx-BAC1	DB-ALC1			
ZB-BAC-2	Proprietary	Rtx-BAC2	DB-ALC2			
ZB-Bioethanol	Proprietary			Phenomenex Exclusive		
ZB-PAH-EU	Proprietary	Rxi-PAH	DB-PAH-EU			
ZB-PAH-CT	Proprietary		PAH-Select			
ZB-Dioxin	Proprietary	Rtx-Dioxin-2	DB-Dioxin, DB-225, DB-5MSUI	SP-2330		

This section is, neither in terms of manufacturers nor in terms of their products, a complete list, and the accuracy of the data is not guaranteed. Small differences in dimensions or performance might be possible and slight adjustments to your application may be necessary.

# Environmental Selection Chart


Listed below are recommended Zebron columns for environmental and EPA methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

Drinking Water	Method #	Description	Primary Column	Confirmation Column	Page	
	501.3	Trihalomethanes by GC-MS with Selected Ion Monitoring (SIM)	ZB-624, ZB-624 <sup>PLUS</sup> <sup>™</sup>		157, 140	
	502.2	Volatile Halogenated Organics by Purge & Trap GC/PID/ELCD	ZB-624, ZB-624 <sup>PLUS</sup>		157, 140	
	503.1	Volatile Aromatics and Unsaturated Organics by Purge & Trap GC	ZB-624, ZB-624 <sup>PLUS</sup>		157, 140	
	504.1	1,2-Dibromoethane (EDB), 1,2-Dibromo-3-chloropropane (DBCP), and 1,2,3-Trichloropropane (123TCP) by GC	ZB-CLPesticides-1 ZB-MultiResidue <sup>™</sup> -1	ZB-CLPesticides-2 ZB-MultiResidue-2	116 118	
	505	Organohalide Pesticides & Aroclors by GC-ECD	ZB-CLPesticides-1 ZB-MultiResidue-1	ZB-CLPesticides-2 ZB-MultiResidue-2	116 118	
	507	Nitrogen & Phosphorus Containing Pesticides by GC-NPD	ZB-MultiResidue-1 ZB-CLPesticides-2	ZB-MultiResidue-2 ZB-CLPesticides-2	118 116	
	508	Chlorinated Pesticides by GC-ECD	ZB-CLPesticides-1 ZB-MultiResidue-1	ZB-CLPesticides-2 ZB-MultiResidue-2	116 118	
	509	Ethylene Thiourea (ETU) by GC-NPD	ZB-WAX <sup>PLUS</sup> <sup>™</sup>	ZB-1701	138, 158	
	513	2, 3, 7, 8-Tetrachlorodibenzo-p-dioxin by GC-HRMS	ZB-SemiVolatiles		114	
	515.3	Chlorinated Acids by Liquid-Liquid Extraction, Derivatization and GC-ECD	ZB-XLB	ZB-35	162, 155	
	521	Nitrosamines by Solid Phase Extraction (SPE) and GC-MS/MS with Large Volume Injection	ZB-SemiVolatiles		114	
	522	1,4-Dioxane by Solid Phase Extraction (SPE) and GC-MS with Selected Ion Monitoring (SIM)	ZB-SemiVolatiles		114	
	523	Triazine Pesticides and their Degradates by GC-MS	ZB-50		156	
	524.3	Purgeable Organic Compounds by GC-MS	ZB-624, ZB-624 <sup>PLUS</sup>		157, 140	
	525.2	Semi-volatile Organic Chemicals by Solid Phase Extraction (SPE) and GC-MS	ZB-SemiVolatiles		114	
	526	Selected Semi-volatile Organic Compounds by Solid Phase Extraction (SPE) and GC-MS	ZB-SemiVolatiles		114	
	527	Selected Pesticides and Flame Retardants by Solid Phase Extraction (SPE) and GC-MS	ZB-5 <sup>PLUS</sup> <sup>™</sup>		134	
	528	Phenols by Solid Phase Extraction (SPE) and GC-MS	ZB-SemiVolatiles	ZB-35	114, 155	
	529	Explosives and Related Compounds by Solid Phase Extraction (SPE) and GC-MS	ZB-5 <sup>PLUS</sup> <sup>™</sup>		134	
	548	Endothall by Aqueous Derivatization, Liquid-Solid Extraction, and GC-ECD	ZB-SemiVolatiles	ZB-35	114, 155	
	551.1	Chlorinated Solvents & Disinfection Byproducts by Liquid-Liquid Extraction and GC-ECD	ZB-35		155	
	552.3	Haloacetic Acids and Dalapon by Liquid-Liquid Extraction, Derivatization, and GC-ECD	ZB-CLPesticides-1 ZB-XLB	ZB-CLPesticides-2 ZB-35	116, 116 162, 155	
	556	Carbonyl Compounds by Pentafluorobenzylhydroxylamine Derivatization and GC-ECD	ZB-SemiVolatiles	ZB-1701	114, 158	
	Waste Water	Method #	Description	Primary Column	Confirmation Column	Page
		601	Purgeable Halocarbons by Purge & Trap GC	ZB-624, ZB-624 <sup>PLUS</sup>		157, 140
		602	Purgeable Aromatics by Purge & Trap GC	ZB-624, ZB-624 <sup>PLUS</sup>		157, 140
		603	Acrolein & Acrylonitrile Purge & Trap GC	ZB-624, ZB-624 <sup>PLUS</sup>		157, 140
604		Phenols by GC-ECD	ZB-SemiVolatiles		114	
606		Phthalate Esters by GC-ECD	ZB-5 <sup>PLUS</sup> <sup>™</sup>		134	
607		Nitrosamines by GC-NPD	ZB-SemiVolatiles		114	
608		Organochlorine Pesticides and PCBs by GC-ECD	ZB-MultiResidue-1	ZB-MultiResidue-2	118, 118	
609		Nitroaromatics & Isophorone by GC-FID and GC-ECD	ZB-SemiVolatiles		114	
610		Polynuclear Aromatic Hydrocarbons by GC-FID	ZB-PAH-EU ZB-PAH-CT		106 110	
611		Haloethers by GC-ECD	ZB-SemiVolatiles	ZB-SemiVolatiles	114	
612		Chlorinated Hydrocarbons by GC-ECD	ZB-SemiVolatiles		114	
613		2,3,7,8-Tetrachlorodibenzo-p-dioxin by GC-MS	ZB-SemiVolatiles		114	
615		Chlorinated Herbicides by GC-ECD	ZB-CLPesticides-1 ZB-XLB	ZB-CLPesticides-2 ZB-35	116, 116 162, 155	
619		Triazine Herbicides by GC-MS	ZB-50		156	
622		Organophosphorus Pesticides by GC-MS	ZB-MultiResidue-1		118	
624		Purgeable Volatiles by Purge & Trap GC-MS	ZB-624		157	
625		Base/Neutral and Acids by GC-MS	ZB-SemiVolatiles		114	
1613		Tetra- through Octa-Chlorinated Dioxins & Furans by Isotope Dilution HRGC/HRMS	ZB-Dioxin	ZB-SemiVolatiles	102, 114	
1614		Polybrominated Diphenyl Esters (PBDEs) by HRGC/HRMS	ZB-5HT Inferno <sup>™</sup> ZB-SemiVolatiles		146 114	
1618		Organohalide Pesticides, Organophosphorus Pesticides, and Phenoxy-Acid Herbicides by GC	ZB-MultiResidue-1	ZB-MultiResidue-2	118, 118	
1624		Volatile Organic Compounds by Isotope Dilution GC-MS	ZB-624, ZB-624 <sup>PLUS</sup>		157, 140	
1625		Semi-volatile Organic Compounds by Isotope Dilution GC-MS	ZB-SemiVolatiles		114	
1653		Chlorinated Phenols by In-Situ Acetylation and GC-MS	ZB-SemiVolatiles		114	
1657		Organophosphorous Pesticides by GC-FPD	ZB-MultiResidue-1	ZB-MultiResidue-2	118, 118	
1658		Phenoxy-Acid Herbicides by GC-ECD	ZB-MultiResidue-1	ZB-MultiResidue-2	118, 118	
1659		Dazomet by GC-NPD	ZB-MultiResidue-1	ZB-MultiResidue-2	118, 118	
1666		Pharmaceutical Volatile Organic Compounds by Purge & Trap GC or Isotope Dilution GC-MS	ZB-SemiVolatiles (Direct Injection) ZB-624 (Purge & Trap), ZB-624 <sup>PLUS</sup>		114 157 140	
1668	Polychlorinated Biphenyl (PCB) Congeners by HRGC/HRMS	ZB-MultiResidue-1	ZB-1	118, 152		
1671	Pharmaceutical Manufacturing Volatile Organic Compounds by GC-FID	ZB-1		152		
7850	White Phosphorus (P4) by Solvent Extraction and GC-NPD	ZB-1		152		

# Environmental Selection Chart

Listed below are recommended Zebron columns for environmental and EPA methods. Other columns may also be used for these analyses – please contact Phenomenex for your specific GC column needs.

Solid Waste	Method #	Description	Primary Column	Confirmation Column	Page
	8010B	Halogenated Volatile Organics by GC-ELCD	ZB-624, ZB-624 <sup>PLUS</sup> <sup>™</sup>		157, 140
	8015C	Nonhalogenated Organics by GC	ZB-5HT Inferno <sup>™</sup>		146
	8020A	Aromatic Volatile Organics by GC-PID	ZB-WAX, ZB-WAX <sup>PLUS</sup> <sup>™</sup>		160 138
	8021B	Aromatic and Halogenated Volatiles by GC-PID or GC-ELCD	ZB-624, ZB-624 <sup>PLUS</sup>	ZB-1 (thick phase)	157, 140, 152
	8030A	Acrolein and Acrylonitrile by GC-FID	ZB-624, ZB-624 <sup>PLUS</sup>		157, 140
	8032A	Acrylamide by GC-ECD	ZB-5HT Inferno		146
	8041	Phenols by GC-ECD or GC-FID	ZB-SemiVolatiles		114
	8061A	Phthalate Esters by GC-ECD	ZB-SemiVolatiles	ZB-1701	114, 158
	8081B	Organochlorine Pesticides by GC-ECD	ZB-MultiResidue <sup>™</sup> -1 ZB-CLPesticides-1	ZB-MultiResidue-2 ZB-CLPesticides-2	118 116
	8082A	Polychlorinated Biphenyls (PCBs) by GC-ECD	ZB-MultiResidue-1 ZB-CLPesticides-1	ZB-MultiResidue-2 ZB-CLPesticides-2	118 116
	8091	Nitroaromatics and Cyclic Ketones by GC-ECD or GC-NPD	ZB-SemiVolatiles	ZB-1701	114, 158
	8095	Explosives by GC-ECD	ZB-50		156
	8100	Polynuclear Aromatic Hydrocarbons by GC-FID	ZB-SemiVolatiles ZB-35		114 155
	8121	Chlorinated Hydrocarbons by GC-ECD	ZB-MultiResidue-1	ZB-MultiResidue-2	118
	8131	Aniline and Selected Derivatives by GC-NPD	ZB-SemiVolatiles	ZB-1	114, 152
	8141B	Organophosphorus Pesticides by GC-FPD or GC-NPD	ZB-MultiResidue-1 ZB-CLPesticides-1	ZB-MultiResidue-2 ZB-CLPesticides-2	118 116
	8151A	Chlorinated Herbicides by GC-ECD	ZB-CLPesticides-1 ZB-XLB	ZB-CLPesticides-2 ZB-35	116, 116 162, 155
	8260B	Volatile Organic Compounds by GC-MS	ZB-624, ZB-624 <sup>PLUS</sup>		157, 140
	8270D	Semi-volatile Organic Compounds by GC-MS	ZB-SemiVolatiles		114
	8272	Polynuclear Aromatic Hydrocarbons (PAHs) by SPME and GC-MS with Selected Ion Monitoring (SIM)	ZB-SemiVolatiles, ZB-35		114 155
	8280B	Polychlorinated Dibenzo-P-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) By HRGC-LRMS	ZB-SemiVolatiles		114
	8290A	Polychlorinated Dibenzo-P-Dioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) By HRGC/HRMS	ZB-SemiVolatiles		114
	8410	Semi-Volatile Organic Compounds by GC-FTIR	ZB-SemiVolatiles		114
	8430	Bis(2-chloroethyl) Ether and Hydrolysis Products by Direct Aqueous Injection GC-FTIR	ZB-WAX <sup>PLUS</sup>		138

Air	Method #	Description	Primary Column	Page
	TO-1	Volatile Organic Compounds by Thermal Adsorption and GC-MS	ZB-1 <sup>PLUS</sup> <sup>™</sup>	132
	TO-2	Volatile Organic Compounds by Carbon Molecular Sieve Adsorption and GC-MS	ZB-1 <sup>PLUS</sup>	132
	TO-3	Volatile Organic Compounds by Cryogenic Preconcentration Techniques and GC-FID /ECD	ZB-1 <sup>PLUS</sup>	132
	TO-4A	Pesticides and Polychlorinated Biphenyls (PCBs) by High Volume Polyurethane Foam (PUF) Sampling and GC	ZB-MultiResidue-1	118
	TO-7	N-Nitrosodimethylamine by GC-MS	ZB-WAX <sup>PLUS</sup>	138
	TO-9A	Polychlorinated, Polybrominated, and Brominated/Chlorinated Dibenzo-p-Dioxins and Dibenzofurans by HRGC/HRMS	ZB-SemiVolatiles	114
	TO-10A	Pesticides and Polychlorinated Biphenyls (PCBs) by Low Volume Polyurethane Foam (PUF) Sampling and GC	ZB-MultiResidue-1	118
	TO-13A	Polycyclic Aromatic Hydrocarbons (PAHs) by GC-MS	ZB-SemiVolatiles	114
	TO-14A	Volatile Organic Compounds by Specially Prepared Canisters and GC	ZB-1 <sup>PLUS</sup>	132
	TO-15	Volatile Organic Compounds by Specially Prepared Canisters and GC-MS	ZB-1 <sup>PLUS</sup>	132

# Food & Flavors Selection Chart

Listed below are recommended Zebron columns for food safety, food quality, and flavor/fragrance methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

Food Safety	Compound Class	Analysis	Recommended Columns	Page
	<b>Pesticides &amp; Antimicrobials</b>	Multi-Residue Pesticide Screening	ZB-MultiResidue™-1 and -2	118
		Organochlorine Pesticides in Water	ZB-MultiResidue-1 and -2	118
		Organochlorine Pesticides in Foods of Plant Origin	ZB-MultiResidue-1 and -2	118
		Organophosphorus Pesticides in Foods of Plant Origin	ZB-MultiResidue-1 and -2	118
		Triazine Pesticides in Water	ZB-50	156
		Triazine Pesticides in Foods of Plant Origin	ZB-50	156
		Chloramphenicol in Foods of Animal Origin	ZB-1 <sup>PLUS</sup> ™	132
		<b>Environmental Contaminants</b>	Polybrominated Diphenyl Ethers (PBDEs) in Food	ZB-5MS <sup>PLUS</sup> ™, ZB-SemiVolatiles, ZB-35
Polychlorinated Biphenyls (PCBs) in Water	ZB-MultiResidue-1, ZB-XLB-HT Inferno™		118, 150	
Polychlorinated Dibenzo-dioxins (PCDDs) in Food	ZB-5MS <sup>PLUS</sup> , ZB-SemiVolatiles		136, 114	
Polychlorinated Dibenzo-furans (PCDFs) in Food	ZB-5MS <sup>PLUS</sup> , ZB-SemiVolatiles		136, 114	
Polycyclic Aromatic Hydrocarbons (PAHs) in Water	ZB-PAH-EU, ZB-PAH-CT, ZB-5MS <sup>PLUS</sup> , ZB-SemiVolatiles, ZB-35		106, 110, 136, 114, 155	
<b>Food Contact Materials</b>	Food Packaging Volatiles	ZB-624, ZB-624 <sup>PLUS</sup> ™	157, 140	
	Dioxins and Furans in Food	ZB-Dioxin	102	
	Melamine in Food	ZB-XLB-HT Inferno	150	
	Cyanuric Acid in Food	ZB-XLB-HT Inferno	150	
	Phthalates in Food	ZB-5MS <sup>PLUS</sup>	136	
	Residual Solvents in Food	ZB-624, ZB-624 <sup>PLUS</sup> , ZB-WAX <sup>PLUS</sup>	157, 140, 138	
	Bisphenol A & F (BPA/BPF) in Food	ZB-5MS <sup>PLUS</sup>	136	
<b>Additives &amp; Preservatives</b>	Parabens in Food	ZB-5MS <sup>PLUS</sup>	136	
	Chloropropanols (3-MCPD) in Food	ZB-5MS <sup>PLUS</sup>	136	
	Flavor Additives (Borneol)	ZB-MultiResidue-1	118	
	Phenolic Antioxidants (BHA & BHT) in Food	ZB-50	156	
	Tocopherols in Food	ZB-5MS <sup>PLUS</sup>	136	
<b>Process Contaminants</b>	Acrylamide in Foods	ZB-5HT Inferno	146	
	Acrylamide, Acrylonitrile, and Acrolein in Water	ZB-624, ZB-624 <sup>PLUS</sup>	157, 140	
	Benzene in Food	ZB-WAX <sup>PLUS</sup>	138	
	Glycols in Food	ZB-WAX <sup>PLUS</sup>	138	
<b>Hormones</b>	Steroid Hormones in Food	ZB-5MS <sup>PLUS</sup> , ZB-1 <sup>PLUS</sup>	136, 132	

## Try The GC Column Finder!

Easily select a column by part number, manufacturer, industry, application, or official method **in under 1 minute.**





[www.phenomenex.com/FindGC](http://www.phenomenex.com/FindGC)



# Food & Flavors Selection Chart


Listed below are recommended Zebron columns for food safety, food quality, and flavor/fragrance methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.


Food Quality	Compound Class	Analysis	Recommended Columns	Page
	<b>Fatty Acids &amp; FAMES</b>	Food Industry Fatty Acid Methyl Esters (FAMES)	ZB-FAME	112
		Marine Oil Fatty Acid Methyl Esters (FAMES)	ZB-FAME	112
		Saw Palmetto Fatty Acid Methyl Esters (FAMES)	ZB-FAME	112
		Free Fatty Acids	ZB-FFAP	161
		Essential Fatty Acids (EFAs) Omega-3 and Omega-6	ZB-FAME	112
	<b>Triglycerides</b>	Butter, Canola Oil, Olive Oil, and Peanut Oil Triglycerides	ZB-5HT Inferno™	146
	<b>Alcoholic Beverages</b>	Cognac Compounds	ZB-WAX <sup>PLUS</sup> ™	138
		Distilled Liquor Screen	ZB-FFAP	161
		Ethanol in Beer	ZB-Bioethanol	122
		Sulfur in Beer	ZB-1 <sup>PLUS</sup> ™	132
		Whiskey Compounds	ZB-WAX <sup>PLUS</sup>	138
	<b>Other Acids</b>	Organic Acids	ZB-FFAP	160
		Amino Acids	ZB-50	156
	<b>Sterols</b>	Sterols in Lard, Margarine, Peanut Butter, or Olive Oil	ZB-5HT Inferno	146
	<b>Sugars</b>	Alditol Acetates	ZB-5MS <sup>PLUS</sup> ™	136
Trimethylsilyl (TMS) Sugars		ZB-MultiResidue™-1	118	

Flavors & Fragrances	Compound Class	Analysis	Recommended Columns	Page
	<b>Essential Oils</b>	Cold-Pressed Orange Oil	ZB-WAX <sup>PLUS</sup>	138
		Ginkgo Biloba Oil, Lavender Oil, and Ylang Ylang Oil	ZB-1 <sup>PLUS</sup>	132
		Peppermint Oil	ZB-WAX	160
		Rose Oil	ZB-XLB	162
		Spearmint Oil	ZB-5MS <sup>PLUS</sup>	136
	<b>Flavors</b>	Flavors Screening	ZB-FFAP	161
		Flavor Allergens	ZB-5MS <sup>PLUS</sup>	136
		Flavor Volatiles	ZB-1 <sup>PLUS</sup> , ZB-WAX <sup>PLUS</sup> , ZB-624	132, 138, 157
		Alcoholic Beverage Profile	ZB-FFAP	161
		Honey Profile	ZB-WAX <sup>PLUS</sup>	138
	<b>Fragrances</b>	Fragrance Screening	ZB-WAX <sup>PLUS</sup> , ZB-624	138, 157
		Fragrance Allergens	ZB-1 <sup>PLUS</sup>	132

# Pharmaceutical Selection Chart

Listed below are recommended Zebron columns for USP and pharmaceutical methods. Other columns may also be used for these analyses – please contact Phenomenex for your specific GC column needs.

USP	Phase Composition	Recommended Columns	Page
	G1 Dimethylpolysiloxane Oil	ZB-1, ZB-1 <sub>PLUS</sub> <sup>™</sup> , ZB-1HT Inferno <sup>™</sup>	152, 132, 144
	G2 Dimethylpolysiloxane Gum	ZB-1, ZB-1 <sub>PLUS</sub> , ZB-1HT Inferno	152, 132, 144
	G3 50 % Phenyl 50 % Methylpolysiloxane	ZB-50	156
	G5 Not less than 70 % of 3-Cyanopropylpolysiloxane	ZB-FAME	112
	G8 80 % Bis (3-Cyanopropyl-20 % 3-Cyanopropylphenylpolysiloxane)	ZB-FAME	112
	G9 Methylvinylpolysiloxane	ZB-1 <sub>PLUS</sub> , ZB-1HT Inferno, ZB-1	132, 144, 152
	G14 Polyethylene Glycol (Average MW 950-1,050)	ZB-WAX, ZB-WAX <sub>PLUS</sub> <sup>™</sup>	160, 138
	G15 Polyethylene Glycol (Average MW 3,000-3,700)	ZB-WAX, ZB-WAX <sub>PLUS</sub>	160, 138
	G16 Polyethylene Glycol (Average MW 15,000)	ZB-WAX, ZB-WAX <sub>PLUS</sub>	160, 138
	G17 75 % Phenyl 25 % Methylpolysiloxane	ZB-50	156
	G20 Polyethylene Glycol (Average MW of 380-420)	ZB-WAX, ZB-WAX <sub>PLUS</sub>	160, 138
	G25 Polyethylene Glycol TPA (Carbowax 20M Terephthalic Acid)	ZB-FFAP	161
	G27 5 % Phenyl 95 % Methylpolysiloxane	ZB-5, ZB-5 <sub>PLUS</sub> <sup>™</sup> , ZB-5HT Inferno	153, 134, 146
	5 % Phenyl-Arylene 95 % Methylpolysiloxane	ZB-5ms, ZB-5MS <sub>PLUS</sub> <sup>™</sup> , ZB-SemiVolatiles	154, 136, 114
	G28 25 % Phenyl 75 % Methylpolysiloxane	ZB-35, ZB-35HT Inferno	155, 148
	G32 20 % Phenylmethyl 80 % Dimethylpolysiloxane	ZB-35, ZB-35HT Inferno	155, 148
	G35 Polyethylene Glycol & Diepoxide Esterified with Nitroterephthalic Acid	ZB-FFAP	161
	G36 1 % Vinyl 5 % Phenylmethylpolysiloxane	ZB-5, ZB-5 <sub>PLUS</sub> , ZB-5HT Inferno	153, 134, 146
	G38 Phase G1 Plus A Tailing Inhibitor	ZB-1, ZB-1 <sub>PLUS</sub> , ZB-1HT Inferno	152, 132, 144
	G39 Polyethylene Glycol (Average MW 1,500)	ZB-WAX, ZB-WAX <sub>PLUS</sub> <sup>™</sup>	160, 138
	G41 Phenylmethyldimethylsilicone (10 % Phenyl Substituted)	ZB-5, ZB-5 <sub>PLUS</sub> , ZB-5HT Inferno	153, 134, 146
	G42 35 % Phenyl 65 % Dimethylpolysiloxane	ZB-35, ZB-35HT Inferno	155, 148
	G43 6 % Cyanopropylphenyl 94 % Dimethylpolysiloxane	ZB-624, ZB-624 <sub>PLUS</sub> <sup>™</sup>	157, 140
	G46 14 % Cyanopropylphenyl 86 % Methylpolysiloxane	ZB-1701, ZB-1701P	158, 159
	G47 Polyethylene glycol (average MW 8,000)	ZB-WAX <sub>PLUS</sub> , ZB-WAX	138, 160
	G48 Highly polar, partially cross-linked cyanopolysiloxane	ZB-FAME	112
	G51 50% Phenyl - 50% Dimethylpolysiloxane phase which is modified with an aromatic selector for optimized separation of polycyclic aromatic hydrocarbons (PAH)	ZB-PAH-CT, ZB-PAH-EU	110,106

Residual Solvents	USP <467> Procedure	USP Phase for Residual Solvents	Recommended Columns	Page
	Procedure A	G43 (6 % Cyanopropyl 94 % Dimethylpolysiloxane)	ZB-624, ZB-624 <sub>PLUS</sub>	157, 140
	Procedure B	G16 (Polyethylene Glycol)	ZB-WAX <sub>PLUS</sub>	138
	Procedure C	G43 or G16	ZB-624 <sub>PLUS</sub> or ZB-WAX <sub>PLUS</sub>	140, 138




Doing Headspace Testing?

Find the right headspace vial for your analysis and learn more about Verex<sup>™</sup> Certified Vial Products with our interactive web tool.

[www.phenomenex.com/verex](http://www.phenomenex.com/verex)

# ASTM Method Selection Chart

Listed below are recommended Zebron columns for ASTM methods. Other columns may also be used for these analyses — please contact Phenomenex for your specific GC column needs.

ASTM	Method	Description	Recommended Columns	Page
	D 1946	Reformed gas	ZB-1	152
	D 2268	Analysis of n-heptane and iso-octane (high purity)	ZB-1	152
	D 2306-96	Xylene isomers	ZB-WAX, ZB-WAX <sub>PLUS</sub> <sup>™</sup>	160, 138
	D 2426	Butadiene and styrene in butadiene concentrates	ZB-1	152
	D 2504	Non-condensable gases in C1-C3 hydrocarbons	ZB-1 (thick phase)	152
	D 2580	Phenols in water	ZB-WAX <sub>PLUS</sub>	138
	D 2600	Aromatic traces in light saturated hydrocarbons	ZB-WAX	160
	D 2804	Purity of methyl ethyl ketone	ZB-WAX	160
	D 2887	SimDist analysis of petroleum fractions	ZB-1, ZB-1XT SimDist	152, 124
	D 2908	Volatile organics in water	ZB-WAX, ZB-WAX <sub>PLUS</sub>	160, 138
	D 2998	Polyhydric alcohols in alkyd resins	ZB-1	152
	D 2999	Monopentaerythritol in commercial pentaerythritol	ZB-1	152
	D 3009	Composition of turpentine	ZB-WAX <sub>PLUS</sub>	138
	D 3054	Purity and benzene content of cyclohexane	ZB-1	152
	D 3086	Organochlorine pesticides in water	ZB-CLPesticides-1 or -2, ZB-MultiResidue <sup>™</sup> -1 or -2	116, 118
	D 3168	Polymers in emulsion paints	ZB-1	152
	D 3271	Solvent analysis in paints	ZB-WAX <sub>PLUS</sub>	138
	D 3304	PCBs in environmental materials	ZB-MultiResidue-1 or -2	118
	D 3328	Comparison of waterborne petroleum oils	ZB-1	152
	D 3329	Purity of methyl isobutyl ketone	ZB-WAX <sub>PLUS</sub>	138
	D 3432	Toluene diisocyanates in urethane prepolymers	ZB-1	152
	D 3447	Purity of trichlorotrifluoroethane (CFC-113)	ZB-1, ZB-624	152, 157
	D 3452	Identification of rubber	ZB-1HT Inferno <sup>™</sup>	144
	D 3465	Purity of monomeric plasticizers	ZB-1	152
	D 3524	Diesel fuel in lubricating oil (SAE 30)	ZB-1HT Inferno	144
	D 3534	PCBs in water	ZB-5, ZB-5 <sub>PLUS</sub> <sup>™</sup>	153, 134
	D 3606	Benzene and toluene in gasoline	ZB-1	152
	D 3687	Volatile organic compounds	ZB-WAX, ZB-WAX <sub>PLUS</sub>	160, 138
	D 3710	Gasoline fractions	ZB-1XT SimDist	124
	D 3725	Fatty acids in drying oils	ZB-FFAP	161
	D 3760	Analysis of cumene	ZB-WAX, ZB-WAX <sub>PLUS</sub>	160, 138
	D 3797	Analysis of o-xylene	ZB-WAX, ZB-WAX <sub>PLUS</sub>	160, 138
	D 3798	Analysis of p-xylene impurities	ZB-WAX, ZB-WAX <sub>PLUS</sub>	160, 138
	D 3876	Methoxyl and hydroxypropyl substitution in cellulose ether products	ZB-1	152
	D 3962	Impurities in styrene	ZB-FFAP	161
	D 4059	PCBs in insulating liquids	ZB-5 <sub>PLUS</sub> , ZB-5HT Inferno	134, 146
	D 4275	Butylated hydroxy toluene in ethylene and ethylenevinylacetate polymers	ZB-1	152
	D 4367	Benzene in hydrocarbon solvent	ZB-1	152
	D 4420	Aromatics in gasoline	ZB-1	152
	D 4735	Thiophene impurities in benzene	ZB-FFAP	161
	D 4768	Phenol and cresol inhibitors in insulating oils	ZB-FFAP	161
	D 5060	Impurities in ethylbenzene	ZB-FFAP, ZB-WAX, ZB-WAX <sub>PLUS</sub>	161, 160, 138
	D 5134	Petroleum naphthas through n-nonane	ZB-1, ZB-DHA-PONA	152, 126
	D 5135-95	Analysis of styrene	ZB-WAX, ZB-WAX <sub>PLUS</sub>	160, 138
	D 5441	Analysis of Methyl Tert-Butyl Ether (MTBE)	ZB-DHA-PONA	126
	D 5501	Determination of denatured bioethanol	ZB-1, ZB-Bioethanol, ZB-DHA-PONA	152, 122, 126
	D 5580	Aromatics in finished gasoline	ZB-1	152
	D 6352	Extended SimDist	ZB-1HT Inferno, ZB-1XT SimDist	144, 124
	D 6584	Determination of glycerine in biodiesel	ZB-5HT Inferno	146
	D 6729-30, D 6733	Components in spark ignition fuels	ZB-DHA-PONA	126
D 7169	Crude Oil; Vacuum distillates	ZB-1XT SimDist	124	
E 0202	Analysis of glycols	ZB-WAX <sub>PLUS</sub> , ZB-1	138, 152	
E 1100	Analysis of denatured ethanol	ZB-WAX <sub>PLUS</sub> , ZB-Bioethanol	138, 122	





## Essentials

A collection of tried-and-true selectivities, Essentials phases are the smart starting point for the GC method developer.

ZB-1	ZB-624
ZB-5	ZB-1701
ZB-5ms	ZB-1701P
ZB-35	ZB-WAX
ZB-50	ZB-FFAP
	ZB-XLB



## PLUS

PLUS phases offer a suite of upgrades compared to their Essentials counterparts – from exceptional inertness to enhanced aqueous stability.

ZB-1 <sup>PLUS</sup> ™
ZB-5 <sup>PLUS</sup> ™
ZB-5MS <sup>PLUS</sup> ™
ZB-WAX <sup>PLUS</sup> ™
ZB-624 <sup>PLUS</sup> ™



## Inferno™

Resilient under even the most intense GC conditions, Inferno phases dare to defy high boilers, contaminants, and carry-overs.

ZB-1HT
ZB-5HT
ZB-35HT
ZB-XLB-HT



## Unlimited

Designed for the truly bold GC scientist, Unlimited phases unleash the power of selectivity for targeted performance that breaks from the mold.

ZB-PAH-EU
ZB-PAH-CT
ZB-Dioxin
ZB-FAME
ZB-SemiVolatiles
ZB-MultiResidue™ -1 & -2
ZB-CLPesticides -1 & -2
ZB-Drug-1
ZB-BAC-1 & -2
ZB-1XT SimDist
ZB-Bioethanol
ZB-DHA-PONA

# Meet Your GC Column Family

## Selected Zebron Polarities

<b>Polarity</b>	<b>5</b>	<b>ZB-1</b>	<b>For Non-Polar Analytes</b>
		<b>ZB-DHA-PONA</b>	
		<b>ZB-1PLUS™</b>	
		<b>ZB-1HT Inferno™</b>	
		<b>ZB-1XT SimDist</b>	
			<ul style="list-style-type: none"> <li>• Alkanes</li> <li>• Aromatics</li> <li>• Oils</li> <li>• Boiling Point Separations</li> </ul>
	<b>8</b>	<b>ZB-5</b>	
		<b>ZB-5ms</b>	
		<b>ZB-5PLUS™</b>	
		<b>ZB-5MSPLUS™</b>	
		<b>ZB-5HT Inferno</b>	
		<b>ZB-SemiVolatiles</b>	
	<b>9</b>	<b>ZB-XLB</b>	
		<b>ZB-XLB-HT Inferno</b>	
	<b>11</b>	<b>ZB-MultiResidue™-1</b>	
	<b>13</b>	<b>ZB-624</b>	<b>For Slightly Polar Analytes</b>
		<b>ZB-624PLUS™</b>	
		<b>ZB-MultiResidue-2</b>	
			<ul style="list-style-type: none"> <li>• Volatiles</li> <li>• Drugs</li> <li>• Pesticides</li> </ul>
<b>15</b>	<b>ZB-35</b>		
	<b>ZB-35HT Inferno</b>		
<b>18</b>	<b>ZB-1701</b>		
	<b>ZB-1701P</b>		
<b>19</b>	<b>ZB-50</b>		
<b>24</b>	<b>ZB-WAXPLUS™</b>	<b>For Very Polar Analytes</b>	
	<b>ZB-WAX</b>		
	<b>ZB-FFAP</b>		
		<ul style="list-style-type: none"> <li>• Polar Volatiles</li> <li>• Alcohols</li> <li>• Phenols</li> <li>• Acids</li> </ul>	

## Meet Your GC Column Family Zebron Unlimited

### Food Testing

ZB-FAME .....	112
---------------	-----

### Environmental Testing

ZB-Dioxin.....	102
ZB-PAH-EU.....	106
ZB-PAH-CT.....	110
ZB-SemiVolatiles .....	114
ZB-CLPesticides-1 & -2 .....	116
ZB-MultiResidue™-1 & -2 .....	118

### Fuels

ZB-Dioxin.....	102
ZB-PAH-EU.....	106
ZB-PAH-CT.....	110
ZB-Bioethanol .....	122
ZB-1XT SimDist.....	124
ZB-DHA-PONA .....	126

### Forensics & Toxicology

ZB-Drug-1 .....	128
ZB-BAC-1 & -2.....	130

### Zebron PLUS

ZB-1PLUS™ .....	132
ZB-5PLUS™ .....	134
ZB-5MSPLUS™ .....	136
ZB-WAXPLUS™ .....	138
ZB-624PLUS™ .....	140

### Zebron Inferno™

ZB-1HT Inferno.....	144
ZB-5HT Inferno.....	146
ZB-35HT Inferno.....	148
ZB-XLB-HT Inferno .....	150

### Zebron Essentials

ZB-1 .....	152
ZB-5 .....	153
ZB-5ms .....	154
ZB-35 .....	155
ZB-50 .....	156
ZB-624 .....	157
ZB-1701 .....	158
ZB-1701P.....	159
ZB-WAX .....	160
ZB-FFAP .....	161
ZB-XLB .....	162

### Zebron Guard Columns

Guardian™ Integrated Guard Columns .....	163
Z-Guard™ Columns.....	164



## ZB-Dioxin

### Improve Lab Productivity by 50%

- Fast PCB analysis
- Enhanced resolution of TCDD and TCDF
- Improved column lifetime with integrated guard column option
- MS certified, low bleed GC column

Upgrade to Zebtron from traditional phases used for Dioxin analysis:

#### Agilent®

- DB®-5MSUI
- DB-Dioxin
- DB-225

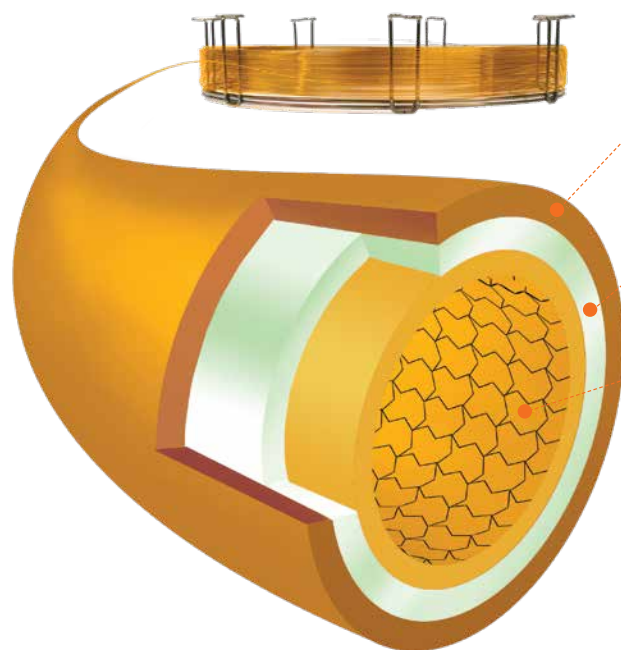
#### Restek®

- Rtx®-Dioxin2

#### Supelco®

- SP®-2330

### Why Choose ZB-Dioxin?



**A Proprietary Phenyl phase** which provides improved resolution of critical dioxin isomers

Intermediate polarity and thin film (60 meter x 0.20  $\mu$ m x 0.25 mm) to **reduce analysis times** and **increase productivity**

**Extensive cross-linking through ESC™** (Engineered Self Cross-Linking™) for low bleed and high temperature stability to minimize GC-MS maintenance and system downtime.

### ZB-Dioxin for Fast Dioxin and PCB Analysis

Zebtron ZB-Dioxin columns are specifically tailored for the analysis of aromatic compounds like dioxins, furans and PCBs in Food and Environmental matrices. The current analysis of Tetra through Octa Dioxin and Furan is time consuming and requires two GC columns and two GC-HRMS instruments. By switching to the unique selectivity of ZB-Dioxin analysis, you will gain enhanced resolution of 2,3,7,8-TCDD and 2,3,7,8-TCDF from its isomers in one run, and only need a single ZB-Dioxin GC column. In addition, ZB-Dioxin serves as your single column solution for Dioxin and PCB analysis. Upgrade your existing GC column for Dioxin analysis to a Zebtron ZB-Dioxin GC column and get all the analytical benefits and productivity gains of a single column solution.

Learn more at:

[www.phenomenex.com/GCDioxin](http://www.phenomenex.com/GCDioxin)

#### Our Customer Says YES!

“  
*The ZB-Dioxin achieves superior resolution for both 2,3,7,8-TCDD and 2,3,7,8-TCDF while not only maintaining chromatography for the hexes but actually improving it. This is all performed while reducing the overall runtime over traditional 5ms dioxin columns by as much as 25%. The ZB-Dioxin increases throughput by not only eliminating the need for a second column confirmation, but also by allowing additional samples to be analyzed in each 12-hour analytical sequence.*  
 ”

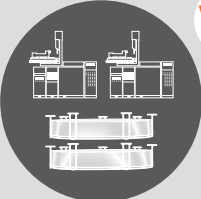
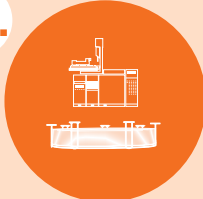
**Andrew Patterson, Technical Director  
 Eurofins Specialty Services, USA**



The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.



## ZB-Dioxin (cont'd)



### Increase Throughput and Improve Resolution of Dioxins and PCBs by using Zebron ZB-Dioxin!



Zebron ZB-Dioxin has a unique phase that allows for improved resolution of critical dioxin and PCB congeners and its consistent film thickness allows for optimal dioxin analysis on a single column.



Traditional	VS.	ZB-Dioxin Upgrade
		
<ul style="list-style-type: none"> <li>PCB and Dioxin required 2 different GC columns</li> </ul>		<ul style="list-style-type: none"> <li>Zebron ZB-Dioxin is a single column solution for Dioxin and PCB</li> </ul>

Traditional	VS.	ZB-Dioxin Upgrade
		
<ul style="list-style-type: none"> <li>Higher analysis cost: 2 GC-HRMS + 2 GC columns</li> </ul>		<ul style="list-style-type: none"> <li>Lower analysis cost: 1 GC-HRMS + 1 GC column</li> </ul>

Traditional	VS.	ZB-Dioxin Upgrade
		
<ul style="list-style-type: none"> <li>Long run time for Dioxin analysis</li> <li>First column (5% phenyl phase) ~60 minutes</li> <li>Second column (225 phase) ~30 minutes</li> </ul>		<ul style="list-style-type: none"> <li>Faster run time using one ZB-Dioxin ~40 minutes</li> </ul>

Traditional	VS.	ZB-Dioxin Upgrade
		
<ul style="list-style-type: none"> <li>Shorter column lifetime for difficult matrix like soil</li> </ul>		<ul style="list-style-type: none"> <li>Longer column lifetime with ZB-Dioxin Guardian™ option (Part No: <a href="#">7KG-G045-10-GGA</a>)</li> </ul>

Traditional	VS.	ZB-Dioxin Upgrade
		
<ul style="list-style-type: none"> <li>Lower throughput from customer perspective</li> </ul>		<ul style="list-style-type: none"> <li>HIGH throughput from customer perspective</li> </ul>

Traditional	VS.	ZB-Dioxin Upgrade
		
<ul style="list-style-type: none"> <li>Some GC Dioxin columns do not exceed 290 °C Temperature Limits</li> </ul>		<ul style="list-style-type: none"> <li>Low Bleed GC column temp with 320/340 °C Temperature Limits, this will provide higher sensitivity for later eluters and the ability to bake out major contaminants.</li> </ul>

## ZB-Dioxin (cont'd)

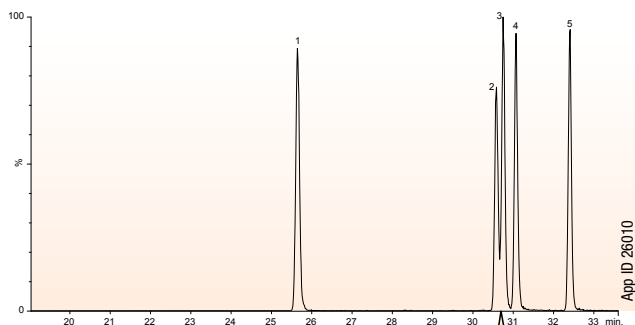
### TCDD on a Zebron ZB-Dioxin and a Popular Brand A

#### Zebron ZB-Dioxin GC Column

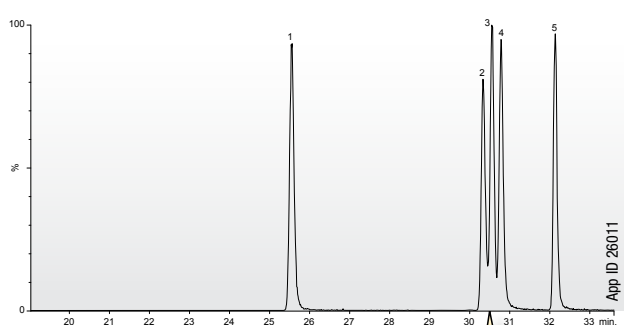
Part No. [7KG-G045-10](#)  
60 meter x 0.25 mm x 0.20 µm

#### Brand A Premium 5MS Phase

60 meter x 0.25 mm x 0.25 µm



High Resolution of 2,3,7,8-TCDD by using ZB-Dioxin which exceeds 25% valley EPA-1613 method requirement and provided extended lifetime



2,3,7,8-TCDD is not completely resolved which affects the column lifetime

Sample:	Run Time (min)	
	ZB-Dioxin	Brand A
1. 1,3,6,8-TCDD	25.65	23.20
2. 1,2,3,7-TCDD	30.58	30.33
3. 1,2,3,8-TCDD	30.75	30.55
4. 2,3,7,8-TCDD	31.07	30.78
5. 1,2,8,9-TCDD	32.41	32.13

#### Conditions for all separations:

Column 1: Zebron ZB-Dioxin  
 Column 1 Dimension: 60 meter x 0.25 mm x 0.20 µm  
 Column Part No.: [7KG-G045-10](#)  
 Column 2: Brand A Premium 5MS  
 Column 2 Dimension: 60 meter x 0.25 mm x 0.25 µm  
 Guard Column: 5 meter Z-Guard™ Kit  
 Guard Kit Part No.: [7AG-G000-00-GZK](#)  
 Injection: Pulse Splitless (2.0 min, 60 psi) @ 280 °C, 1 µL  
 Liner: Zebron PLUS 4 mm ID Single Taper Liner  
 Liner Part No.: [AG2-0A10-05](#)

Carrier Gas: Helium @ 1.25 mL/min (constant flow)  
 Oven Program: 160 °C for 2.4 min to 200 °C @ 25 °C/min to 220 °C @ 5 °C/min for 19 min to 288 °C @ 4 °C/min to 300 °C @ 5 °C/min for 7.6 min  
 Detector: HRMS  
 Transfer Line Temperature: 300 °C

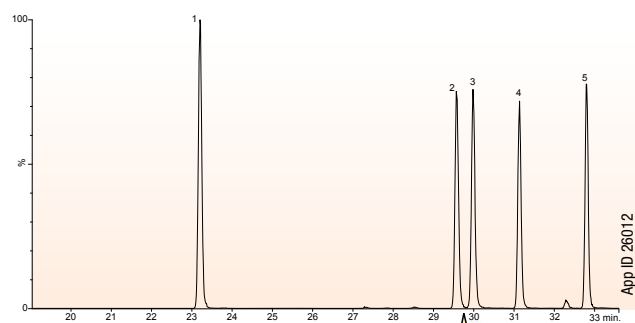
### TCDF on a Zebron ZB-Dioxin and a Popular Brand A

#### Zebron ZB-Dioxin GC Column

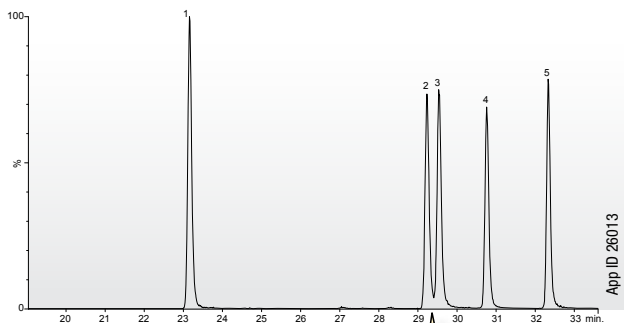
Part No. [7KG-G045-10](#)  
60 meter x 0.25 mm x 0.20 µm

#### Brand A Premium 5MS Phase

60 meter x 0.25 mm x 0.25 µm



Complete resolution of 2,3,7,8-TCDF on a single column ZB-Dioxin—NO NEED FOR ADDITIONAL CONFIRMATION COLUMN



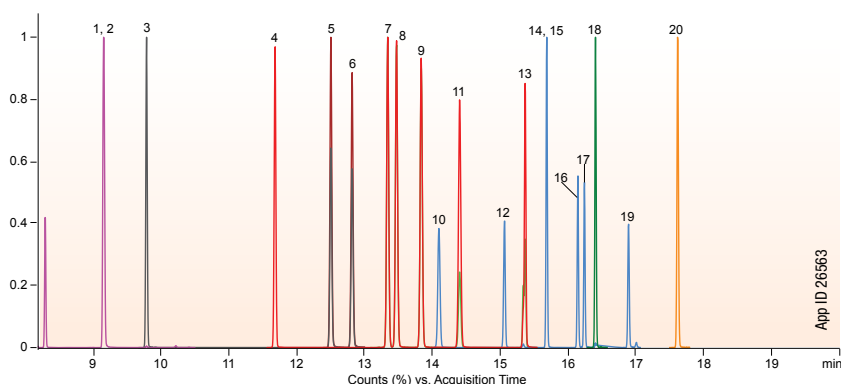
2,3,7,8-TCDF are not completely resolved and need an additional GC column to confirm isomers separation

Sample:	Run Time (min)	
	ZB-Dioxin	Brand A
1. 1,3,6,8-TCDF	23.20	23.16
2. 1,3,4,7-TCDF	29.57	29.23
3. 2,3,7,8-TCDF	29.98	29.53
4. 1,2,3,9-TCDF	31.14	30.76
5. 1,2,8,9-TCDF	32.79	32.33

Comparative separations may not be representative of all applications.

## ZB-Dioxin (cont'd)

### Fast GC-MS/MS Analysis of PCBs on a Single 40 Meter Zebron ZB-Dioxin GC Column



#### GC-MS/MS Conditions:

**Column:** Zebron ZB-Dioxin

**Dimension:** 40 meter x 0.18 mm x 0.14 µm

**Part No.:** [7PD-G045-47](#)

**Injection:** Splitless for 1.5 min @ 290 °C, 1 µL

**Recommended Liner:** Zebron PLUS Z-Liner™

(Compatible with Agilent® & Thermo® GC instrument)

**Part No.:** [AG2-0A13-05](#)

**Carrier Gas:** Helium @ 0.8 mL/min (constant flow)

**Oven Program:** 45 °C for 0 min to 175 °C @ 50 °C/min, to 220 °C @ 15 °C/min, to 250 °C @ 5 °C/min for 3 min, to 300 °C @ 50 °C/min for 10 min

**Detector:** GC-MS/MS

**Transfer Line Temperature:** 300 °C

**Mode:** Scan (100-450 m/z)

**Source Temperature:** 300 °C

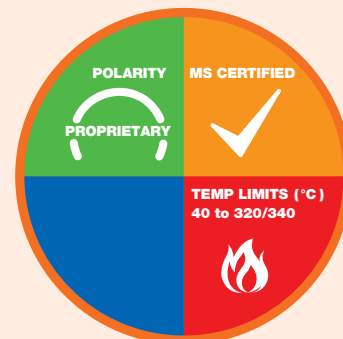
**Quad Temperature:** 150 °C

**Solvent Delay:** 8.0 min

#### Analyte:

1. PCB-28
2. PCB-31
3. PCB-52
4. PCB-101
5. PCB-81
6. PCB-77
7. PCB-123
8. PCB-118
9. PCB-114
10. PCB-153
11. PCB-105
12. PCB-138
13. PCB-126
14. PCB-167
15. PCB-128
16. PCB-156
17. PCB-157
18. PCB-180
19. PCB-169
20. PCB-189

#### Column Profile



#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry

- Proprietary

#### Recommended Applications

- Dioxin and PCB in Food, Environmental Samples
- POPs in Food



Zebron GC Columns MS Certification, see p. 437



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

#### Ordering Information

##### Zebron ZB-Dioxin GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
<b>40-Meter</b>			
0.18	0.14	40 to 320/340	<a href="#">7PD-G045-47</a>
<b>60-Meter</b>			
0.25	0.20	40 to 320/340	<a href="#">7KG-G045-10</a>
<b>60-Meter with 5-Meter Guardian™ Integrated Guard</b>			
0.25	0.20	40 to 320/340	<a href="#">7KG-G045-10-GGA</a>

## ZB-PAH-EU

- Up to 70 % faster PAH analysis
- Elevated temperature stability (340/360 °C)
- Great resolution of critical isomers, e.g. Benzo[b,j,k]fluoranthene

Upgrade to Zebtron from traditional phases used for PAHs:

**Agilent®**

- DB®-EUPAH

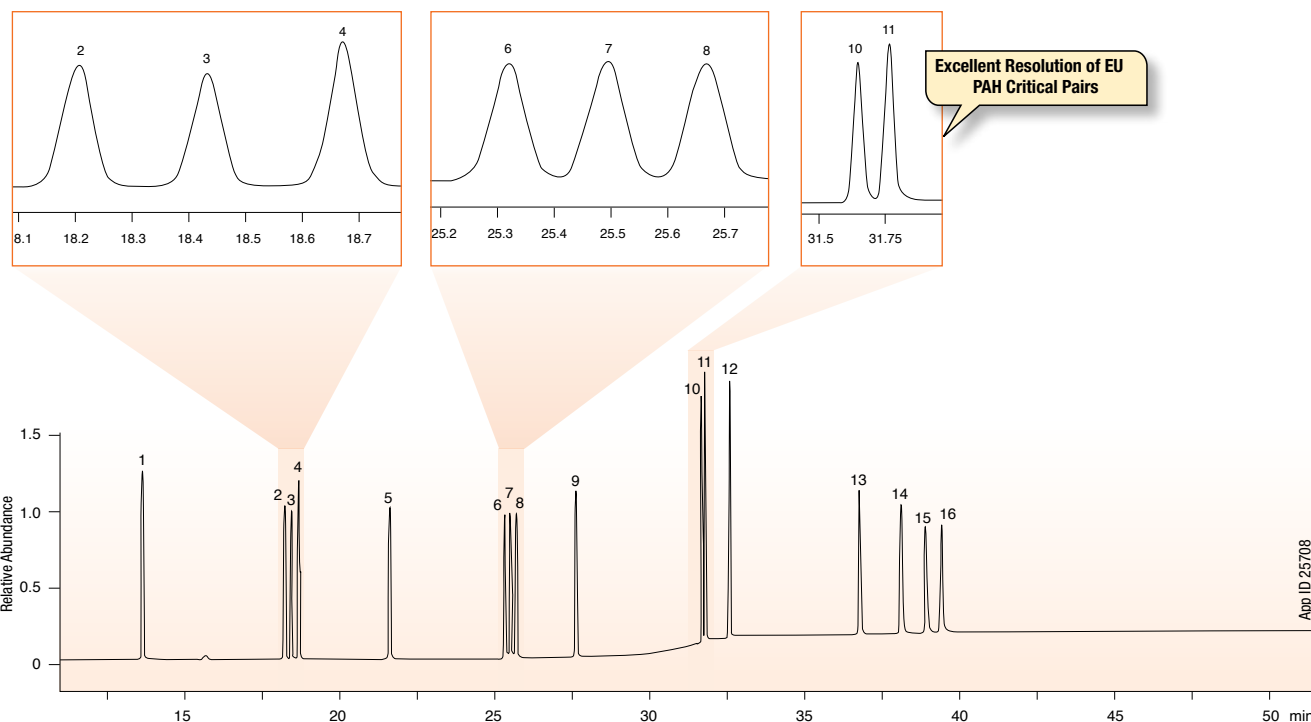
**Restek®**

- Rxi®-PAH

### Priority PAH Analysis by GC

Zebtron ZB-PAH-EU columns are designed to move conventional PAH testing to the exceptional, Zebtron GC columns come to life through a coupling of innovative spirit and technical excellence. The Zebtron ZB-PAH-EU and ZB-PAH-CT offer unparalleled performance through the power of targeted selectivity when analyzing Polycyclic Aromatic Hydrocarbons (PAHs).

#### Analysis of EU 15+1 PAHs



#### GC-MS conditions:

**Column:** Zebtron ZB-PAH-EU  
**Dimensions:** 30 meter x 0.25 mm x 0.20 µm  
**Part No.:** ZHG-G043-10  
**Injection:** Split 5:1 @ 330 °C, 1 µL  
**Recommended Liner:** Zebtron PLUS Single Taper Z-Liner™  
**Liner Part No.:** AG2-4B13-05 (for Shimadzu® 2010 GC)  
**Carrier Gas:** Helium @ 24 psi (constant pressure)  
**Oven Program:** 45 °C for 0.8 min to 200 °C @ 45 °C/min to 226 °C @ 3 °C/min for 0 min to 320 °C @ 10 °C/min for 20 min  
**Detector:** MSD, 50-500 m/z  
**Transfer Line Temperature:** 300 °C  
**Source Temperature:** 300 °C

#### Sample:

- |                          |                            |
|--------------------------|----------------------------|
| 1. Benzo[c]fluorene      | 9. Benzo[a]pyrene          |
| 2. Benz[aj]anthracene    | 10. Indeno[1,2,3-cd]pyrene |
| 3. Cyclopenta[c,d]pyrene | 11. Dibenzo[a,h]anthracene |
| 4. Chrysene              | 12. Benzo[g,h,i]perylene   |
| 5. 5-Methylchrysene      | 13. Dibenzo[a,l]pyrene     |
| 6. Benzo[b]fluoranthene  | 14. Dibenzo[a,e]pyrene     |
| 7. Benzo[k]fluoranthene  | 15. Dibenzo[a,i]pyrene     |
| 8. Benzo[j]fluoranthene  | 16. Dibenzo[a,h]pyrene     |

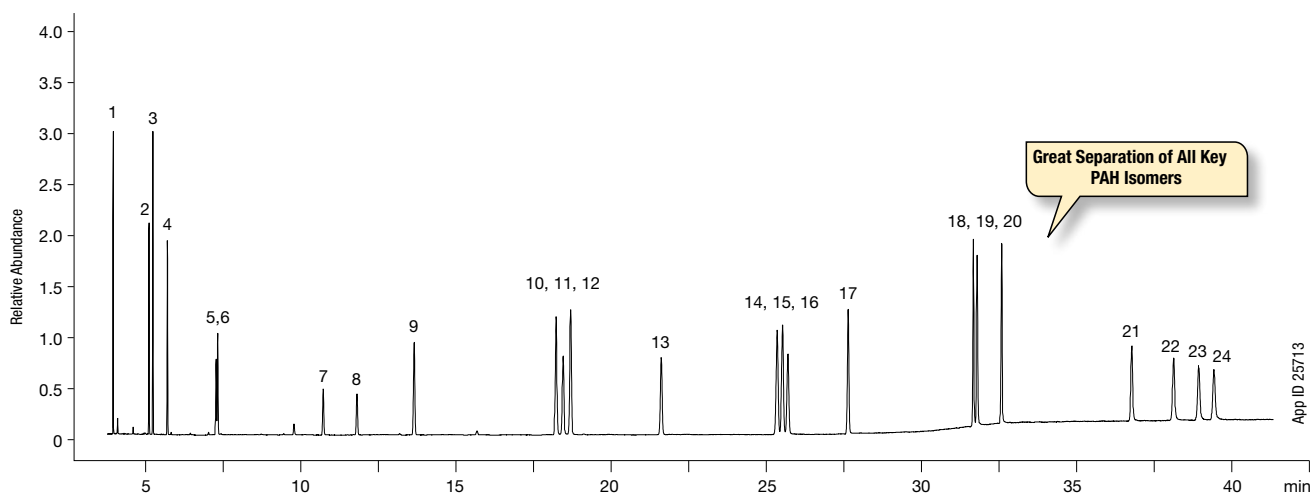


## ZB-PAH-EU (cont'd)

### Complete Resolution of EU 15+1 and EPA 610 PAHs

Zebron ZB-EU-PAH GC column demonstrates excellent resolution and accurate quantitation of European regulated EU 15+1 and EPA 610 PAHs.

#### Analysis of EU 15+1 and EPA 610 PAHs



#### GC-MS conditions:

**Column:** Zebron ZB-PAH-EU  
**Dimensions:** 30 meter x 0.25 mm x 0.20  $\mu$ m  
**Part No.:** [7HG-G043-10](#)  
**Injection:** Split 5:1 @ 330 °C, 1  $\mu$ L  
**Recommended Liner:** Zebron PLUS Single Taper Z-Liner™  
**Liner Part No.:** [AG2-4B13-05](#) (for Shimadzu® 2010 GC)  
**Carrier Gas:** Helium @ 24 psi (constant pressure)  
**Oven Program:** 45 °C for 0.8 min to 200 °C @ 45 °C/min to 226 °C @ 3 °C/min for 0 min to 320 °C @ 10 °C/min for 20 min  
**Detector:** MSD, 50-500 m/z  
**Transfer Line Temperature:** 300 °C  
**Source Temperature:** 300 °C

#### Sample:

- |                   |                           |                            |
|-------------------|---------------------------|----------------------------|
| 1. Naphthalene    | 9. Benzo[c]fluorene       | 17. Benzo[a]pyrene         |
| 2. Acenaphthylene | 10. Benz[a]anthracene     | 18. Indeno[1,2,3-cd]pyrene |
| 3. Acenaphthene   | 11. Cyclopenta[c,d]pyrene | 19. Dibenzo[a,h]anthracene |
| 4. Fluorene       | 12. Chrysene              | 20. Benzo[g,h,i]perylene   |
| 5. Phenanthrene   | 13. 5-Methylchrysene      | 21. Dibenzo[a,i]pyrene     |
| 6. Anthracene     | 14. Benzo[b]fluoranthene  | 22. Dibenzo[a,e]pyrene     |
| 7. Fluoranthene   | 15. Benzo[k]fluoranthene  | 23. Dibenzo[a,i]pyrene     |
| 8. Pyrene         | 16. Benzo[j]fluoranthene  | 24. Dibenzo[a,h]pyrene     |

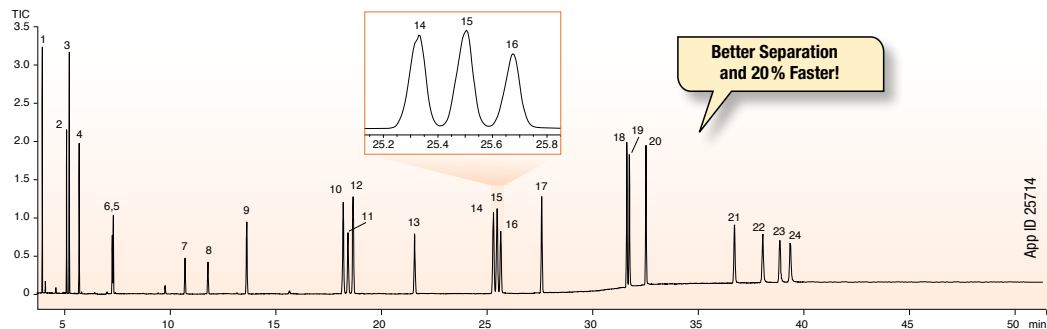
## ZB-PAH-EU (cont'd)

### Better Combination of Resolution and Speed

Zebron outperforms popular GC columns for the separation of EU 15+1 and EPA 610 PAHs.

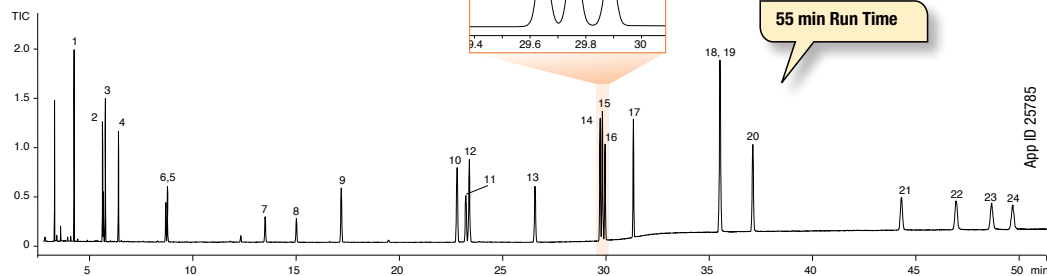
#### Zebron ZB-PAH-EU

30 meter x 0.25 mm x 0.20 μm



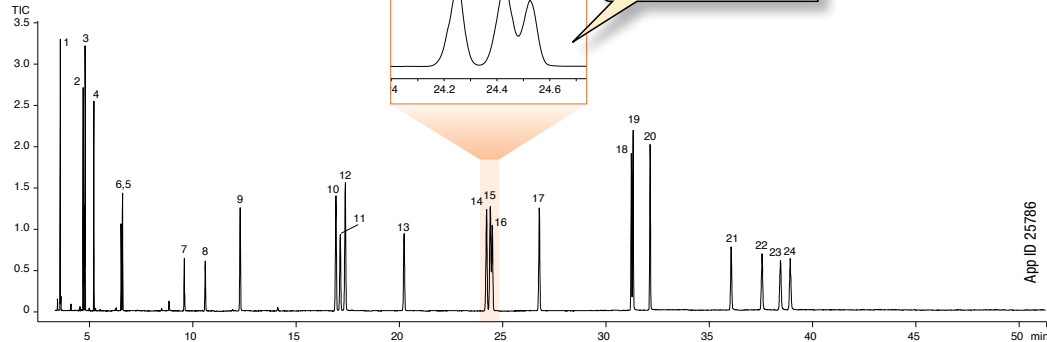
#### Popular Brand A

30 meter x 0.25 mm x 0.25 μm



#### Popular Brand B

30 meter x 0.25 mm x 0.10 μm



#### GC-MS conditions for both applications:

- Column: As Indicated
- Dimension: As indicated
- Injection: Split 5:1 @ 330 °C, 1 μL
- Recommended Liner: Zebron PLUS Single Taper Z-Liner™
- Liner Part No.: [AG2-4B13-05](#) (for Shimadzu® 2010 GC)
- Carrier Gas: Helium @ 24 psi (constant pressure)
- Oven Program: 45 °C for 0.8 min to 200 °C @ 45 °C/min to 226 °C @ 3 °C/min for 0 min to 320 °C @ 10 °C/min for 20 min
- Detector: MSD, 50-500 m/z
- Transfer Line Temperature: 300 °C
- Source Temperature: 300 °C

#### Sample:

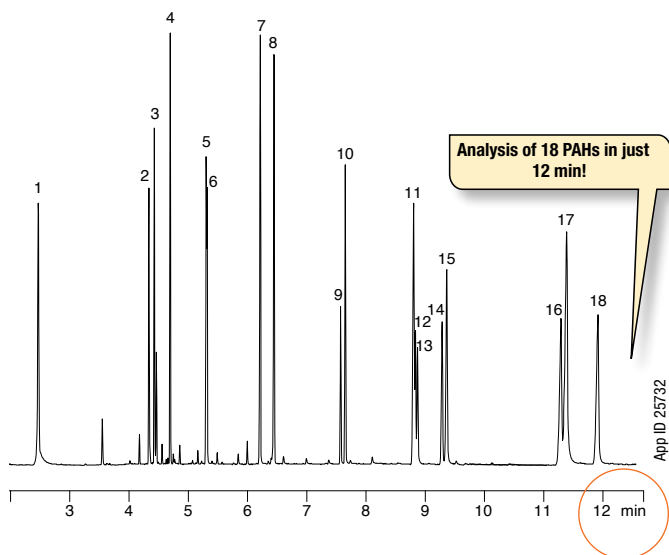
- |                   |                           |                            |
|-------------------|---------------------------|----------------------------|
| 1. Naphthalene    | 9. Benzo[c]fluorene       | 17. Benzo[a]pyrene         |
| 2. Acenaphthylene | 10. Benz[a]anthracene     | 18. Indeno[1,2,3-cd]pyrene |
| 3. Acenaphthene   | 11. Cyclopenta[c,d]pyrene | 19. Dibenzo[a,h]anthracene |
| 4. Fluorene       | 12. Chrysene              | 20. Benzo[g,h,i]perylene   |
| 5. Phenanthrene   | 13. 5-Methylchrysene      | 21. Dibenzo[a,h]pyrene     |
| 6. Anthracene     | 14. Benzo[b]fluoranthene  | 22. Dibenzo[a,e]pyrene     |
| 7. Fluoranthene   | 15. Benzo[k]fluoranthene  | 23. Dibenzo[a,i]pyrene     |
| 8. Pyrene         | 16. Benzo[j]fluoranthene  | 24. Dibenzo[a,h]pyrene     |

Comparative separations may not be representative of all applications.

## ZB-PAH-EU (cont'd)

### GC-MS Analysis of PAHs in Rubber and Plastic

Zebtron ZB-PAH-EU GC column separates the 18 PAH isomers within 12 minutes, resolving all critical pairs while demonstrating consistent column inertness.



The high temperature limits of the ZB-PAH-EU (340/360 °C) is extremely helpful for easy bakeout of dirty matrices and allows for eluting heavy PAHs!

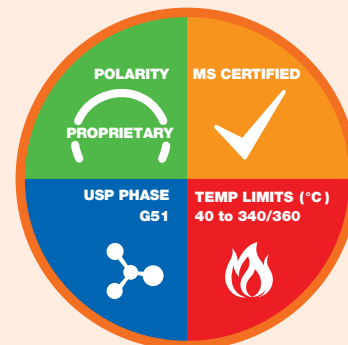
**Column:** Zebtron ZB-PAH-EU  
**Dimensions:** 10 meter x 0.10 mm x 0.08 µm  
**Part No.:** [7CB-G043-59](#)  
**Injection:** Split 5:1 @ 320 °C, 1 µL  
**Recommended Liner:** Zebtron PLUS Single Taper Z-Liner™  
**Liner Part No.:** [AG2-4B13-05](#) (for Shimadzu® 2010 GC System)  
**Carrier Gas:** Helium @ 0.68 mL/min (constant flow)  
**Oven Program:** 100 °C for 3.0 min to 200 °C @ 60 °C/min to 270 °C @ 22 °C/min to 300 °C @ 4.5 °C/min to 330 °C @ 80 °C/min for 0.5 min  
**Detector:** MSD, 50-500 m/z  
**Transfer Line Temperature:** 300 °C  
**Source Temperature:** 330 °C

<b>Sample:</b>	1. Naphthalene	10. Chrysene
	2. Acenaphthylene	11. Benzo[b]fluoranthene
	3. Acenaphthene	12. Benzo[k]fluoranthene
	4. Fluorene	13. Benzo[j]fluoranthene
	5. Phenanthrene	14. Benzo[a]pyrene
	6. Anthracene	15. Benzo[e]pyrene
	7. Fluoranthene	16. Indeno[1,2,3-cd]pyrene
	8. Pyrene	17. Dibenzo[a,h]anthracene
	9. Benz[a]anthracene	18. Benzo[g,h,i]perylene

#### Ordering Information

Zebtron ZB-PAH-EU GC Columns			
ID (mm)	df (µm)	Temp. Limits °C	Part No.
<b>10-Meter</b>			
0.10	0.08	40 to 340/360	<a href="#">7CB-G043-59</a>
<b>20-Meter</b>			
0.18	0.14	40 to 340/360	<a href="#">7FD-G043-47</a>
<b>30-Meter</b>			
0.25	0.20	40 to 340/360	<a href="#">7HG-G043-10</a>
<b>60-Meter</b>			
0.25	0.20	40 to 340/360	<a href="#">7KG-G043-10</a>

#### Column Profile



#### Phase Chemistry

- Proprietary

#### Recommended Applications

- Analysis of 15+1 EU-regulated and EPA regulated PAHs in food testing, rubber, plastic, coal
- Sources include cigarette smoke, vehicle exhausts, asphalt roads, coal, coal tar, wildfires, agricultural burning, residential wood burning, municipal, industrial waste incineration

**i** Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

**i** [www.phenomenex.com/Products/GCdetail/Zebtron/ZB-PAH-EU](http://www.phenomenex.com/Products/GCdetail/Zebtron/ZB-PAH-EU)

## ZB-PAH-CT

- Enhanced resolution for chrysene and triphenylene (PAH Interferences)
- Increased Benzo[b,k] fluoranthene separation
- Optimal performance and resolution of regulated PAH isomers
- Great resolution of critical isomers, e.g. Benzo[b,j,k]fluoranthene

Upgrade to Zebtron from traditional phases used for PAHs:

- Agilent®**
- Select PAH

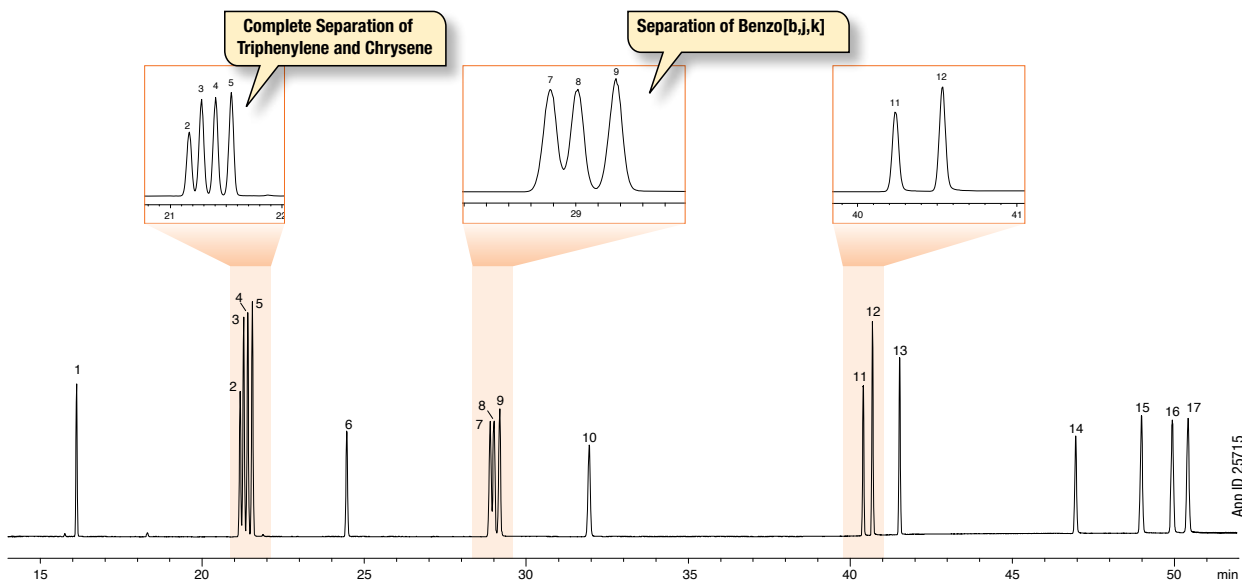
## Priority PAH Analysis by GC

Zebtron ZB-PAH-CT columns are manufactured to provide the most optimal performance for EU-regulated polycyclic aromatic hydrocarbons (PAHs) and EPA regulated PAHs.

## Excellent Resolution of Chrysene and Triphenylene

We designed the Zebtron ZB-PAH-CT GC column to achieve complete resolution of Chrysene from Triphenylene along with other EU 15+1 PAH compounds. Its unique selectivity helps eliminate false positives while resolving PAH isomers, providing easy, fast, and accurate quantification of PAHs in environmental and food samples.

## EU 15+1 PAH Analysis Using Zebtron ZB-PAH-CT



**Column:** Zebtron ZB-PAH-CT  
**Dimensions:** 40 meter x 0.18 mm x 0.14 µm  
**Part No.:** [7PD-G044-47](#)  
**Injection:** Split 30:1 @ 320 °C, 1 µL  
**Recommended Liner:** Zebtron PLUS Single Taper Z-Liner™  
**Liner Part No.:** [AG2-4B13-05](#) (for Shimadzu® 2010 GC)  
**Carrier Gas:** Helium @ 78 psi (constant pressure)  
**Oven Program:** 45 °C for 0.8 min to 200 °C @ 45 °C/min to 265 °C @ 3 °C/min for 5 min to 270 °C @ 1 °C/min to 320 °C @ 10 °C/min for 15 min  
**Detector:** MSD (Shimadzu GC-MS-QP2010 Ultra)  
**Mode:** SIM  
**SIM Ions:** 216, 226, 228, 242, 252, 276, 278, 302 m/z  
**Transfer Line Temperature:** 300 °C  
**Source Temperature:** 300 °C

- Sample:**
- |                          |                             |
|--------------------------|-----------------------------|
| 1. Benzo[c]fluorene      | 10. Benzo[a]pyrene          |
| 2. Cyclopenta[c,d]pyrene | 11. Indeno[1,2,3-c,d]pyrene |
| 3. Benz[a]anthracene     | 12. Dibenzo[a,h]anthracene  |
| 4. Triphenylene          | 13. Benzo[g,h,i]perylene    |
| 5. Chrysene              | 14. Dibenzo[a,i]pyrene      |
| 6. 5-Methylchrysene      | 15. Dibenzo[a,e]pyrene      |
| 7. Benzo[b]fluoranthene  | 16. Dibenzo[a,j]pyrene      |
| 8. Benzo[j]fluoranthene  | 17. Dibenzo[a,h]pyrene      |
| 9. Benzo[k]fluoranthene  |                             |

## ZB-PAH-CT (cont'd)

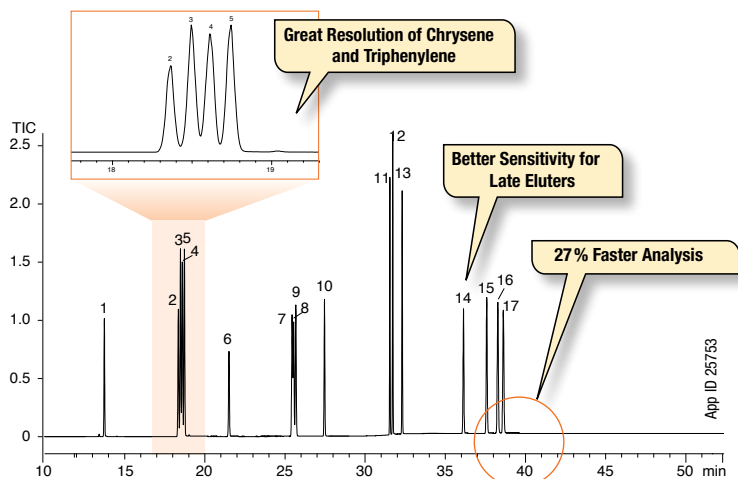
### Comparison of ZB-PAH-CT vs. Popular GC PAH column

Shorter Run Time and Better Sensitivity

#### Analysis of EU 15+1 and Triphenylene PAHs

##### Zebron ZB-PAH-CT

30 meter x 0.25 mm x 0.20 μm



#### GC-MS conditions for both applications:

Column: As Indicated

Dimensions: As Indicated

Part No.: [ZHG-G044-10](#) (Zebron ZB-PAH-CT)

Injection: Split 15:1 @ 320 °C, 1 μL

Recommended Liner: Zebron PLUS Single Taper Z-Liner™

Liner Part No.: [AG2-4B13-05](#)

Carrier Gas: Helium @ 23.7 psi (constant pressure)

Oven Program: 45 °C for 0.8 min to 200 °C @ 45 °C/min to 266 °C @ 3 °C/min for 0 min to 320 °C @ 10 °C/min to 320 °C for 20 min

Detector: MSD (Shimadzu® GC-MS-QP2010 Ultra)

Mode: SIM

SIM Ions: 216, 226, 228, 242, 252, 276, 278, 302 m/z

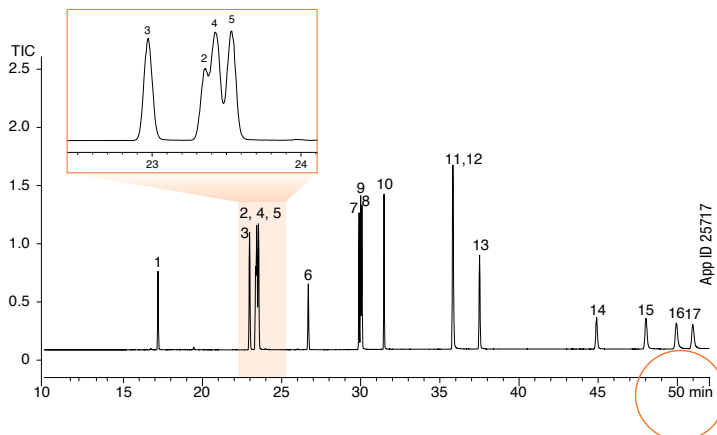
Transfer Line Temperature: 300 °C

Source Temperature: 300 °C

- Sample:
1. Benzo[c]fluorene
  2. Cyclopenta[c,d]pyrene
  3. Benz[a]anthracene
  4. Triphenylene
  5. Chrysene
  6. 5-Methylchrysene
  7. Benzo[b]fluoranthene
  8. Benzo[j]fluoranthene
  9. Benzo[k]fluoranthene
  10. Benzo[a]pyrene
  11. Indeno[1,2,3-c,d]pyrene
  12. Dibenz[a,h]anthracene
  13. Benzo[g,h,i]perylene
  14. Dibenzo[a,i]pyrene
  15. Dibenzo[a,e]pyrene
  16. Dibenzo[a,i]pyrene
  17. Dibenzo[a,h]pyrene

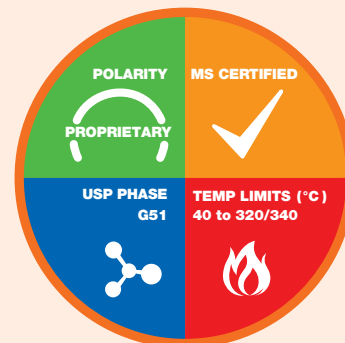
#### Popular Brand A

30 meter x 0.25 mm x 0.15 μm



Comparative separations may not be representative of all applications.

#### Column Profile



#### Phase Chemistry

- Proprietary

#### Recommended Applications

- Analysis of 15+1 EU-regulated and EPA regulated PAHs in food testing, rubber, plastic, coal
- Sources include cigarette smoke, vehicle exhausts, asphalt roads, coal, coal tar, wildfires, agricultural burning, residential wood burning, municipal, industrial waste incineration.



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.



Zebron ZB-PAH-CT Phase details [www.phenomenex.com/Products/GCDetail/Zebron/ZB-PAH-CT](http://www.phenomenex.com/Products/GCDetail/Zebron/ZB-PAH-CT)

#### Ordering Information

##### Zebron ZB-PAH-CT GC Columns

ID (mm)	df (μm)	Temp. Limits °C	Part No.
<b>20-Meter</b>			
0.18	0.14	40 to 320/340	<a href="#">7FD-G044-47</a>
<b>30-Meter</b>			
0.25	0.20	40 to 320/340	<a href="#">ZHG-G044-10</a>
<b>40-Meter</b>			
0.18	0.14	40 to 320/340	<a href="#">7PD-G044-47</a>



## ZB-FAME

- Reduce traditional run times up to 75%
- Improve separation of cis/trans FAME isomers
- Suitable with AOAC, AOCS, and IOC methods

Upgrade to Zebtron from any high cyanopropyl phase:

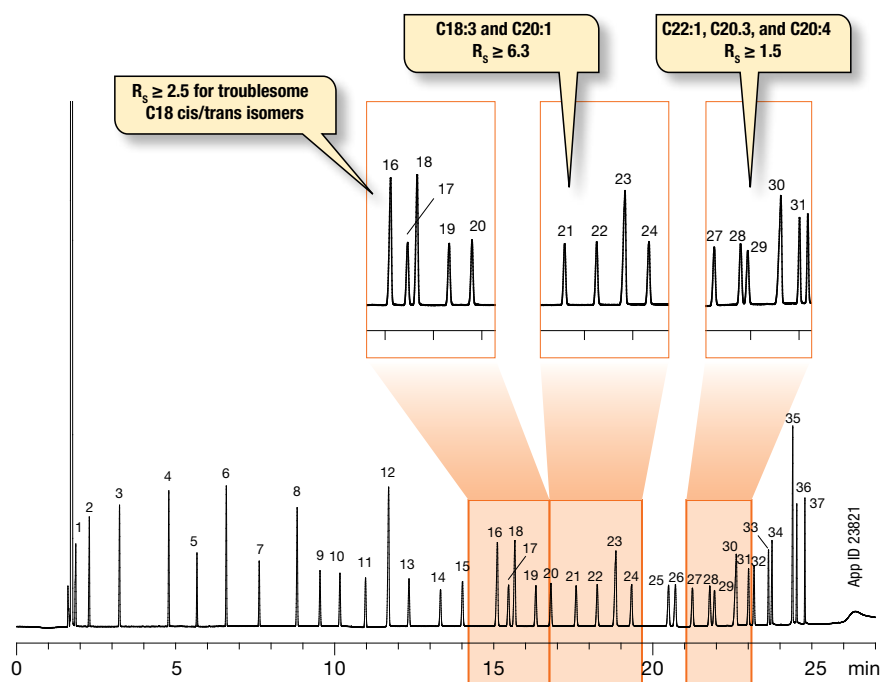
**Agilent®**

- CP-Sil 88
- HP-88
- DB®-23

**Supelco®**

- SP®-2380
- SP-2560

### Baseline Separation of Common Isomers



**Column:** Zebtron ZB-FAME

**Dimensions:** 30 meter x 0.25 mm x 0.20 µm

**Part No.:** ZHG-G033-10

**Injection:** Split 50:1 @ 240 °C, 1 µL

**Recommended Liner:** Zebtron PLUS Single Taper with Wool, 4 mm ID

**Liner Part No.:** AG2-0A11-05 (for Agilent® systems)

**Carrier Gas:** Helium @ 1.2 mL/min (constant flow)

**Oven Program:** 100 °C for 2 min to 140 °C @ 10 °C/min to 190 °C @ 3 °C/min to 260 °C @ 30 °C/min for 2 min

**Detector:** FID @ 260 °C

**Sample:** 37 FAME standard

### Easy Liner Selection



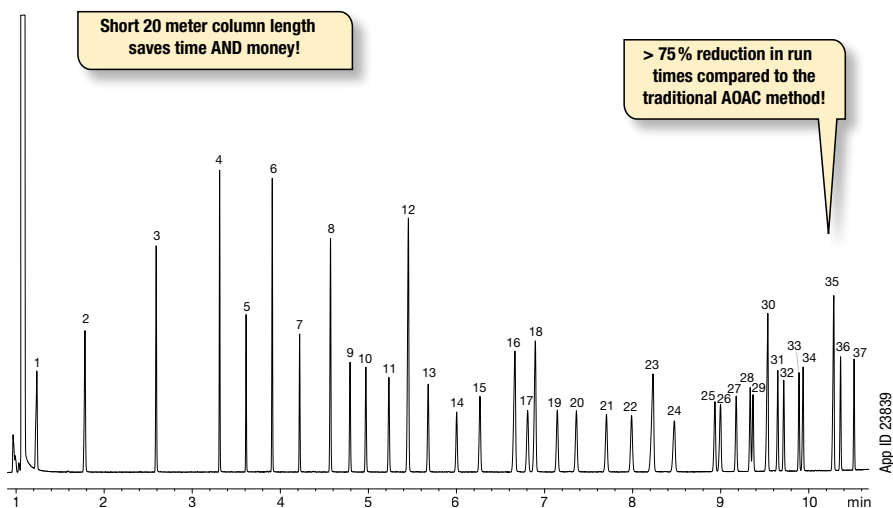
Our GC liner finder tool makes liner selection a breeze. You can even search by application, injection type, GC system, or your current liner part number.

[www.phenomenex.com/FindLiner](http://www.phenomenex.com/FindLiner)

## The Fast FAME GC Column

Traditionally, cis/trans FAME separations require the use of long (100 meters or more) columns and can run up to 60 minutes, resulting in a bottleneck to higher productivity. Zebron ZB-FAME provides targeted selectivity that allows for reduced column length – run times as short as 11 minutes without compromising your results!

### 37 FAMES In A Short 11 Minute Run



**Column:** Zebron ZB-FAME

**Dimensions:** 20 meter x 0.18 mm x 0.15 µm

**Part No.:** [7FD-G033-05](#)

**Injection:** Split 100:1 @ 250 °C, 1 µL

**Recommended Liner:** Zebron PLUS Single Taper Z-Liner™

**Liner Part No.:** [AG2-0A13-05](#) (for Agilent® systems)

**Carrier Gas:** Helium @ 1.0 mL/min (constant flow)

**Oven Program:** 80 °C for 1.5 min to 160 °C @ 40 °C/min to 185 °C @ 5 °C/min to 260 °C @ 30 °C/min

**Detector:** FID @ 260 °C

**Sample:** 37 FAME standard



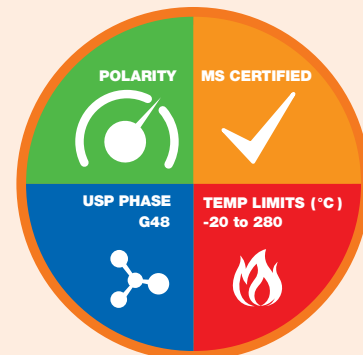
### Ordering Information

#### Zebron ZB-FAME GC Columns

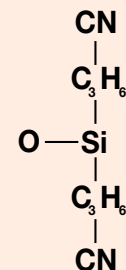
ID (mm)	df (µm)	Temp. Limits °C	Part No.
<b>20-Meter</b>			
0.18	0.15	-20 to 280	<a href="#">7FD-G033-05</a>
<b>30-Meter</b>			
0.25	0.20	-20 to 280	<a href="#">7HG-G033-10</a>
<b>30-Meter with 5-Meter Guardian™ Integrated Guard</b>			
0.25	0.20	-20 to 280	<a href="#">7HG-G033-10-GGA</a>
<b>60-Meter</b>			
0.25	0.20	-20 to 280	<a href="#">7KG-G033-10</a>
<b>100-Meter</b>			
0.25	0.20	-20 to 280	<a href="#">7MG-G033-10</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](http://Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

### Column Profile



### Phase Chemistry



High Cyanopropyl

### Recommended Applications

- Fatty Acid Methyl Ester (FAMES)
- cis/trans FAME isomers
- Omega 3, Omega 6 FAMES

## ZB-SemiVolatiles

### Maximize Inertness

- Specifically designed to overcome obstacles for sensitive semi-volatiles methods
- **Enviro-Inert™ Technology** provides a rugged 5% phenyl-arylene phase – reduce activity without compromising selectivity
- Rugged QC test includes EPA 8270 tuning standard to ensure column is ready to pass suitability requirements
- Popular for EPA Methods 525, 610, 625, 8100, and 8270D

Upgrade to Zebron from any 5%-phenyl or 5% phenyl-arylene / 95% dimethylpolysiloxane phase:

#### Agilent®

- DB®-5ms
- DB-5ms Ultra Inert
- DB-5.625
- DB-UI 8270D

- HP-5ms
- HP-5ms Ultra Inert
- VP-5ms
- CP-5il 8 CB MS

#### Restek®

- Rxi®-5Sil MS
- Rxi-5ms

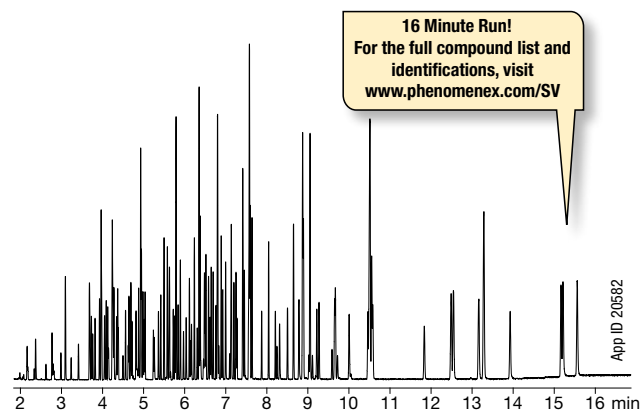
#### Supelco®

- SLB®-5ms

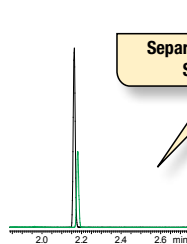
### 135 Compounds in Under 16 Minutes

ZB-SemiVolatiles provides improved productivity with shorter run times for EPA 8270D, while maintaining resolution of key critical pairs.

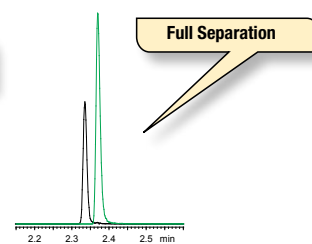
### Semivolatile Organic Compounds



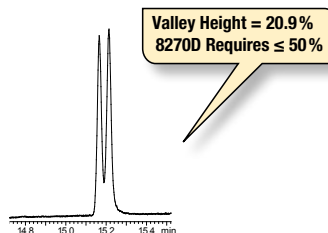
### Improved Peak Shapes



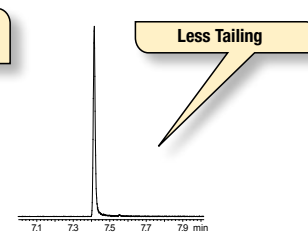
1,4-Dioxane-D8 and 1,4-Dioxane



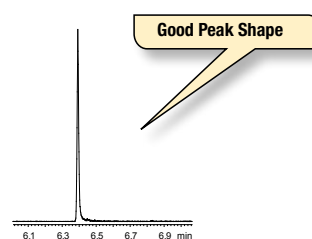
N-Nitrosodimethylamine and Pyridine



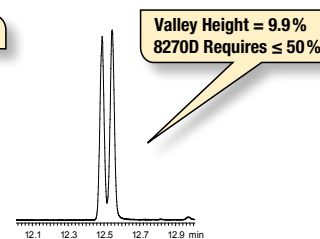
Indeno[1,2,3-cd]pyrene and Dibenz[a,h]anthracene, both share mass 276



Pentachlorophenol



2,4-Dinitrophenol



Benzo[b]fluoranthene and Benzo[k]fluoranthene

- Column:** Zebron ZB-SemiVolatiles
- Dimensions:** 30 meter x 0.25 mm x 0.25 μm
- Part No.:** 7HG-G027-11
- Injection:** Split 10:1 @ 280 °C, 1 μL
- Liner:** AGO-8499 (Single Taper with Wool)
- Septum:** AGO-4697 (PhenoRed™-400)
- Inlet Seal:** AGO-8620 (Easy Seals™ Inlet Base Seal)
- Carrier Gas:** Helium @ 1.4 mL/min (constant flow)
- Oven Program:** 40 °C for 0.5 min to 260 °C @ 40 °C/min to 295 °C @ 6 °C/min to 325 °C @ 25 °C/min for 2 min
- Detector:** MSD @ 340 °C; 45 – 450 amu
- Sample:** Analytes are 25 ppm in Dichloromethane  
135 compounds in EPA Method 8270D



## ZB-SemiVolatiles

### We QC Test For the Compounds You Analyze

We take the guesswork out of meeting method requirements by aggressively testing ZB-SemiVolatiles with two different test mixes. We incorporated troublesome analytes from your samples and compounds in the EPA 8270D tuning standard into our QC test, so you can be sure your column is ready to meet suitability requirements for the method.

#### Meet Requirements Out-of-the-Box

Test Probe	Criteria	EPA Requirement	Our Requirement
<b>Pyridine</b> Very active amine that exposes even the smallest amount of column activity. This ensures that our Enviro-Inert™ deactivated column performs at the highest possible level for difficult basic compounds.	Peak Response	Not Specified	≥ 0.6
<b>Pentachlorophenol</b> Disappears and tails on active columns; it is important to measure relative response and peak skew criteria.	Peak Skew Peak Response	≤ 2.0 Not Specified	≤ 2.0 ≥ 0.3
<b>Benzidine</b> Active amine that tails when column activity is present, complicating peak quantification.	Peak Skew	≤ 2.0	≤ 2.0
<b>DDT</b> Breaks down in an active system to DDE and DDD. With our QC test, you are assured that your column will meet the EPA requirements upon installation.	Breakdown	< 20 %	< 20 %
<b>Injection</b> To ensure trace-level sensitivity, QC is performed with a 20 ppm mix using a 100:1 split injection – effectively 250 times less than the EPA maximum allowed.	Sensitivity	50 ng or less on column	0.2 ng on column

#### Stands Up to Tough Samples for Increased Lifetime

“ I have found the Phenomenex ZB-SemiVolatiles columns to be superior in quality and durability than any other columns we have previously used. The columns not only last longer, but the reproducibility of column is extraordinary. The column holds calibrations particularly well, even after multiple injections of samples with far less than desirable matrices. All of this equates to less downtime and maintenance and more productivity for TestAmerica. ”

**Ryan McKernan, GC-MS Semi-Volatile Analyst**  
TestAmerica Laboratories, Inc. Buffalo

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

**Column Profile**

**Engineered Self Cross-linking™ (ESC)**

**Phase Chemistry**

5 % Phenyl-Arylene

C[Si](C)(C)c1ccc(cc1)[Si](C)(C)Oc2ccc(cc2)[Si](C)(C)Oc3ccc(cc3)C

95 % Dimethylpolysiloxane

**Recommended Applications**

- Semivolatiles (SVOCs)
- EPA Methods (525, 610, 625, 8100, 8270D)
- PAHs
- PBDEs

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

#### Ordering Information

Zebtron ZB-SemiVolatiles GC Columns			
ID (mm)	df (µm)	Temp. Limits °C	Part No.
<b>15-Meter</b>			
0.25	0.25	-60 to 325/350	<a href="#">7EG-G027-11</a>
0.25	0.50	-60 to 325/350	<a href="#">7EG-G027-17</a>
<b>20-Meter</b>			
0.18	0.18	-60 to 325/350	<a href="#">7FD-G027-08</a>
0.18	0.36	-60 to 325/350	<a href="#">7FD-G027-53</a>
<b>30-Meter</b>			
0.25	0.25	-60 to 325/350	<a href="#">7HG-G027-11</a>
0.25	0.50	-60 to 325/350	<a href="#">7HG-G027-17</a>
0.32	0.25	-60 to 325/350	<a href="#">7HM-G027-11</a>
<b>30-Meter with 5-Meter Guardian™ Integrated Guard</b>			
0.25	0.25	-60 to 325/350	<a href="#">7HG-G027-11-GGA</a>
0.25	0.50	-60 to 325/350	<a href="#">7HG-G027-17-GGA</a>
<b>30-Meter with 10-Meter Guardian Integrated Guard</b>			
0.25	0.25	-60 to 325/350	<a href="#">7HG-G027-11-GGC</a>
0.25	0.50	-60 to 325/350	<a href="#">7HG-G027-17-GGC</a>
<b>60-Meter</b>			
0.25	0.25	-60 to 325/350	<a href="#">7KG-G027-11</a>

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

## ZB-CLPesticides-1 and -2

### 7 EPA Methods, One Column Set

- **Guaranteed alternative to Restek Rtx-CLPesticides**
- **Optimized, versatile selectivity for chlorinated pesticides and herbicides**
- **Well-suited for dual-column configurations using GC-ECD**
- **Run EPA Methods 8081 and 8081 extended, 8082, 8151, 504, 505, 508, and 552 without changing columns – save time**

### Direct Replacement for Restek Rtx-CLPesticides Phases

You asked for optimized performance for pesticides by GC-ECD detectors, without time-consuming method development. We've delivered a direct replacement\*\*! ZB-CLPesticides-1 and -2 provide guaranteed drop-in performance compared to your current Rtx-CLPesticides column set, without the hassle.

Upgrade to Zebron from these similar\* phases:

#### Restek®

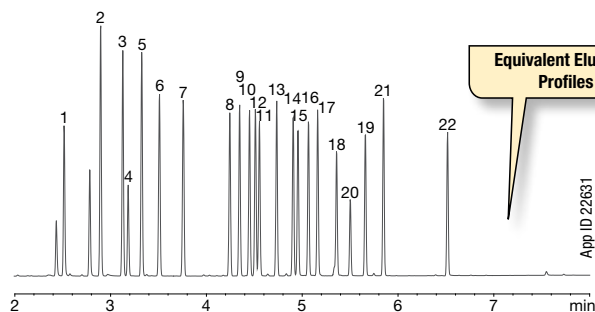
- Rtx®-CLPesticides
- Rtx-CLPesticides2
- Stx®-CLPesticides
- Stx-CLPesticides2

\*not exact equivalent, selectivity may differ

#### Zebron

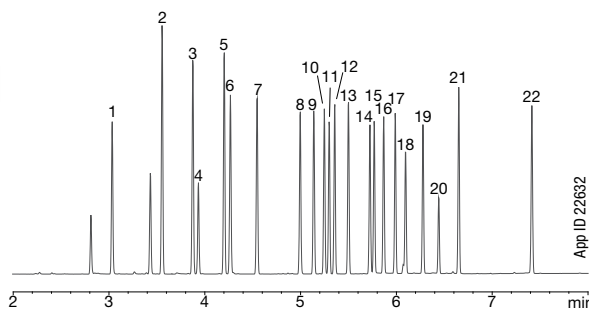
##### ZB-CLPesticides-1

30 m x 0.32 mm x 0.32 µm



##### ZB-CLPesticides-2

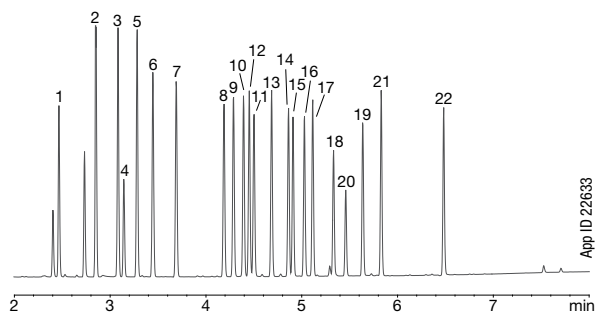
30 m x 0.32 mm x 0.25 µm



#### Restek®

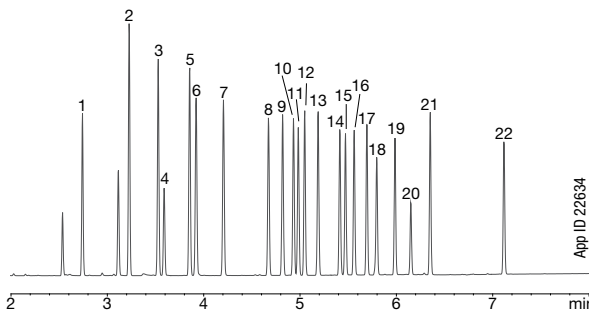
##### Rtx®-CLPesticides

30 m x 0.32 mm x 0.32 µm



##### Rtx-CLPesticides2

30 m x 0.32 mm x 0.25 µm



#### Conditions for all columns:

- Columns:** As listed
- Dimensions:** As listed
- Part No.:** [ZHM-G028-51](#) (ZB-CLPesticides-1)  
[ZHM-G029-11](#) (ZB-CLPesticides-2)
- Injection:** Splitless (hold 0.3 min) @ 250 °C, 1 µL
- Carrier Gas:** Helium @ 3.9 mL/min (constant flow)
- Oven Program:** 120 °C to 200 °C @ 45 °C/min to 230 °C @ 15 °C/min to 330 °C @ 30 °C/min for 2 min

- Detector:** ECD @ 330 °C
- Y-Connector:** [AG0-4717](#) (Fused Quartz)
- Guard Column:** [ZAM-G000-00-GZ0](#) (5 m Z-Guard™)
- Liner:** [AG0-8499](#) (Single Taper with Wool at Bottom)
- Septum:** [AG0-4696](#) (PhenoRed™-400)
- Inlet Seal:** [AG0-8620](#) (Gold-Plated Easy Seals™)
- Sample:** Analytes are 250 ng/mL in hexane.

See page 117 for compound list.

\*\*Direct replacement: this category indicates an alternative column which will likely give a similar selectivity. Conditions for each method were the same for all columns tested. Comparative separations may not be representative of all applications.



## ZB-CLPesticides-1 and -2

### Five-Point Calibration Curve at 5, 15, 25, 100, and 250 ng/mL

Peak No.	Analyte	ZB-CLPesticides-1 % RSD*	ZB-CLPesticides-2 % RSD*	US EPA Specifications
1	2,4,5,6-TCMX (Surr)	3.8	3.0	< 20
2	α-BHC	8.3	3.8	< 20
3	γ-BHC	5.9	5.6	< 20
4	β-BHC	6.9	6.9	< 20
5	δ-BHC	4.9	5.7	< 20
6	Heptachlor	8.0	6.5	< 20
7	Aldrin	4.2	2.3	< 20
8	Heptachlor epoxide	3.8	2.3	< 20
9	trans-Chlordane	4.1	3.8	< 20
10	cis-Chlordane	4.0	3.3	< 20
11	4,4'-DDE	4.8	2.9	< 20
12	Endosulfan I	6.0	2.5	< 20
13	Dieldrin	7.7	4.9	< 20
14	Endrin	9.4	6.6	< 20
15	4,4'-DDD	9.2	3.6	< 20
16	Endosulfan II	6.6	4.1	< 20
17	4,4'-DDT	11.6	6.9	< 20
18	Endrin aldehyde	8.3	7.3	< 20
19	Endosulfan sulfate	8.0	7.1	< 20
20	Methoxychlor	6.7	6.1	< 20
21	Endrin ketone	6.5	7.2	< 20
22	Decachlorobiphenyl (Surr)	6.7	6.6	< 20
Average		6.6%	4.9%	< 20

\*Calculated using response factors as per EPA guidelines


## ZB-CLPesticides GC Column Kits

### Ordering Information

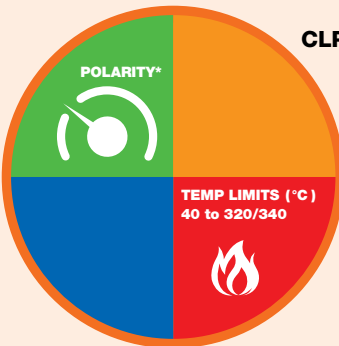
0.25 mm ID Kit (includes 1 of each below) Part No.: <a href="#">KG0-9285</a>			
Description	Dimension	Part No.	
ZB-CLPesticides-1	30 meter x 0.25 mm x 0.25 μm	<a href="#">7HG-G028-11</a>	
ZB-CLPesticides-2	30 meter x 0.25 mm x 0.20 μm	<a href="#">7HG-G029-10</a>	
Z-Guard™ Column	5 meter x 0.25 mm	<a href="#">7AG-G000-00-GZ0</a>	
Y-Connector	Fused Quartz	<a href="#">AGO-4717</a>	
Polyimide Resin	0.5 mL, rated to 350 °C	<a href="#">AGO-5722</a>	

0.32 mm ID Kit (includes 1 of each below) Part No.: <a href="#">KG0-9286</a>			
Description	Dimension	Part No.	
ZB-CLPesticides-1	30 meter x 0.32 mm x 0.32 μm	<a href="#">7HM-G028-51</a>	
ZB-CLPesticides-2	30 meter x 0.32 mm x 0.25 μm	<a href="#">7HM-G029-11</a>	
Z-Guard Column	5 meter x 0.32 mm	<a href="#">7AM-G000-00-GZ0</a>	
Y-Connector	Fused Quartz	<a href="#">AGO-4717</a>	
Polyimide Resin	0.5 mL, rated to 350 °C	<a href="#">AGO-5722</a>	

0.53 mm ID Kit (includes 1 of each below) Part No.: <a href="#">KG0-9290</a>			
Description	Dimension	Part No.	
ZB-CLPesticides-1	30 meter x 0.53 mm x 0.50 μm	<a href="#">7HK-G028-17</a>	
ZB-CLPesticides-2	30 meter x 0.53 mm x 0.42 μm	<a href="#">7HK-G029-16</a>	
Z-Guard Column	5 meter x 0.53 mm	<a href="#">7AK-G000-00-GZ0</a>	
Y-Connector	Fused Quartz	<a href="#">AGO-4717</a>	
Polyimide Resin	0.5 mL, rated to 350 °C	<a href="#">AGO-5722</a>	

 Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

**Column Profile**

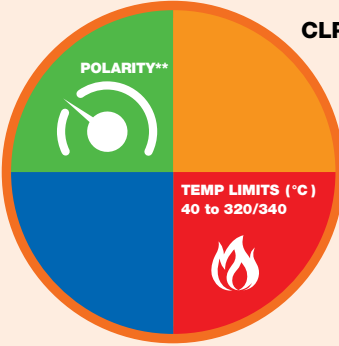


**CLP-1**

**POLARITY\***

**TEMP LIMITS (°C)**  
40 to 320/340

\*Similar polarity to ZB-35.



**CLP-2**

**POLARITY\*\***

**TEMP LIMITS (°C)**  
40 to 320/340

\*\*Similar polarity to ZB-MultiResidue-2

**Phase Chemistry**

- Proprietary

**Recommended Applications**

- Dual-Column Chlorinated Pesticide Methods
- EPA Methods (8081 and 8081 extended, 8082, 8151,504, 505, 508, 552)

## ZB-CLPesticides GC Columns

### Ordering Information

ZB-CLPesticides-1 GC Columns			
ID (mm)	df (μm)	Temp. Limits °C	Part No.
<b>30-Meter</b>			
0.25	0.25	40 to 320/340	<a href="#">7HG-G028-11</a>
0.32	0.32	40 to 320/340	<a href="#">7HM-G028-51</a>
0.32	0.50	40 to 320/340	<a href="#">7HM-G028-17</a>
0.53	0.50	40 to 320/340	<a href="#">7HK-G028-17</a>
ZB-CLPesticides-2 GC Columns			
ID (mm)	df (μm)	Temp. Limits °C	Part No.
<b>30-Meter</b>			
0.25	0.20	40 to 320/340	<a href="#">7HG-G029-10</a>
0.32	0.25	40 to 320/340	<a href="#">7HM-G029-11</a>
0.32	0.50	40 to 320/340	<a href="#">7HM-G029-17</a>
0.53	0.42	40 to 320/340	<a href="#">7HK-G029-16</a>

## ZB-MultiResidue™ -1 and -2

### Optimized Selectivity for Pesticides

- Specially designed for the separation of all types of pesticides, herbicides, and insecticides
- Baseline resolution and confirmation of all 20 chlorinated pesticides regulated under EPA Method 8081 in  $\leq 10$  min
- Decreased breakdown of sensitive pesticides such as DDT
- Robust performance for high temperature bakeouts
- Low bleed performance for pesticide confirmation by MS

Upgrade to Zebron from these similar\* phases:

#### Agilent®

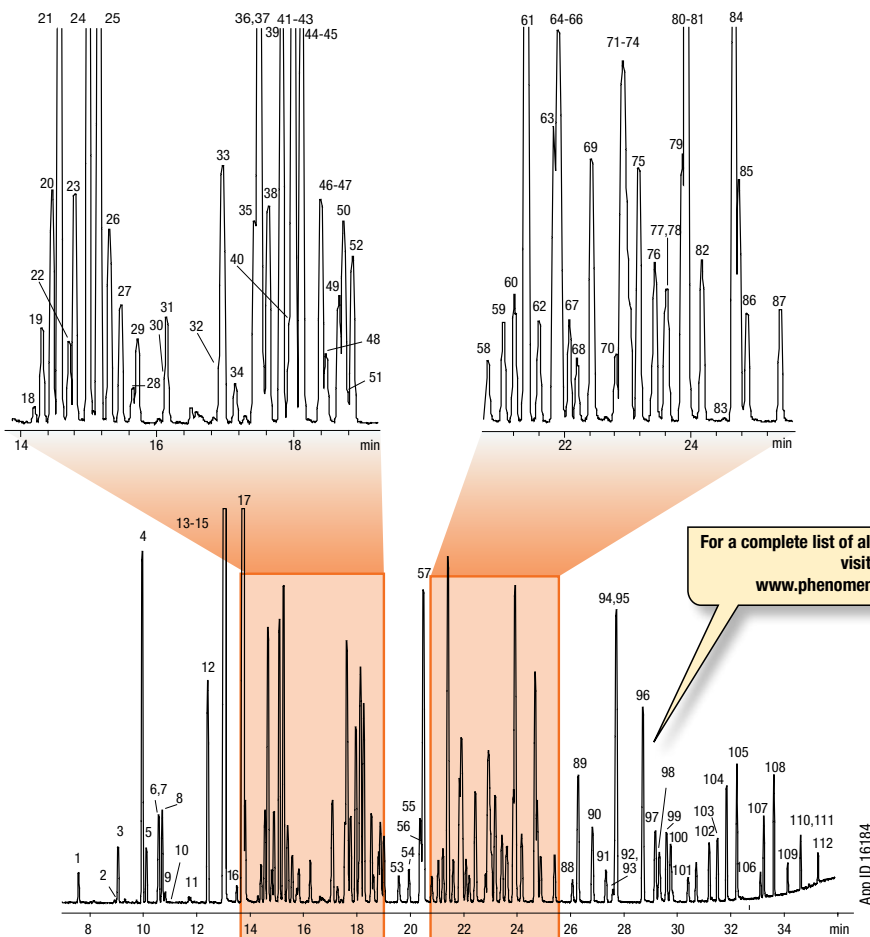
- DB®-CLP1
- DB-CLP2

#### Restek®

- Rtx®-CLPesticides
- Rtx-CLPesticides2
- Stx®-CLPesticides
- Stx-CLPesticides2

\*not exact equivalent, selectivity may differ

### Improved Multi-Residue Pesticide Screening by GC-MS

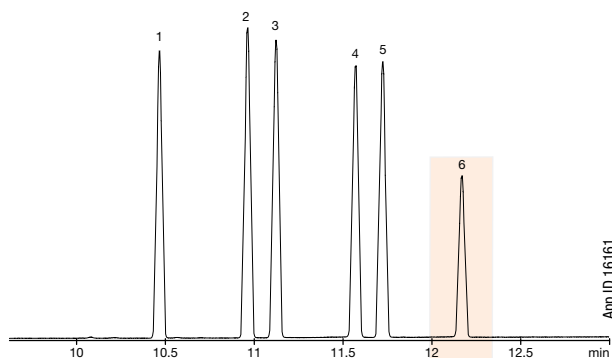


**Column:** Zebron MultiResidue™ -1  
**Dimensions:** 30 meter x 0.25 mm x 0.25  $\mu$ m  
**Part No.:** ZHG-G016-11  
**Injection:** Splitless @ 260 °C, 1  $\mu$ L  
**Carrier Gas:** Helium @ 0.9 mL/min (constant flow)  
**Oven Program:** 80 °C for 0.5 min to 150 °C @ 10 °C/min to 240 °C @ 4 °C/min to 320 °C @ 15 °C/min for 3 min  
**Detector:** MSD @ 320 °C; 45-400 amu  
**Sample:** Analytes were 1 ppm in Dichloromethane

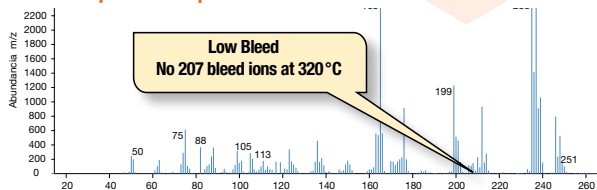
## ZB-MultiResidue™ -1 and -2 (cont'd)

### Resolve Common Pesticide Isomers

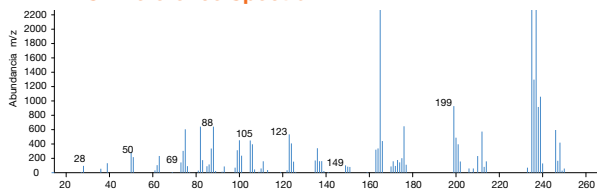
ZB-MultiResidue optimized selectivities improve resolution of complex pesticide, herbicide, and insecticide isomers. Our extremely stable siloxane-based polymer contains absolutely no nitrogen or halogenated functionality, which can be unfriendly to NPD and ECD detectors. Engineered Self-Crosslinking™ (ESC) bonding incorporates ladders into the phase backbone for low bleed and unmatched spectral integrity – even for trace-level samples.



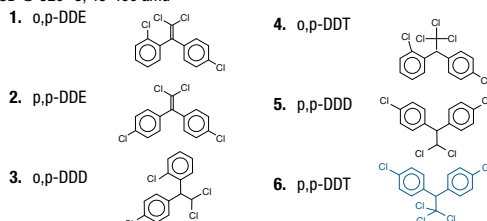
#### Acquisition Spectra



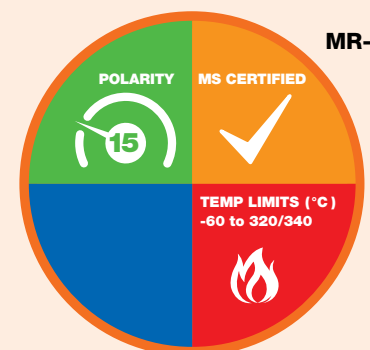
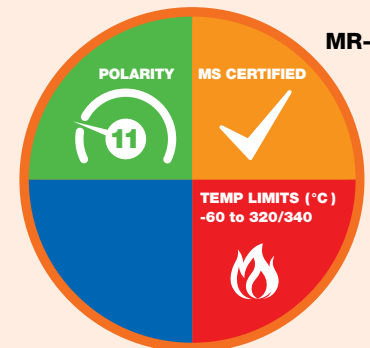
#### NIST Reference Spectra



**Column:** Zebron ZB-MultiResidue-1  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** [7HG-G016-11](#)  
**Injection:** Splitless (hold 0.5 min) @ 260 °C, 1 µL  
**Carrier Gas:** Helium @ 0.8 mL/min (constant flow)  
**Oven Program:** 100 °C for 0.5 min to 200 °C @ 25 °C/min to 320 °C @ 15 °C/min for 2 min  
**Detector:** MSD @ 320 °C, 45-400 amu  
**Sample:** 1. o,p-DDE



#### Column Profile



#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry

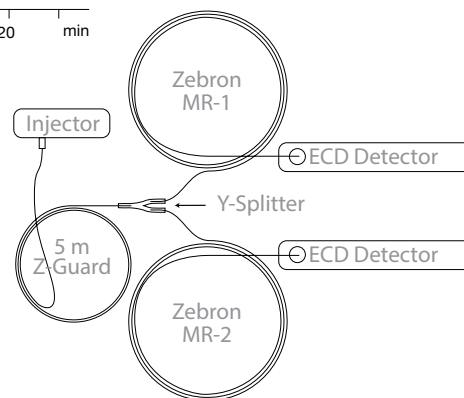
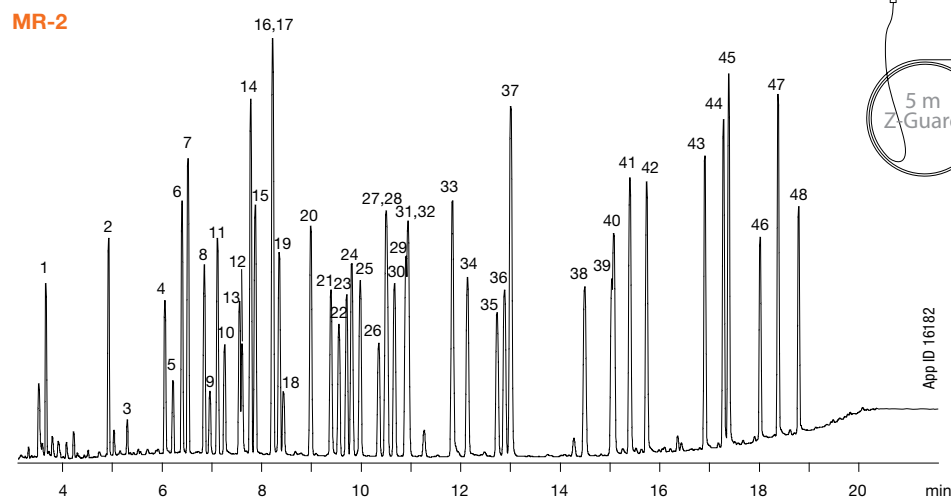
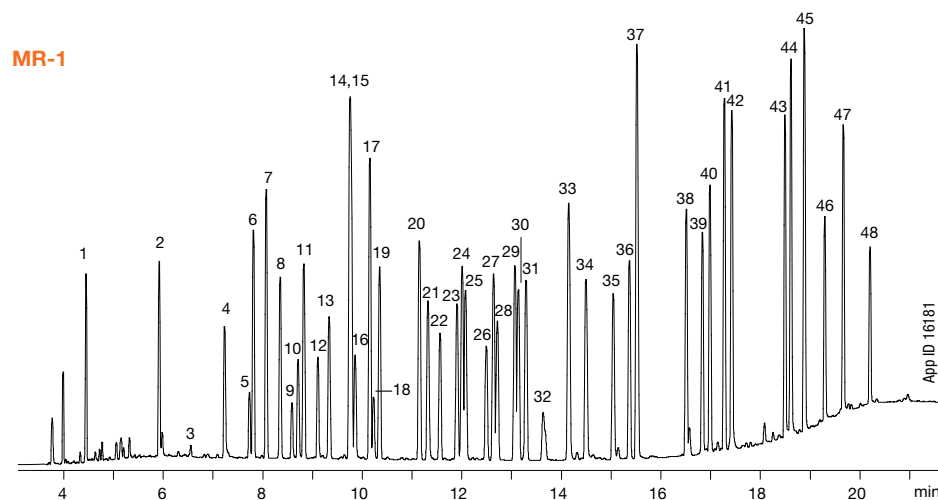
- Proprietary

#### Recommended Applications

- Haloacetic Acids (HAAs)
- Herbicides / Insecticides
- Multi-Pesticide Screening
- Nitrogen Containing Pesticides
- Organochlorine Pesticides
- Organophosphorous Pesticides
- PCBs / Aroclors

## ZB-MultiResidue™ -1 and -2 (cont'd)

### Great Results for Organophosphate Pesticides



**Conditions for both column**

**Columns:** Zebron MultiResidue-1  
Zebron MultiResidue-2

**Dimensions:** 30 meter x 0.32 mm x 0.50 µm  
30 meter x 0.32 mm x 0.25 µm

**Part No.:** [7HM-G016-17](#)  
[7HM-G017-11](#)

**Injection:** On-Column @ 103 °C, 1 µL

**Carrier Gas:** Helium @ 2.8 mL/min (constant flow)

**Oven Program:** 100 °C for 0.5 min to 180 °C @ 20 °C/min to 240 °C @ 6 °C/min to 320 °C @ 15 °C/min for 2 min

**Detector:** FID @ 340 °C

Note: Columns connected using a 5 m Z-Guard™ Column and a 'Y' splitter.

**Sample:** Analytes are 2 ppm in Dichloromethane.

- |                                    |                         |                            |
|------------------------------------|-------------------------|----------------------------|
| 1. Dichlorvos                      | 17. Fonofos             | 33. Chlorfenvinphos        |
| 2. Mevinphos                       | 18. Phosphamidon Isomer | 34. Crotoxyphos            |
| 3. Trichlorfon                     | 19. Disulfoton          | 35. Stirofos               |
| 4. TEPP (Tetraethyl Pyrophosphate) | 20. Dichlofenthion      | 36. Tokuthion              |
| 5. Demeton Isomer                  | 21. Phosphamidon        | 37. Merphos Oxide (Tribus) |
| 6. Thionazin                       | 22. Chlorpyrifos Methyl | 38. Ethion                 |
| 7. Ethoprop                        | 23. Ronnel              | 39. Fensulfothion          |
| 8. Sulfotep                        | 24. Aspon               | 40. Contaminant            |
| 9. Naled                           | 25. Methyl Parathion    | 41. Carbophenothion        |
| 10. Dicrotophos                    | 26. Malathion           | 42. Famfur                 |
| 11. Phorate                        | 27. Fenitrothion        | 43. EPN                    |
| 12. Monocrotophos                  | 28. Chlorpyrifos        | 44. Phosmet                |
| 13. Demeton                        | 29. Fenthion            | 45. Leptophos              |
| 14. Terbufos                       | 30. Trichloronate       | 46. Azinphos Methyl        |
| 15. Diazinon                       | 31. Parathion           | 47. Azinphos Ethyl         |
| 16. Dimethoate                     | 32. Merphos             | 48. Coumaphos              |

## ZB-MultiResidue™ -1 and -2 (cont'd)

### Ordering Information

#### Zebron ZB-MultiResidue -1 GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
<b>20-Meter</b>			
0.18	0.18	-60 to 320/340	<a href="#">7FD-G016-08</a>
<b>30-Meter</b>			
0.25	0.25	-60 to 320/340	<a href="#">7HG-G016-11</a>
0.32	0.25	-60 to 320/340	<a href="#">7HM-G016-11</a>
0.32	0.50	-60 to 320/340	<a href="#">7HM-G016-17</a>
0.53	0.50	-60 to 320/340	<a href="#">7HK-G016-17</a>

### Ordering Information

#### Zebron ZB-MultiResidue -2 GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
<b>30-Meter</b>			
0.25	0.20	-60 to 320/340	<a href="#">7HG-G017-10</a>
0.32	0.25	-60 to 320/340	<a href="#">7HM-G017-11</a>
0.53	0.50	-60 to 320/340	<a href="#">7HK-G017-17</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](http://Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.



## ZB-MultiResidue Column Kits

### Ordering Information

<b>0.25 mm ID</b> (kit consists of products below)			Part No.: <a href="#">KGO-8237</a>
Description	Dimension	Part No.	
ZB-MultiResidue-1 Column	30 meter x 0.25 mm x 0.25 µm df	<a href="#">7HG-G016-11</a>	
ZB-MultiResidue-2 Column	30 meter x 0.25 mm x 0.20 µm df	<a href="#">7HG-G017-10</a>	
Z-Guard™	5 meter x 0.25 mm	<a href="#">7AG-G000-00-GZ0</a>	
Universal Capillary Column Y-connector, Fused Quartz		<a href="#">AGO-4717</a>	
Polyimide Resin	0.5 mL, rated to 350 °C	<a href="#">AGO-5722</a>	
<b>0.32 mm ID</b> (kit consists of products below)			Part No.: <a href="#">KGO-8238</a>
Description	Dimension	Part No.	
ZB-MultiResidue-1 Column	30 meter x 0.32 mm x 0.50 µm df	<a href="#">7HM-G016-17</a>	
ZB-MultiResidue-2 Column	30 meter x 0.32 mm x 0.25 µm df	<a href="#">7HM-G017-11</a>	
Z-Guard	5 meter x 0.32 mm	<a href="#">7AM-G000-00-GZ0</a>	
Universal Capillary Column Y-connector, Fused Quartz		<a href="#">AGO-4717</a>	
Polyimide Resin	0.5 mL, rated to 350 °C	<a href="#">AGO-5722</a>	
<b>0.53 mm ID</b> (kit consists of products below)			Part No.: <a href="#">KGO-8239</a>
Description	Dimension	Part No.	
ZB-MultiResidue-1 Column	30 meter x 0.53 mm x 0.50 µm df	<a href="#">7HK-G016-17</a>	
ZB-MultiResidue-2 Column	30 meter x 0.53 mm x 0.50 µm df	<a href="#">7HK-G017-17</a>	
Z-Guard	5 meter x 0.53 mm	<a href="#">7AK-G000-00-GZ0</a>	
Universal Capillary Column Y-connector, Fused Quartz		<a href="#">AGO-4717</a>	
Polyimide Resin	0.5 mL, rated to 350 °C	<a href="#">AGO-5722</a>	



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.



## ZB-Bioethanol

### Quicker Bioethanol Testing

- Specially designed for fast and accurate bioethanol testing
- Provides accurate and reproducible results for Certificate of Analysis (COA)
- Resolve methanol and ethanol from all other denaturant peaks
- Great resolution of fusel alcohols
- Allows for quick bake out in between runs to eliminate contaminants

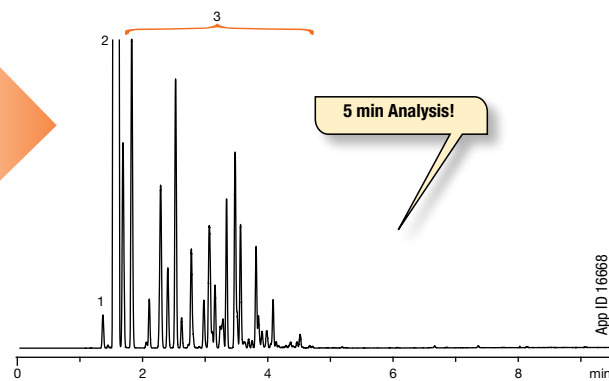
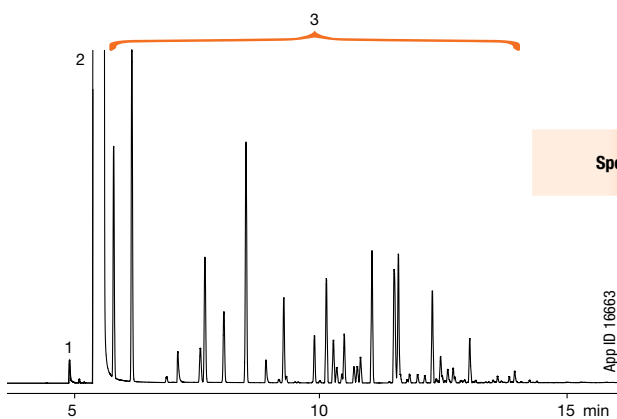
Upgrade to Zebron from traditional phases used for bioethanol:

Agilent®	Restek®	SGE®	Supelco®
• DB®-1	• Rtx®-1	• BP1	• SPB®-1
• HP-1	• Rxi®-1ms		• SE-30
• CP-Sil 5 CB			



### Fast, Accurate Analysis

Determination of Denatured Bioethanol: ASTM Method D5501



**Column:** Zebron ZB-1

**Dimensions:** 100 meter x 0.25 mm x 0.50 µm

**Part No.:** ZMG-G001-17

**Injection:** Split 50:1 @ 300 °C, 1 µL

**Carrier Gas:** Helium @ 35 cm/sec (constant flow)

**Oven Program:** 45 °C for 7 min to 255 °C @ 30 °C/min for 6 min

**Detector:** FID @ 300 °C

**Instrument:** Shimadzu® GC-2010 with Flame Ionization

**Sample:** 1. Methanol  
2. Ethanol  
3. Denaturant

**Column:** Zebron ZB-Bioethanol

**Dimensions:** 15 meter x 0.25 mm x 1.00 µm

**Part No.:** ZEG-G020-22

**Injection:** Split 50:1 @ 300 °C, 1 µL

**Carrier Gas:** Hydrogen @ 25 cm/sec (constant flow)

**Oven Program:** 55 °C for 1.7 min to 260 °C @ 40 °C/min (hold 2.67 min)

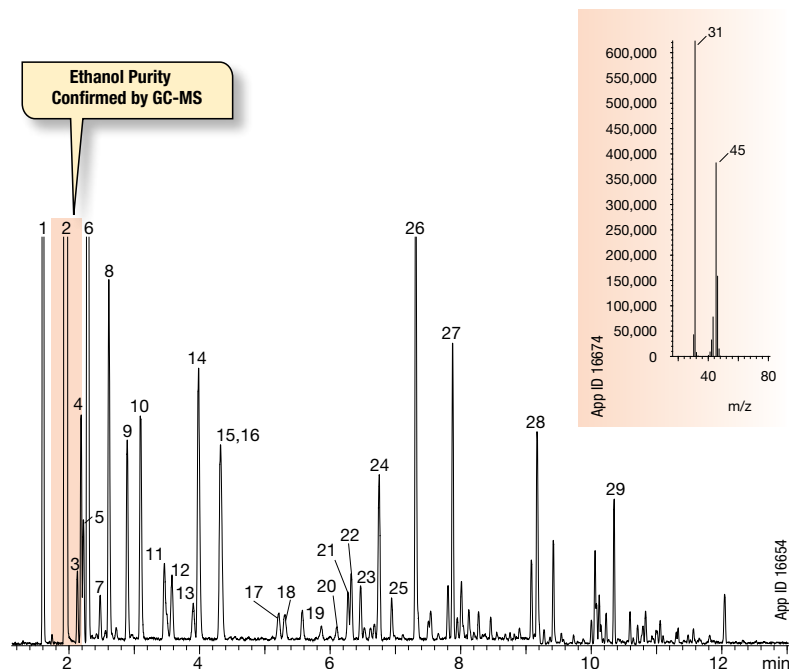
**Detector:** FID @ 300 °C

**Instrument:** Shimadzu® GC-2010 with Flame Ionization Detection and AOC-20i Automatic Liquid

**Sample:** 1. Methanol  
2. Ethanol  
3. Denaturant

## ZB-Bioethanol

### Resolve Fusel Alcohols

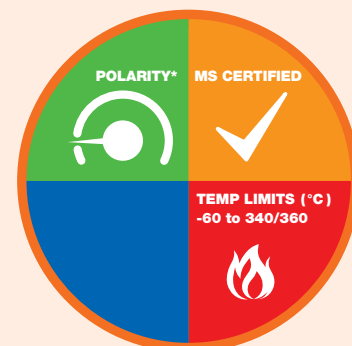


**Column:** Zebron ZB-Bioethanol  
**Dimensions:** 30 meter x 0.25 mm x 1.00 µm  
**Part No.:** [7HG-G020-22](#)  
**Injection:** Split 100:1 @ 240 °C, 0.1 µL  
**Carrier Gas:** Helium @ 1.2 mL/min (constant flow)  
**Oven Program:** 40 °C for 5 min to 300 °C @ 25 °C/min  
**Detector:** MSD @ 230 °C; 30-450 amu

**Sample:**

1. Methanol	17. Methylcyclopentane
2. Ethanol	18. 2,4-Dimethylpentane
3. Acrolein	19. Benzene
4. Acetone	20. Cyclohexane
5. 2-Methylbutane	21. 2-Methylhexane
6. Isopropyl alcohol	22. 2,3-Dimethylpentane
7. Pentane	23. 3-Methylhexane
8. t-Butanol	24. 2,2,4-Trimethylpentane
9. Allyl alcohol	25. Heptane
10. n-Propanol	26. Acetal
11. 2,3-Dimethylbutane	27. Toluene
12. 2-Methylpentane	28. Xylene
13. 3-Methylpentane	29. Trimethylbenzene
14. 2-Butanol	
15. Ethyl acetate	
16. Hexane	

#### Column Profile



#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry

- Proprietary

#### Recommended Applications

- Alcohols
- Ethanol Testing
- Fusel Alcohols



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



For Bioethanol fermentation monitoring, use Rezex-ROA HPLC columns, see p. 325

#### Ordering Information

##### Zebron ZB-Bioethanol GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>15-Meter</b>			
0.25	1.00	-60 to 340/360	<a href="#">7EG-G020-22</a>
<b>30-Meter</b>			
0.25	1.00	-60 to 340/360	<a href="#">7HG-G020-22</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](mailto:TechnicalSupport@phenomenex.com) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

## ZB-1XT SimDist

### High Efficiency Metal Column Performance

- Glass Infusion™ technology for higher efficiency and greater column-to-column reproducibility
- Individual QC testing for every column
- Up to 70% higher efficiency than other columns
- Increased accuracy for high temperature simulated distillation

Upgrade to Zebron from any 100% dimethylpolysiloxane phase:

**Agilent®**

- DB®-1
- DB-HT SimDis
- DB-PS1
- DB-PS2887
- CP-SimDist
- CP-SimDist UltiMetal

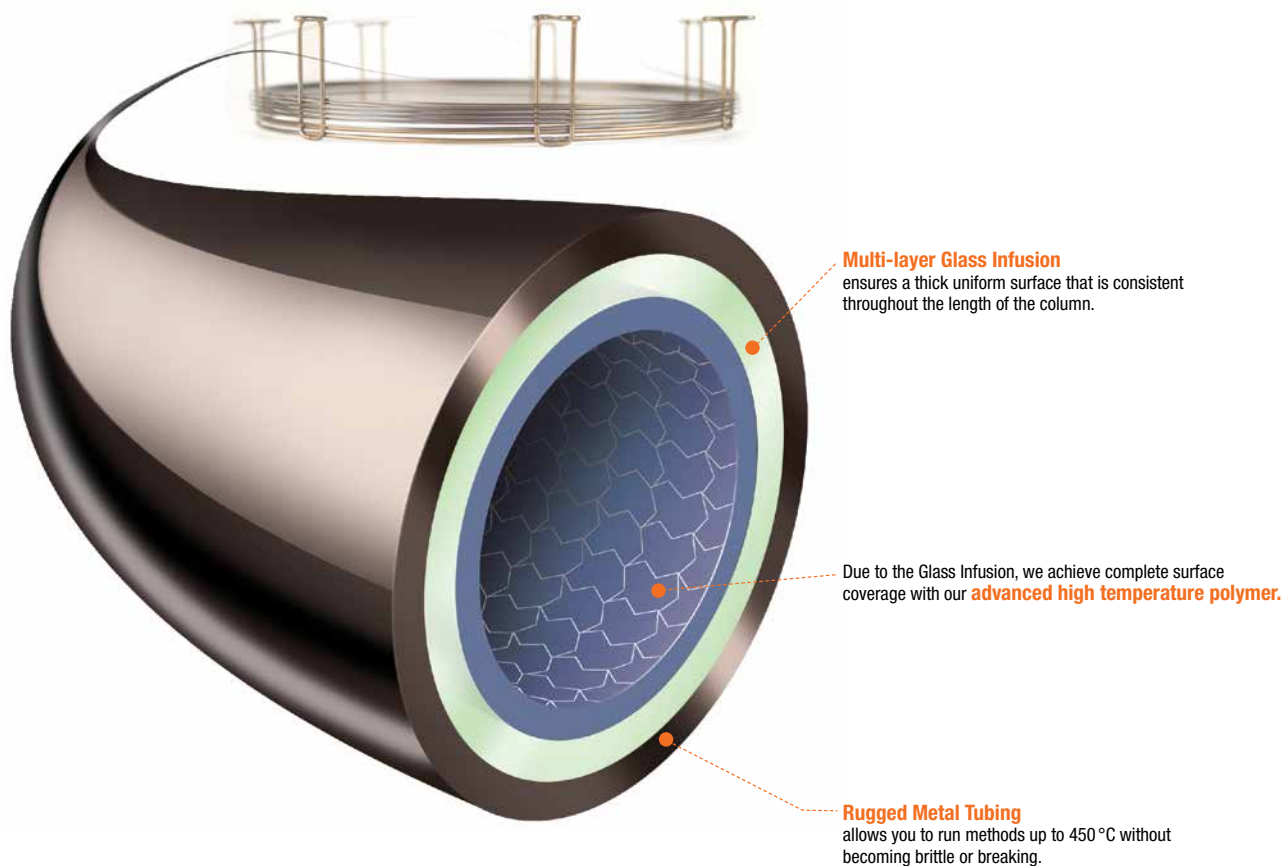
**Restek®**

- Rtx®-1
- Rxi®-1HT
- MXT®-1HT SimDist

**SGE®**

- BP1
- BPX1-SimD

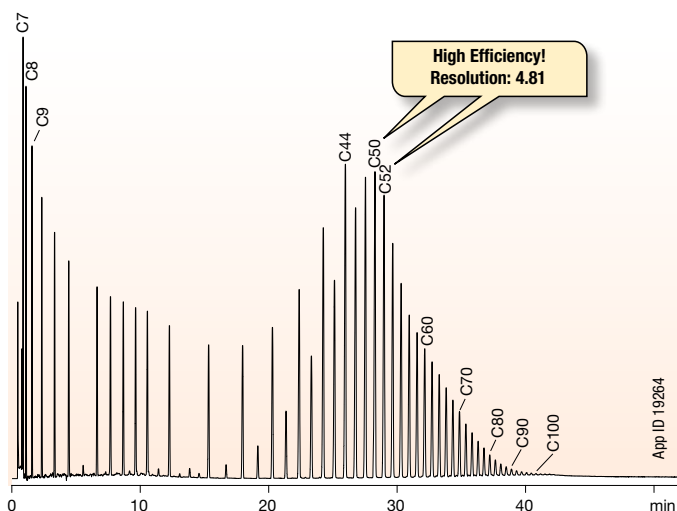
### Glass Infusion Technology for Improved Performance



## ZB-1XT SimDist

### Improve Results for Simulated Distillation

Hydrocarbons C7–C100+: ASTM Method D7169



**Column:** Zebron ZB-1XT SimDist  
**Dimensions:** 5 meter x 0.53 mm x 0.15 µm  
**Part No.:** [7AK-G026-05](#)  
**Injection:** On-Column @ 33 °C, 1 µL  
**Carrier Gas:** Helium @ 7 mL/min (constant flow)  
**Oven Program:** 30 °C to 450 °C @ 10 °C/min for 10 min  
**Detector:** FID @ 450 °C  
**Sample:** C7 to C44 hydrocarbons and POLYWAX® 655 in CS<sub>2</sub>  
 Note: Chromatogram is baseline subtracted.

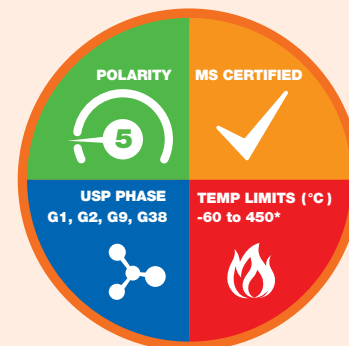
#### Ordering Information

##### Zebron ZB-1XT SimDist GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>5-Meter</b>			
0.53	0.09	-60 to 450	<a href="#">7AK-G026-55</a>
0.53	0.15	-60 to 450	<a href="#">7AK-G026-05</a>
0.53	0.88	-60 to 450	<a href="#">7AK-G046-49</a>
<b>5-Meter with 2-Meter Guardian™ Integrated Guard</b>			
0.53	0.09	-60 to 450	<a href="#">7AK-G026-55-GGT</a>
0.53	0.15	-60 to 450	<a href="#">7AK-G026-05-GGT</a>
<b>10-Meter</b>			
0.53	0.15	-60 to 450	<a href="#">7CK-G026-05</a>
0.53	0.88	-60 to 450	<a href="#">7CK-G026-49</a>
0.53	2.65	-60 to 400	<a href="#">7CK-G026-35</a>
<b>10-Meter with 5-Meter Guardian Integrated Guard</b>			
0.53	2.65	-60 to 450	<a href="#">7CK-G026-35-GGA</a>
<b>15-Meter</b>			
0.53	0.25	-60 to 450	<a href="#">7EK-G026-11</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](mailto:Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

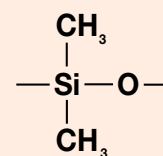
#### Column Profile



\*Thicker film (2.65 µm) is rated to 400 °C.

#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry



100 % Dimethylpolysiloxane

#### Recommended Applications

- ASTM Methods (D2887, D3710, D6352, D7169)
- Crude Oil
- Gasoline Fractions
- Petroleum Distillates
- Petroleum Fractions
- Simulated Distillation
- Vacuum Distillates



**ZB-1XT SimDist Test Mix**  
 Part No.: [AG0-8645](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Guard Column Connections  
 SiTite™ Mini-Unions for 0.8mm ID columns (P/N: [AG0-8825](#)) and Replacement Ferrules (P/N: [AG0-8824](#))

## ZB-DHA-PONA

- Excellent peak shape for polar and nonpolar compounds
- Temperature stability and flexibility
- Highly efficient dimension and consistent film thickness delivers excellent separation of paraffins, iso-paraffins, olefins, naphthenes, aromatics and polar compounds
- Extensive ESC™ provides intact stationary phase and MS certified low bleed
- Well-suited for true boiling point separation
- Excellent resolving power for critical pairs in complex petrochemical samples

### The Choice for PIONA, DHA and PONA

Zebron ZB-DHA-PONA is the choice for the analysis of Detailed Hydrocarbon Analysis (DHA) within the fuel industry. The Engineered Self Cross-linking™(ESC) stationary phase provides low bleed and exceptional column life for separation of DHA critical pairs with symmetric peaks. In addition, Zebron ZB-DHA-PONA GC columns provide excellent response and peak symmetry for polar oxygenates.

The Zebron ZB-DHA-PONA GC column provides excellent separation of DHA critical pairs with symmetric peaks suitable for ASTM Method D6730, see table below.

Upgrade to Zebron from any 100% dimethylpolysiloxane phase:

#### Agilent®

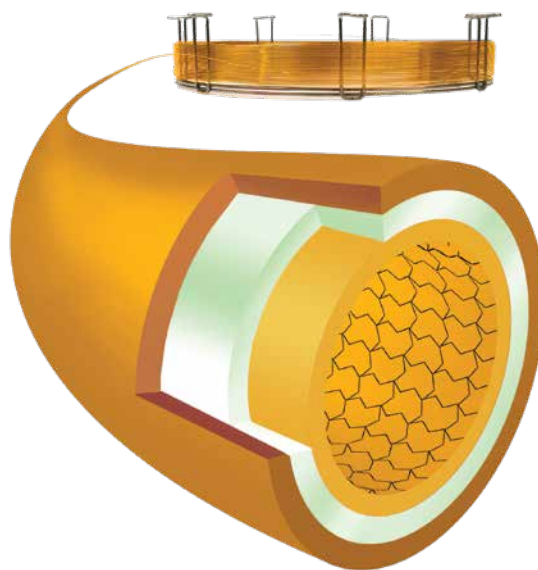
- HP-PONA
- DB®-PETRO
- CP-Sil PONA CB

#### Restek®

- Rtx®-DHA

#### Supelco®

- Petrocol®-DH



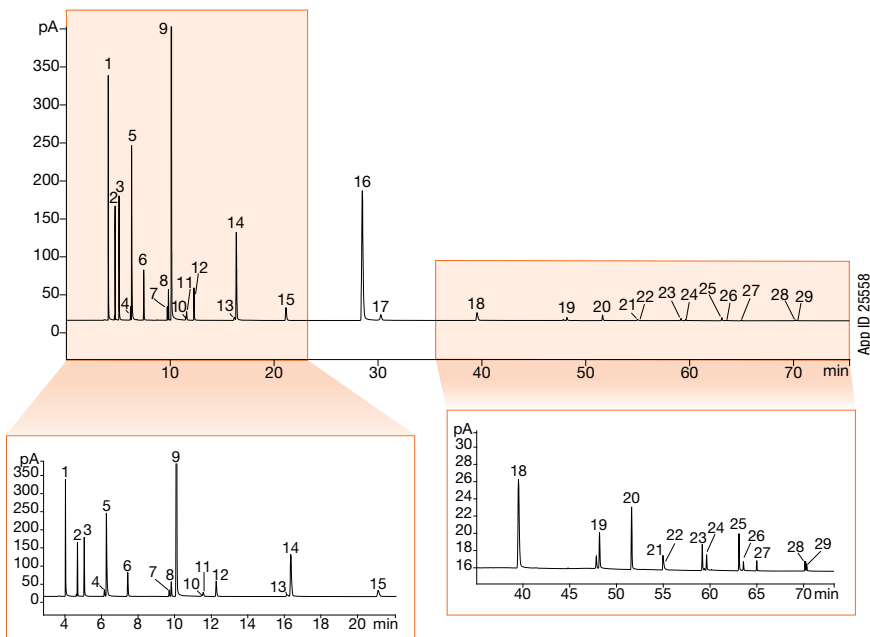
#### Easy ZB-DHA-PONA Selection for Your ASTM Method

Method	Description	Recommended Column	Recommended Dimensions	Part Number
ASTM D5134	Standard Test Method for Detailed Analysis of Petroleum Naphtha's through n-Nonane by Capillary Gas Chromatography	ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	<a href="#">7JE-G042-17</a>
		ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	<a href="#">7MG-G042-17</a>
ASTM D5441	Standard Test Method for Analysis of Methyl Tert-Butyl Ether (MTBE) by GC	ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	<a href="#">7JE-G042-17</a>
		ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	<a href="#">7MG-G042-17</a>
		ZB-DHA-PONA	150 m x 0.25 mm x 1 µm	<a href="#">7QG-G042-22</a>
ASTM D5501	Standard Test Method for Determination of Ethanol and Methanol Content in Fuels Containing Greater than 20% Ethanol by Gas Chromatography	ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	<a href="#">7MG-G042-17</a>
		ZB-DHA-PONA	150 m x 0.25 mm x 1 µm	<a href="#">7QG-G042-22</a>
ASTM D6729	Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100 Meter Capillary High Resolution Gas Chromatography	ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	<a href="#">7MG-G042-17</a>
ASTM D6730	Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100-Meter Capillary (with Pre-column) High-Resolution Gas Chromatography	ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	<a href="#">7JE-G042-17</a>
		ZB-DHA-PONA	100 m x 0.25 mm x 0.5 µm	<a href="#">7MG-G042-17</a>
		ZB-DHA-PONA	150 m x 0.25 mm x 1 µm	<a href="#">7QG-G042-22</a>
		ZB-DHA-PONA-TUNE	5 m x 0.25 mm x 1 µm	<a href="#">7AG-G042-22</a>
ASTM D6733	Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 50-Meter Capillary High Resolution Gas Chromatography	ZB-DHA-PONA	50 m x 0.20 mm x 0.5 µm	<a href="#">7JE-G042-17</a>



## ZB-DHA-PONA

Analysis of ASTM D6730 Components by GC-FID on ZB-DHA-PONA & ZB-DHA-PONA-TUNE GC Column



**Column 1 (Tuning):** Zebron ZB-DHA-PONA-TUNE  
**Phase:** 5% Phenyl 95% Dimethylpolysiloxane  
**Dimensions:** 5 meter x 0.25 mm x 1.00 μm  
**Part No.:** [7AG-G042-22](#)  
**Column 2:** Zebron ZB-DHA-PONA  
**Phase:** 100% Dimethylpolysiloxane  
**Dimensions:** 100 meter x 0.25 mm x 0.50 μm  
**Part No.:** [7MG-G042-17](#)

**Recommended Column Union:** [AG0-4716](#)  
**Injection:** Split 150:1 @ 200 °C, 0.2 μL  
**Recommended Liner:** Zebron PLUS Straight Z-Liner™  
**Part No.:** [AG2-0A03-05](#)  
**Carrier Gas:** Hydrogen @ 2 mL/min (constant flow)  
**Oven Program:** 30 °C for 8.5 min, to 48 °C @ 22 °C/min for 27 min, to 141 °C @ 3 °C/min for 1 min, to 275 °C @ 1 °C/min for 2 min  
**Detection:** Flame Ionization (FID) @ 275 °C

**Sample:**

1. Ethanol	16. C8 (n-octane)
2. C5 (n-pentane)	17. Ethylbenzene
3. 2-Methylbutane	18. 2,3-Dimethylheptane
4. Tert-Butanol	19. p-Xylene
5. 2,3-Dimethylbutane	20. C9 (n-nonane)
6. Methyl tert-butyl ether (MTBE)	21. 5-Methylnonane
7. C6 (n-hexane)	22. 1-Methyl-2-ethylbenzene
8. 1-Methylcyclopentene	23. C10 (n-decane)
9. Benzene	24. C11 (undecane)
10. Cyclohexane	25. 1,2,3,5-Tetramethylbenzene
11. 3-Ethylpentane	26. Naphthalene
12. trans-1,2-Dimethylcyclopentane	27. C12 (dodecane)
13. C7 (n-heptane)	28. 1-Methylnaphthalene
14. 2,3,3-Trimethylpentane	29. C13 (Tridecane)
15. Toluene	

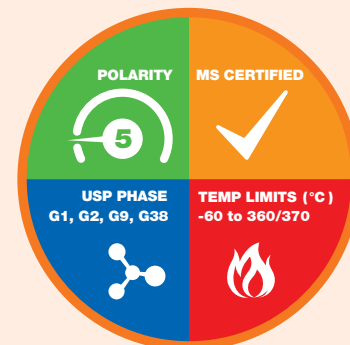
### Ordering Information

#### Zebron ZB-DHA-PONA GC Columns

ID (mm)	df (μm)	Temp. Limits °C	Part No.
<b>5-Meter</b>			
0.25	1.00	-60 to 340/360	<a href="#">7AG-G042-22</a>
<b>50-Meter</b>			
0.20	0.50	-60 to 360/370	<a href="#">7GE-G042-17</a>
<b>100-Meter</b>			
0.25	0.50	-60 to 360/370	<a href="#">7MG-G042-17</a>
<b>150-Meter</b>			
0.25	1.00	-60 to 340/360	<a href="#">7QG-G042-22</a>

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

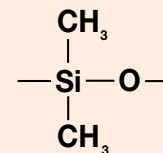
### Column Profile



\*Thicker films (≥ 1.0 μm) are rated to 340/360 °C.

### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry



100 % Dimethylpolysiloxane

### Recommended Applications

- DHA
- PONA
- PIANO
- ASTM D5134, D5441, D5501, D6729, D6730 and D6733

Zebron GC Columns MS Certification, see p. 437

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-Drug-1

### Faster Drugs of Abuse Testing

- Optimized phase for the separation of drugs of abuse
- Provides fast analysis with great peak shape
- Improves resolution of target analytes from matrix interferences
- Specially deactivated to improve quantitation for drug compounds

Upgrade to Zebron from traditional phases used for drugs of abuse:

#### Agilent®

- DB®-1ms
- DB-5ms
- DB-35

#### Restek®

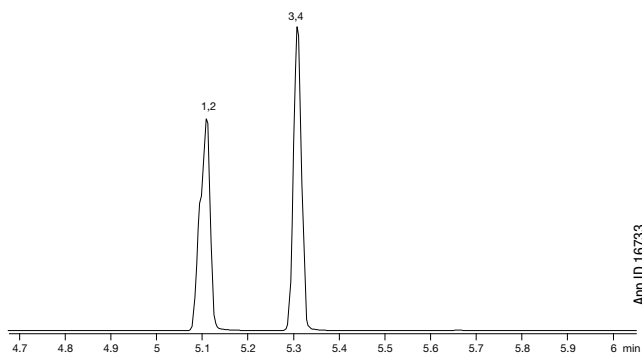
- Rxi®-1ms
- Rtx®-5
- Rtx-5ms
- Rtx-35ms

#### Supelco®

- SPB®-1

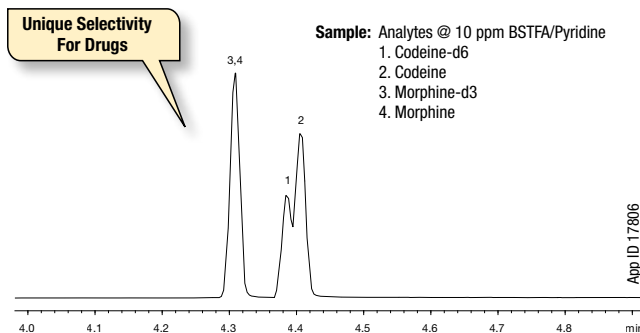
### Optimized Selectivity for Multiple Drug Classes

#### Traditional 5% Phenyl Phase



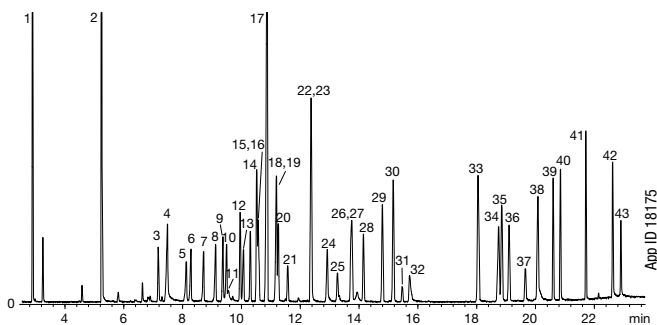
**Column:** As listed  
**Dimensions:** 10 meter x 0.18 mm x 0.18 µm  
**Injection:** Split 10:1 @ 240 °C, 1 µL  
**Carrier Gas:** Helium @ 1.2 mL/min (constant flow)  
**Oven Program:** 140 °C to 320 °C @ 20 °C for 1 min  
**Detector:** MSD @ 230 °C

#### Zebron ZB-Drug-1



**Column:** As listed  
**Dimensions:** 10 meter x 0.18 mm x 0.18 µm  
**Part No.:** [ZCD-G023-08](#)  
**Injection:** Split 10:1 @ 280 °C, 1 µL  
**Carrier Gas:** Helium @ 55 cm/sec (constant flow)  
**Oven Program:** 180 °C to 340 °C @ 20 °C/min  
**Detector:** MSD @ 230 °C

#### Common Drug Screen by GC-MS



**Column:** Zebron ZB-Drug-1  
**Dimensions:** 10 meter x 0.18 mm x 0.18 µm  
**Part No.:** [ZCD-G023-08](#)  
**Injection:** Split 10:1 @ 260 °C, 1 µL  
**Carrier Gas:** Helium @ 1 mL/min (constant flow)  
**Oven Program:** 50 °C to 150 °C @ 15 °C/min to 240 °C @ 7 °C/min to 320 °C @ 25 °C/min for 2 min  
**Detector:** MSD @ 320 °C; 45-450 amu

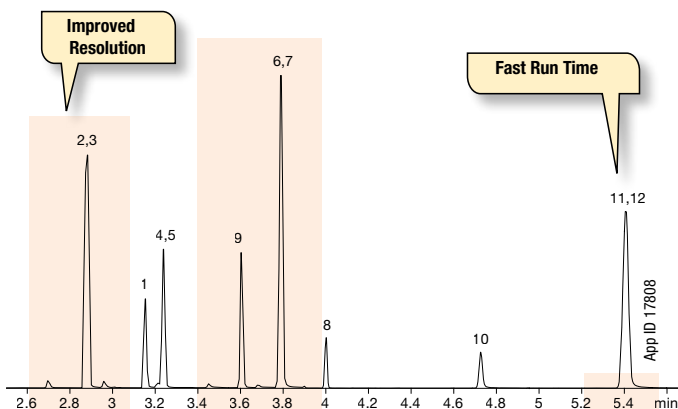
**Sample:** Analytes are 25 ppm in Methanol

- |                   |                      |                    |
|-------------------|----------------------|--------------------|
| 1. Acetophenone   | 15. Meprobamate      | 29. Trimipramine   |
| 2. Nicotine       | 16. Diphenhydramine  | 30. Chlorcyclizine |
| 3. Benzocaine     | 17. Lidocaine        | 31. Cocaine        |
| 4. Ibuprofen      | 18. Hexobarbital     | 32. Desipramine    |
| 5. Allobarbitol   | 19. Doxylamine       | 33. Codeine        |
| 6. Aprobarbital   | 20. Glutethimide     | 34. Morphine       |
| 7. Butalbital     | 21. Caffeine         | 35. Diazepam       |
| 8. Amobarbital    | 22. Chlorpheniramine | 36. Hydrocodone    |
| 9. Phenacetin     | 23. Methapyrilene    | 37. 6-MAM          |
| 10. Pentobarbital | 24. Phenobarbital    | 38. Oxycodone      |
| 11. Acetaminophen | 25. Procaine         | 39. Heroin         |
| 12. Benzphetamine | 26. Methadone        | 40. Fentanyl       |
| 13. Secobarbital  | 27. Brompheniramine  | 41. Ibogaine       |
| 14. Phencyclidine | 28. Propoxyphene     | 42. Triazolam      |
|                   |                      | 43. LSD            |

## ZB-Drug-1

### Faster Run Times and Improved Resolution

#### Zebron ZB-Drug-1

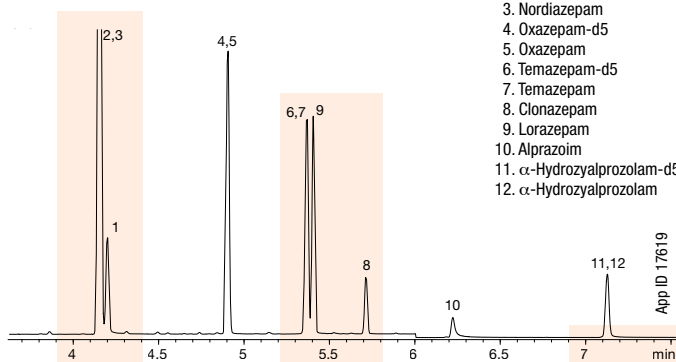


**Column:** Zebron ZB-Drug-1  
**Dimensions:** 10 meter x 0.18 mm x 0.18  $\mu$ m  
**Part No.:** [7CD-G023-08](#)  
**Injection:** Split 10:1 @ 280 °C, 1  $\mu$ L  
**Carrier Gas:** Helium @ 0.7 mL/min (constant flow)  
**Oven Program:** 200 °C to 210 °C @ 20 °C/min at 320 °C @ 30 °C/min for 1 min  
**Detector:** MSD @ 320 °C

#### Traditional Mid-Polar Phase

**Sample:**

1. Diazepam
2. Nordiazepam-d5
3. Nordiazepam
4. Oxazepam-d5
5. Oxazepam
6. Temazepam-d5
7. Temazepam
8. Clonazepam
9. Lorazepam
10. Alprazolam
11.  $\alpha$ -Hydroxyalprazolam-d5
12.  $\alpha$ -Hydroxyalprazolam



**Dimensions:** 10 meter x 0.18 mm x 0.18  $\mu$ m  
**Injection:** Split 10:1 @ 250 °C, 1  $\mu$ L  
**Carrier Gas:** Helium @ 0.6 mL/min (constant flow)  
**Oven Program:** 180 °C to 340 °C @ 20 °C/min for 2 min  
**Detector:** MSD @ 320 °C

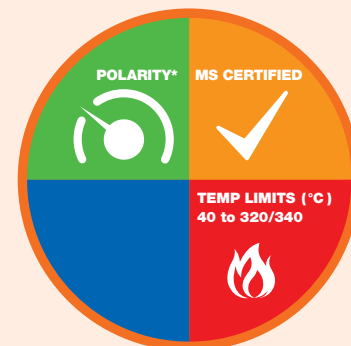
#### Ordering Information

##### Zebron ZB-Drug-1 GC Columns

ID(mm)	df( $\mu$ m)	Temp. Limits °C	Part No.
<b>10-Meter</b>			
0.18	0.18	40 to 320/340	<a href="#">7CD-G023-08</a>
<b>15-Meter</b>			
0.25	0.25	40 to 320/340	<a href="#">7EG-G023-11</a>
<b>15-Meter with 5-Meter Guardian™ Integrated Guard</b>			
0.25	0.25	40 to 320/340	<a href="#">7EG-G023-11-GGA</a>
<b>30-Meter</b>			
0.25	0.25	40 to 320/340	<a href="#">7HG-G023-11</a>

Note: If you need a 5 in. cage, contact Technical support via [TechnicalSupport@phenomenex.com](mailto:TechnicalSupport@phenomenex.com)/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

#### Column Profile



\*Similar polarity to ZB-MultiResidue™-2.

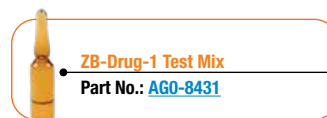
#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry

- Proprietary

#### Recommended Applications

- Drug Screening
- 6-MAM
- Amphetamines
- Barbiturates
- Benzodiazepines
- PCP
- THC



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime.  
 Add a Z-Guard™ to your next Zebron GC order.

## ZB-BAC-1 and -2

### Optimized Pair for Blood Alcohol Testing

- Enhanced accuracy for post mortem samples
- Fast run time with baseline resolution of key components in just 2 minutes
- Enhanced resolution of ethanol and acetone peaks
- Achieve confirmation with two elution order changes when running columns in parallel
- Allows for the use of t-butanol or n-propanol as an internal standard

Upgrade to Zebron from these similar\* phases:

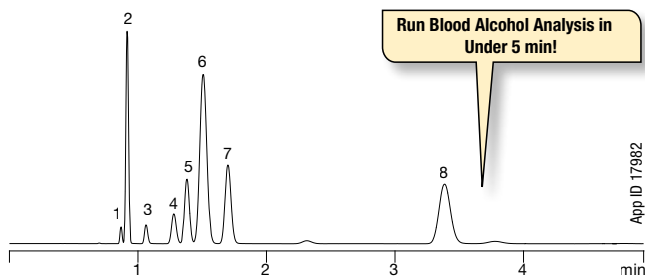
- |                 |                |
|-----------------|----------------|
| <b>Agilent®</b> | <b>Restek®</b> |
| • DB®-ALC1      | • Rtx®-BAC1    |
| • DB-ALC2       | • Rtx-BAC2     |

\*not exact equivalent, selectivity may differ

### Faster, More Sensitive Blood Alcohol Analysis

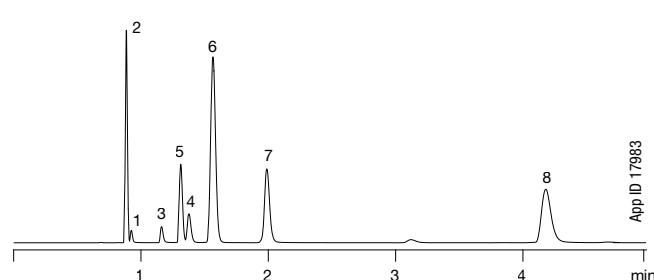
#### Zebron ZB-BAC-1

30 meter x 0.53 mm x 3.00 µm



#### Zebron ZB-BAC-2

30 meter x 0.53 mm x 2.00 µm



#### Conditions for both columns:

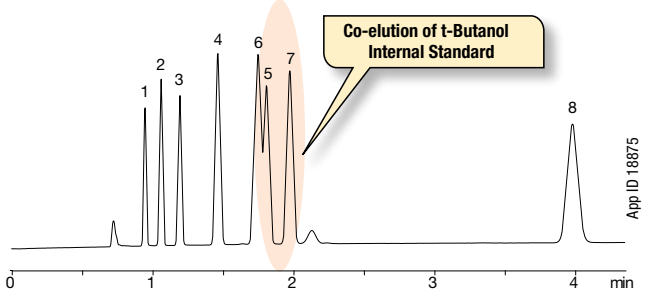
**Column:** As listed  
**Dimensions:** As listed  
**Part No.:** ZHK-G021-36 (ZB-BAC-1)  
 ZHK-G022-32 (ZB-BAC-2)  
**Injection:** Split 0.8:1 @ 150 °C, 1 mL  
**Carrier Gas:** Helium @ 80 cm/sec (constant flow)  
**Oven Program:** 40 °C (Isothermal)  
**Detector:** FID @ 250 °C

**Sample:** Analytes 0.025 % and internal standards 0.100 % in water

1. Methanol
2. Acetaldehyde
3. Ethanol
4. Isopropanol
5. Acetone
6. t-Butanol (IS)
7. n-Propanol (IS)
8. 2-Butanol (IS)

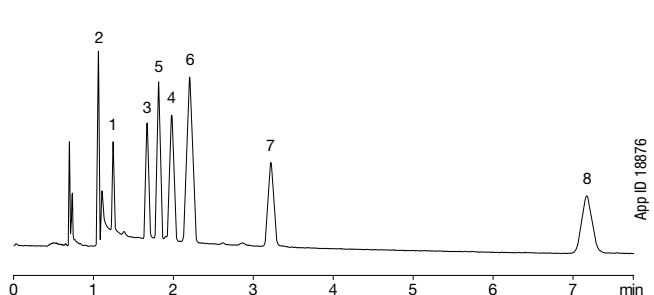
#### Restek Rtx-BAC1

30 meter x 0.53 mm x 3.00 µm



#### Restek Rtx-BAC2

30 meter x 0.53 mm x 2.00 µm



#### Conditions for both columns:

**Column:** As listed  
**Dimensions:** As listed  
**Injection:** Split 5:1 @ 150 °C, 1 mL  
**Carrier Gas:** Helium @ 80 cm/sec (constant flow)  
**Oven Program:** 40 °C (Isothermal)  
**Detector:** FID @ 220 °C

**Sample:** Analytes and internal standards 0.100 % in water

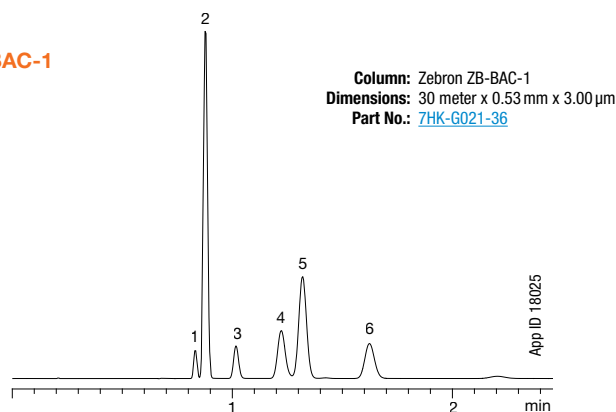
- |                 |                    |
|-----------------|--------------------|
| 1. Methanol     | 5. Acetone         |
| 2. Acetaldehyde | 6. t-Butanol (IS)  |
| 3. Ethanol      | 7. n-Propanol (IS) |
| 4. Isopropanol  | 8. 2-Butanol (IS)  |

Comparative separations may not be representative of all applications.

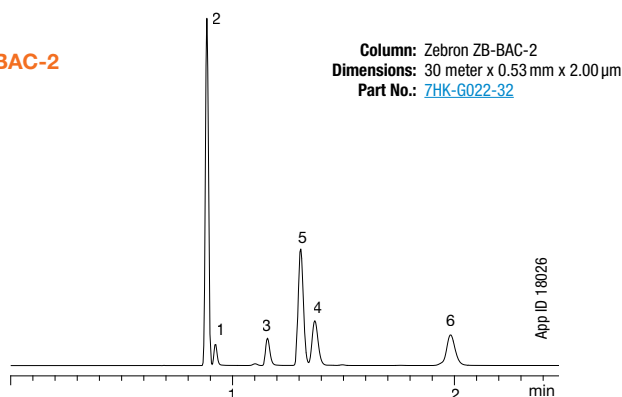
## ZB-BAC-1 and -2

### Run On Helium Or Hydrogen

#### BAC-1



#### BAC-2



#### Conditions for both columns:

- Injection:** Split 5:1 @ 150 °C, 1 mL
- Carrier Gas:** Hydrogen @ 80 cm/sec (constant flow)
- Oven Program:** 40 °C (Isothermal)
- Detector:** FID @ 250 °C
- Sample:** Analytes are 0.100% in water
  1. Methanol
  2. Acetaldehyde
  3. Ethanol
  4. Isopropanol
  5. Acetone
  6. n-Propanol

#### Ordering Information

Zebron ZB-BAC-1 GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>30-Meter</b>			
0.32	1.80	-20 to 260/280	<a href="#">7HM-G021-31</a>
0.53	3.00	-20 to 260/280	<a href="#">7HK-G021-36</a>

Zebron ZB-BAC-2 GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>30-Meter</b>			
0.32	1.20	-20 to 260/280	<a href="#">7HM-G022-25</a>
0.53	2.00	-20 to 260/280	<a href="#">7HK-G022-32</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](mailto:Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

**Column Profile**

**POLARITY\***

**MS CERTIFIED**

**BAC-1**

**TEMP LIMITS (°C)**  
-20 to 260/280

\*Similar polarity to ZB-35.

---

**POLARITY\*\***

**MS CERTIFIED**

**BAC-2**

**TEMP LIMITS (°C)**  
-20 to 260/280

\*\*Similar polarity to ZB-624.

**Engineered Self Cross-linking™ (ESC)**

**Phase Chemistry**

- Proprietary

**Recommended Applications**

- Abused Inhalant Anesthetics
- Blood Alcohol Analysis

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.



## ZB-1PLUS™

### MS Certified “1” Phase

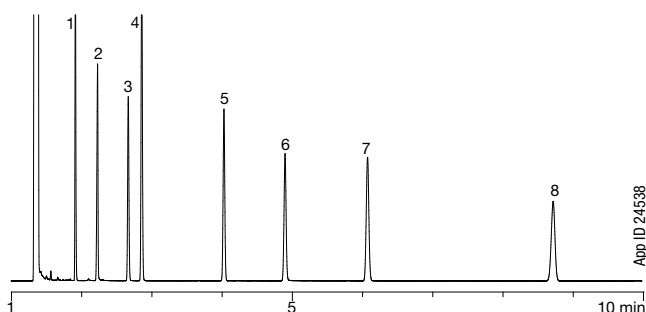
- **Very low bleed (MS Certified) phase especially suited to high sensitivity GC-MS**
- **Extremely inert for active compounds such as drugs, pesticides, or acids and bases**
- **Improved signal-to-noise ratio for better sensitivity and mass spectral integrity**
- **Identical selectivity to 100% dimethylpolysiloxane phases**

Upgrade to Zebron from any 100% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®
• DB®-1	• Rtx®-1	• BP1	• SPB®-1
• DB-1ms	• Rtx-1ms	• SolGel-1ms™	• SE-30
• DB-1ms Ultra Inert	• Rxi®-1ms		• MET-1
• HP-1			• MDN-1
• HP-1ms			• Equity®-1
• HP-1ms Ultra Inert			
• VF-1ms			
• CP-Sil 5 CB			
• Ultra 1			

### Lower Overall Column Activity

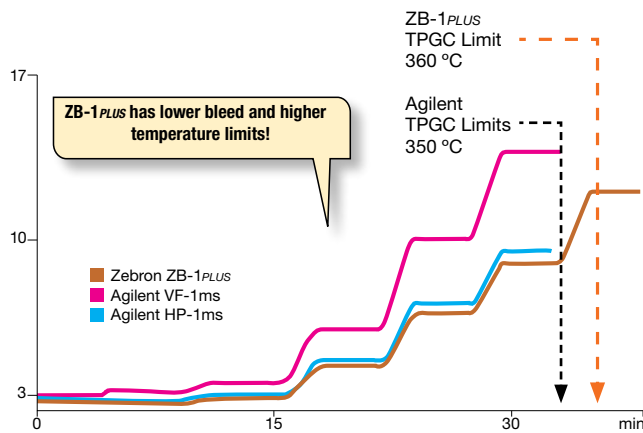
Activity is a key measure of column quality. ZB-1PLUS columns are aggressively tested to ensure full deactivation. Our QC test below demonstrates low tailing on ZB-1PLUS for even the most active compounds, like 2-ethylhexanoic acid.



**Column:** Zebron ZB-1PLUS  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** ZHG-G031-11  
**Injection:** Split 100:1 @ 250 °C, 1.0 µL  
**Carrier Gas:** Hydrogen @ 1.18 mL/min (constant flow)  
**Oven Program:** 140 °C (Isothermal)  
**Detector:** FID @ 325 °C  
**Sample:** 1. Decane  
 2. 2-Ethylhexanoic Acid  
 3. 4-Chlorophenol  
 4. Naphthalene  
 5. Tridecane  
 6. 1-Undecanol  
 7. Dicyclohexylamine  
 8. Pentadecane

### Lower Column Bleed

We tested the ZB-1PLUS column bleed profile against other “MS” columns on the market – ZB-1PLUS shows the lowest bleed, even at temperatures up to 360 °C.



Test conditions were stopped at 350 °C for all competitor columns so as not to cause damage to the stationary phase by exceeding their maximum temperature limit.

#### Conditions for all columns:

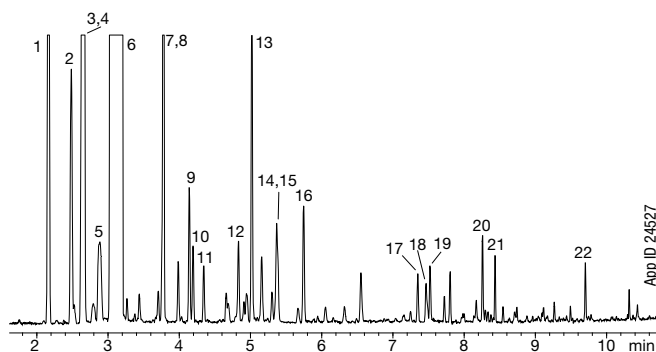
**Columns:** As listed  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Injection:** Null Injection @ 250 °C  
**Carrier Gas:** Hydrogen @ 100 mL/min (constant flow)  
**Oven Program:** 240 °C for 9 min to 280 °C for 6.3 min to 320 °C for 6.4 min to 340 °C for 5.8 min to 350 °C for 5.5 min to 360 °C  
**Detector:** FID @ 320 °C

Comparative separations may not be representative of all applications.

## ZB-1PLUS™

### Well-Suited for Food & Flavors

#### Cold Pressed Orange Oil by GC-MS



Column: Zebron ZB-1PLUS  
 Dimensions: 10 meter x 0.10 mm x 0.10 μm  
 Part No.: [7CB-G031-02](#)  
 Injection: Split 120:1 @ 160 °C, 0.2 μL  
 Carrier Gas: Helium @ 0.3 mL/min (constant flow)  
 Oven Program: 60 °C to 130 °C @ 10 °C/min to 280 °C @ 30 °C/min for 3 min  
 Detector: MSD  
 Sample: Sample was 10% in dichloromethane

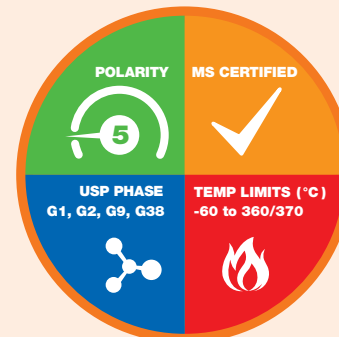
1. α-Pinene	9. cis-Limonene oxide	17. α-Cubebene
2. β-Phellandrine	10. trans-Limonene oxide	18. β-Cubebene
3. β-Myrcene	11. Citronellal	19. Dodecanal
4. Octanal	12. α-Terpineol	20. Valencene
5. 3-Carene	13. Decanal	21. Cadinene
6. Limonene	14. Carvone	22. Nootkatone
7. Nonanal	15. Neral	
8. Linalool	16. Geranial	

#### Ordering Information

Zebron ZB-1PLUS GC Columns			
ID(mm)	df(μm)	Temp. Limits °C	Part No.
<b>5-Meter</b>			
0.18	0.18	-60 to 360/370	<a href="#">7AD-G031-08</a>
<b>10-Meter</b>			
0.10	0.10	-60 to 360/370	<a href="#">7CB-G031-02</a>
<b>12-Meter</b>			
0.20	0.33	-60 to 360/370	<a href="#">7DE-G031-14</a>
<b>15-Meter</b>			
0.25	0.25	-60 to 360/370	<a href="#">7EG-G031-11</a>
0.32	0.25	-60 to 360/370	<a href="#">7EM-G031-11</a>
<b>15-Meter with 10-Meter Guardian™ Integrated Guard</b>			
0.25	0.25	-60 to 360/370	<a href="#">7EG-G031-11-GGC</a>
<b>20-Meter</b>			
0.18	0.18	-60 to 360/370	<a href="#">7FD-G031-08</a>
<b>25-Meter</b>			
0.20	0.33	-60 to 360/370	<a href="#">7GE-G031-14</a>
<b>30-Meter</b>			
0.25	0.10	-60 to 360/370	<a href="#">7HG-G031-02</a>
0.25	0.25	-60 to 360/370	<a href="#">7HG-G031-11</a>
0.32	0.25	-60 to 360/370	<a href="#">7HM-G031-11</a>
<b>30-Meter with 5-Meter Guardian Integrated Guard</b>			
0.25	0.25	-60 to 360/370	<a href="#">7HG-G031-11-GGA</a>
<b>30-Meter with 10-Meter Guardian Integrated Guard</b>			
0.25	0.25	-60 to 360/370	<a href="#">7HG-G031-11-GGC</a>
<b>60-Meter</b>			
0.25	0.25	-60 to 360/370	<a href="#">7KG-G031-11</a>
0.25	1.00	-60 to 360/370	<a href="#">7KG-G031-22</a>
0.32	0.25	-60 to 360/370	<a href="#">7KM-G031-11</a>

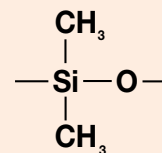
Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

#### Column Profile



#### Engineered Self Cross-linking™ (ESC)

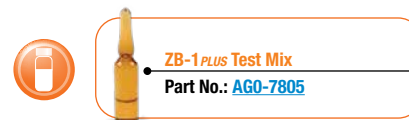
#### Phase Chemistry



100 % Dimethylpolysiloxane

#### Recommended Applications

- Acids
- Amines
- Diesel Fuel
- Drugs
- EPA Methods (1668)
- Essential Oils
- Flavors & Fragrances
- Oxygenates and GROs
- PCBs
- Pesticides
- Solvent Impurities
- Sulfur Compounds (Light)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-5PLUS™

### Inert 5% Phenyl Selectivity

- Highly inert—improved peak shape for acidic/basic compounds, drugs of abuse, and pesticides
- Very low bleed (MS certified) levels provide maximum sensitivity
- Intense QC specifications ensure column-to-column performance
- ESC™ bonding results in phase stability and high temperature limits
- Traditional bonding chemistry provides the same selectivity as the ZB-5 columns

Upgrade to Zebron from any

5% phenyl / 95% dimethylpolysiloxane phase:

#### Agilent®

- DB®-5
- HP-5
- HP-5ms
- HP-5msi

#### Restek®

- Rtx®-5
- Rtx-5MS
- Rtx-5Amine
- Rxi®-5ms

#### SGE®

- BP5
- BPX5

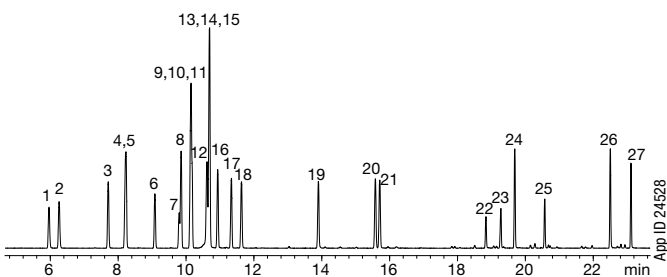
#### Supelco®

- MDN-5S
- SPB®-5
- Equity®-5

#### OV®

- OV-5

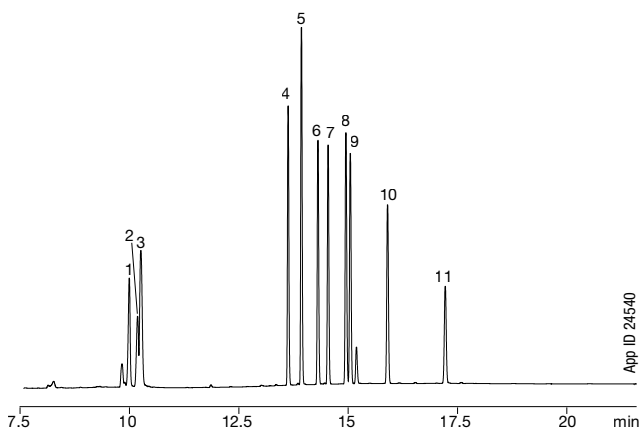
### Phenols



**Column:** Zebron ZB-5PLUS  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** 7HG-G032-11  
**Injection:** Split 5:1 @ 240 °C, 1 µL  
**Carrier Gas:** Helium @ 1.2 mL/min (constant flow)  
**Oven Program:** 60 °C to 140 °C @ 5 °C/min to 280 °C @ 10 °C/min  
**Detector:** MSD @ 230 °C, 45-450 amu  
**Sample:**

1. Phenol	16. 2,3-Dimethylphenol
2. 2-Chlorophenol	17. 3,4-Dimethylphenol
3. 2-Methylphenol	18. 2,6-Dichlorophenol
4. 4-Methylphenol	19. 4-Chloro-3-methylphenol
5. 3-Methylphenol	20. 2,4,6-Trichlorophenol
6. 2,6-Dimethylphenol	21. 2,4,5-Trichlorophenol
7. 2-Nitrophenol	22. 2,4-Dinitrophenol
8. 2-Ethylphenol	23. 4-Nitrophenol
9. 2,4-Dimethylphenol	24. 2,3,4,6-Tetrachlorophenol
10. 3,5-Dimethylphenol	25. 4,6-Dinitro-2-methylphenol
11. 2,5-Dimethylphenol	26. Pentachlorophenol
12. 4-Ethylphenol	27. Dinoseb
13. 3-Ethylphenol	
14. 2,4-Dichlorophenol	
15. Benzoic Acid	

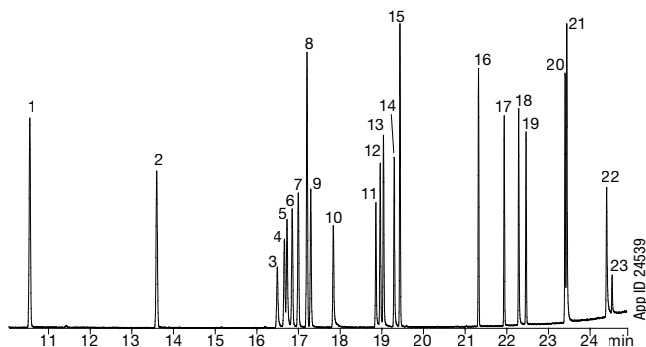
### Underivatized Antihistamines by GC-FID



**Column:** Zebron ZB-5PLUS  
**Dimensions:** 30 meter x 0.25 mm x 1.0 µm  
**Part No.:** 7HG-G032-22  
**Injection:** Split 50:1 @ 305 °C, 1 µL  
**Carrier Gas:** Helium @ 1.3 mL/min (constant flow)  
**Oven Program:** 40 °C for 1 min to 240 °C @ 25 °C/min for 2 min to 305 °C @ 25 °C/min for 8 min  
**Detector:** FID @ 320 °C  
**Sample:**

1. Phenylpropanolamine	7. Phenyltoloxamine
2. Ephedrine	8. Methapyrilene
3. Pseudoephedrine	9. Chlorpheniramine
4. Pheniramine	10. Brompheniramine
5. Diphenhydramine	11. Triprolidine
6. Doxylamine	

### Endocrine Disruptors by GC-MS



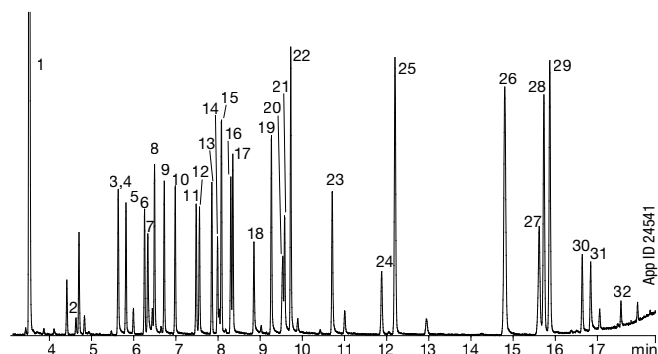
**Column:** Zebron ZB-5PLUS  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** 7HG-G032-11  
**Injection:** Split 40:1 @ 250 °C, 1 µL  
**Carrier Gas:** Helium @ 1.2 mL/min (constant flow)  
**Oven Program:** 100 °C to 180 °C @ 5 °C/min to 320 °C @ 15 °C/min  
**Detector:** MSD @ 180 °C, 45-450 amu  
**Sample:** Analytes are 50 ppm in acetone

1. Dimethyl phthalate	9. Terbutylazine	17. 4,4'-DDD
2. Diethyl phthalate	10. Secbumeton	18. Di-n-hexyl phthalate
3. Atraton	11. Simetryn	19. 4,4'-DDT
4. Simazine	12. Ametryn	20. Dicyclohexyl phthalate
5. Prometon	13. Prometryn	21. bis(2-Ethylhexyl)phthalate
6. Atrazine	14. Terbutryn	22. Di-n-octyl phthalate
7. Propazine	15. Dibutyl phthalate	23. Ethinyl estradiol
8. Dipropyl phthalate	16. 4,4'-DDE	

## ZB-5PLUS™

### Good Results for Drugs

#### Drug Screening by GC-MS



**Column:** Zebron ZB-5PLUS  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** 7HG-G032-11  
**Injection:** Split 15:1 @ 240 °C, 1 µL  
**Carrier Gas:** Helium @ 1.1 mL/min (constant flow)  
**Oven Program:** 140 °C to 240 °C @ 10 °C/min for 5 min to 320 °C @ 25 °C/min for 2.25 min  
**Detector:** MSD @ 230 °C, 45-450 amu

**Sample:** Analytes (underivatized) are 25 ppm in dichloromethane

1. Nicotine	14. Caffeine	27. Morphine
2. Methylecgonine	15. Benzphetamine	28. Diazepam
3. Ibuprofen	16. Hexobarbital	29. Hydrocodone
4. Allobarbitol	17. Dimenhydrinate	30. 6-Monoacetylmorphine
5. Aprobarbital	18. Doxylamine	31. Oxymorphone
6. Butobarbital	19. Phenobarbital	32. Diacetylmorphine (Heroin)
7. Acetaminophen	20. 8-Chlorotheophylline	
8. Phenacetin	21. Methapyrilene	
9. Amobarbital	22. Chlorpheniramine	
10. Pentobarbital	23. Brompheniramine	
11. Secobarbital	24. Cocaine	
12. Meprobamate	25. Chlorcyclizine	
13. Methyl benzilate	26. Codeine	

#### Ordering Information

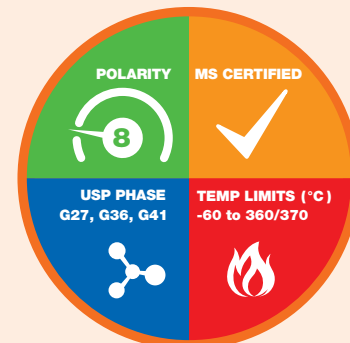
##### Zebron ZB-5PLUS GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>10-Meter</b>			
0.18	0.18	-60 to 360/370	<a href="#">7CD-G032-08</a>
<b>15-Meter</b>			
0.25	0.25	-60 to 360/370	<a href="#">7EG-G032-11</a>
<b>20-Meter</b>			
0.18	0.18	-60 to 360/370	<a href="#">7FD-G032-08</a>
0.18	0.36	-60 to 360/370	<a href="#">7FD-G032-53</a>
<b>20-Meter with 5-Meter Guardian™ Integrated Guard</b>			
0.18	0.18	-60 to 360/370	<a href="#">7FD-G032-08-GGA</a>
<b>30-Meter</b>			
0.25	0.25	-60 to 360/370	<a href="#">7HG-G032-11</a>
0.25	0.50	-60 to 360/370	<a href="#">7HG-G032-17</a>
0.25	1.00	-60 to 360/370	<a href="#">7HG-G032-22</a>
0.32	0.25	-60 to 360/370	<a href="#">7HM-G032-11</a>
0.32	0.50	-60 to 360/370	<a href="#">7HM-G032-17</a>
0.32	1.00	-60 to 360/370	<a href="#">7HM-G032-22</a>
<b>30-Meter with 5-Meter Guardian Integrated Guard</b>			
0.25	0.10	-60 to 360/370	<a href="#">7HG-G032-02-GGA</a>
0.25	0.25	-60 to 360/370	<a href="#">7HG-G032-11-GGA</a>
<b>60-Meter</b>			
0.25	0.25	-60 to 360/370	<a href="#">7KG-G032-11</a>
<b>60-Meter with 5-Meter Guardian Integrated Guard</b>			
0.25	0.25	-60 to 360/370	<a href="#">7KG-G032-11-GGA</a>

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

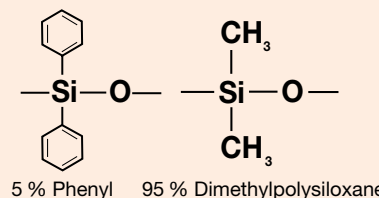
Phenomenex

#### Column Profile



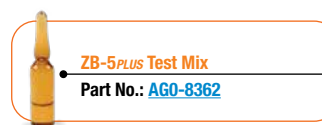
#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry



#### Recommended Applications

- Barbiturates
- Benzodiazepines
- Drugs of Abuse
- EPA Methods
- FAMES
- Nitrosamines
- Pesticides
- Phenols
- THC Metabolites



For high temperature analysis, consider using a ZB-5HT, see p. 146



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-5MS<sup>PLUS</sup>™

### The Next Generation of Inertness

- The next generation of inertness for specialty chemical, forensic, toxicology, and food testing applications
- Specialized deactivation for versatile 5% phenyl-arylene selectivity with improved sensitivity
- Low bleed (MS Certified) and well-suited to high sensitivity GC-MS and GC-MS/MS work

Upgrade to Zebron from any 5% phenyl or 5% phenyl-arylene / 95% dimethylpolysiloxane phase:

#### Agilent®

- DB®-5ms
- DB-5ms Ultra Inert
- HP-5ms
- HP-5ms Ultra Inert
- VF-5ms

#### Restek®

- Rxi®-5Sil MS

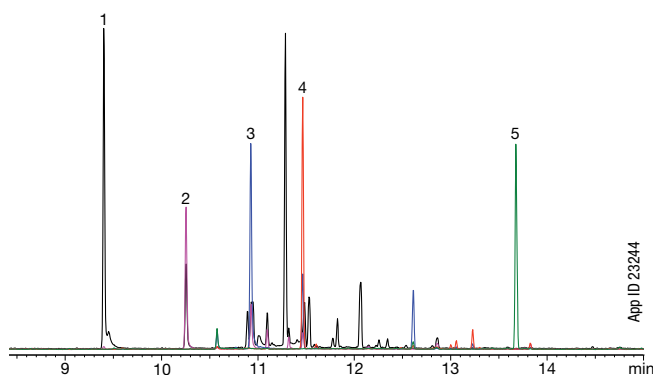
#### Supelco®

- SLB®-5ms

### Engineered for High Performance

Active sites on a GC column's surface can result in analyte adsorption and degradation, negatively affecting peak shape and response. To reduce potential surface activity, Zebron ZB-5MS<sup>PLUS</sup> is designed with a rigorous fused silica deactivation process that improves inertness for troublesome compounds. Instantly achieve higher responses for active compounds compared to your current 5ms phase column, without changing your selectivity.

#### Melamine in Dog Food by GC-MS



- Extraction Protocol:**
1. Combine 0.5 g of homogenized dog food with 10 mL of DEA/Water/ Acetonitrile (1:4:5) in a 15 mL centrifuge tube
  2. Sonicate for 30 min
  3. Centrifuge at 5000 rpm for 10 min
  4. Transfer 100 µL of supernatant to an autosampler vial and evaporate to dryness using nitrogen gas
  5. Reconstitute with 100 µL of Acetonitrile/Pyridine (1:1) and then derivatize using 100 µL BSTFA with 1% TCMS at 70 °C for 45 min

**Column:** Zebron ZB-5MS<sup>PLUS</sup>

**Dimensions:** 30 meter x 0.25 mm x 0.25 µm

**Part No.:** 7HG-G030-11

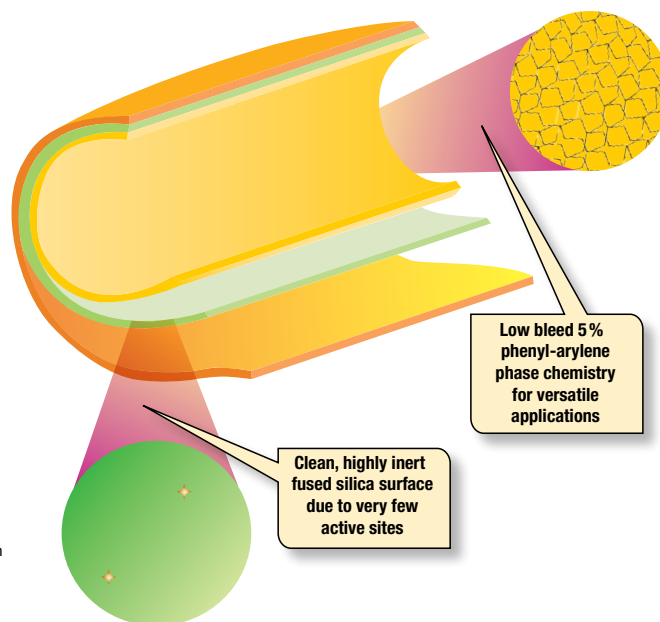
**Injection:** Splitless @ 280 °C, 1 µL

**Carrier Gas:** Helium @ 1 mL/min (constant flow)

**Oven Program:** 75 °C for 1 min to 320 °C @ 15 °C/min hold for 4 min

**Detector:** MSD @ 320 °C

- Sample:**
1. Cyanuric acid
  2. Ammelide
  3. Ammeline
  4. Melamine
  5. Benzoguanamine

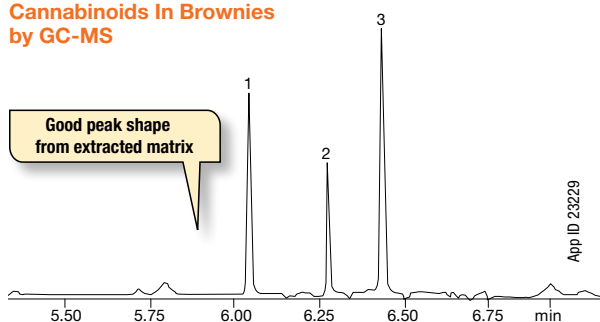




## ZB-5MSPLUS™

### Versatile Performance For Drugs and Chemicals

#### Cannabinoids In Brownies by GC-MS

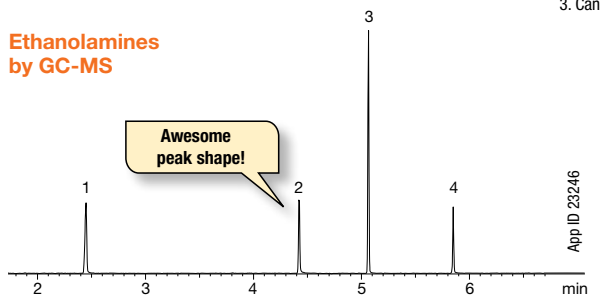


#### Extraction Protocol:

1. Combine 1 g of chocolate brownie with 10 mL of water in a 50 mL centrifuge tube
2. Shake using a mechanical shaker until dissolved
3. Add roQ™ QuEChERS EN15662 extraction salt packet (KSO-8909) and 10 mL of acetonitrile
4. Shake tube for 3 min using mechanical shaker
5. Centrifuge at 2700 rpm for 5 min
6. Transfer 1 mL of supernatant to an autosampler vial for GC-MS analysis

**Column:** Zebron ZB-5MSPLUS  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** [7HG-G030-11](#)  
**Injection:** Splitless @ 250 °C, 1 µL  
**Carrier Gas:** Helium @ 1.5 mL/min (constant flow)  
**Oven Program:** 100 °C for 1 min to 320 °C @ 50 °C/min, hold for 2 min  
**Detector:** MSD @ 320 °C  
**Sample:** 1. Cannabidiol  
 2. Δ-9-Tetrahydrocannabinol  
 3. Cannabinol

#### Ethanolamines by GC-MS



**Column:** Zebron ZB-5MSPLUS  
**Dimensions:** 30 meter x 0.25 mm x 1.00 µm  
**Part No.:** [7HG-G030-22](#)  
**Injection:** Split 200:1 @ 250 °C, 1 µL  
**Carrier Gas:** Helium @ 1.4 mL/min (constant flow)  
**Oven Program:** 30 °C to 300 °C @ 40 °C/min  
**Detector:** MSD @ 320 °C  
**Sample:** 1. Monoethanolamine  
 2. Diethanolamine  
 3. Triethylene glycol monomethyl ether (IS)  
 4. Triethanolamine

#### Ordering Information

##### Zebron ZB-5MSPLUS GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>1.5-Meter</b>			
0.25	0.25	-60 to 325/350	<a href="#">7XG-G030-11</a>
<b>15-Meter</b>			
0.25	0.25	-60 to 325/350	<a href="#">7EG-G030-11</a>
0.25	0.50	-60 to 325/350	<a href="#">7EG-G030-17</a>
0.25	1.00	-60 to 325/350	<a href="#">7EG-G030-22</a>
<b>20-Meter</b>			
0.18	0.18	-60 to 325/350	<a href="#">7FD-G030-08</a>
0.18	0.36	-60 to 325/350	<a href="#">7FD-G030-53</a>
<b>30-Meter</b>			
0.25	0.25	-60 to 325/350	<a href="#">7HG-G030-11</a>
0.25	0.50	-60 to 325/350	<a href="#">7HG-G030-17</a>
0.25	1.00	-60 to 325/350	<a href="#">7HG-G030-22</a>
0.32	0.25	-60 to 325/350	<a href="#">7HM-G030-11</a>
0.32	0.50	-60 to 325/350	<a href="#">7HM-G030-17</a>
0.32	1.00	-60 to 325/350	<a href="#">7HM-G030-22</a>
0.32	1.50	-60 to 325/350	<a href="#">7HM-G030-28</a>
0.53	1.00	-60 to 325/350	<a href="#">7HK-G030-22</a>
0.53	3.00	-60 to 325/350	<a href="#">7HG-G030-36</a>

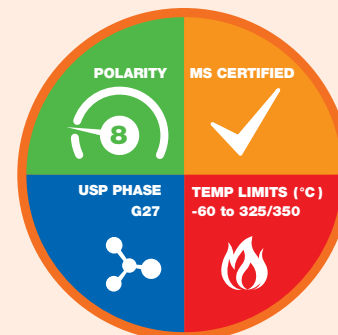
#### Ordering Information

##### Zebron ZB-5MSPLUS GC Columns (cont'd)

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>30-Meter with 5-Meter Guardian™ Integrated Guard</b>			
0.25	0.25	-60 to 325/350	<a href="#">7HG-G030-11-GGA</a>
0.25	0.50	-60 to 325/350	<a href="#">7HG-G030-17-GGA</a>
<b>30-Meter with 10-Meter Guardian Integrated Guard</b>			
0.25	0.25	-60 to 325/350	<a href="#">7HG-G030-11-GGC</a>
0.25	0.50	-60 to 325/350	<a href="#">7HG-G030-17-GGC</a>
<b>60-Meter</b>			
0.25	0.25	-60 to 325/350	<a href="#">7KG-G030-11</a>
0.25	1.00	-60 to 325/350	<a href="#">7KG-G030-22</a>
0.32	1.00	-60 to 325/350	<a href="#">7KM-G030-22</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](mailto:Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

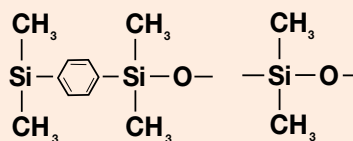
#### Column Profile



#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry

5 % Phenyl-Arylene



95 % Dimethylpolysiloxane

#### Recommended Applications

- Acids
- Alkaloids
- Amines
- Drugs
- Essential Oils
- Flavors
- Halo-hydrocarbons
- Pesticides
- Phenols
- Residual Solvents
- Solvent Impurities



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

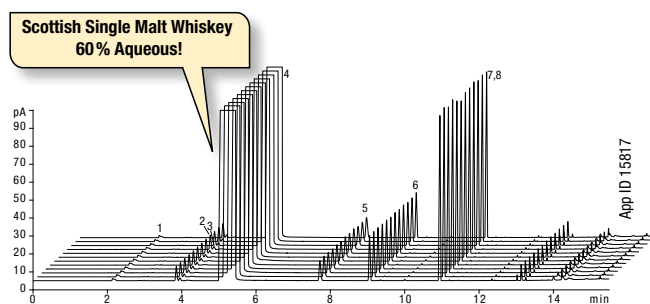
## ZB-WAXPLUS™

### Enhanced Aqueous Stability

- 100% aqueous stable, excellent for aqueous samples
- Extremely inert for acidic compounds
- Enhanced selectivity for low boiling solvents
- High retention of alcohols and chlorinated solvents
- Increased efficiency at 20 °C

### Water Reproducibility of ZB-WAXPLUS

Historically, polyethylene glycol (PEG) phases have been unstable with aqueous samples such as beverages or glycols, resulting in poor reproducibility and decreased lifetime. ZB-WAXPLUS bonding procedure results in exceptional stability to repeated injections of aqueous matrices.

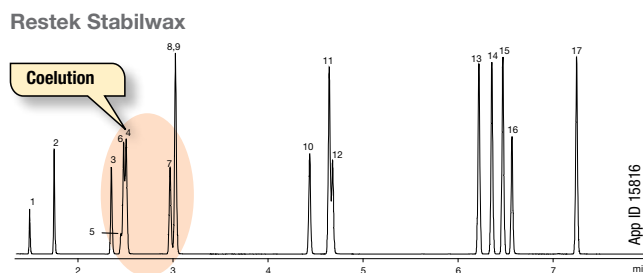
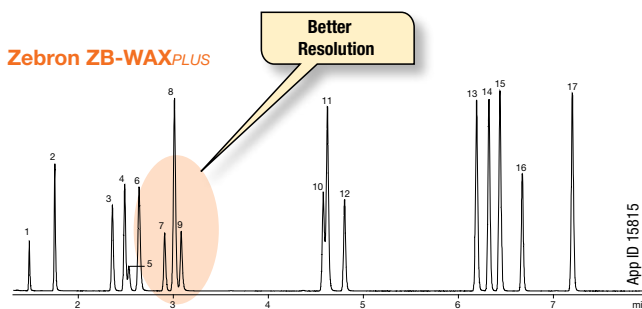


Upgrade to Zebron from any polyethylene glycol phase:

- |                                                                                                                                              |                                                                |                                                          |                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------|
| <b>Agilent®</b>                                                                                                                              | <b>Restek®</b>                                                 | <b>SGE®</b>                                              | <b>Supelco®</b>                                                    |
| <ul style="list-style-type: none"> <li>• DB®-WAX</li> <li>• CAM</li> <li>• HP-20M</li> <li>• Carbowax 20M</li> <li>• CP-Wax 52 CB</li> </ul> | <ul style="list-style-type: none"> <li>• Stabilwax®</li> </ul> | <ul style="list-style-type: none"> <li>• BP20</li> </ul> | <ul style="list-style-type: none"> <li>• SUPELCOWAX® 10</li> </ul> |

- Column:** Zebron ZB-WAXPLUS  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** 7HG-G013-11  
**Injection:** Split 30:1 @ 140 °C, 0.2 µL  
**Carrier Gas:** Helium @ 1.4 mL/min (constant flow)  
**Oven Program:** 35 °C for 5 min to 85 °C @ 10 °C/min to 200 °C @ 25 °C/min for 1 min  
**Detector:** FID @ 200 °C  
**Sample:** 1. Acetaldehyde  
 2. Ethyl Acetate  
 3. Methanol  
 4. Ethanol  
 5. Propanol  
 6. Isobutanol  
 7. 2-Methylbutanol  
 8. 3-Methylbutanol

### Improve Resolution



Conditions same for both columns:

- Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Injection:** Split 100:1 @ 250 °C, 1 µL  
**Carrier Gas:** Hydrogen @ 1.0 mL/min (constant flow)  
**Oven Program:** 35 °C for 2.5 min to 85 °C @ 10 °C/min and hold until last peak elutes  
**Detector:** FID @ 225 °C

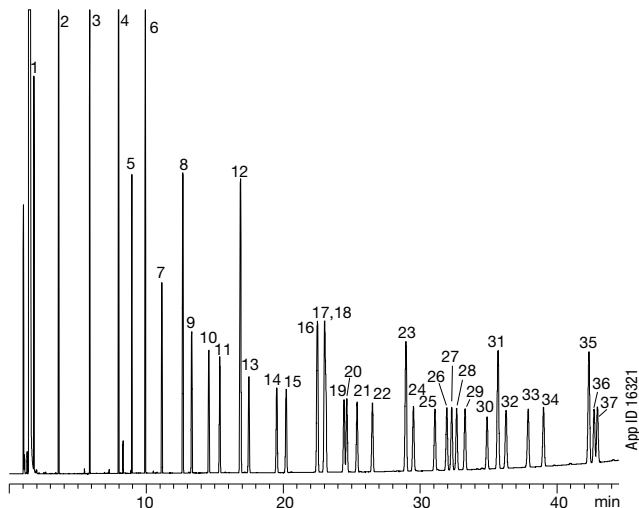
- Sample:** 1. Methyl Formate  
 2. Acetone  
 3. Ethyl Acetate  
 4. Methyl Ethyl Ketone  
 5. Methanol  
 6. 2-Methyl-2-propanol  
 7. Methylene Chloride  
 8. Benzene  
 9. Ethanol  
 10. 2-Butanol  
 11. Toluene  
 12. n-Propanol  
 13. Ethyl Benzene  
 14. p-Xylene  
 15. m-Xylene  
 16. 1-Butanol  
 17. o-Xylene

Comparative separations may not be representative of all applications.

## ZB-WAXPLUS™

### A Food Testing Must-Have

#### Food Industry FAMES



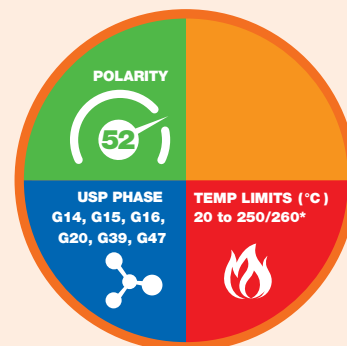
**Column:** Zebron ZB-WAXPLUS  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** [7HG-G013-11](#)  
**Injection:** Split 5:1 @ 220 °C, 1 µL  
**Carrier Gas:** Helium @ 3 mL/min (constant flow)  
**Oven Program:** 60 °C for 2 min to 150 °C @ 13 °C/min to 240 °C @ 2 °C/min  
**Detector:** FID @ 250 °C  
**Sample:** See the full compound list at [www.phenomenex.com/GC](http://www.phenomenex.com/GC)

#### Ordering Information

Zebron ZB-WAXPLUS GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>10-Meter</b>			
0.10	0.10	20 to 250/260	<a href="#">7CB-G013-02</a>
<b>15-Meter</b>			
0.25	0.25	20 to 250/260	<a href="#">7EG-G013-11</a>
0.53	1.00	20 to 230/240	<a href="#">7EK-G013-22</a>
<b>20-Meter</b>			
0.18	0.18	20 to 250/260	<a href="#">7FD-G013-08</a>
<b>30-Meter</b>			
0.25	0.25	20 to 250/260	<a href="#">7HG-G013-11</a>
0.25	0.50	20 to 250/260	<a href="#">7HG-G013-17</a>
0.32	0.25	20 to 250/260	<a href="#">7HM-G013-11</a>
0.32	0.50	20 to 250/260	<a href="#">7HM-G013-17</a>
0.32	1.00	20 to 230/240	<a href="#">7HM-G013-22</a>
0.53	0.25	20 to 250/260	<a href="#">7HK-G013-11</a>
0.53	1.00	20 to 230/240	<a href="#">7HK-G013-22</a>
<b>60-Meter</b>			
0.25	0.15	20 to 250/260	<a href="#">7KG-G013-05</a>
0.25	0.25	20 to 250/260	<a href="#">7KG-G013-11</a>
0.25	0.50	20 to 250/260	<a href="#">7KG-G013-17</a>
0.32	0.25	20 to 250/260	<a href="#">7KM-G013-11</a>
0.32	0.50	20 to 250/260	<a href="#">7KM-G013-17</a>
0.53	1.00	20 to 230/240	<a href="#">7KK-G013-22</a>

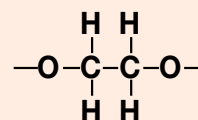
Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](http://Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

#### Column Profile



\*Thicker films (≥ 1.0 µm) are rated to 230/240 °C.

#### Phase Chemistry



100 % Polyethylene Glycol

#### Recommended Applications

- Alcohols
- Aldehydes
- Aromatics
- Essential Oils
- Flavors & Fragrances
- Free Fatty Acids
- Glycols
- OVIs
- Pharmaceuticals
- Solvents / Residual Solvents
- Styrene
- Xylene Isomers



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

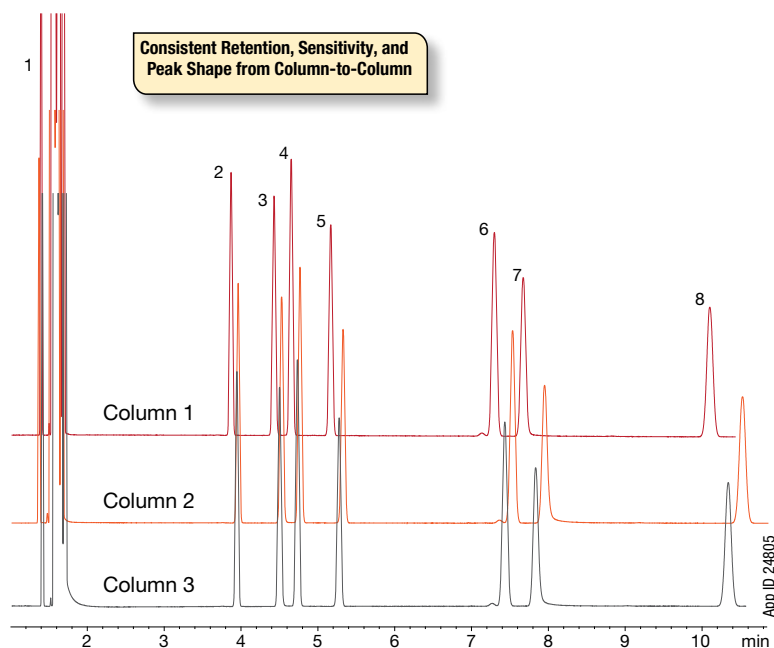




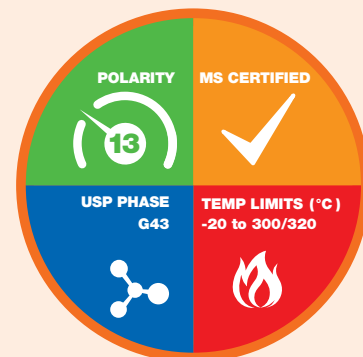
## ZB-624PLUS™

### We QC Test for the Compounds You Analyze

We added challenging and troublesome analytes to our QC test to make sure each ZB-624PLUS column has superior deactivation.



#### Column Profile



#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry

- Proprietary

#### Recommended Applications

- Cannabis
- Terpenes
- Residual Solvents
- Volatile Amines
- EPA Method 8260
- EPA Method 524
- EPA Method 624
- Food
- Flavors and Fragrances
- Solvent Purity
- Alcohols

Test Probe	The Plus Advantage	Property
2,4-Dimethylphenol 2,4-Dimethylaniline	We screen challenging analytes, like acids and bases, to mimic your most challenging compounds.	Inertness

#### Conditions for all separations:

- Column:** Zebron ZB-624PLUS
- Dimensions:** 30 meter x 0.32 mm x 1.80 μm
- Part No.:** [7HM-G040-31](#)
- Injection:** Split 50:1 @ 250 °C, 1 μL
- Recommended Liner:** Zebron PLUS Straight Z-Liner™
- Liner Part No.:** [AG2-0A03-05](#) (for Agilent® & Thermo Scientific® systems)
- Carrier Gas:** Hydrogen @ 6 psi (constant pressure)
- Oven Program:** 85 °C for 10.5 min
- Detector:** FID @ 305 °C
- Sample:**
  1. Methane
  2. Dodecane
  3. 2,4-Dimethylphenol
  4. 2,4-Dimethylaniline
  5. Tridecane
  6. 1-Methylnaphthalene
  7. 1-Undecanol
  8. Pentadecane



**ZB-624PLUS Test Mix**  
Part No.: [AG0-9203](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

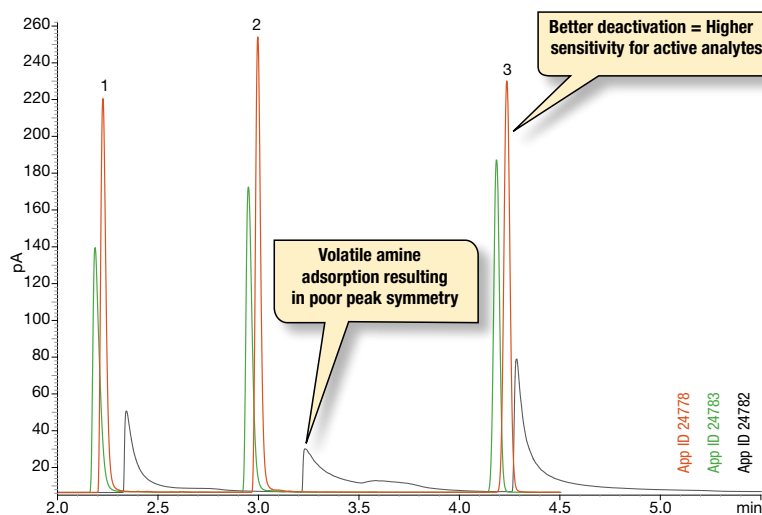


## ZB-624PLUS™ (cont'd)

### Improved Peak Shape of Volatile Amines

Volatile amines are challenging analytes for GC analysis. They can adsorb to even the smallest imperfections in fused silica. ZB-624PLUS undergoes a superior deactivation process which minimizes active compound adsorption leading to gains in peak response and shape.

#### Comparison of Volatile Amines on Various 624 Columns



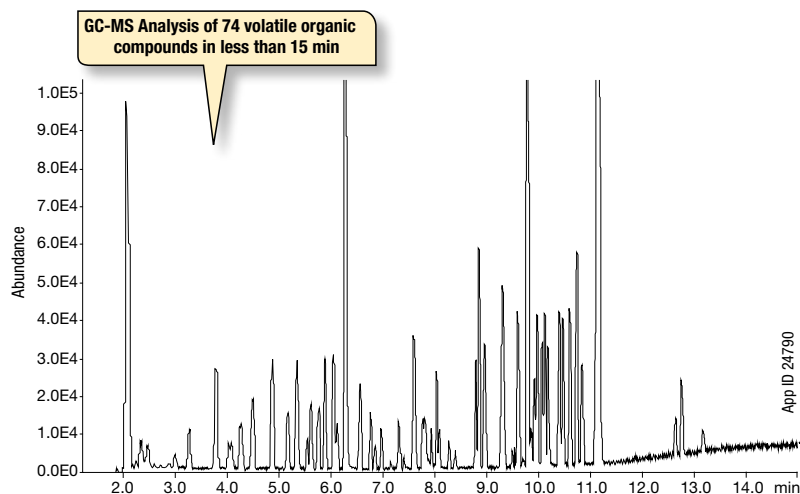
**Volatile Amines on a Zebron ZB-624PLUS - 500 ppm**  
**Volatile Amines on a Restek® Rxi®-624Sil MS - 500 ppm**  
**Volatile Amines on a Agilent® DB®-624UI Ultra Inert - 500 ppm**

#### Conditions for all separations:

- Column:** Zebron ZB-624PLUS  
Restek Rxi-624Sil MS  
Agilent DB-624UI Ultra Inert
- Dimensions:** 30 meter x 0.32 mm x 1.80 µm
- Injection:** Split 20:1 @ 200 °C, 1 µL
- Recommended Liner:** Zebron PLUS Straight Z-Liner™
- Liner Part No.:** AG2-0A03-05 (for Agilent® & Thermo Scientific® systems)
- Carrier Gas:** Helium @ 1.8 mL/min (constant flow)
- Oven Program:** 50 °C for 1 min, to 200 °C @ 20 °C/min for 5 min
- Detector:** FID @ 250 °C
- Sample:**
  1. Isopropylamine
  2. Diethylamine
  3. Triethylamine

### Volatile Organic Compounds in EPA Methods 8260, 524, and 624

Our high efficiency dimension and superior deactivation can stand real world samples. In addition, MS certification provides extreme low bleed to your GC-MS analysis.



- Column:** Zebron ZB-624PLUS
- Dimensions:** 30 meter x 0.25 mm x 1.40 µm
- Part No.:** ZHG-G040-27
- Injection:** Split 50:1 @ 230 °C, 1 µL
- Recommended Liner:** Zebron PLUS Straight Z-Liner™
- Liner Part No.:** AG2-0A03-05 (for Agilent® & Thermo Scientific® systems)
- Carrier Gas:** Helium @ 0.7 mL/min (constant flow)
- Oven Program:** 40 °C for 2 min, to 210 °C @ 17 °C/min for 3 min
- Detection:** Mass Spec transfer line @ 250 °C

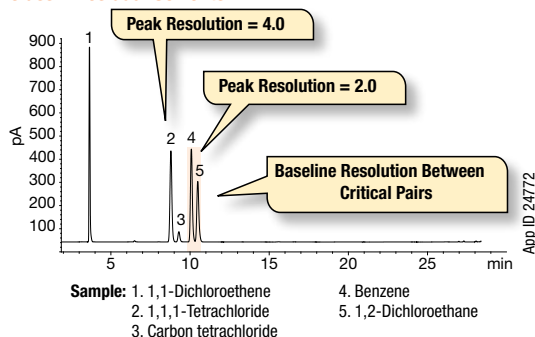
Comparative separations may not be representative of all applications.

## ZB-624PLUS™ (cont'd)

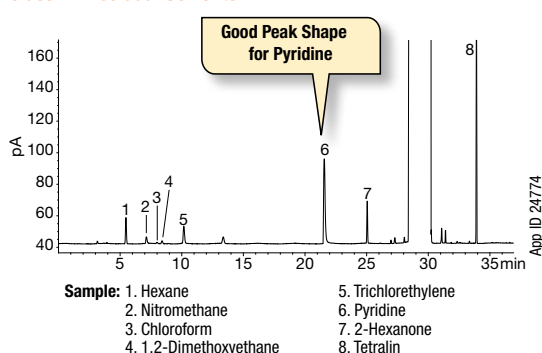
### Exceeding USP <467> System Suitability

USP <467> method requires resolution of 1.5 for critical pairs. Zebron ZB-624PLUS took the challenge and succeeded with even greater resolution!

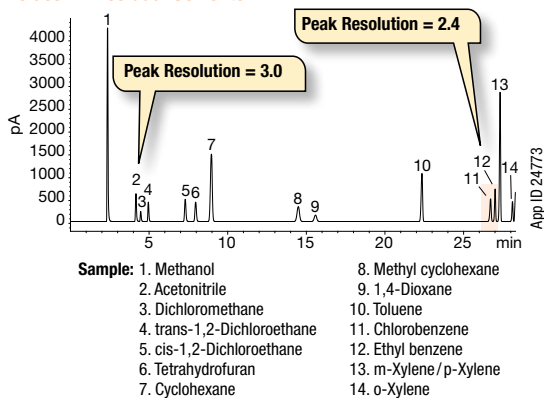
#### Class 1 Residual Solvents



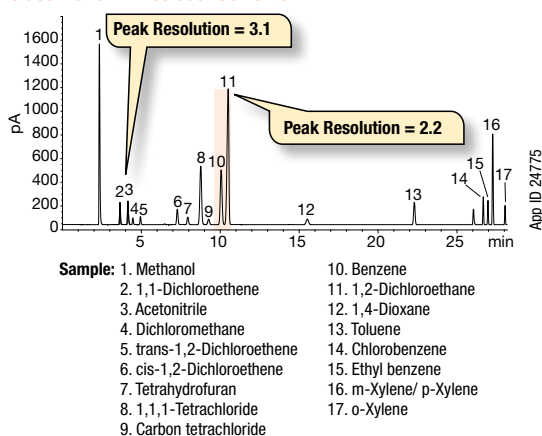
#### Class 2B Residual Solvents



#### Class 2A Residual Solvents



#### Class 1 and 2A Residual Solvents



#### Same conditions for all separations:

- Column: Zebron ZB-624PLUS
- Dimensions: 30 meter x 0.32 mm x 1.80 µm
- Part No.: [7HM-G040-31](#)
- Injection: Split 5:1 @ 140 °C, 1 µL
- Recommended Liner: Zebron PLUS Straight Z-Liner™
- Liner Part No.: [AG2-0A03-05](#) (for Agilent® & Thermo Scientific® systems)
- Carrier Gas: Helium @ 2.2 mL/min (constant flow)
- Oven Program: 40 °C for 20 min to 240 °C @ 10 °C/min
- Detector: FID @ 250 °C

#### Ordering Information

##### Zebron ZB-624PLUS GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>20-Meter</b>			
0.18	1.00	-20 to 300/320	<a href="#">7FD-G040-22</a>
0.25	1.40	-20 to 300/320	<a href="#">7FG-G040-27</a>
<b>30-Meter</b>			
0.25	1.40	-20 to 300/320	<a href="#">7HG-G040-27</a>
0.32	1.80	-20 to 300/320	<a href="#">7HM-G040-31</a>
0.53	3.00	-20 to 300/320	<a href="#">7HK-G040-36</a>
<b>60-Meter</b>			
0.25	1.40	-20 to 300/320	<a href="#">7KG-G040-27</a>
0.32	1.80	-20 to 300/320	<a href="#">7KM-G040-31</a>
0.53	3.00	-20 to 300/320	<a href="#">7KK-G040-36</a>
<b>75-Meter</b>			
0.53	3.00	-20 to 300/320	<a href="#">7LK-G040-36</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](http://Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages. 0.18 mm, 0.25 mm, and 0.32 mm IDs are MS certified.

## ZB-1HT Inferno™

### Robust Results Up to 430 °C

- First non-metal columns stable to 430 °C
- Provides true boiling point separation for hydrocarbon distillation methods
- Longer lifetime with rugged high temperature, polyimide coated, fused silica tubing
- Low activity, provides good peak shape for acidic and basic samples
- Provides robust column performance for high temperature bake outs

Upgrade to Zebron from any 100% dimethylpolysiloxane phase:

#### Agilent®

- DB®-1
- DB-1ht
- HP-1
- CP-Sil 5 CB
- CP-SimDist

#### Restek®

- Rtx®-1
- Rxi®-1HT

#### SGE®

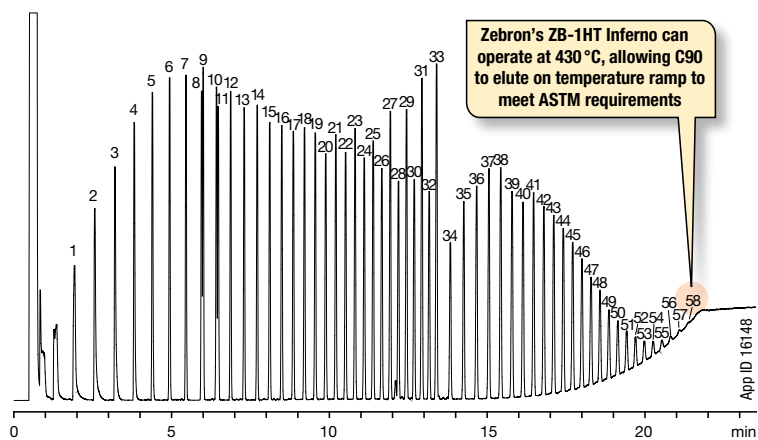
- BP1

#### Supelco®

- SPB®-1
- Petrocol® 2887

### Rugged, High-Temperature Performance

#### Great Separation of High Boiling Hydrocarbons (ASTM D6352)

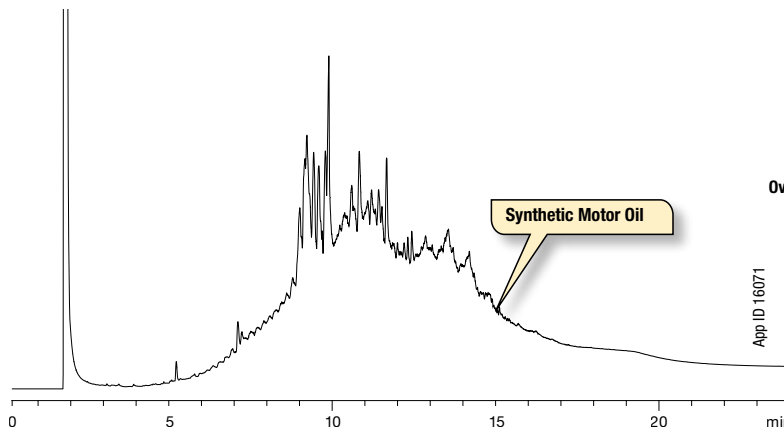


**Column:** Zebron ZB-1HT Inferno  
**Dimensions:** 5 meter x 0.53 mm x 0.10 µm  
**Part No.:** [7AK-G014-02](#)  
**Injection:** On-Column @ 43 °C, 0.1 µL  
**Carrier Gas:** Helium @ 4.4 mL/min (constant flow)  
**Oven Program:** 40 °C for 0.5 min to 430 °C @ 20 °C/min for 10 min  
**Detector:** FID @ 430 °C

Sample:	1. C10	16. C23	31. C38	46. C66
	2. C11	17. C24	32. C39	47. C68
	3. C12	18. C25	33. C40	48. C70
	4. C13	19. C26	34. C42	49. C72
	5. C14	20. C27	35. C44	50. C74
	6. C15	21. C28	36. C46	51. C76
	7. C16	22. C29	37. C48	52. C78
	8. C17	23. C30	38. C50	53. C80
	9. Pristane	24. C31	39. C52	54. C82
	10. C18	25. C32	40. C54	55. C84
	11. Phytane	26. C33	41. C56	56. C86
	12. C19	27. C34	42. C58	57. C88
	13. C20	28. C35	43. C60	58. C90
	14. C21	29. C36	44. C62	
	15. C22	30. C37	45. C64	

Note: Sample was a combination of PolyWax® 655 and retention time markers C8-C40 in CS<sub>2</sub>/Chloroform

#### Bake Off Contaminants from Dirty Matrices

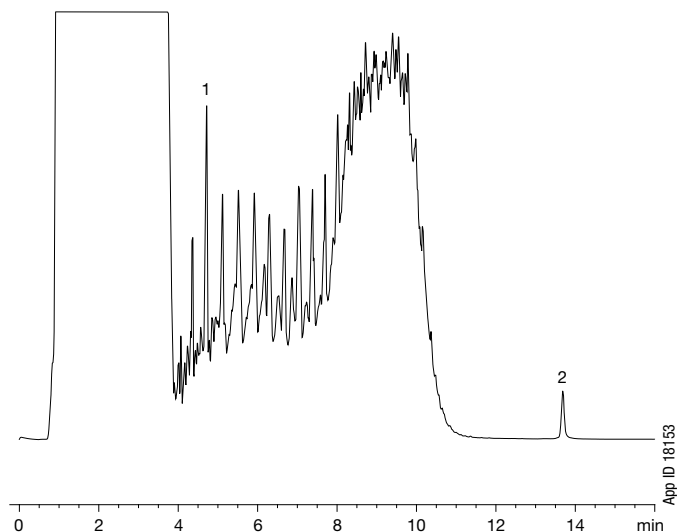


**Column:** Zebron ZB-1HT Inferno  
**Dimensions:** 30 meter x 0.25 mm x 0.10 µm  
**Part No.:** [7HG-G014-02](#)  
**Injection:** On-Column @ 153 °C, 1 µL  
**Carrier Gas:** Helium @ 1 mL/min (constant flow)  
**Oven Program:** 150 °C to 400 °C @ 14 °C/min for 6 min  
**Detector:** FID @ 400 °C  
**Sample:** Sample was 1% in dichloromethane Mobil® 1 10W-30 Fully Synthetic Motor Oil

## ZB-1HT Inferno™

### Run Versatile Samples

#### Hydrocarbons from Water by GC-FID DIN EN ISO 9377-2 (DEV H53)



**Column:** Zebron ZB-1HT Inferno  
**Dimensions:** 15 meter x 0.32 mm x 0.25 µm  
**Part No.:** [ZEM-G014-11](#)  
**Injection:** Splitless @ 300 °C, 20 µL  
**Carrier Gas:** Helium @ 2.0 mL/min (constant flow)  
**Oven Program:** 50 °C for 2 min to 320 °C @ 30 °C/min for 5 min  
**Detector:** FID @ 330 °C  
**Sample:** 1. Decane (C10)  
 2. Tetracontane (C40)

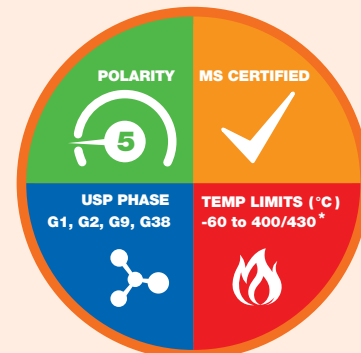
#### Ordering Information

##### Zebron ZB-1HT Inferno GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>5-Meter</b>			
0.53	0.10	-60 to 400	<a href="#">7AK-G014-02</a>
<b>10-Meter</b>			
0.32	0.25	-60 to 400/430	<a href="#">7CM-G014-11</a>
<b>15-Meter</b>			
0.25	0.10	-60 to 400/430	<a href="#">7EG-G014-02</a>
0.25	0.25	-60 to 400/430	<a href="#">7EG-G014-11</a>
0.32	0.10	-60 to 400/430	<a href="#">7EM-G014-02</a>
0.32	0.25	-60 to 400/430	<a href="#">7EM-G014-11</a>
0.53	0.15	-60 to 400	<a href="#">7EK-G014-05</a>
<b>20-Meter</b>			
0.18	0.18	-60 to 400/430	<a href="#">7FD-G014-08</a>
<b>30-Meter</b>			
0.25	0.10	-60 to 400/430	<a href="#">7HG-G014-02</a>
0.25	0.25	-60 to 400/430	<a href="#">7HG-G014-11</a>
0.32	0.10	-60 to 400/430	<a href="#">7HM-G014-02</a>
0.32	0.25	-60 to 400/430	<a href="#">7HM-G014-11</a>
0.53	0.15	-60 to 400	<a href="#">7HK-G014-05</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](http://Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

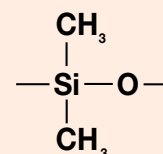
#### Column Profile



\*0.53 mm ID columns are rated to 400 °C.

#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry



100 % Dimethylpolysiloxane

#### Recommended Applications

- Diesel Fuel
- High Boiling Petroleum Products
- High Molecular Weight Waxes
- Hydrocarbons
- Motor Oils
- Polymers/Plastics
- Simulated Distillation



**ZB-1HT Test Mix**  
**Part No.:** [AGO-5155](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-5HT Inferno™

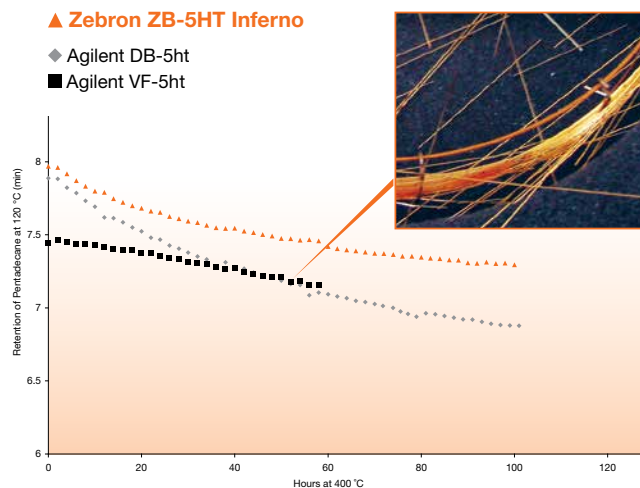
### Robust Results Up to 430 °C

- First non-metal columns stable to 430 °C
- Robust column for high temperature bake outs and analysis, such as biodiesel, long-chain hydrocarbons, polymers, and high molecular weight compounds
- Provides true boiling point separation for hydrocarbon distillation methods
- Longer lifetime with rugged high temperature, polyimide coated, fused silica tubing
- Low activity, provides good peak shape for acidic and basic samples

### Zebron Inferno Columns Win In The Lifetime Test

#### How does the lifetime test work?

All columns were held at 400 °C for 2 hours and then the oven was lowered to 120 °C for pentadecane analysis. The VF-5ht column broke just after 40 hours at 400 °C. The ZB-5HT had the same retention for pentadecane at 100 hours as the DB-5ht column at 40 hours — over 2X the lifetime!



Note that the VF-5ht column died around 40 hours at 400 °C whereas the Zebron ZB-5HT Inferno column maintained great retention of Pentadecane over 100 hours.

#### Conditions for all columns:

- Dimensions:** 30 meter x 0.25 mm x 0.10 μm
- Injection:** 1.0 μL of test mix [AGO-7578](#)
- Carrier Gas:** Helium @ 1.9 mL/min (constant flow)
- Oven Program:** 120 °C (Isothermal)
- Detector:** FID @ 400 °C
- Sample:** Pentadecane

Comparative separations may not be representative of all applications.

Upgrade to Zebron from any 5 % phenyl / 95 % dimethylpolysiloxane phase:

#### Agilent®

- DB®-5ht
- VF-5ht

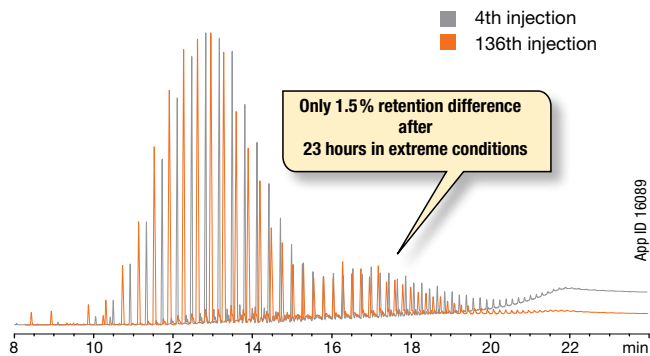
#### Restek®

- Rxi®-5HT
- Stx®-5HT
- XTI®-5HT
- Rtx®-5HT

#### SGE®

- HT-5

### Paraffin Wax



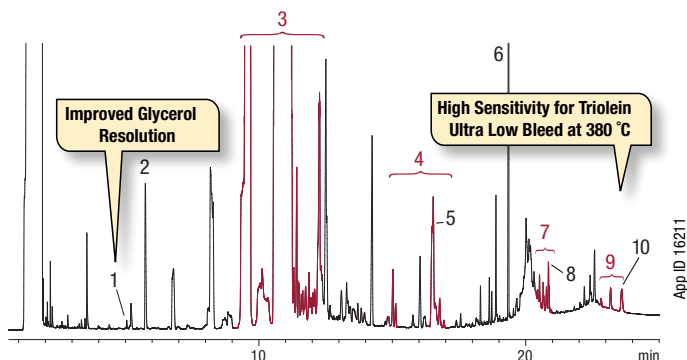
**Column:** Zebron ZB-5HT Inferno  
**Dimensions:** 15 meter x 0.32 mm x 0.10 μm  
**Part No.:** [7EM-G015-02](#)  
**Injection:** On Column @ 43 °C, 0.1 μL  
**Carrier Gas:** Helium @ 1.9 mL/min (constant flow)  
**Oven Program:** 40 °C for 2 min to 430 °C @ 20 °C for 10 min  
**Detector:** FID @ 430 °C  
**Sample:** Paraffin Wax



## ZB-5HT Inferno™

### Well-Suited for Fuels Analysis

#### Free Total Glycerin in B100 Biodiesel by GC-FID



**Column:** Zebron ZB-5HT Inferno  
**Dimensions:** 15 meter x 0.32 mm x 0.10 µm  
 + 2 meter x 0.53 mm Z-Guard™  
**Part No.:** [ZEM-G015-02](#)  
**Injection:** On-Column @ 53 °C, 1 µL  
**Carrier Gas:** Helium @ 3.0 mL/min (constant flow)  
**Oven Program:** 50 °C for 1 min to 180 °C @ 15 °C/min to 230 °C @ 7 °C/min to 380 °C @ 30 °C/min for 10 min  
**Detector:** FID @ 380 °C

**Note:** A 2 m x 0.53 mm Guard Column was connected to the analytical column per ASTM method requirement

**Sample:**

1. Glycerol	6. Tricarpin (ISTD2)
2. Butanetriol (ISTD1)	7. Diglycerides
3. Esters	8. 1,3-Diolein
4. Monoglycerides	9. Triglycerides
5. 1-Monooleoyl-rac-glycerol	10. Triolein

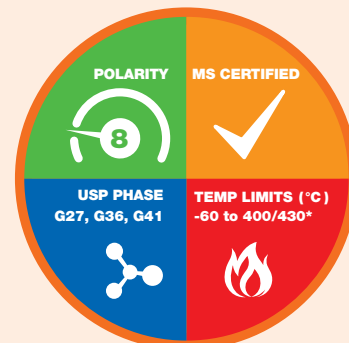
#### Ordering Information

##### Zebron ZB-5HT Inferno GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>10-Meter with 2-Meter Spliced Guard (0.53 mm ID)</b>			
0.32	0.10	-60 to 400/430	<a href="#">ZCM-G015-02-GST</a>
<b>15-Meter</b>			
0.25	0.10	-60 to 400/430	<a href="#">ZEG-G015-02</a>
0.25	0.25	-60 to 400/430	<a href="#">ZEG-G015-11</a>
0.32	0.10	-60 to 400/430	<a href="#">ZEM-G015-02</a>
0.32	0.25	-60 to 400/430	<a href="#">ZEM-G015-11</a>
0.53	0.15	-60 to 400	<a href="#">ZEK-G015-05</a>
<b>15-Meter with 2-Meter Spliced Guard (0.53 mm ID)</b>			
0.32	0.10	-60 to 400/430	<a href="#">ZEM-G015-02-GST</a>
<b>20-Meter</b>			
0.18	0.18	-60 to 400/430	<a href="#">ZFD-G015-08</a>
<b>30-Meter</b>			
0.25	0.10	-60 to 400/430	<a href="#">ZHG-G015-02</a>
0.25	0.25	-60 to 400/430	<a href="#">ZHG-G015-11</a>
0.32	0.10	-60 to 400/430	<a href="#">ZHM-G015-02</a>
0.32	0.25	-60 to 400/430	<a href="#">ZHM-G015-11</a>
0.53	0.15	-60 to 400	<a href="#">ZHK-G015-05</a>
<b>60-Meter</b>			
0.25	0.25	-60 to 400/430	<a href="#">ZKG-G015-11</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](mailto:Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

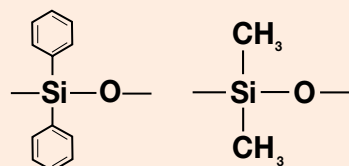
#### Column Profile



\*0.53 mm ID columns are rated to 400 °C.

#### Engineered Self Cross-linking™ (ESC)

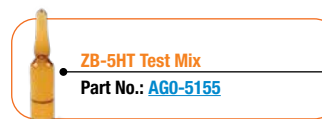
#### Phase Chemistry



5 % Phenyl 95 % Dimethylpolysiloxane

#### Recommended Applications

- Diesel Fuels
- High Boiling Petroleum Products
- High Molecular Weight Waxes
- Hydrocarbons
- Motor Oils
- Polymers/Plastics
- Simulated Distillation
- Surfactants
- Triglycerides



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

## ZB-35HT Inferno™

### High Temperature Stability for Mid-Polarity

- First non-metal, 35% phenyl columns stable to 400 °C
- Longer lifetime with rugged high temperature, polyimide coated, fused silica tubing
- Robust column for high temperature analysis
- Great for high molecular weight compounds
- Eliminate carry-over with high temperature bake outs
- Low activity, provides good peak shape for acidic and basic samples

Upgrade to Zebron from any

35% phenyl / 65% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-35	• Rtx®-35	• BPX35	• MDN-35	• OV-11
• HP-35ms	• Rtx-35ms	• BPX608	• SPB®-35	
• HP-35			• SPB-608	

### Lower Bleed Than Other Columns!

Conditions for all columns:

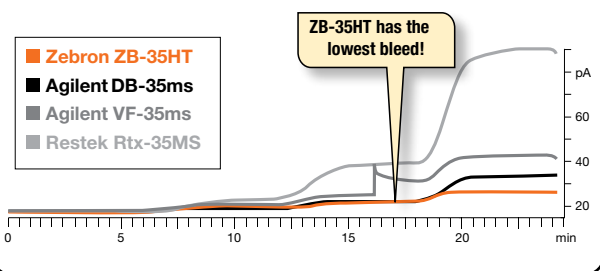
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm

**Injection:** Split 20:1 @ 200 °C, 1 µL

**Carrier Gas:** Helium @ 1.7 mL/min (constant flow)

**Oven Program:** 100 °C to 320 °C @ 30 °C/min for 5 min to 340 °C @ 20 °C/min for 5 min to 360 °C @ 20 °C/min for 5 min to 380 °C @ 20 °C/min for 5 min to 400 °C @ 20 °C/min for 5 min to 100 °C @ 30 °C/min for 8 min

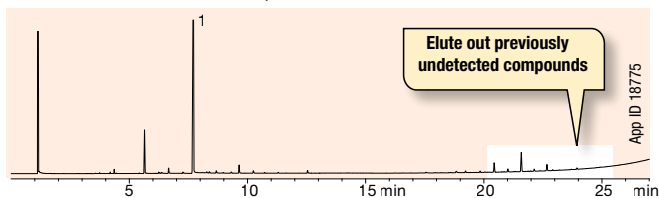
**Detector:** FID @ 405 °C



### See What You've Been Missing

#### A) ZB-35HT Inferno

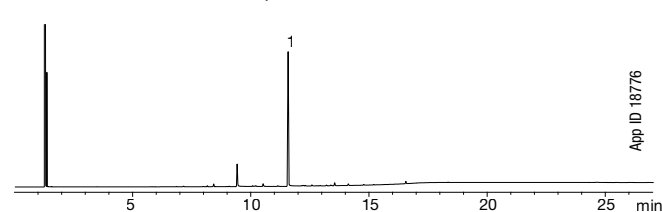
30 meter x 0.25 mm x 0.25 µm



VS.

#### B) Restek Rtx-35

30 meter x 0.25 mm x 1.00 µm



**Column:** As listed

**Dimensions:** As listed

**Part No.:** 7HG-G025-11 (ZB-35HT Inferno)

**Injection:** A) Split 50:1 @ 350 °C, 1 µL

B) Split 50:1 @ 300 °C, 1 µL

**Carrier Gas:** Helium @ 2.1 mL/min (constant flow)

**Oven Program:** A) 140 °C to 400 °C @ 10 °C/min

B) 140 °C to 300 °C @ 10 °C/min

**Detector:** A) FID @ 400 °C

B) FID @ 320 °C

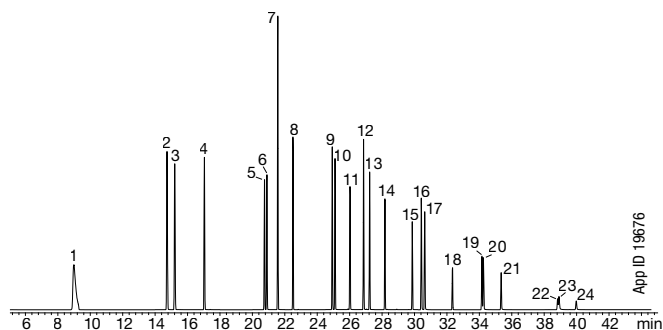
**Sample:** 1. Hexadecylamine

**Note:** Chromatogram is courtesy of Northeastern Chemical Company.

## ZB-35HT Inferno™

### Well-Suited for Environmental Contaminants

#### PAHs and PCBs In A Single Run



**Column:** Zebron ZB-35HT Inferno  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** [7HG-G025-11](#)  
**Injection:** Splitless @ 265 °C, 2 µL  
**Carrier Gas:** Helium @ 1 mL/min (constant flow)  
**Oven Program:** 85 °C for 3 min to 320 °C @ 7 °C /min for 8 min  
**Detector:** MSD @ 280 °C  
**Sample:** Compounds are 5 ppm

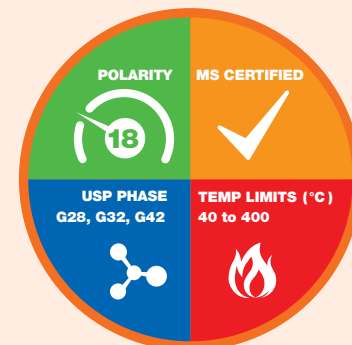
1. Naphthalene	9. PCB 101	17. Chrysene
2. Acenaphthylene	10. Fluoranthene	18. PCB 194
3. Acenaphthene	11. Pyrene	19. Benzo[b]fluoranthene
4. Fluorene	12. PCB 118	20. Benzo[k]fluoranthene
5. Phenanthrene	13. PCB 153	21. Benzo[a]pyrene
6. Anthracene	14. PCB 138	22. Indeno[1,2,3-cd]pyrene
7. PCB 28	15. PCB 180	23. Dibenz[a,h]anthracene
8. PCB 52	16. Benz[a]anthracene	24. Benzo[g,h,i]perylene

#### Ordering Information

Zebron ZB-35HT Inferno GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>15-Meter</b>			
0.25	0.10	40 to 400	<a href="#">7EG-G025-02</a>
0.25	0.25	40 to 400	<a href="#">7EG-G025-11</a>
0.32	0.25	40 to 400	<a href="#">7EM-G025-11</a>
<b>20-Meter</b>			
0.18	0.18	40 to 400	<a href="#">7FD-G025-08</a>
<b>30-Meter</b>			
0.25	0.10	40 to 400	<a href="#">7HG-G025-02</a>
0.25	0.25	40 to 400	<a href="#">7HG-G025-11</a>
0.32	0.25	40 to 400	<a href="#">7HM-G025-11</a>

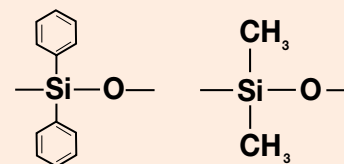
Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](mailto:Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

#### Column Profile



#### Engineered Self Cross-linking™ (ESC)

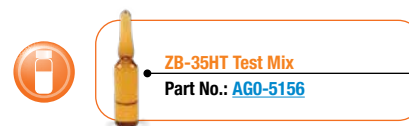
#### Phase Chemistry



35 % Phenyl    65 % Dimethylpolysiloxane

#### Recommended Applications

- Amines
- Chemicals
- Drugs
- EPA Methods (508, 608, 8081, 8141, 8151)
- PCBs / Aroclors
- Pesticides
- Pharmaceuticals
- Steroids



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-XLB-HT Inferno™

### High Temp Stability, Low Bleed

- Rugged, non-metal si-arylene GC column stable to 400 °C
- Robust column for high temperature bake outs and analysis, such as high molecular weight compounds
- Provides unique selectivity for conformational analyses
- Longer lifetime with high temperature, polyimide coated, fused silica tubing
- Low activity, provides good peak shape for acidic and basic samples
- Good tool for general screening to identify unknown samples

Upgrade to Zebron from these similar\* phases:

**Agilent®**

- DB®-XLB
- VF-XMS

**Restek®**

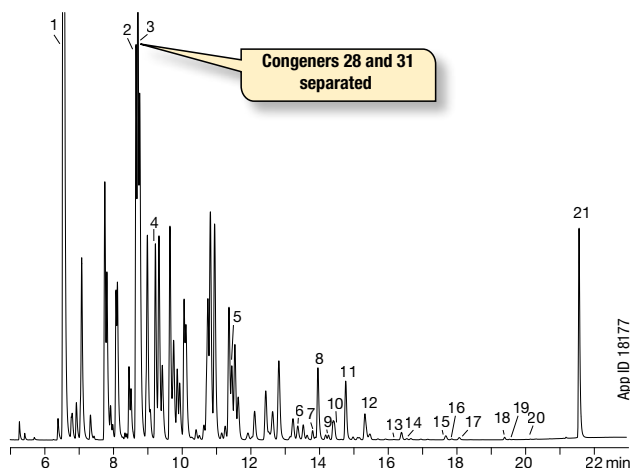
- DB®-XLB

**Supelco®**

- MDN-12

\*not exact equivalent, selectivity may differ

### Aroclor 1242: DIN Method 51527



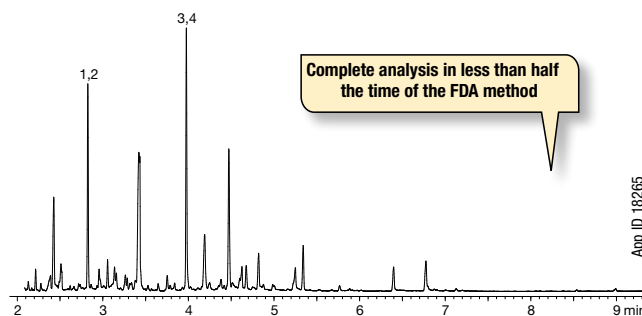
**Column:** Zebron ZB-XLB-HT Inferno  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** 7HG-G024-11  
**Injection:** Split 2:1 @ 250 °C, 1 µL, pressure pulse @ 40 psi for first 0.25 min  
**Carrier Gas:** Helium @ 1.5 mL/min (constant flow)  
**Oven Program:** 50 °C for 0.5 min to 210 °C @ 40 °C/min for 3 min to 230 °C @ 30 °C/min for 5 min to 250 °C @ 30 °C/min for 5 min to 320 °C @ 40 °C/min for 2 min

**Detector:** ECD @ 350 °C

**Sample:** Total concentration of aroclors was 90 ppm in isoctane

- |             |             |
|-------------|-------------|
| 1. TCMX     | 12. BZ# 138 |
| 2. BZ# 31   | 13. BZ# 126 |
| 3. BZ# 28   | 14. BZ# 167 |
| 4. BZ# 52   | 15. BZ# 156 |
| 5. BZ# 101  | 16. BZ# 180 |
| 6. BZ# 77   | 17. BZ# 157 |
| 7. BZ# 123  | 18. BZ# 170 |
| 8. BZ# 118  | 19. BZ# 169 |
| 9. BZ# 153  | 20. BZ# 189 |
| 10. BZ# 114 | 21. DCB     |
| 11. BZ# 105 |             |

### Melamine and Cyanuric Acid by GC-MS

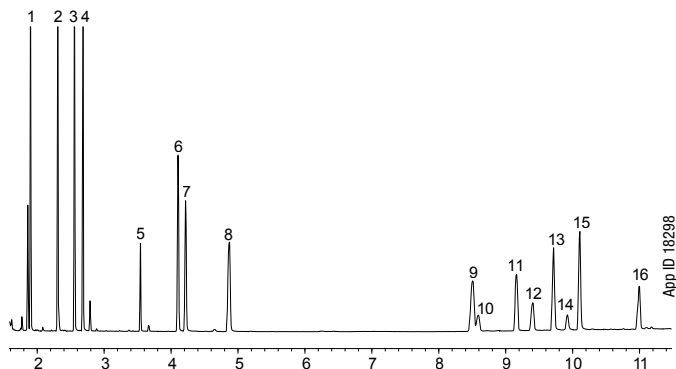


**Column:** Zebron ZB-XLB-HT Inferno  
**Dimensions:** 15 meter x 0.25 mm x 0.25 µm  
**Part No.:** 7EG-G024-11  
**Injection:** On-Column @ 103 °C, 1 µL  
**Carrier Gas:** Helium @ 1.4 mL/min (constant flow)  
**Oven Program:** 100 °C for 0.5 min to 320 °C @ 25 °C/min  
**Detector:** MSD @ 325 °C  
**Sample:** Analytes are 200 ng / 100 µL in BSTFA / Pyridine (1:1)  
 1. Cyanuric Acid 13C3 (IS)  
 2. Cyanuric Acid  
 3. Melamine 13C3 15N3 (IS)  
 4. Melamine

## ZB-XLB-HT Inferno™

### Good Results for Difficult Samples

#### Explosives by GC-MS



**Column:** Zebron ZB-XLB-HT Inferno  
**Dimensions:** 15 meter x 0.25 mm x 0.25 µm  
**Part No.:** [7EG-G024-11](#)  
**Injection:** On-Column @ 73 °C, 0.5 µL  
**Carrier Gas:** Helium @ 1.4 mL/min (constant flow)  
**Oven Program:** 70 °C for 1 min to 140 °C @ 25 °C/min for 4 min to 280 °C @ 25 °C/min  
**Detector:** MSD @ 300 °C, 40-400 amu  
**Sample:** Analytes are 10 ppm in dichloromethane

- |                                 |                                       |
|---------------------------------|---------------------------------------|
| 1. Nitrobenzene                 | 9. 2,4,6-Trinitrotoluene (2,4,6-TNT)  |
| 2. 2-Nitrotoluene               | 10. PETN                              |
| 3. 3-Nitrotoluene               | 11. 1,3,5-Trinitrobenzene (1,3,5-TNB) |
| 4. 4-Nitrotoluene               | 12. RDX                               |
| 5. Nitroglycerin                | 13. 4-Amino-2,6-dinitrotoluene        |
| 6. 2,6-Dinitrotoluene (2,6-DNT) | 14. 3,5-Nitroaniline                  |
| 7. 1,3-Dinitrobenzene (1,3-DNB) | 15. 2-Amino-4,6-dinitrotoluene        |
| 8. 2,4-Dinitrotoluene           | 16. Tetryl                            |

#### Ordering Information

Zebron ZB-XLB-HT Inferno GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>15-Meter</b>			
0.25	0.10	30 to 400	<a href="#">7EG-G024-02</a>
0.25	0.25	30 to 400	<a href="#">7EG-G024-11</a>
0.32	0.10	30 to 400	<a href="#">7EM-G024-02</a>
<b>20-Meter</b>			
0.18	0.18	30 to 400	<a href="#">7FD-G024-08</a>
<b>30-Meter</b>			
0.25	0.10	30 to 400	<a href="#">7HG-G024-02</a>
0.25	0.25	30 to 400	<a href="#">7HG-G024-11</a>
0.32	0.25	30 to 400	<a href="#">7HM-G024-11</a>
<b>60-Meter</b>			
0.25	0.25	30 to 400	<a href="#">7KG-G024-11</a>

Note: If you need a 5 in. cage, contact Technical support via [TechnicalSupport@phenomenex.com](mailto:TechnicalSupport@phenomenex.com) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

**Column Profile**

**Engineered Self Cross-linking™ (ESC)**

**Phase Chemistry**

- Proprietary

**Recommended Applications**

- Herbicides / Insecticides
- PCBs
- Pesticides
- Unknown Samples

**ZB-XLB-HT Test Mix**

Part No.: [AGO-7578](#)

Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.



## ZB-1

### Low Polarity for Versatile Applications

- Low polarity phase suited for true boiling point compounds
- Low bleed (MS Certified), low activity, and high efficiency
- Excellent resolving power of critical pairs in complex petrochemical samples
- Used for “fingerprinting” and routine quality control analyses

Upgrade to Zebron from any 100% dimethylpolysiloxane phase:

#### Agilent®

- DB®-1
- DB-2887
- DB-1 EVDX
- HP-1
- HP-101
- HP-PONA
- Ultra 1
- CP-Sil 5 CB

#### Restek®

- Rtx®-1
- Rtx-1PONA
- Rtx-1 F&F

#### SGE®

- BP1
- BP1-PONA
- BPX1-SimD

#### Supelco®

- SPB®-1
- SPB-1 TG
- SE-30
- MET-1
- SPB-1 Sulfur
- SPB-HAP

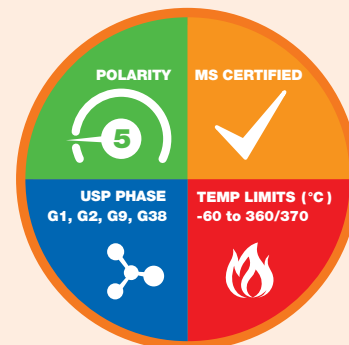
### Ordering Information

#### Zebron ZB-1 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>10-Meter</b>			
0.53	2.65	-60 to 340/360	<a href="#">7CK-G001-35</a>
<b>15-Meter</b>			
0.25	0.10	-60 to 360/370	<a href="#">7EG-G001-02</a>
0.25	0.25	-60 to 360/370	<a href="#">7EG-G001-11</a>
0.25	1.00	-60 to 340/360	<a href="#">7EG-G001-22</a>
0.32	0.25	-60 to 360/370	<a href="#">7EM-G001-11</a>
0.32	1.00	-60 to 340/360	<a href="#">7EM-G001-22</a>
0.53	0.15	-60 to 360/370	<a href="#">7EK-G001-05</a>
0.53	0.50	-60 to 360/370	<a href="#">7EK-G001-17</a>
0.53	1.50	-60 to 340/360	<a href="#">7EK-G001-28</a>
<b>30-Meter</b>			
0.25	0.10	-60 to 360/370	<a href="#">7HG-G001-02</a>
0.25	0.25	-60 to 360/370	<a href="#">7HG-G001-11</a>
0.25	0.50	-60 to 360/370	<a href="#">7HG-G001-17</a>
0.25	1.00	-60 to 340/360	<a href="#">7HG-G001-22</a>
0.32	0.25	-60 to 360/370	<a href="#">7HM-G001-11</a>
0.32	0.50	-60 to 360/370	<a href="#">7HM-G001-17</a>
0.32	1.00	-60 to 340/360	<a href="#">7HM-G001-22</a>
0.32	3.00	-60 to 340/360	<a href="#">7HM-G001-36</a>
0.32	5.00	-60 to 340/360	<a href="#">7HM-G001-39</a>
0.53	0.50	-60 to 360/370	<a href="#">7HK-G001-17</a>
0.53	1.50	-60 to 340/360	<a href="#">7HK-G001-28</a>
0.53	3.00	-60 to 340/360	<a href="#">7HK-G001-36</a>
0.53	5.00	-60 to 340/360	<a href="#">7HK-G001-39</a>
<b>50-Meter</b>			
0.25	0.50	-60 to 360/370	<a href="#">7JG-G001-17</a>
<b>60-Meter</b>			
0.25	0.25	-60 to 360/370	<a href="#">7KG-G001-11</a>
0.25	1.00	-60 to 340/360	<a href="#">7KG-G001-22</a>
0.32	0.25	-60 to 360/370	<a href="#">7KM-G001-11</a>
0.32	1.00	-60 to 340/360	<a href="#">7KM-G001-22</a>
0.32	3.00	-60 to 340/360	<a href="#">7KM-G001-36</a>
0.53	1.50	-60 to 340/360	<a href="#">7KK-G001-28</a>
<b>100-Meter</b>			
0.25	0.50	-60 to 360/370	<a href="#">7MG-G001-17</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](http://Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

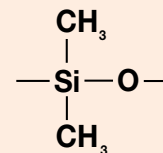
### Column Profile



\*Thicker films (≥ 1.0 µm) are rated to 340/360 °C.

### Engineered Self Cross-linking™ (ESC)

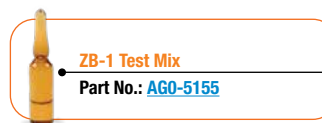
#### Phase Chemistry



100% Dimethylpolysiloxane

#### Recommended Applications

- Ethanol
- Hydrocarbons
- Mercaptans
- MTBE
- Natural Gas Odorants
- Oxygenates and GROs
- Solvent Impurities
- Sulfur Compounds (Light)



ZB-1 Test Mix

Part No.: [AGO-5155](#)



Zebron GC Columns MS Certification, see p. 437



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-5

### Low Polarity For A Wide Application Range

- Rugged, versatile low polarity column for general lab purpose
- Resilient to dirty samples—long column life
- Low bleed (MS Certified) especially suited to high sensitivity work using GC-MS
- Extremely inert for active compounds such as drugs or pesticides
- Great column for unknown samples

Upgrade to Zebron from any 5% phenyl / 95% dimethylpolysiloxane phase:

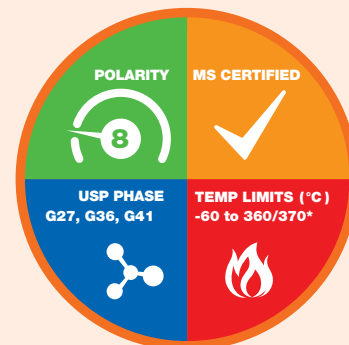
Agilent®	Restek®	SGE®	Supelco®	OV®
<ul style="list-style-type: none"> <li>• DB®-5</li> <li>• HP-5</li> <li>• HP-PAS-5</li> <li>• CP-Sil 8 CB</li> <li>• Ultra 2</li> </ul>	<ul style="list-style-type: none"> <li>• Rtx®-5</li> </ul>	<ul style="list-style-type: none"> <li>• BP5</li> <li>• BPX5</li> </ul>	<ul style="list-style-type: none"> <li>• MDN-5</li> <li>• SPB®-5</li> <li>• PTE-5</li> <li>• SE-54</li> <li>• PTA-5</li> <li>• Equity®-5</li> <li>• Sac-5</li> </ul>	<ul style="list-style-type: none"> <li>• OV-5</li> </ul>

### Ordering Information

Zebron ZB-5 GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>15-Meter</b>			
0.25	0.10	-60 to 360/370	<a href="#">7EG-G002-02</a>
0.25	0.25	-60 to 360/370	<a href="#">7EG-G002-11</a>
0.25	0.50	-60 to 360/370	<a href="#">7EG-G002-17</a>
0.25	1.00	-60 to 340/360	<a href="#">7EG-G002-22</a>
0.32	0.10	-60 to 360/370	<a href="#">7EM-G002-02</a>
0.32	0.25	-60 to 360/370	<a href="#">7EM-G002-11</a>
0.32	1.00	-60 to 340/360	<a href="#">7EM-G002-22</a>
0.53	0.50	-60 to 360/370	<a href="#">7EK-G002-17</a>
0.53	1.50	-60 to 340/360	<a href="#">7EK-G002-28</a>
0.53	3.00	-60 to 340/360	<a href="#">7EK-G002-36</a>
<b>20-Meter</b>			
0.18	0.18	-60 to 360/370	<a href="#">7FD-G002-08</a>
<b>30-Meter</b>			
0.25	0.10	-60 to 360/370	<a href="#">7HG-G002-02</a>
0.25	0.25	-60 to 360/370	<a href="#">7HG-G002-11</a>
0.25	0.50	-60 to 360/370	<a href="#">7HG-G002-17</a>
0.25	1.00	-60 to 340/360	<a href="#">7HG-G002-22</a>
0.32	0.25	-60 to 360/370	<a href="#">7HM-G002-11</a>
0.32	0.50	-60 to 360/370	<a href="#">7HM-G002-17</a>
0.32	1.00	-60 to 340/360	<a href="#">7HM-G002-22</a>
0.53	0.50	-60 to 360/370	<a href="#">7HK-G002-17</a>
0.53	1.50	-60 to 340/360	<a href="#">7HK-G002-28</a>
0.53	3.00	-60 to 340/360	<a href="#">7HK-G002-36</a>
0.53	5.00	-60 to 340/360	<a href="#">7HK-G002-39</a>
<b>60-Meter</b>			
0.25	0.10	-60 to 360/370	<a href="#">7KG-G002-02</a>
0.25	0.25	-60 to 360/370	<a href="#">7KG-G002-11</a>
0.25	0.50	-60 to 360/370	<a href="#">7KG-G002-17</a>
0.25	1.00	-60 to 340/360	<a href="#">7KG-G002-22</a>
0.32	0.25	-60 to 360/370	<a href="#">7KM-G002-11</a>
0.32	1.00	-60 to 340/360	<a href="#">7KM-G002-22</a>
0.53	1.50	-60 to 340/360	<a href="#">7KK-G002-28</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](mailto:Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

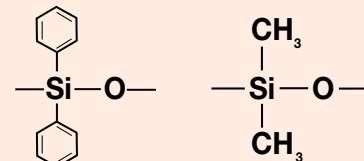
### Column Profile



\*Thicker films (≥ 1.0 µm) are rated to 340/360 °C.

### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry



5 % Phenyl 95 % Dimethylpolysiloxane

#### Recommended Applications

- Alkaloids
- Dioxins
- Drugs
- Essential Oils
- Flavors
- FAMES
- Halo-Hydrocarbons
- Herbicides
- PCBs / Aroclors
- Pesticides
- Phenols
- Residual Solvents



- ➔ For ultra low bleed, consider using a ZB-5ms, see p. 154
- ➔ For high temperature analysis, consider using a ZB-5HT, see p. 146

- ℹ Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

- ⚠ Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-5ms

### Robust Results, Versatile Performance

- Popular rugged column for general purpose use
- Fully conditioned within 35 minutes
- High response for acids and bases
- Enhanced resolution of polyaromatic hydrocarbons (PAHs) and other multi-ring aromatic compounds

Upgrade to Zebron from any 5% phenyl-arylene / 95% dimethylpolysiloxane phase:

#### Agilent®

- DB®-5ms
- DB-5.625
- DB-5ms EVDX
- CP-Sil 8 CB MS
- VF-5ms

#### Restek®

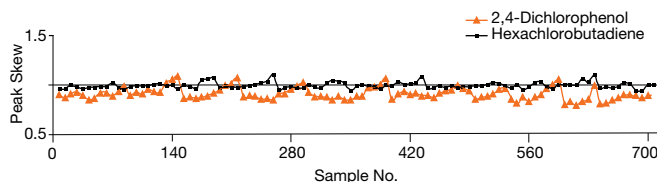
- Rtx®-5Sil MS
- Rxi®-5Sil MS

#### Supelco®

- SLB®-5ms

### Long Lifetime

Consistent response after more than 700 samples at pH 2!



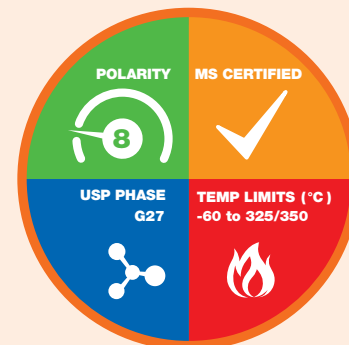
#### Ordering Information

##### Zebron ZB-5ms GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
<b>10-Meter</b>			
0.10	0.10	-60 to 325/350	<a href="#">7CB-G010-02</a>
0.18	0.18	-60 to 325/350	<a href="#">7CD-G010-08</a>
<b>12-Meter</b>			
0.20	0.33	-60 to 325/350	<a href="#">7DE-G010-14</a>
<b>15-Meter</b>			
0.25	0.25	-60 to 325/350	<a href="#">7EG-G010-11</a>
<b>20-Meter</b>			
0.18	0.18	-60 to 325/350	<a href="#">7FD-G010-08</a>
0.18	0.32	-60 to 325/350	<a href="#">7FD-G010-51</a>
0.18	0.36	-60 to 325/350	<a href="#">7FD-G010-53</a>
<b>25-Meter</b>			
0.20	0.33	-60 to 325/350	<a href="#">7GE-G010-14</a>
<b>30-Meter</b>			
0.25	0.25	-60 to 325/350	<a href="#">7HG-G010-11</a>
0.25	0.50	-60 to 325/350	<a href="#">7HG-G010-17</a>
0.25	1.00	-60 to 325/350	<a href="#">7HG-G010-22</a>
0.32	0.25	-60 to 325/350	<a href="#">7HM-G010-11</a>
0.32	0.50	-60 to 325/350	<a href="#">7HM-G010-17</a>
0.32	1.00	-60 to 325/350	<a href="#">7HM-G010-22</a>
<b>60-Meter</b>			
0.25	0.10	-60 to 325/350	<a href="#">7KG-G010-02</a>
0.25	0.25	-60 to 325/350	<a href="#">7KG-G010-11</a>
0.32	0.25	-60 to 325/350	<a href="#">7KM-G010-11</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](http://Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

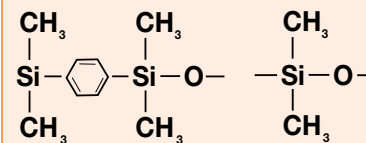
#### Column Profile



#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry

5 % Phenyl-Arylene



95 % Dimethylpolysiloxane

#### Recommended Applications

- Acids
- Alkaloids
- Amines
- Dioxins
- Drugs
- Essential Oils
- Flavors
- FAMES
- Halo-hydrocarbons
- Herbicides
- PCBs/Aroclors
- Pesticides
- Phenols
- Residual Solvents
- Solvent Impurities



**ZB-5ms Test Mix**  
Part No.: [AGO-7578](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-35

### Intermediate Polarity for GC-MS

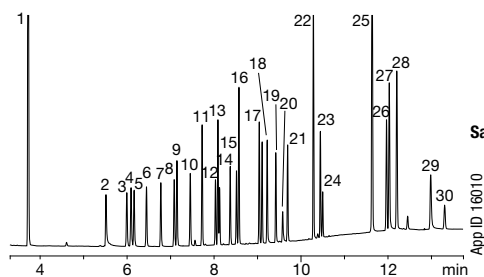
- Intermediate polarity column with temperature limits up to 360 °C allows high molecular weight analysis
- Excellent inertness to minimize analyte adsorption, improve efficiency, and reproducibility
- More rugged (longer column life) than other polar phases
- Excellent for trace analysis with bleed-sensitive detectors (MS, FID, ECD, NPD)

#### Upgrade to Zebron from any

35 % phenyl / 65 % dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-35	• Rtx®-35	• BPX35	• MDN-35	• OV-11
• DB-35ms	• Rtx-35ms	• BPX608	• SPB®-35	
• HP-35			• SPB-608	
• HP-35ms				

#### Common Drug Screen by GC-FID



**Sample:** All analytes are 25 ppm except nicotine at 100 ppm

- |                    |                      |
|--------------------|----------------------|
| 1. Nicotine        | 16. Caffeine         |
| 2. Ibuprofen       | 17. Chlorpheniramine |
| 3. Allobarbitol    | 18. Methapyrilene    |
| 4. Acetaminophen   | 19. Phenobarbital    |
| 5. Aprobital       | 20. Procaine         |
| 6. Butalbitol      | 21. Brompheniramine  |
| 7. Amobarbital     | 22. Chlorcyclizine   |
| 8. Pentobarbital   | 23. Cocaine          |
| 9. Phenacetin      | 24. Benactyzine      |
| 10. Secobarbital   | 25. Codeine          |
| 11. Benzphetamine  | 26. Diazepam         |
| 12. Meprobamate    | 27. Morphine         |
| 13. Dimenhydrinate | 28. Hydrocodone      |
| 14. Hexobarbital   | 29. Oxymorphone      |
| 15. Doxylamine     | 30. Heroin           |

**Column:** Zebron ZB-35  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** [7HG-G003-11](#)  
**Injection:** Split 10:1 @ 225 °C, 1.5 µL  
**Carrier Gas:** Helium @ 1.4 mL/min (constant flow)  
**Oven Program:** 120 °C to 180 °C @ 25 °C/min to 200 °C @ 6 °C/min to 300 °C @ 20 °C/min for 3 min  
**Detector:** FID @ 300 °C

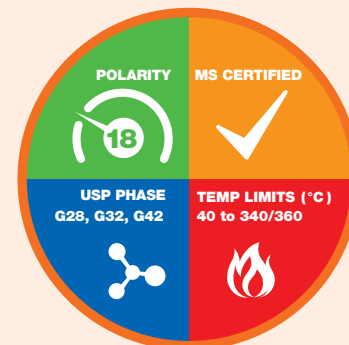
#### Ordering Information

##### Zebron ZB-35 GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>10-Meter</b>			
0.10	0.10	40 to 340/360	<a href="#">7CB-G003-02</a>
<b>15-Meter</b>			
0.25	0.25	40 to 340/360	<a href="#">7EG-G003-11</a>
0.25	0.50	40 to 340/360	<a href="#">7EG-G003-17</a>
0.53	1.00	40 to 340/360	<a href="#">7EK-G003-22</a>
<b>30-Meter</b>			
0.25	0.25	40 to 340/360	<a href="#">7HG-G003-11</a>
0.25	0.50	40 to 340/360	<a href="#">7HG-G003-17</a>
0.32	0.25	40 to 340/360	<a href="#">7HM-G003-11</a>
0.32	0.50	40 to 340/360	<a href="#">7HM-G003-17</a>
0.53	0.50	40 to 340/360	<a href="#">7HK-G003-17</a>
0.53	1.00	40 to 340/360	<a href="#">7HK-G003-22</a>
<b>60-Meter</b>			
0.25	0.25	40 to 340/360	<a href="#">7KG-G003-11</a>
0.32	0.25	40 to 340/360	<a href="#">7KM-G003-11</a>

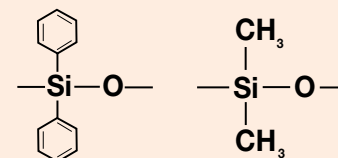
Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](mailto:Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

#### Column Profile



#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry



35 % Phenyl 65 % Dimethylpolysiloxane

#### Recommended Applications

- Amines
- Drugs
- EPA Methods (508, 608, 8081, 8141, 8151)
- PCBs / Aroclors
- Pesticides
- Pharmaceuticals



**ZB-35 Test Mix**  
**Part No.:** [AGO-5156](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-50

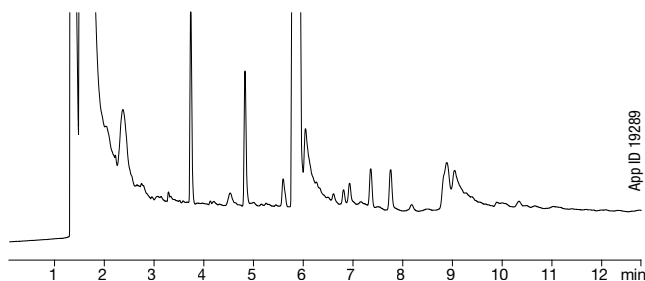
### Robust Results, Rugged Performance

- High polarity column with temperature limits up to 340 °C allows high temperature bake out to remove contaminants
- Excellent inertness to minimize analyte adsorption, improve efficiency, and reproducibility
- More rugged (longer column life) than other polar phases
- Excellent for trace analysis with bleed-sensitive detectors
- Great for drug screening and environmental compounds

Upgrade to Zebron from any 50% phenyl / 50% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®
<ul style="list-style-type: none"> <li>• DB®-17</li> <li>• DB-17ht</li> <li>• DB-17ms</li> <li>• DB-17 EVDX</li> </ul>	<ul style="list-style-type: none"> <li>• Rtx®-50</li> </ul>	<ul style="list-style-type: none"> <li>• BPX50</li> </ul>	<ul style="list-style-type: none"> <li>• SP®-2250</li> <li>• SPB®-17</li> <li>• SPB-50</li> </ul>

### Antihistamine by GC-FID



**Column:** Zebron ZB-50  
**Dimensions:** 30 meter x 0.32 mm x 0.50 µm  
**Part No.:** [7HM-G004-17](#)  
**Injection:** Split 20:1 @ 250 °C, 1 µL  
**Carrier Gas:** Helium @ 40 cm/sec (constant flow)  
**Oven Program:** 190 °C to 260 °C @ 25 °C/min for 10 min  
**Detector:** FID @ 270 °C  
**Sample:** Brompheniramine

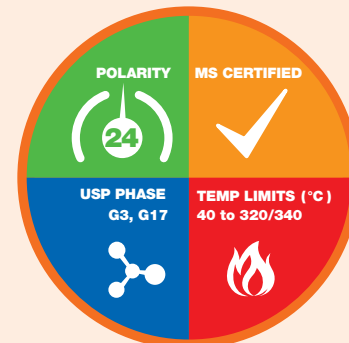
### Ordering Information

#### Zebron ZB-50 GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
<b>10-Meter</b>			
0.10	0.10	40 to 320/340	<a href="#">7CB-G004-02</a>
0.53	2.00	40 to 320/340	<a href="#">7CK-G004-32</a>
<b>15-Meter</b>			
0.25	0.15	40 to 320/340	<a href="#">7EG-G004-05</a>
0.25	0.25	40 to 320/340	<a href="#">7EG-G004-11</a>
0.32	0.25	40 to 320/340	<a href="#">7EM-G004-11</a>
0.32	0.50	40 to 320/340	<a href="#">7EM-G004-17</a>
0.53	1.00	40 to 320/340	<a href="#">7EK-G004-22</a>
<b>30-Meter</b>			
0.25	0.25	40 to 320/340	<a href="#">7HG-G004-11</a>
0.25	0.50	40 to 320/340	<a href="#">7HG-G004-17</a>
0.32	0.25	40 to 320/340	<a href="#">7HM-G004-11</a>
0.32	0.50	40 to 320/340	<a href="#">7HM-G004-17</a>
0.53	1.00	40 to 320/340	<a href="#">7HK-G004-22</a>
<b>60-Meter</b>			
0.25	0.25	40 to 320/340	<a href="#">7KG-G004-11</a>
0.25	0.50	40 to 320/340	<a href="#">7KG-G004-17</a>

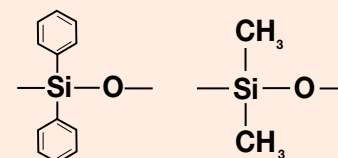
Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](http://Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

### Column Profile



Engineered Self Cross-linking™ (ESC)

### Phase Chemistry



50 % Phenyl      50 % Dimethylpolysiloxane

### Recommended Applications

- Antidepressants
- Cholesterols
- Drugs of Abuse
- EPA Methods (508, 608, 8081, 8141, 8151)
- Glycols
- Herbicides
- Pesticides
- Steroids
- Triglycerides



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.



## ZB-624

### Robust Results for VOCs and Residual Solvents

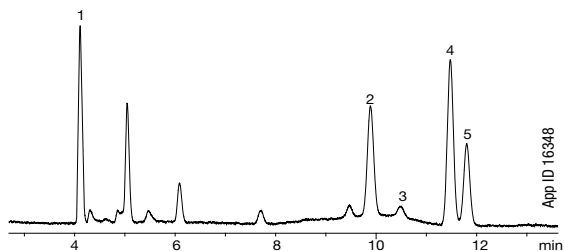
- Widely used phase to separate volatile organic flavor and fragrance additives and residual solvents in industrial or pharmaceutical products (OVIs)
- Popular choice for residual solvent testing
- Excellent for US EPA Methods 501.3, 502.2, 503.1, 524.2, 601, 602, 624, 8010, 8015, 8020, 8021, 8240, 8260
- Specifically designed for the separation of volatile organic compounds (VOCs)
- Increased temperature limit speeds run times and re-equilibration

Upgrade to Zebron from any 6% cyanopropylphenyl / 94% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-624	• Rtx®-624	• BPX624	• SPB®-624	• OV-624
• DB-1301	• Rtx-1301		• SPB-1301	
• DB-VRX	• Rtx-VMS			
• HP-VOC				
• CP-1301				
• CP-Select 624 CB				

### Good Performance for Pharmaceuticals

#### USP <467> Residual Solvents Procedure A – Class 1



**Column:** Zebron ZB-624  
**Dimensions:** 30 meter x 0.32 mm x 1.80 µm  
**Part No.:** [7HM-G005-31](#)  
**Injection:** Split 5:1 @ 140 °C, 1 mL  
**Carrier Gas:** Helium @ 35 cm/sec (constant flow)  
**Oven Program:** 40 °C for 20 min to 240 °C @ 10 °C/min for 20 min  
**Detector:** FID @ 250 °C

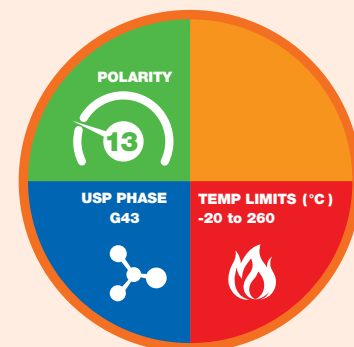
**Sample:** 1. 1,1-Dichloroethene  
 2. 1,1,1-Trichloroethane  
 3. Carbon tetrachloride  
 4. Benzene  
 5. 1,2-Dichloroethane

#### Ordering Information

Zebron ZB-624 GC Columns			
ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>20-Meter</b>			
0.18	1.00	-20 to 260	<a href="#">7FD-G005-22</a>
<b>30-Meter</b>			
0.25	1.40	-20 to 260	<a href="#">7HG-G005-27</a>
0.32	1.80	-20 to 260	<a href="#">7HM-G005-31</a>
0.53	3.00	-20 to 260	<a href="#">7HK-G005-36</a>
<b>60-Meter</b>			
0.25	1.40	-20 to 260	<a href="#">7KG-G005-27</a>
0.32	1.80	-20 to 260	<a href="#">7KM-G005-31</a>
0.53	3.00	-20 to 260	<a href="#">7KK-G005-36</a>
<b>75-Meter</b>			
0.53	3.00	-20 to 260	<a href="#">7LK-G005-36</a>
<b>105-Meter</b>			
0.53	3.00	-20 to 260	<a href="#">7NK-G005-36</a>

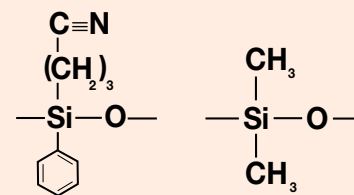
Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](http://Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

#### Column Profile



#### Phase Chemistry

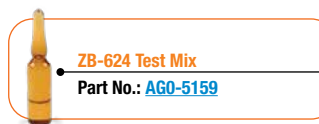
6% Cyanopropylphenyl



94% Dimethylpolysiloxane

#### Recommended Applications

- Pharmaceuticals
- Residual Solvents
- Volatile Organic Compounds (VOCs)
- EPA Methods (501.3, 502.2, 503.1, 524.2, 601, 602, 624, 8010, 8015, 8020, 8021, 8240, 8260)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-1701

### Alternate Selectivity for Mid-Polarity Analyses

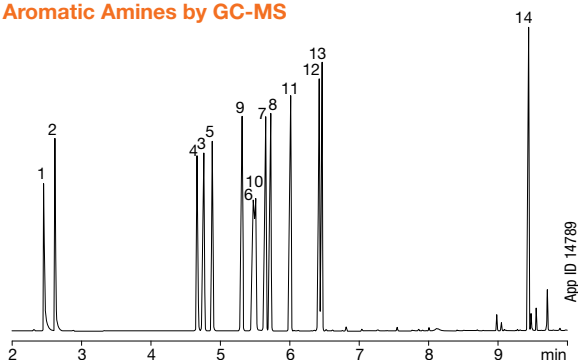
- Fast run and re-equilibration times for enhanced sample throughput and productivity
- Provides alternate selectivity to phenyl phases with similar polarity

Upgrade to Zebron from any 14% cyanopropylphenyl / 86% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-1701	• Rtx®-1701	• BP10	• SPB®-1701	• OV-1701
• CP-Sil 19 CB	• Rtx-VMS		• Equity®-1701	

### Good Peak Shape for Active Analytes

#### Aromatic Amines by GC-MS



**Column:** Zebron ZB-1701  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** [7HG-G006-11](#)  
**Injection:** Split 15:1 @ 220 °C, 1 µL  
**Carrier Gas:** Helium @ 1.0 mL/min (constant flow)  
**Oven Program:** 60 °C for 1 min to 110 °C @ 30 °C/min to 135 °C @ 9 °C/min to 260 °C @ 30 °C/min for 2 min  
**Detector:** MSD @ 180 °C  
**Sample:** Analytes are at 1.58 mg/mL each

1. Piperidine	8. o-Toluidine
2. 2-Methylpiperidine	9. N,N-Dimethylaniline
3. Aniline	10. β-Phenylethylamine
4. Benzylamine	11. N-Ethylaniline
5. α-Phenylethylamine	12. 2,4-Dimethylaniline
6. N-Methylaniline	13. N,N-Diethylaniline
7. m-Toluidine	14. Dibenzylamine

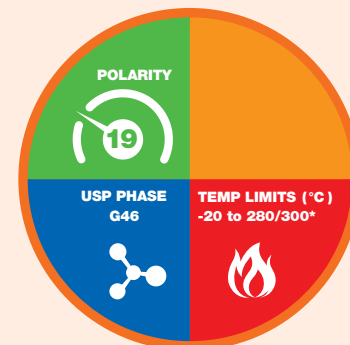
#### Ordering Information

##### Zebron ZB-1701 GC Columns

ID (mm)	df (µm)	Temp. Limits °C	Part No.
<b>15-Meter</b>			
0.25	0.25	-20 to 280/300	<a href="#">7EG-G006-11</a>
0.32	0.25	-20 to 280/300	<a href="#">7EM-G006-11</a>
<b>30-Meter</b>			
0.25	0.25	-20 to 280/300	<a href="#">7HG-G006-11</a>
0.25	1.00	-20 to 260/280	<a href="#">7HG-G006-22</a>
0.32	0.25	-20 to 280/300	<a href="#">7HM-G006-11</a>
0.32	1.00	-20 to 260/280	<a href="#">7HM-G006-22</a>
0.53	1.00	-20 to 260/280	<a href="#">7HK-G006-22</a>
<b>60-Meter</b>			
0.25	0.25	-20 to 280/300	<a href="#">7KG-G006-11</a>
0.32	0.25	-20 to 280/300	<a href="#">7KM-G006-11</a>

Note: If you need a 5 in. cage, contact Technical support via [TechnicalSupport@phenomenex.com](mailto:TechnicalSupport@phenomenex.com) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

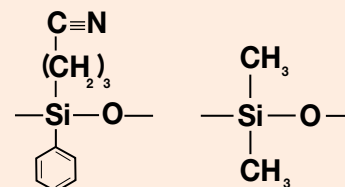
#### Column Profile



\*Thicker films (≥ 1.0 µm) are rated to 260/280 °C.

#### Phase Chemistry

14% Cyanopropylphenyl



86% Dimethylpolysiloxane

#### Recommended Applications

- Alcohols
- Amines
- Aromatic Hydrocarbons
- Drugs
- Esters
- PAHs
- PCBs
- Pharmaceutical Intermediates
- Phenols
- Solvents
- Steroids
- TMS Sugars
- Tranquilizers



**ZB-1701 Test Mix**  
**Part No.:** [AGO-5156](#)



For enhanced response to Endrin and DDT, consider using [ZB-1701P](#), See p. 159  
 Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-1701P

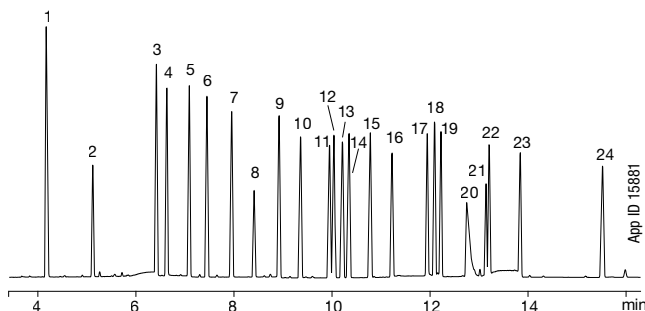
### Enhanced Response for DDT and Endrin

- Specially tested to ensure response of DDT, Endrin, Endrin Aldehyde, and Endrin Ketone
- Fast run and re-equilibration times for enhanced sample throughput and productivity
- Guaranteed column for pesticide analysis

Upgrade to Zebron from any 14% cyanopropylphenyl / 86% dimethylpolysiloxane phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
• DB®-1701	• Rtx®-1701	• BP10	• SPB®-1701	• OV-1701
• DB-1701P	• Rtx-VMS		• Equity®-1701	
• CP-Sil 19 CB				

### Chlorinated Pesticides by GC-ECD: EPA Method 8081



**Column:** Zebron ZB-1701P  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Part No.:** 7HG-G012-11  
**Injection:** Splitless @ 240 °C, 1 µL  
**Carrier Gas:** Helium @ 1.6 mL/min (constant flow)  
**Oven Program:** 100 °C to 200 °C @ 25 °C/min to 240 °C @ 6 °C/min to 265 °C @ 20 °C/min for 5 min  
**Detector:** ECD @ 300 °C  
**Sample:** All compounds are 20 ppm

1. 1-Bromo-2-Nitrobenzene (IS)	9. δ-BHC	17. DDD
2. Tetrachloro-m-xylene (Surr)	10. Heptachlor Epoxide	18. Endosulfan II
3. α-BHC	11. Endosulfan I	19. DDT
4. Pentachloronitrobenzene (IS)	12. γ-Chlordane	20. Endrin Aldehyde
5. γ-BHC (Lindane)	13. α-Chlordane	21. Methoxychlor
6. Heptachlor	14. DDE	22. Endosulfan Sulfate
7. Aldrin	15. Dieldrin	23. Endrin Ketone
8. β-BHC	16. Endrin	24. Decachlorobiphenyl (Surr)

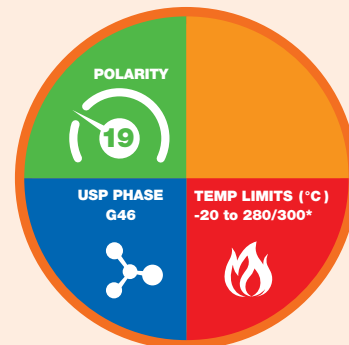
### Ordering Information

#### Zebron ZB-1701P GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>30-Meter</b>			
0.25	0.25	-20 to 280/300	<a href="#">7HG-G012-11</a>
0.32	0.25	-20 to 280/300	<a href="#">7HM-G012-11</a>
0.53	1.00	-20 to 260/280	<a href="#">7HK-G012-22</a>

Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](mailto:Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

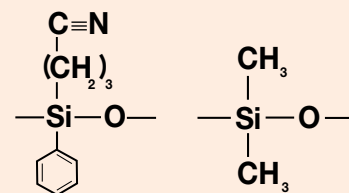
### Column Profile



\*Thicker films (≥ 1.0 µm) are rated to 260/280 °C.

### Phase Chemistry

14 % Cyanopropylphenyl



86 % Dimethylpolysiloxane

### Recommended Applications

- Nitrogen Containing Pesticides
- Organochlorine Pesticides
- Organophosphorous Pesticides
- PCBs / Aroclors



**ZB-1701 Test Mix**  
**Part No.:** [AGO-5156](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-WAX

### PEG Versatility for Solvents, Acids, and Amines

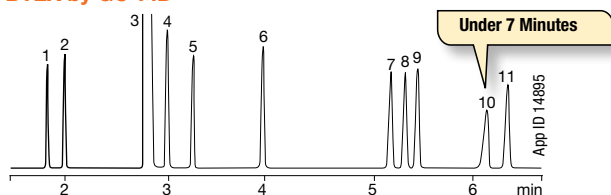
- High polarity column with low bleed (MS certified) for improved results
- Highly stable, long lifetime
- Low activity for amines
- Bonded, solvent rinsible
- Excellent chromatography of polar complex mixtures
- Widely used for profiling and “fingerprinting”

Upgrade to Zebron from any polyethylene glycol phase:

Agilent®	Restek®	SGE®	Supelco®
<ul style="list-style-type: none"> <li>• DB®-WAXetr</li> <li>• HP-INNOWax</li> <li>• CP-Wax 57 CB</li> </ul>	<ul style="list-style-type: none"> <li>• Rtx®-WAX</li> <li>• Famewax</li> <li>• Stabilwax®-DB</li> </ul>	<ul style="list-style-type: none"> <li>• SolGel-WAX™</li> </ul>	<ul style="list-style-type: none"> <li>• Met-Wax</li> <li>• Omegawax</li> </ul>

### Performs for Industrial Chemicals

#### BTEX by GC-FID



**Column:** Zebron ZB-WAX  
**Dimensions:** 30 meter x 0.32 mm x 0.50 µm  
**Part No.:** [7HM-G007-17](#)  
**Injection:** Split 20:1 @ 250 °C, 0.2 µL  
**Carrier Gas:** Helium @ 2 mL/min (constant flow)  
**Oven Program:** 60 °C to 75 °C @ 15 °C/min to 90 °C @ 3 °C/min (hold 3 min)  
**Detector:** FID @ 300 °C

**Sample:**

1. Pentane	7. Ethylbenzene
2. Heptane	8. p-Xylene
3. Solvent (methylene chloride)	9. m-Xylene
4. Benzene	10. Dodecane
5. Decane	11. o-Xylene
6. Toluene	

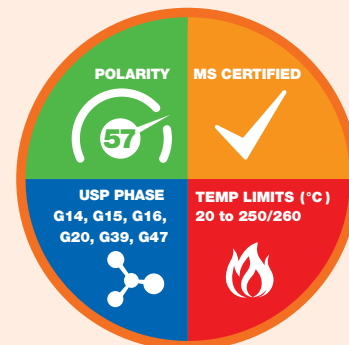
#### Ordering Information

##### Zebron ZB-WAX GC Columns

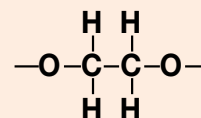
ID (mm)	df (µm)	Temp. Limits °C	Part No.
<b>10-Meter</b>			
0.10	0.10	20 to 250/260	<a href="#">7CB-G007-02</a>
<b>15-Meter</b>			
0.25	0.25	20 to 250/260	<a href="#">7EG-G007-11</a>
0.32	0.25	20 to 250/260	<a href="#">7EM-G007-11</a>
0.32	0.50	20 to 250/260	<a href="#">7EM-G007-17</a>
0.53	1.00	20 to 250/260	<a href="#">7EK-G007-22</a>
<b>20-Meter</b>			
0.18	0.18	20 to 250/260	<a href="#">7FD-G007-08</a>
<b>30-Meter</b>			
0.25	0.15	20 to 250/260	<a href="#">7HG-G007-05</a>
0.25	0.25	20 to 250/260	<a href="#">7HG-G007-11</a>
0.25	0.50	20 to 250/260	<a href="#">7HG-G007-17</a>
0.25	1.00	20 to 250/260	<a href="#">7HG-G007-22</a>
0.32	0.15	20 to 250/260	<a href="#">7HM-G007-05</a>
0.32	0.25	20 to 250/260	<a href="#">7HM-G007-11</a>
0.32	0.50	20 to 250/260	<a href="#">7HM-G007-17</a>
0.53	0.50	20 to 250/260	<a href="#">7HK-G007-17</a>
0.53	1.00	20 to 250/260	<a href="#">7HK-G007-22</a>
<b>60-Meter</b>			
0.25	0.15	20 to 250/260	<a href="#">7KG-G007-05</a>
0.25	0.25	20 to 250/260	<a href="#">7KG-G007-11</a>
0.25	0.50	20 to 250/260	<a href="#">7KG-G007-17</a>
0.32	0.25	20 to 250/260	<a href="#">7KM-G007-11</a>
0.32	0.50	20 to 250/260	<a href="#">7KM-G007-17</a>
0.53	1.00	20 to 250/260	<a href="#">7KK-G007-22</a>

Note: If you need a 5 in. cage, contact Technical support via Phenomenex.com/chat or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

#### Column Profile



#### Phase Chemistry



100 % Polyethylene Glycol

#### Recommended Applications

- |                        |                   |
|------------------------|-------------------|
| • Alcohols             | • Glycols         |
| • Aldehydes            | • Pharmaceuticals |
| • Aromatics            | • Solvents        |
| • Basic Compounds      | • Styrene         |
| • Essential Oils       | • Xylene Isomers  |
| • Flavors & Fragrances |                   |



**ZB-WAX Test Mix**  
**Part No.:** [AGO-5158](#)



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

## ZB-FFAP

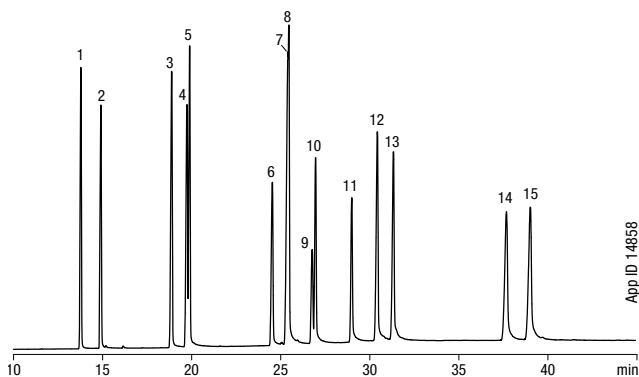
### Improve Resolution for Free Fatty Acids

- High polarity column; excellent thermal and chemical stability
- Provides better peak shape for underivatized acids
- Especially suited for organic acids, free fatty acids, and alcohols
- Bonded, solvent rinsable FFAP phase

Upgrade to Zebron from any nitroterephthalic acid modified polyethylene glycol phase:

Agilent®	Restek®	SGE®	Supelco®	OV®
<ul style="list-style-type: none"> <li>• DB®-FFAP</li> <li>• HP-FFAP</li> <li>• CP-Wax 58 FFAP CB</li> <li>• CP-FFAP CB</li> </ul>	<ul style="list-style-type: none"> <li>• Stabilwax®-DA</li> </ul>	<ul style="list-style-type: none"> <li>• BP21</li> </ul>	<ul style="list-style-type: none"> <li>• Nukol</li> <li>• SPB®-1000</li> </ul>	<ul style="list-style-type: none"> <li>• OV-351</li> </ul>

### Unsaturated Free Fatty Acids by GC-FID



**Column:** Zebron ZB-FFAP  
**Dimensions:** 60 meter x 0.25 mm x 0.25 µm  
**Part No.:** [7KG-G009-11](#)  
**Injection:** Split 40:1 @ 220 °C, 0.2 µL  
**Carrier Gas:** Helium @ 2.4 mL/min (constant flow)  
**Oven Program:** 200 °C to 260 °C @ 2 °C/min for 30 min  
**Detector:** FID @ 250 °C

**Sample:**

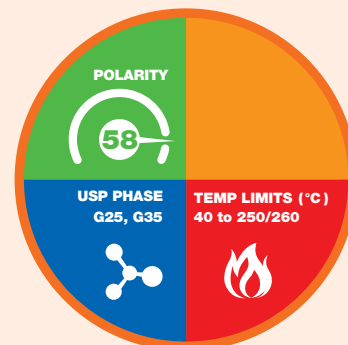
1. Myristic Acid (C14:0)	9. Linolelaidic Acid (C18:2t)
2. Myristoleic Acid (C14:1c)	10. Linoleic Acid (C18:2c)
3. Palmitic Acid (C16:0)	11. Linolenic Acid (C18:3c)
4. Palmitoleic Acid (C16:1t)	12. Arachidic Acid (C20:0)
5. Palmitoleic Acid (C16:1c)	13. Gondoic Acid (C20:1c)
6. Stearic Acid (C18:0)	14. Behenic Acid (C22:0)
7. Elaidic Acid (C18:1t)	15. Erucic Acid (C22:1c)
8. Oleic Acid (C18:1c)	

### Ordering Information

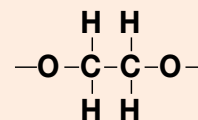
Zebron ZB-FFAP GC Columns			
ID (mm)	df (µm)	Temp. Limits °C	Part No.
<b>15-Meter</b>			
0.25	0.25	40 to 250/260	<a href="#">7EG-G009-11</a>
0.32	0.25	40 to 250/260	<a href="#">7EM-G009-11</a>
0.32	0.50	40 to 250/260	<a href="#">7EM-G009-17</a>
0.53	1.00	40 to 250/260	<a href="#">7EK-G009-22</a>
<b>30-Meter</b>			
0.25	0.25	40 to 250/260	<a href="#">7HG-G009-11</a>
0.32	0.25	40 to 250/260	<a href="#">7HM-G009-11</a>
0.32	0.50	40 to 250/260	<a href="#">7HM-G009-17</a>
0.32	1.00	40 to 250/260	<a href="#">7HM-G009-22</a>
0.53	1.00	40 to 250/260	<a href="#">7HK-G009-22</a>
<b>50-Meter</b>			
0.32	0.50	40 to 250/260	<a href="#">7JM-G009-17</a>
<b>60-Meter</b>			
0.25	0.25	40 to 250/260	<a href="#">7KG-G009-11</a>

Note: If you need a 5 in. cage, contact Technical support via [TechnicalSupport@phenomenex.com](mailto:TechnicalSupport@phenomenex.com) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

### Column Profile



### Phase Chemistry



Nitroterephthalic Acid Modified Polyethylene Glycol

### Recommended Applications

- |                    |                       |
|--------------------|-----------------------|
| • Acrylates        | • Ketones             |
| • Alcohols         | • Organic Acids       |
| • Aldehydes        | • Phenols             |
| • Free Fatty Acids | • Volatile Free Acids |



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.



## ZB-XLB

### Get Extremely Low Bleed

- Unique, low polarity si-arylene column
- Engineered specifically for use with bleed sensitive detectors such as MS
- Provides alternate selectivity to standard 5-type phases
- Often used for confirmation of pesticides, PCBs, or other environmental samples
- Good tool for sample screening to identify unknown contaminants

Upgrade to Zebron from these similar\* phases:

#### Agilent®

- DB®-XLB
- VF-XMS

#### Restek®

- Rtx®-XLB
- Rxi®-XLB

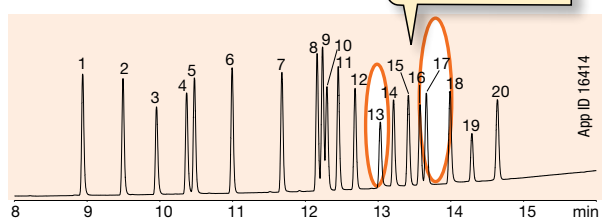
#### Supelco®

- MDN-12

\*not exact equivalent, selectivity may differ

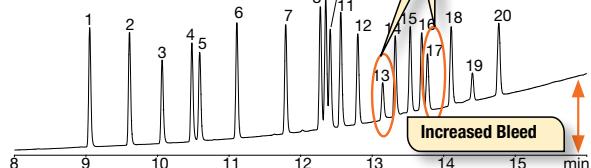
### Better Performance for Chlorinated Pesticides EPA Method 8081A

#### Zebron ZB-XLB



VS.

#### Restek Rxi-XLB



#### Conditions for both columns:

**Columns:** As listed  
**Dimensions:** 30 meter x 0.25 mm x 0.25 µm  
**Injection:** Split 111:1 @ 250 °C, 1.5 µL  
**Carrier Gas:** Helium @ 0.9 mL/min (constant flow)  
**Oven Program:** 110 °C to 320 °C @ 15 °C/min and hold until last peak elutes  
**Detector:** ECD @ 350 °C

**Sample:** 1. α-BHC 11. 4,4'-DDE  
 2. γ-BHC 12. Dieldrin  
 3. β-BHC 13. Endrin  
 4. δ-BHC 14. 4,4'-DDD  
 5. Heptachlor 15. Endosulfan II  
 6. Aldrin 16. Endrin aldehyde  
 7. Heptachlor epoxide 17. 4,4'-DDT  
 8. γ-Chlordane 18. Endosulfan sulfate  
 9. α-Chlordane 19. Methoxychlor  
 10. Endosulfan I 20. Endrin ketone

Comparative separations may not be representative of all applications.

#### Ordering Information

##### Zebron ZB-XLB GC Columns

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>10-Meter</b>			
0.18	0.18	30 to 340/360	<a href="#">7CD-G019-08</a>
<b>15-Meter</b>			
0.25	0.25	30 to 340/360	<a href="#">7EG-G019-11</a>
<b>20-Meter</b>			
0.18	0.18	30 to 340/360	<a href="#">7FD-G019-08</a>

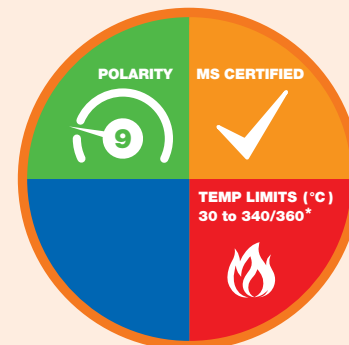
Note: If you need a 5 in. cage, contact Technical support via [Phenomenex.com/chat](mailto:Phenomenex.com/chat) or simply reach out to your Technical consultant. Conditions may apply. Agilent 6850, some SRI and process GC systems use only 5 in. cages.

#### Ordering Information

##### Zebron ZB-XLB GC Columns (cont'd)

ID(mm)	df(µm)	Temp. Limits °C	Part No.
<b>30-Meter</b>			
0.25	0.25	30 to 340/360	<a href="#">7HG-G019-11</a>
0.25	0.50	30 to 340/360	<a href="#">7HG-G019-17</a>
0.32	0.25	30 to 340/360	<a href="#">7HM-G019-11</a>
0.32	0.50	30 to 340/360	<a href="#">7HM-G019-17</a>
0.53	1.50	30 to 320/340	<a href="#">7HK-G019-28</a>
<b>60-Meter</b>			
0.25	0.25	30 to 340/360	<a href="#">7KG-G019-11</a>

#### Column Profile



\*Thicker films (≥ 1.0 µm) are rated to 320/340 °C.

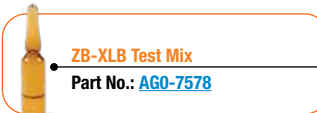
#### Engineered Self Cross-linking™ (ESC)

#### Phase Chemistry

- Proprietary

#### Recommended Applications

- Herbicides / Insecticides
- PCBs
- Pesticides
- Unknown Samples



Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.



Extend column lifetime. Add a Z-Guard™ to your next Zebron GC order.

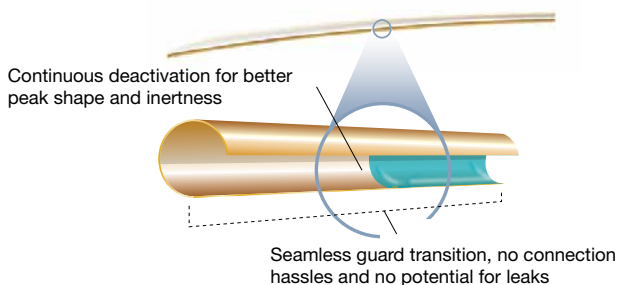
## Guardian Integrated Guard Columns

### Built-In Column Protection: No Leaks, No Worries!

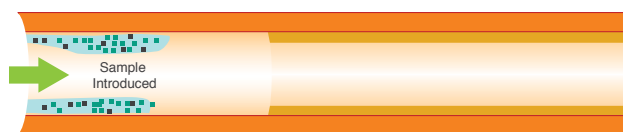
#### Why Choose Zebron With Guardian?

Guardian columns have the 2 m, 5 m or 10 m guard built directly into the analytical column in one continuous length of tubing. Unlike traditional guard columns, which are known to be difficult to seal and prone to leaking after normal column maintenance, the Guardian system provides the same inert column protection, but eliminates the possibility of leaks.

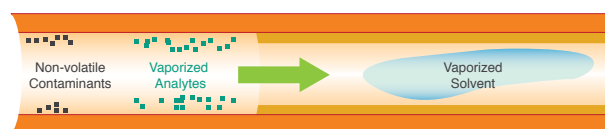
- Eliminate the potential for leaks
- Extend column life
- Improve analyte focusing for low boiling compounds
- Aggressively tested to ensure deactivation



#### How It Works



The sample is introduced onto the Guardian section of the column.



As temperature increases (oven ramp program), the sample is vaporized and moves unretained through the Guardian section of the column. Non-volatile contaminants are deposited on the Guardian section, better preserving the stationary phase and making it easier to trim contaminants off the front of the column.



When the analytes reach the stationary phase (analytical portion of the column), they are refocused, resulting in a narrower initial peak width. This can help improve resolution.

#### Ordering Information

##### Guardian: Integrated Guard Columns

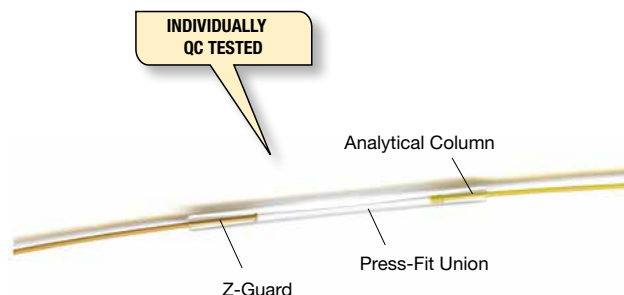
Zebron GC Column Phase	Dimensions	2m Guardian Part No.	5m Guardian Part No.	10m Guardian Part No.
ZB-1PLUS™	15 meter x 0.25 mm x 0.25 µm	—	—	7EG-G031-11-GGC
ZB-1PLUS	30 meter x 0.25 mm x 0.25 µm	—	7HG-G031-11-GGA	7HG-G031-11-GGC
ZB-1HT Inferno™	30 meter x 0.25 mm x 0.10 µm	—	7HG-G014-02-GGA	—
ZB-5ms	15 meter x 0.25 mm x 0.25 µm	—	—	7EG-G010-11-GGC
ZB-5ms	30 meter x 0.25 mm x 0.25 µm	—	7HG-G010-11-GGA	7HG-G010-11-GGC
ZB-5ms	30 meter x 0.25 mm x 0.50 µm	—	7HG-G010-17-GGA	7HG-G010-17-GGC
ZB-5ms	30 meter x 0.32 mm x 0.25 µm	—	7HM-G010-11-GGA	—
ZB-5ms	30 meter x 0.32 mm x 1.00 µm	—	7HM-G010-22-GGA	—
ZB-5MSPLUS™	30 meter x 0.25 mm x 0.25 µm	—	7HG-G030-11-GGA	7HG-G030-11-GGC
ZB-5MSPLUS	30 meter x 0.25 mm x 0.50 µm	—	—	7HG-G030-17-GGC
ZB-5	30 meter x 0.25 mm x 0.25 µm	—	7HG-G002-11-GGA	7HG-G002-11-GGC
ZB-5	30 meter x 0.25 mm x 0.50 µm	—	7HG-G002-17-GGA	7HG-G002-17-GGC
ZB-5	60 meter x 0.25 mm x 0.25 µm	—	7KG-G002-11-GGA	—
ZB-5HT Inferno	30 meter x 0.25 mm x 0.10 µm	—	7HG-G015-02-GGA	—
ZB-5HT Inferno	30 meter x 0.25 mm x 0.25 µm	—	7HG-G015-11-GGA	—
ZB-5PLUS™	20 meter x 0.18 mm x 0.18 µm	—	7FD-G032-08-GGA	—
ZB-5PLUS	30 meter x 0.25 mm x 0.10 µm	—	7HG-G032-02-GGA	—
ZB-5PLUS	30 meter x 0.25 mm x 0.25 µm	—	7HG-G032-11-GGA	—
ZB-50	10 meter x 0.18 mm x 0.18 µm	7CD-G004-08-GGT	—	—
ZB-MultiResidue™-1	30 meter x 0.25 mm x 0.25 µm	—	—	7HG-G016-11-GGC
ZB-SemiVolatiles	30 meter x 0.25 mm x 0.25 µm	—	7HG-G027-11-GGA	7HG-G027-11-GGC
ZB-Dioxin	60 meter x 0.25 mm x 0.20 µm	—	7KG-G045-10-GGA	—

## Z-Guard™ Columns

### Protect and Extend Column Lifetime

- Individually QC tested to ensure the highest level of quality
- Extend column lifetime by preventing stationary phase damage
- Improve separation and peak shapes (especially early elutors)
- Improve sensitivity and accuracy of quantitative results
- Available as individual guard columns or as complete kits with connectors

To ensure that all Z-Guards are the highest possible quality, we individually test each one! The columns are attached to a reference Zebron ZB-5 column and are tested using our specially designed QC mix. We carefully monitor activity, bleed, and stability. This way, we are able to say with confidence that Z-Guards will provide the low activity and high quality your methods require.



#### Ordering Information

Metal Z-Guard Column			
ID (mm)	Description	Part No.	
5-Meter			
0.53	Guard Column	<a href="#">7AK-G000-00-GMO</a>	

High Temperature Z-Guard Columns and Kits			
ID (mm)	Description	Part No.	
		5-Meter	10-Meter
0.25	Guard Column	<a href="#">7AG-G000-00-GHO</a>	<a href="#">7CG-G000-00-GHO</a>
	Guard Column Kit	<a href="#">7AG-G000-00-GHK</a>	<a href="#">7CG-G000-00-GHK</a>
0.32	Guard Column	<a href="#">7AM-G000-00-GHO</a>	<a href="#">7CM-G000-00-GHO</a>
	Guard Column Kit	<a href="#">7AM-G000-00-GHK</a>	<a href="#">7CM-G000-00-GHK</a>
0.53	Guard Column	<a href="#">7AK-G000-00-GHO</a>	<a href="#">7CK-G000-00-GHO</a>
	Guard Column Kit	<a href="#">7AK-G000-00-GHK</a>	<a href="#">7CK-G000-00-GHK</a>

Standard Z-Guard Columns and Kits			
ID (mm)	Description	Part No.	
		5-Meter	10-Meter
0.10	Guard Column	<a href="#">7AB-G000-00-GZO</a>	<a href="#">7CB-G000-00-GZO</a>
	Guard Column Kit	<a href="#">7AB-G000-00-GZK</a>	—
0.18	Guard Column	<a href="#">7AD-G000-00-GZO</a>	<a href="#">7CD-G000-00-GZO</a>
	Guard Column Kit	<a href="#">7AD-G000-00-GZK</a>	<a href="#">7CD-G000-00-GZK</a>
0.20	Guard Column	<a href="#">7AE-G000-00-GZO</a>	—
0.25	Guard Column	<a href="#">7AG-G000-00-GZO</a>	<a href="#">7CG-G000-00-GZO</a>
	Guard Column Kit	<a href="#">7AG-G000-00-GZK</a>	<a href="#">7CG-G000-00-GZK</a>
0.32	Guard Column	<a href="#">7AM-G000-00-GZO</a>	<a href="#">7CM-G000-00-GZO</a>
	Guard Column Kit	<a href="#">7AM-G000-00-GZK</a>	<a href="#">7CM-G000-00-GZK</a>
0.53	Guard Column	<a href="#">7AK-G000-00-GZO</a>	<a href="#">7CK-G000-00-GZO</a>
	Guard Column Kit	<a href="#">7AK-G000-00-GZK</a>	<a href="#">7CK-G000-00-GZK</a>

Bulk Z-Guard Columns			
ID (mm)	Description	Part No.	Unit
50-Meter			
0.25	Guard Column	<a href="#">7JG-G000-00-GZO</a>	ea
0.32	Guard Column	<a href="#">7JM-G000-00-GZO</a>	ea
0.53	Guard Column	<a href="#">7JK-G000-00-GZO</a>	ea
5-Meter			
0.53	Guard Column	<a href="#">7AK-G000-00-GZ1</a>	10/pk

ZB-5 Z-Guard Column Multi-Pak			
ID (mm)	Description	Part No.	Unit
2-Meter			
0.25	Zebron ZB-5 Z-Guard Column	<a href="#">KG0-7868</a>	25/pk

**i** Universal GC Guard Column. Designed for use with virtually any GC Capillary column from virtually any manufacturer. Alternative to: Restek, Supelco, Agilent Technologies, and many more.

**i** Z-Guard Column Kits include 5 or 10 meters of deactivated fused silica tubing, 5 universal connectors and 0.5 mL of high-temperature polyimide resin.

Replacement Parts for Z-Guard Kits		
Description	Part No.	Unit
Universal Capillary Column Union, Borosilicate	<a href="#">AG0-4716</a>	5/pk
High Temperature Polyimide Resin, 0.5 mL	<a href="#">AG0-8514</a>	ea

# GC Accessories

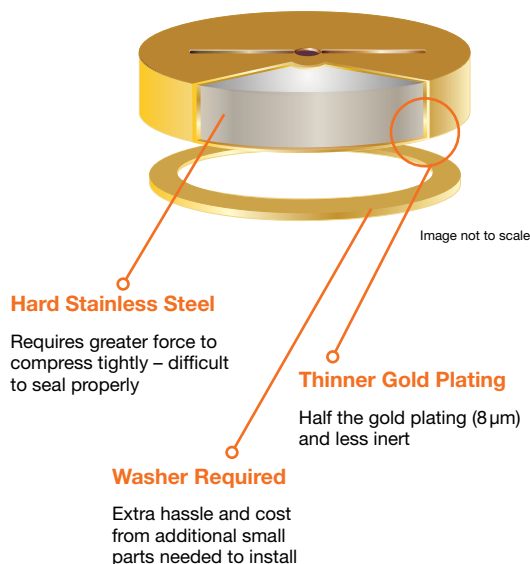
## Inlet Base Seals

Easy Seals™ Compatible with Agilent® GC Systems

### Phenomenex Easy Seals



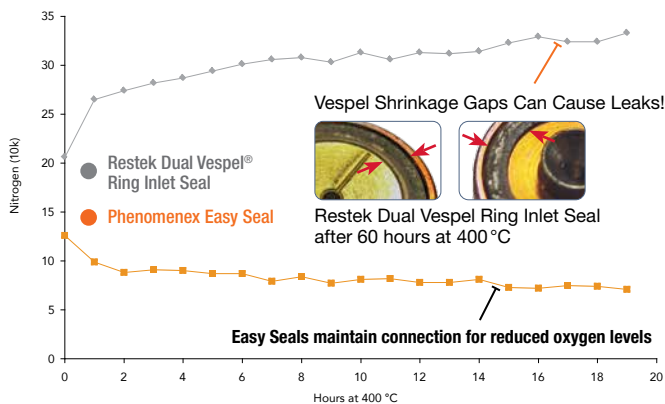
### Traditional Gold Plated Seals



## The Oxygen Test: 20 Hours at 400 °C

Easy Seals are designed to create leak-tight connections that reduce the amount of oxygen entering the GC system, even up to 400 °C! Our testing showed that the Easy Seal maintained a good connection while the Restek® Dual Vespel® Ring Inlet Seal showed increasing levels of oxygen in the system – increased potential for contamination!

Test Conditions: Both inlet base seals were new and unused prior to testing. Seals were installed in an Agilent 6890 Series instrument with a 5973 MS with a Zebtron ZB-5ms GC column (15 meter x 0.25 mm x 0.25 µm). An initial air and water check was performed upon installation to ensure there was no error in installation. The inlet temperature was set to 400 °C and counts of oxygen were measured over time.



### Ordering Information

#### Easy Seals Inlet Base Seals

Description	Injection Type	Groove Style	Inlet Hole Diameter (mm)	2/pk	10/pk
				Part No.	Part No.
Easy Seals Gold Inlet Seal	Splitless	Single	0.8	<a href="#">AGO-8619</a>	<a href="#">AGO-8620</a>



# GC Accessories

## Inlet Base Seals (cont'd)

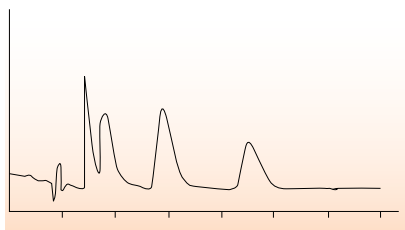
### Standard Inlet Base Seals & Washers

- Prevent leaks and reduce oxygen damage
- Trap non-volatile residues, septum fragments, and other contaminants
- Gold plated Easy Seals™ provide the best performance, inertness, and ease of use

An inert flow path through the entire GC system is critical to achieving the best results for your analysis – and that includes the seal at the base of the inlet! Leaks can allow air into the system and cause oxygen contamination, leading to:

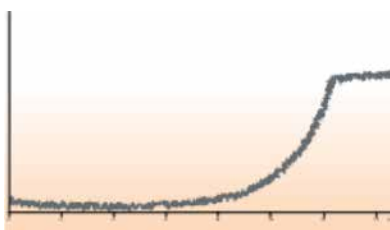
#### Difficult Quantitation

Stationary phase damage can distort peak shape



#### Low Sensitivity

Excessive bleed can lower signal-to-noise






#### Expensive Column Replacement

Oxygen damage is irreversible and can only be fixed by replacing your column



#### Ordering Information

##### Standard Inlet Base Seals

					2/pk		10/pk	
Description	Injection Type	Groove Style	Inlet Hole Diameter (mm)	Similar to Mfr No.*	Part No.	Similar to Mfr No.*	Part No.	
Standard Gold Inlet Seal		Splitless	Single	0.8	18740-20885	<a href="#">AG0-7518</a>	18740-20885	<a href="#">AG0-7519</a>
		Splitless	Single	1.2	21305	<a href="#">AG0-8581</a>	21306	<a href="#">AG0-8582</a>
		Split	Cross	0.8	5182-9652	<a href="#">AG0-7520</a>	5182-9652	<a href="#">AG0-7521</a>
		Split	Cross	1.2	21009	<a href="#">AG0-8583</a>	21010	<a href="#">AG0-8584</a>
Standard Stainless Steel Inlet Seal		Splitless	Single	0.8	18740-20880	<a href="#">AG0-8393</a>	18740-20880	<a href="#">AG0-8394</a>
		Split	Cross	0.8	—	<a href="#">AG0-8395</a>	—	<a href="#">AG0-8396</a>

#### Ordering Information

##### Standard Inlet Base Seal Replacement Washers

		12/pk
Description	Similar to Mfr No.*	Part No.
Standard Gold Inlet Seal Washer	—	<a href="#">AG0-8397</a>
Stainless Steel Inlet Seal Washer	5061-5869	<a href="#">AG0-7522</a>



Due to different replacement frequencies, inlet seal washers are sold separately from inlet base seals.



\*Similar to but not always an exact equivalent to the original manufacturer's product.



For Sealing O-Rings, see p. 171



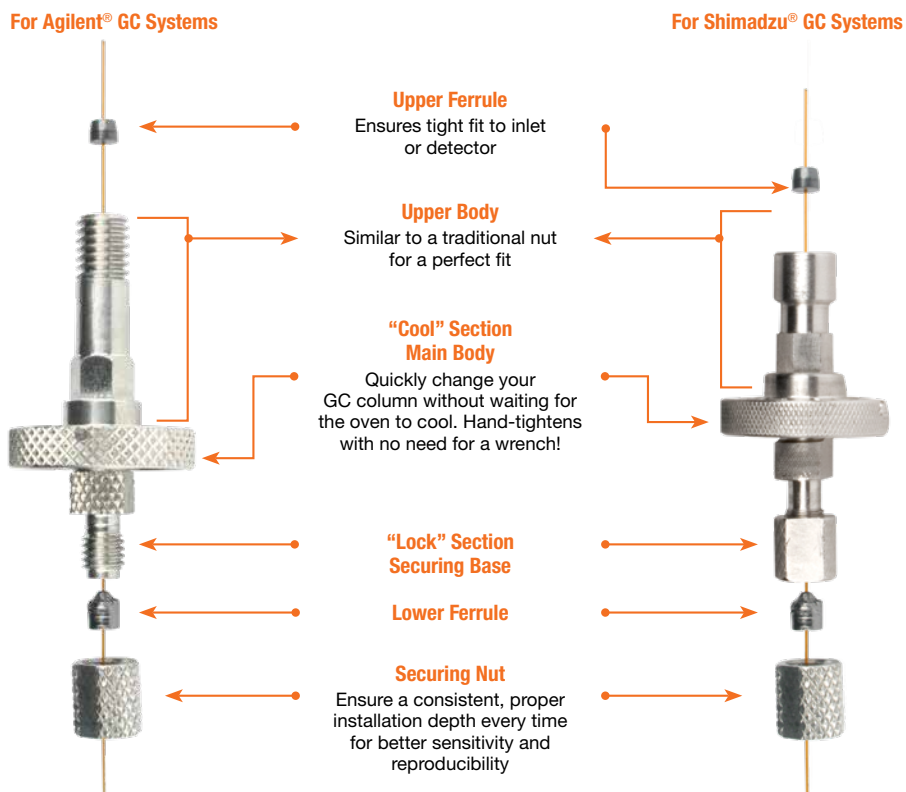
# GC Accessories

## Installation Nuts

### Cool-Lock™ Nut

U.S. Patent No. 8, 062, 516

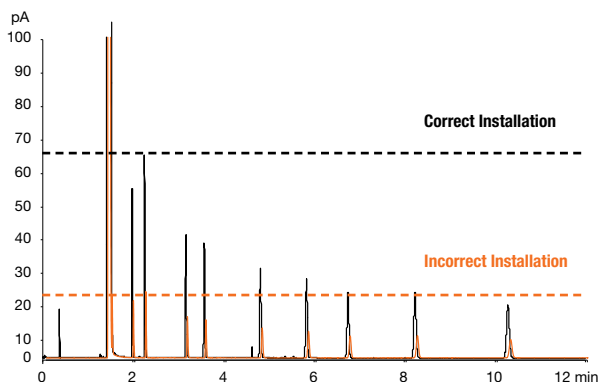
### Fast GC Column Installation Without The Burn



### Consistent, Accurate Installation Every Time

The red trace below is installed at 2mm, rather than the manufacturer's recommended 6mm past the column on the injector side of the system. Correct installation noticeably increases sensitivity for all peaks; Cool-Lock Nut allows for locking of the proper insertion depth every time to improve run-to-run response reproducibility.

#### Correct Installation = 165% Better Signal



#### Conditions for both chromatograms:

- Column:** Zebron ZB-WAX
- Dimensions:** 30 meter x 0.25 mm x 0.25  $\mu$ m
- Part No.:** 7HG-G007-11
- Injection:** Split 1:100 @ 250 °C, 1.4  $\mu$ L
- Carrier Gas:** Helium @ 40 cm/sec (constant flow)
- Oven Program:** 140 °C for 10 minutes
- Detector:** FID @ 250 °C
- Sample:**
  - 1. 2-Octanone
  - 2. Tetradecane
  - 3. 1-Octanol
  - 4. Methyl decanoate
  - 5. Methyl undecanoate
  - 6. 1-Decanol
  - 7. Methyl dodecanoate
  - 8. 2,6-Dimethylaniline
  - 9. 2,6-Dimethylphenol

# GC Accessories





## Installation Nuts (cont'd)

### Cool-Lock™ Nut Selection Guide

Shimadzu® Systems	Agilent® Systems			
<b>1 Use Part No.</b>	<b>1 Decide On The Style of Cool-Lock Nut Needed</b>		<b>2 Determine How Many Cool-Lock Nuts Needed Per System</b>	
<a href="#">AGO-8419</a>	<b>Short Style (AGO-8319)</b> Recommended for use with standard short style ferrules.  Also, use for both the inlet and detector configurations on Agilent 6890, 5890, and 7890 GC systems	<b>Long Style (AGO-8320)</b> Recommend for use with standard long style ferrules.	<b>Detector</b> MS	<b>Number of Nuts</b> 1
			FID, ECD, Other	2

### Ordering Information

#### Cool-Lock Installation Nuts and Gauges

Description	Fits Model No.	For Use With Ferrule Style	Part No.	Unit	
<b>For Agilent Systems</b>					
Cool-Lock Installation Nut		Short (1.65 mm)	<a href="#">AGO-8319</a>	ea	
		Long (2.4 mm)	<a href="#">AGO-8320</a>	ea	
Cool-Lock Installation Gauge		5850, 5890, 6850, 6890, 7890	—	<a href="#">AGO-8349</a>	ea
<b>For Shimadzu Systems</b>					
Cool-Lock Installation Nut		2010, 2014, 2025	—	<a href="#">AGO-8419</a>	ea
Cool-Lock Installation Gauge		2010, 2014, 2025	—	<a href="#">AGO-8420</a>	ea




For Ferrule Selection Guide for Cool-Lock Nuts, see p. 169



### Ordering Information

#### Standard Installation Nut

Description	Similar to Mfr No.*	For Use With Ferrule Style	Part No.	Unit	
<b>For GC-MS Systems</b>					
Brass Installation Nut, Nickel Plated	—	—	<a href="#">AGO-9076</a>	5/pk	
<b>For Other Systems</b>					
Agilent Installation Nut, Standard (1/16 in. Hex Stainless Steel)		5181-8830	Short (1.65 mm)	<a href="#">AGO-5152</a>	2/pk
Agilent Installation Nut, Deep Well (1/16 in. Hex Stainless Steel)		5020-8292	Long (2.4 mm)	<a href="#">AGO-5153</a>	2/pk

\* Similar to but not always an exact equivalent to the original manufacturer's product.



**Caution:** For safety, please use common sense when handling metal surfaces within the GC oven, including the Cool-Lock Nut. The Cool-Lock Nut is designed to track the GC oven temperature as close as possible, therefore, when you cool down your GC oven, the Cool-Lock Nut will follow suit because it is related to oven temperature with the fan on. So if the oven is hot enough to cause severe burns, the Cool-Lock Nut will also be hot enough to cause severe burns. If the GC oven fan has turned off and the injection port temperature is still hot, the Cool-Lock Nut will begin to heat up causing it to be too hot to touch with the bare hand. For any questions regarding use of the Cool-Lock Nut, please contact your local Phenomenex representative.

# GC Accessories

## Ferrules

### Ferrule Selection Guide by Material

Material	Advantage	Disadvantage	Recommended for
100% Graphite	<ul style="list-style-type: none"> <li>Easy to use</li> <li>Tight, stable seal</li> <li>Rated to 450 °C</li> </ul>	<ul style="list-style-type: none"> <li>Porous to oxygen</li> <li>Not for MS or other oxygen sensitive detectors</li> <li>Easily deformed</li> <li>Potential to contaminate system</li> </ul>	<ul style="list-style-type: none"> <li>General use</li> <li>FID and NPD</li> <li>High temperature analysis</li> <li>Cool on-column</li> </ul>
85/15% Vespel®/Graphite	<ul style="list-style-type: none"> <li>Durable for long lifetime</li> <li>Not porous to oxygen</li> <li>Rated to 350 °C</li> </ul>	<ul style="list-style-type: none"> <li>Non-reusable</li> <li>Need to re-tighten frequently</li> <li>Flows at high temperatures</li> </ul>	<ul style="list-style-type: none"> <li>Good for MS or other oxygen sensitive detectors</li> <li>Most leak free</li> </ul>
60/40% Vespel/Graphite	<ul style="list-style-type: none"> <li>Easier to use than 85/15</li> <li>Not porous to oxygen</li> <li>Rated to 400 °C</li> </ul>	<ul style="list-style-type: none"> <li>Non-reusable</li> <li>Easier to deform than 85/15</li> </ul>	<ul style="list-style-type: none"> <li>Good for MS or other oxygen sensitive detectors</li> <li>Best balance between tight seal and ease of use</li> </ul>
SilTite™	<ul style="list-style-type: none"> <li>No need to re-tighten</li> <li>Reliable seal</li> <li>No contamination</li> <li>Rated &gt; 450 °C</li> </ul>	<ul style="list-style-type: none"> <li>Easily deforms</li> </ul>	<ul style="list-style-type: none"> <li>High temperature MS analysis</li> </ul>

### Ferrule Selection Guide by Length

Length	Advantage	Disadvantage	Recommended for
Short	<ul style="list-style-type: none"> <li>Robust seal</li> </ul>	<ul style="list-style-type: none"> <li>Not recommended for MS detector connection</li> </ul>	<ul style="list-style-type: none"> <li>Standard detectors and inlet</li> </ul>
Long	<ul style="list-style-type: none"> <li>Good nut and interface design</li> </ul>	<ul style="list-style-type: none"> <li>Not recommended for inlet connection</li> </ul>	<ul style="list-style-type: none"> <li>MS detector connection</li> </ul>

### Ferrule Selection Guide for Cool-Lock™ Nuts

Column ID (mm)	Ferrule ID (mm)	Agilent Systems				Shimadzu Systems	
		Long Style Nut		Short Style Nut		Top Ferrule	Bottom Ferrule
		Top Ferrule	Bottom Ferrule	Top Ferrule	Bottom Ferrule		
0.10-0.25	0.4	<a href="#">AGO-4698</a>	<a href="#">AGO-4698</a>	<a href="#">AGO-8929</a>	<a href="#">AGO-4698</a>	<a href="#">AGO-8881</a>	<a href="#">AGO-4698</a>
0.28-0.35	0.5	<a href="#">AGO-4701</a>	<a href="#">AGO-4701</a>	<a href="#">AGO-7513</a>	<a href="#">AGO-4701</a>	<a href="#">AGO-8881</a>	<a href="#">AGO-4701</a>
0.45-0.53	0.8	<a href="#">AGO-4704</a>	<a href="#">AGO-4704</a>	<a href="#">AGO-8676</a>	<a href="#">AGO-4704</a>	<a href="#">AGO-8882</a>	<a href="#">AGO-4704</a>



Ferrule ordering information on next page.



All ferrules are 1/16 in. (except SilTite™)  
Preconditioned for lower bleed.








All Vespel containing ferrules should be pre-shrunk  
in an oven at 250 °C for at least 4 hours prior to use.

# GC Accessories

## Ferrules (cont'd)

### Ordering Information

	Composition	GC Column ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Preconditioned	Part No.	Unit	
<b>Short</b> 	<b>100% Graphite</b>	0.10-0.25	0.4	500-2114	N	<a href="#">AGO-8929</a>	10/pk	
		0.28-0.35	0.5	072635 5080-8853	Y	<a href="#">AGO-7513</a>	10/pk	
		0.45-0.53	0.8	072636 500-2118	Y	<a href="#">AGO-8676</a>	10/pk	
	<b>85% Vespel® / 15% Graphite</b>	0.10-0.25	0.4	5181-3323 5181-3322	N Y	<a href="#">AGO-7318</a> <a href="#">AGO-7321</a>	10/pk 10/pk	
		0.28-0.35	0.5	5062-3514 5062-3513	N Y	<a href="#">AGO-7319</a> <a href="#">AGO-7322</a>	10/pk 10/pk	
		0.40-0.53	0.8	5062-3512 5062-3511	N Y	<a href="#">AGO-7320</a> <a href="#">AGO-7323</a>	10/pk 10/pk	
		<b>Long</b> 	0.10-0.25	0.4	20200 20227	N	<a href="#">AGO-4698</a> <a href="#">AGO-4699</a>	10/pk 50/pk
			0.28-0.35	0.5	72635	N	<a href="#">AGO-4701</a> <a href="#">AGO-4702</a>	10/pk 50/pk
			0.45-0.53	0.8	82636	N	<a href="#">AGO-4704</a> <a href="#">AGO-4705</a>	10/pk 50/pk
<b>85% Vespel / 15% Graphite</b>	0.10-0.25	0.4	072663 5062-3508	Y	<a href="#">AGO-8677</a>	10/pk		
	0.28-0.35	0.5	072654 5062-3506	Y	<a href="#">AGO-8678</a>	10/pk		
	0.45-0.53	0.8	072655 5062-3538	Y	<a href="#">AGO-8679</a>	10/pk		
	<b>60% Vespel / 40% Graphite</b>	0.10-0.25	0.4	20211 20229	Y	<a href="#">AGO-4707</a> <a href="#">AGO-4708</a>	10/pk 50/pk	
		0.28-0.35	0.5	20212 20231	Y	<a href="#">AGO-4710</a> <a href="#">AGO-4711</a>	10/pk 50/pk	
		0.45-0.53	0.8	20213 20230	Y	<a href="#">AGO-4713</a> <a href="#">AGO-4714</a>	10/pk 50/pk	
<b>Two Hole</b> 	<b>85% Vespel / 15% Graphite</b>	0.10-0.25	0.4	072662 5062-3580	Y	<a href="#">AGO-8680</a>	10/pk	
		0.28-0.35	0.5	212222 5062-3581	N	<a href="#">AGO-8681**</a>	10/pk	
		0.45-0.53	0.8	072674	Y	<a href="#">AGO-8682**</a>	10/pk	
<b>SilTite</b> 	<b>SilTite™</b>	0.10-0.25	0.4	073220	Y	<a href="#">AGO-8762</a>	10/pk	
		0.28-0.35	0.5	073221	Y	<a href="#">AGO-8757</a>	10/pk	
		0.45-0.53	0.8	073222	Y	<a href="#">AGO-8758</a>	10/pk	
<b>Metal Encapsulated</b> 	<b>100% Graphite for Shimadzu GCs</b>	0.10-0.25	0.4	221-32126-05	Y	<a href="#">AGO-8881</a>	10/pk	
		0.25-0.35	0.5	221-32126-05	Y	<a href="#">AGO-8881</a>	10/pk	
		0.45-0.53	0.8	221-32126-08	Y	<a href="#">AGO-8882</a>	10/pk	

\* Similar to but not always an exact equivalent to the original manufacturer's product.

Note: SilTite ferrules are to be used with SilTite nuts. Please contact your Phenomenex technical consultant or distributor for the appropriate nut and ferrule part numbers for your GC system.



For Replacement Ferrules for Mini-unions, see p. 181



All ferrules are 1/16 in. (except SilTite™) and \*\* ferrules are 1/8 in. Preconditioned ferrules provide lower bleed.






All Vespel containing ferrules should be pre-shrunk in an oven at 250 °C for at least 4 hours prior to use.

# GC Accessories

## O-Rings

### Ordering Information

#### O-Rings

Fits Liners for Manufacturer	Description	Similar to Mfr. No.*	Part No.	Unit	
Agilent®		Viton® Fluorocarbon, rated to < 300 °C	5180-4182	<a href="#">AGO-7326</a>	10/pk
		Graphite, rated to 450 °C	5180-4168	<a href="#">AGO-7327</a>	10/pk
PerkinElmer®		Viton for 6.2 mm OD inlet liners	N9302783	<a href="#">AGO-8674</a>	10/pk
Shimadzu® (Model 2010)		Viton	036-11203-84	<a href="#">AGO-8675</a>	10/pk

\* Similar to but not always an exact equivalent to the original manufacturer's product.

## Septa


Advanced silicone formulations reduce coring, enhance durability and re-sealing capabilities, and increase septum lifetime. Septa with GuideRight™ holes guide the needle during injection, for longer lifetime and less bent needles.

### Septa Sizes by GC Instrument

Manufacturer	Instrument Model	Septa Diameter		
		9.5 mm (3/8 in.)	11 mm (7/16 in.)	Septa Plug
Agilent® (HP)	5850, 5880A, 5890, 6850, 6890, 7890		•	
	5700 series, 5880	•		
Antek®	All	•		
Thermo Scientific®	Finnigan 9600	•		
GOW-MAC®	All	•		
HNU	Portable GC	•		
PerkinElmer®	Sigma series, 900, 990, 8000, AutoSystem, Clarus 500		•	
Shimadzu®	All			•
SRI	All			•
Tracor	550, 560	•		
Varian®	1040, 1041, 1060, 1061	•		
	1075, 1077, 1078, 1079	•		
	3700 / Vista, Capillary Injectors		•	
	Packed Column Injectors	•		
	SPI			•

### Ordering Information

#### Septa

Type	Description		Diameter		Includes GuideRight Hole	Part No.	Unit
			(mm)	(in.)			
Silicone Rubber Septa		<ul style="list-style-type: none"> <li>Our most popular choice for low-bleed septa, rated to 400 °C</li> <li>Designed and conditioned for high sensitivity</li> <li>Durometer rating of 50 with typical injection life of 150 punctures</li> </ul>	9.5	3/8	✓	<a href="#">AGO-7916</a>	50/pk
			9.5	3/8		<a href="#">AGO-4690</a>	50/pk
			9.5	3/8		<a href="#">AGO-4691</a>	100/pk
			11	7/16	✓	<a href="#">AGO-7917</a>	50/pk
			11	7/16		<a href="#">AGO-4696</a>	50/pk
			11	7/16		<a href="#">AGO-4697</a>	100/pk
			9.5	3/8		<a href="#">AGO-8572</a>	50/pk
			11	7/16	✓	<a href="#">AGO-7875</a>	50/pk
			11	7/16		<a href="#">AGO-8573</a>	50/pk
			9.5	3/8		<a href="#">AGO-4688</a>	50/pk
PhenoGreen™ -400	<ul style="list-style-type: none"> <li>Long-life, high temperature septa for use up to 400 °C</li> </ul>	11	7/16	✓	<a href="#">AGO-4689</a>	100/pk	
		11	7/16		<a href="#">AGO-4694</a>	50/pk	
		11	7/16		<a href="#">AGO-4695</a>	100/pk	
PhenoBlue™ -300	<ul style="list-style-type: none"> <li>Low-bleed septum heat stable to 350 °C</li> <li>Durometer rating of 50 - 60 for easy puncture up to 100 injections at 300 °C</li> </ul>	9.5	3/8		<a href="#">AGO-4686</a>	50/pk	
		11	7/16		<a href="#">AGO-4692</a>	50/pk	
		11	7/16		<a href="#">AGO-4693</a>	100/pk	
PhenoGrey™ -250	<ul style="list-style-type: none"> <li>General purpose silicone rubber septum rated to 250 °C</li> <li>Durometer rating of 40 - 45 for easy puncture up to 100 injections</li> </ul>	9.5	3/8		<a href="#">AGO-7517</a>	50/pk	
		11	7/16				
		11	7/16				
Injector Septa Plugs	BTO® Silicone Septa Plug	<ul style="list-style-type: none"> <li>Fits Shimadzu (9A, 14, 15A, 17A, 2010) and SRI injectors</li> <li>Rated to 400 °C</li> </ul>					



For additional parts and accessories contact Phenomenex or visit: [www.phenomenex.com/GC](http://www.phenomenex.com/GC)



# GC Accessories

## Merlin Microseal™ Septum

- Improves chromatographic performance and quantitative results by reducing bleed and ghost peaks
- Improves reliability and performance during extended automated runs
- Thousands of injections before seal replacement
- Save time changing septa, instrument downtime and troubleshooting

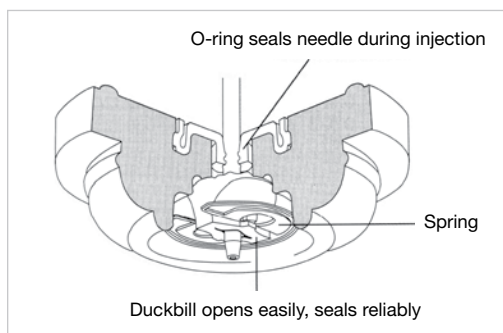


The Merlin Microseal Septum is a long-life replacement for the standard septum on the capillary inlet or the purged-packed inlet of Agilent GC systems.

The Microseal is a patented inlet assembly that provides two distinct sealing mechanisms. The first is a double O-ring seal around the syringe that ensures gas leak integrity during time of injection. There is no traditional septum to core or flake, which can cause bleeding and ghost peaks, and less force is required for the user to make a manual injection. The second seal is a spring-assisted duckbill that reliably maintains a high-pressure seal within the injection port at all times.

Since the syringe does not pierce any septum material, seal lifetime is significantly extended – Microseals are typically used for up to one year or more under normal conditions before septum replacement. Many laboratories experience lifetimes of 5,000 to 10,000 injections or more. This means you save tremendously in time changing septa, instrument downtime and troubleshooting. Chromatographic performance will also improve due to less bleed and fewer ghost peaks, improving quantitation and data reliability.

Instrument Compatibility: The Merlin Microseal systems can be used manually with all Agilent 5800, 6800, and 7890 series GCs. However, for autosampler use it is compatible with only the 7673A and 7673B units. Other inlets or autosampler systems from Agilent or other manufacturers are not compatible.



(1) Complete High Pressure Kits include the nut and one or two Microseal septa. All High Pressure Kits are rated for inlet pressures up to 100 psi. For long-term operation (>6 months) with the Microseal septum use the following injection port limits: (a) Agilent 6890, 5890 Series II - 325 °C; (b) Agilent 5890A - 300 °C. Higher temperatures will result in shorter lifetimes.

(2) The Merlin Microseal Septum should only be used with a blunt-tipped, 0.63 mm diameter (0.025 in., 23 gauge) syringe needle (typically used with the Agilent 7673 autosampler). Sharp-pointed or sharp-edged needles should not be used as they may slice or pierce the seals.

### Ordering Information

#### Merlin Microseal Septum

Part No.	Description	Unit
<a href="#">AGO-5985</a>	Merlin Microseal High Pressure Septum Standard Kit, includes nut and 2 septa	ea
<a href="#">AGO-5986</a>	Merlin Microseal High Pressure Septum Starter Kit, includes nut and 1 septum	ea

#### Replacement Parts

<a href="#">AGO-5987</a>	Merlin Microseal High Pressure Septum	ea
--------------------------	---------------------------------------	----

## Syringes for Use With the Merlin Microseal

### Ordering Information

Part No.	Mfr. No.	Agilent P/N	Description*	Capacity (µL)	Unit
<b>For Agilent 7673 Autosamplers</b>					
<a href="#">ASO-4386</a>	87987	9301-0892	75ASN (23s/1.71in./HP)	5	ea
<a href="#">ASO-4387</a>	80387	9301-0713	701ASN (23s/1.71in./HP)	10	ea
<a href="#">ASO-4388</a>	80390	9301-0725	701ASN (23s/1.71in./HP)	10	6/pk

NOTE: Replacement needles are available in packs of three.

\* Values in parentheses denote the following: (gauge/length/point style). "s" after gauge denotes smaller/reduced internal needle diameter.



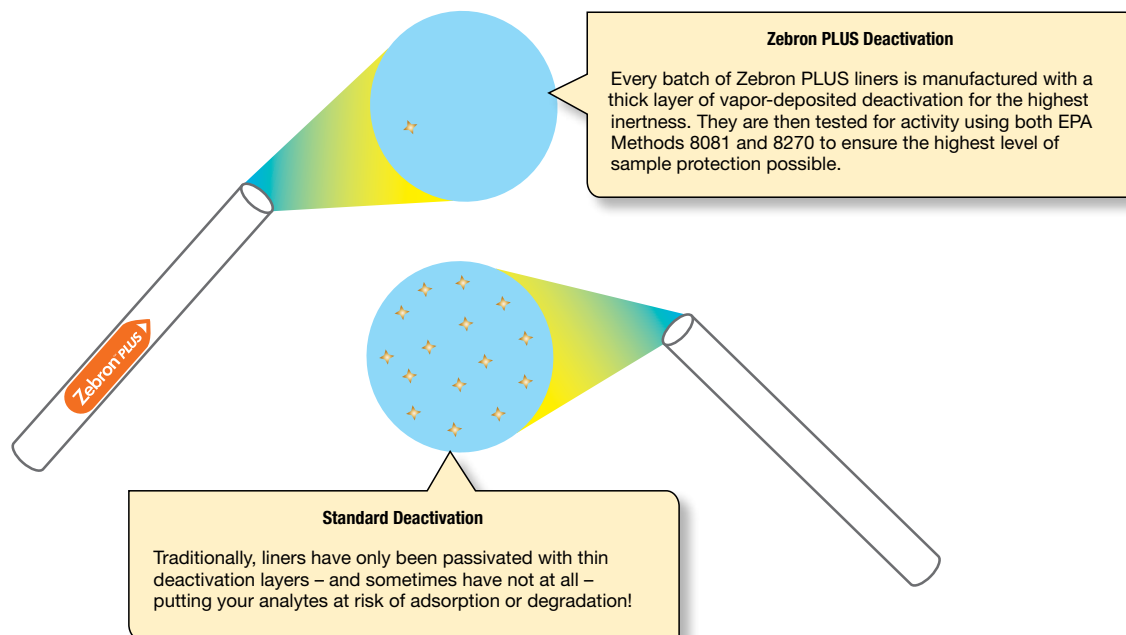
Contact Phenomenex or your local Phenomenex distributor for additional GC products and applications.

## Inlet Liners

### Protect Your Samples with Zebron PLUS GC Inlet Liners

Zebron PLUS GC inlet liners undergo a unique deactivation process, resulting in a remarkably inert pathway that prevents sample adsorption and degradation for active compounds.

### See The Difference: Zebron PLUS vs. Traditional Deactivation



### Enhance Your Analysis

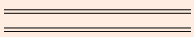


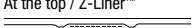

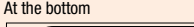




Analysis of dirty samples, samples with wide boiling points, or samples with wide molecular weights can be enhanced by choosing a Zebron PLUS liner with quartz wool. Liners packed with wool can prevent non-volatile compounds from entering the column and also improve sample vaporization for a more robust, reproducible analysis.

### Why Use Pre-Packed Liners?

Though the upfront cost of self-packing your liner may seem attractive, the time and headaches caused by resulting tailing or irreproducible peaks can be sizeable! Self-packed wool fibers commonly break during installation and any existing deactivation on the liner can also be scratched or damaged. Pre-packed Zebron PLUS liners undergo the deactivation process with the quartz wool already in place, which ensures that any active sites that form during packing are not exposed.

## Inlet Liners

### Liner Geometry Selection Guide

Liner Style*	Function	Advantages	Disadvantages	Recommended For
<b>Straight</b> 	Low surface area for less activity	<ul style="list-style-type: none"> <li>Simple to use</li> <li>Least expensive</li> <li>Low activity</li> </ul>	<ul style="list-style-type: none"> <li>Possible inlet discrimination</li> <li>More frequent gold seal maintenance from exposure to sample contamination</li> <li>Possible inconsistency if sample injection bypasses split ratio</li> </ul>	Volatiles
<b>Glass Wool</b> In the middle 	Traps non-volatiles; mixes sample; vaporizes sample above the column	<ul style="list-style-type: none"> <li>Reduces gold seal/column contamination and maintenance</li> <li>More reproducible results</li> <li>Can help focus analytes</li> <li>Extends column life</li> </ul>	<ul style="list-style-type: none"> <li>Higher surface area that can become active</li> <li>Glass wool can become dislodged</li> </ul>	Dirty samples, volatiles, high initial oven temperatures
At the bottom 	Traps non-volatiles; mixes sample; vaporizes sample above the column	<ul style="list-style-type: none"> <li>Reduces gold seal/column contamination and maintenance</li> <li>More reproducible results</li> <li>Can provide higher responses than wool in middle</li> </ul>	<ul style="list-style-type: none"> <li>Higher surface area that can become active</li> <li>Glass wool can become dislodged</li> </ul>	Dirty samples
At the top / Z-Liner™ 	Keeps glass wool in place; wipes syringe needle clean	<ul style="list-style-type: none"> <li>Reduces gold seal/column contamination and maintenance</li> <li>More reproducible results</li> <li>Can help focus analytes</li> <li>Extends column life</li> </ul>	<ul style="list-style-type: none"> <li>Higher surface area that can become active</li> </ul>	Pressure pulsed injections, dirty samples, volatiles, high initial oven temperatures
<b>Taper / Gooseneck</b> At the top 	Limits the expansion of the solvent to the inlet	<ul style="list-style-type: none"> <li>Allows for larger injection volumes</li> <li>Decrease backflash</li> </ul>	<ul style="list-style-type: none"> <li>Higher risk of needle breakage</li> <li>Increased cost</li> <li>Cannot self-pack with glass wool</li> </ul>	Water injections
At the bottom 	Directs flow onto column; low surface area	<ul style="list-style-type: none"> <li>Reduces gold seal/column contamination and maintenance</li> <li>Improved sensitivity</li> <li>Lower activity</li> </ul>	<ul style="list-style-type: none"> <li>Increased cost</li> </ul>	Pesticides (without wool), semi-volatiles (with wool)
<b>Direct Connect</b> 	Connects directly to column to aid transfer of analytes	<ul style="list-style-type: none"> <li>Better sensitivity for splitless injections</li> <li>Decreases inlet discrimination</li> </ul>	<ul style="list-style-type: none"> <li>Only used for splitless injections</li> <li>Increased cost</li> <li>One-time use</li> </ul>	Trace analysis, splitless injections, separation from solvent peak (with top hole), aqueous samples (with bottom hole)
<b>Internal Diameter (ID)</b> Small 	Small internal volume and surface area; restricts sample diffusion	<ul style="list-style-type: none"> <li>Better peak shape of gaseous samples</li> <li>Less activity for small injections of active compounds</li> </ul>	<ul style="list-style-type: none"> <li>Very small internal volume is easy to overload with normal injection volumes</li> </ul>	Headspace, purge and trap, or gas injections; active samples with low expansion solvents
<b>Outer Diameter (OD) / Splitless</b> Large OD / Splitless 	Fits tightly inside the inlet and limits sample contact with inlet components	<ul style="list-style-type: none"> <li>Better sensitivity for long splitless hold times</li> </ul>	<ul style="list-style-type: none"> <li>Not very amenable for changing to large split ratios</li> </ul>	Splitless injections of active compounds
<b>Cup Liner</b> 	Cup traps non-volatiles but has lower surface area than wool; vaporizes sample above the column	<ul style="list-style-type: none"> <li>Good sample mixing</li> <li>Reduces gold seal/column contamination and maintenance</li> <li>More reproducible results</li> <li>Improves results for active compounds</li> <li>Provides receptacle for multiple injections</li> </ul>	<ul style="list-style-type: none"> <li>Increased cost</li> <li>Higher surface area than straight liner can result in increased activity for very active compounds</li> </ul>	Multiple or large volume injections, active samples, dirty samples

\*Examples given are only one possible option. Other available options may be better suited for your analysis.

### What's a Z-Liner?



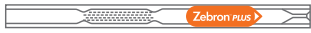



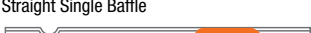
Zebron PLUS Liners with a Z-Liner geometry contain optimally-placed deactivated quartz wool, which is held in place by two tapered sections of glass inside the liner. This ensures that the wool

remains in the correct position for injection, wipes the needle tip completely clean, and properly volatilizes the sample.

## Liners Compatible with Agilent® GC Systems




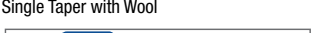



### Ordering Information

#### Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For 5890, 6890 and 7890 Models</b>						
<b>Direct Connect</b> 	Trace analysis, Splitless injections	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A50-01</a> <a href="#">AG2-0A50-05</a> <a href="#">AG2-0A50-25</a>	ea 5/pk 25/pk
<b>Single Taper</b> 	Pesticides	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A10-01</a> <a href="#">AG2-0A10-05</a> <a href="#">AG2-0A10-25</a>	ea 5/pk 25/pk
<b>Single Taper Z-Liner™</b> 	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A13-01</a> <a href="#">AG2-0A13-05</a> <a href="#">AG2-0A13-25</a>	ea 5/pk 25/pk
<b>Single Taper with Wool</b> 	Semi-volatiles	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A11-01</a> <a href="#">AG2-0A11-05</a> <a href="#">AG2-0A11-25</a>	ea 5/pk 25/pk
<b>Straight</b> 	Volatiles	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A00-01</a> <a href="#">AG2-0A00-05</a> <a href="#">AG2-0A00-25</a>	ea 5/pk 25/pk
<b>Straight Z-Liner</b> 	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A03-01</a> <a href="#">AG2-0A03-05</a> <a href="#">AG2-0A03-25</a>	ea 5/pk 25/pk
<b>Straight Single Baffle</b> 	Semi-volatiles, Pesticides	S/SL	1.8 x 71	PLUS Inert	<a href="#">AG2-1F06-01</a> <a href="#">AG2-1F06-05</a> <a href="#">AG2-1F06-25</a>	ea 5/pk 25/pk

### Ordering Information

#### Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For 5890, 6890 and 7890 Models</b>						
<b>Direct Connect</b> 	Trace analysis, Splitless injections	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A50-01</a> <a href="#">AG1-0A50-05</a> <a href="#">AG1-0A50-25</a>	ea 5/pk 25/pk
<b>Single Taper</b> 	Pesticides	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A10-01</a> <a href="#">AG1-0A10-05</a> <a href="#">AG1-0A10-25</a>	ea 5/pk 25/pk
<b>Single Taper Z-Liner</b> 	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A13-01</a> <a href="#">AG1-0A13-05</a> <a href="#">AG1-0A13-25</a>	ea 5/pk 25/pk
<b>Single Taper with Wool</b> 	Semi-volatiles	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A11-01</a> <a href="#">AG1-0A11-05</a> <a href="#">AG1-0A11-25</a>	ea 5/pk 25/pk
<b>Straight</b> 	Volatiles	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A00-01</a> <a href="#">AG1-0A00-05</a> <a href="#">AG1-0A00-25</a>	ea 5/pk 25/pk
<b>Straight Z-Liner</b> 	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A03-01</a> <a href="#">AG1-0A03-05</a> <a href="#">AG1-0A03-25</a>	ea 5/pk 25/pk
<b>Straight Single Baffle</b> 	Semi-volatiles, Pesticides	PTV	1.8 x 71	Standard	<a href="#">AG1-1F06-01</a> <a href="#">AG1-1F06-05</a> <a href="#">AG1-1F06-25</a>	ea 5/pk 25/pk



#### Inlet Styles Key

- S/SL: Split/Splitless
- PTV: Programmed-Temperature Vaporization
- PSS: Programmed-Temperature Split/Splitless
- SPI: Single Point Injection



#### Zebron Essential Liners

Zebron Essential liners undergo a vapor deposited deactivation process resulting in a thin film liner that is ideal for routine analysis.

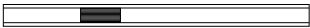








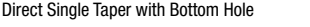
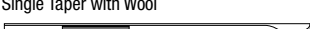




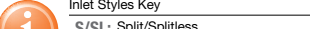
#### Zebron PLUS Liners

Optimized for trace and active compound analysis, Zebron PLUS GC liners undergo a unique chemical deactivation treatment resulting in a remarkably inert GC inlet liner.

## Liners Compatible with Agilent® GC Systems (cont'd)

### Ordering Information

#### GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For 5890, 6890, and 7890 Models</b>						
 Straight with Wool	Large injection, Trace analysis	S/SL	4 x 78.5	Standard	<a href="#">AGO-4655</a> <a href="#">AGO-4656</a>	5/pk 25/pk
 Single Taper with Wool	Large injection, Trace analysis	S/SL	4 x 78.5	Standard	<a href="#">AGO-4657</a> <a href="#">AGO-4658</a>	5/pk 25/pk
 Cup	High and low MW compounds, Large volume injections	S/SL	4 x 78.5	Not Deactivated	<a href="#">AGO-4647</a> <a href="#">AGO-4648</a>	5/pk 25/pk
 Cup with Wool	Large volume injection of dirty samples	S/SL	4 x 78.5	Not Deactivated	<a href="#">AGO-7853</a>	5/pk
 Straight	Large injection, Trace analysis	S/SL	2 x 78.5	Not Deactivated	<a href="#">AGO-4649</a> <a href="#">AGO-4650</a>	5/pk 25/pk
 Straight	Large injection, Trace analysis	S/SL	4 x 78.5	Standard	<a href="#">AGO-4651</a> <a href="#">AGO-4652</a>	5/pk 25/pk
 Single Taper	Small injection, Trace analysis	S/SL	2 x 78.5	Standard	<a href="#">AGO-4653</a>	5/pk
 Direct	Injection < 1 µL, Purge and Trap/Headspace	S/SL	1.5 x 78.5	Standard	<a href="#">AGO-4659</a> <a href="#">AGO-4660</a>	5/pk 25/pk
 Recessed Gooseneck with Wool	Large injection of dirty samples	S/SL	4 x 78.5	Standard	<a href="#">AGO-4661</a> <a href="#">AGO-4662</a>	5/pk 25/pk
 Direct Single Taper with Top Hole	Trace analysis of active compounds	S/SL	4 x 78.5	Standard	<a href="#">AGO-7850</a>	5/pk
 Direct Single Taper with Bottom Hole	Trace analysis of active compounds	S/SL	4 x 78.5	Standard	<a href="#">AGO-7851</a>	5/pk
 Single Taper with Wool	General use, Dirty samples	S/SL	4 x 78.5	Standard	<a href="#">AGO-8172</a>	5/pk
 Double Taper	Large injection, Trace analysis of active compounds	S/SL	4 x 78.5	Standard	<a href="#">AGO-8173</a>	5/pk
 Double Gooseneck with Bottom Hole	Trace analysis of active compounds	S/SL	4 x 78.5	Standard	<a href="#">AGO-8430</a>	5/pk
 Straight with Wool	Large injection Trace analysis,	S/SL	4 x 78.5	Standard	<a href="#">AGO-8653</a> <a href="#">AGO-8654</a>	5/pk 25/pk
 Straight with Stabilized Wool	Small injection, Trace analysis of dirty samples	S/SL	2.3 x 78.5	Standard	<a href="#">AGO-8379</a>	5/pk



#### Inlet Styles Key

S/SL: Split/Splitless

PTV: Programmed-Temperature Vaporization

PSS: Programmed-Temperature Split/Splitless

SPI: Single Point Injection

## Find Your Liner Online!

Easily search by part numbers, applications, injection mode, or system manufacturer for quick selection **in under 1 minute!**

[www.phenomenex.com/FindLiner](http://www.phenomenex.com/FindLiner)






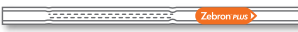



# GC Accessories

## Liners Compatible with PerkinElmer® GC Systems


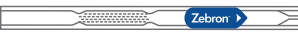



### Ordering Information

#### Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For AutoSystem™, AutoSystem XL, Clarus 500, and Clarus 600 Models</b>						
Single Taper 	Pesticides	S/SL	4 x 92	PLUS Inert	<a href="#">AG2-2A10-01</a> <a href="#">AG2-2A10-05</a> <a href="#">AG2-2A10-25</a>	ea 5/pk 25/pk
Single Taper Z-Liner™ 	Semi-volatiles, Dirty samples	S/SL	4 x 92	PLUS Inert	<a href="#">AG2-2A13-01</a> <a href="#">AG2-2A13-05</a> <a href="#">AG2-2A13-25</a>	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 92	PLUS Inert	<a href="#">AG2-2A00-01</a> <a href="#">AG2-2A00-05</a> <a href="#">AG2-2A00-25</a>	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples	PSS	2 x 86.2	PLUS Inert	<a href="#">AG2-2E03-01</a> <a href="#">AG2-2E03-05</a> <a href="#">AG2-2E03-25</a>	ea 5/pk 25/pk
Straight Z-Liner 	High initial oven temperatures	S/SL	4 x 92	PLUS Inert	<a href="#">AG2-2A03-01</a> <a href="#">AG2-2A03-05</a> <a href="#">AG2-2A03-25</a>	ea 5/pk 25/pk



### Ordering Information

#### Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For AutoSystem, AutoSystem XL, Clarus 500, and Clarus 600 Models</b>						
Single Taper 	Pesticides	S/SL	4 x 92	Standard	<a href="#">AG1-2A10-01</a> <a href="#">AG1-2A10-05</a> <a href="#">AG1-2A10-25</a>	ea 5/pk 25/pk
Single Taper Z-Liner 	Semi-volatiles, Dirty samples	S/SL	4 x 92	Standard	<a href="#">AG1-2A13-01</a> <a href="#">AG1-2A13-05</a> <a href="#">AG1-2A13-25</a>	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	4 x 92	Standard	<a href="#">AG1-2A00-01</a> <a href="#">AG1-2A00-05</a> <a href="#">AG1-2A00-25</a>	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples	PSS	2 x 86.2	Standard	<a href="#">AG1-2E03-01</a> <a href="#">AG1-2E03-05</a> <a href="#">AG1-2E03-25</a>	ea 5/pk 25/pk
Straight Z-Liner 	High initial oven temperatures	S/SL	4 x 92	Standard	<a href="#">AG1-2A03-01</a> <a href="#">AG1-2A03-05</a> <a href="#">AG1-2A03-25</a>	ea 5/pk 25/pk

### Ordering Information

#### GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For AutoSystem, AutoSystem XL, Clarus 500, and Clarus 600 Models</b>						
Straight 	General use, Trace samples	S/SL	4 x 92	Not Deactivated	<a href="#">AG0-4665</a>	5/pk
Sintered Glass 	Large injection, Trace analysis	PSS	2 x 86.2	Standard	<a href="#">AG0-8658</a>	5/pk



#### Inlet Styles Key

S/SL: Split/Splitless

PTV: Programmed-Temperature Vaporization







PSS: Programmed-Temperature Split/Splitless

SPI: Single Point Injection

## Liners Compatible with Shimadzu® GC Systems







### Ordering Information

#### Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For 17A, 2014 and 2025 Models</b>						
Single Taper Z-Liner™ 	Pesticides	S/SL	3.4 x 95	PLUS Inert	<a href="#">AG2-3B13-01</a> <a href="#">AG2-3B13-05</a> <a href="#">AG2-3B13-25</a>	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	<a href="#">AG2-3B03-01</a> <a href="#">AG2-3B03-05</a> <a href="#">AG2-3B03-25</a>	ea 5/pk 25/pk
<b>For 2010 Models</b>						
Single Taper 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	<a href="#">AG2-4B10-01</a> <a href="#">AG2-4B10-05</a> <a href="#">AG2-4B10-25</a>	ea 5/pk 25/pk
Single Taper Z-Liner 	Pesticides	S/SL	3.4 x 95	PLUS Inert	<a href="#">AG2-4B13-01</a> <a href="#">AG2-4B13-05</a> <a href="#">AG2-4B13-25</a>	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	3.4 x 95	PLUS Inert	<a href="#">AG2-4B00-01</a> <a href="#">AG2-4B00-05</a> <a href="#">AG2-4B00-25</a>	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	PLUS Inert	<a href="#">AG2-4B03-01</a> <a href="#">AG2-4B03-05</a> <a href="#">AG2-4B03-25</a>	ea 5/pk 25/pk

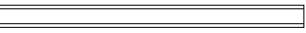




### Ordering Information

#### Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For 17A, 2014, and 2025 Models</b>						
Single Taper Z-Liner 	Pesticides	S/SL	3.4 x 95	Standard	<a href="#">AG1-3B13-01</a> <a href="#">AG1-3B13-05</a> <a href="#">AG1-3B13-25</a>	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	Standard	<a href="#">AG1-3B03-01</a> <a href="#">AG1-3B03-05</a> <a href="#">AG1-3B03-25</a>	ea 5/pk 25/pk
<b>For 2010 Models</b>						
Single Taper 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	Standard	<a href="#">AG1-4B10-01</a> <a href="#">AG1-4B10-05</a> <a href="#">AG1-4B10-25</a>	ea 5/pk 25/pk
Single Taper Z-Liner 	Pesticides	S/SL	3.4 x 95	Standard	<a href="#">AG1-4B13-01</a> <a href="#">AG1-4B13-05</a> <a href="#">AG1-4B13-25</a>	ea 5/pk 25/pk
Straight 	Volatiles	S/SL	3.4 x 95	Standard	<a href="#">AG1-4B00-01</a> <a href="#">AG1-4B00-05</a> <a href="#">AG1-4B00-25</a>	ea 5/pk 25/pk
Straight Z-Liner 	Volatiles, Dirty samples, High initial oven temperatures	S/SL	3.4 x 95	Standard	<a href="#">AG1-4B03-01</a> <a href="#">AG1-4B03-05</a> <a href="#">AG1-4B03-25</a>	ea 5/pk 25/pk

### Ordering Information



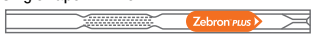
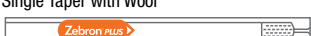


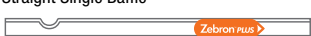
#### GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For 17A, 2014, and 2025 Models</b>						
Straight 	Small injection, Trace analysis	S/SL	2.6 x 95	Standard	<a href="#">AGO-4667</a>	5/pk
<b>For 14A Models</b>						
Straight 	Trace analysis	WBC	3.4 x 139	Standard	<a href="#">AGO-4669</a>	5/pk
Single Taper FocusLiner™ 	General use, Dirty samples	S/SL	3.4 x 99	Standard	<a href="#">AGO-4682</a>	5/pk
Middle Gooseneck 	General use, Dirty samples	S/SL	3.4 x 95	Standard	<a href="#">AGO-8661</a>	5/pk
Recessed Gooseneck with Wool 	General use, Dirty samples	S/SL	3.4 x 95	Standard	<a href="#">AGO-8663</a>	5/pk

## Liners Compatible with Thermo Scientific® GC Systems

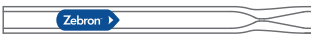

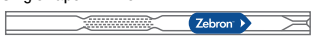

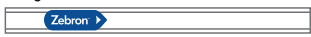

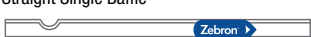
### Ordering Information

#### Zebron™ PLUS Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For 5890, 6890 and 7890 Models</b>						
 Direct Connect	Trace analysis, Splitless injections	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A50-01</a> <a href="#">AG2-0A50-05</a> <a href="#">AG2-0A50-25</a>	ea 5/pk 25/pk
 Single Taper	Pesticides	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A10-01</a> <a href="#">AG2-0A10-05</a> <a href="#">AG2-0A10-25</a>	ea 5/pk 25/pk
 Single Taper Z-Liner™	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A13-01</a> <a href="#">AG2-0A13-05</a> <a href="#">AG2-0A13-25</a>	ea 5/pk 25/pk
 Single Taper with Wool	Semi-volatiles	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A11-01</a> <a href="#">AG2-0A11-05</a> <a href="#">AG2-0A11-25</a>	ea 5/pk 25/pk
 Straight	Volatiles	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A00-01</a> <a href="#">AG2-0A00-05</a> <a href="#">AG2-0A00-25</a>	ea 5/pk 25/pk
 Straight Z-Liner	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	PLUS Inert	<a href="#">AG2-0A03-01</a> <a href="#">AG2-0A03-05</a> <a href="#">AG2-0A03-25</a>	ea 5/pk 25/pk
 Straight Single Baffle	Semi-volatiles, Pesticides	PTV	1.8 x 71	PLUS Inert	<a href="#">AG2-1F06-01</a> <a href="#">AG2-1F06-05</a> <a href="#">AG2-1F06-25</a>	ea 5/pk 25/pk

### Ordering Information

#### Zebron Essentials Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For 5890, 6890 and 7890 Models</b>						
 Direct Connect	Trace analysis, Splitless injections	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A50-01</a> <a href="#">AG1-0A50-05</a> <a href="#">AG1-0A50-25</a>	ea 5/pk 25/pk
 Single Taper	Pesticides	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A10-01</a> <a href="#">AG1-0A10-05</a> <a href="#">AG1-0A10-25</a>	ea 5/pk 25/pk
 Single Taper Z-Liner	Semi-volatiles, Dirty samples	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A13-01</a> <a href="#">AG1-0A13-05</a> <a href="#">AG1-0A13-25</a>	ea 5/pk 25/pk
 Single Taper with Wool	Semi-volatiles	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A11-01</a> <a href="#">AG1-0A11-05</a> <a href="#">AG1-0A11-25</a>	ea 5/pk 25/pk
 Straight	Volatiles	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A00-01</a> <a href="#">AG1-0A00-05</a> <a href="#">AG1-0A00-25</a>	ea 5/pk 25/pk
 Straight Z-Liner	Dirty samples, Volatiles, High initial oven temperatures	S/SL	4 x 78.5	Standard	<a href="#">AG1-0A03-01</a> <a href="#">AG1-0A03-05</a> <a href="#">AG1-0A03-25</a>	ea 5/pk 25/pk
 Straight Single Baffle	Semi-volatiles, Pesticides	PTV	1.8 x 71	Standard	<a href="#">AG1-1F06-01</a> <a href="#">AG1-1F06-05</a> <a href="#">AG1-1F06-25</a>	ea 5/pk 25/pk





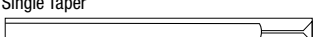


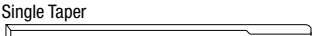

#### Inlet Styles Key

- S/SL: Split/Splitless
- PTV: Programmed-Temperature Vaporization
- PSS: Programmed-Temperature Split/Splitless
- SPI: Single Point Injection

## Liners Compatible with Thermo Scientific® GC Systems (cont'd)

### Ordering Information


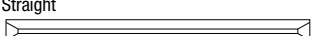





#### GC Liners


Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For TRACE 8000 and FOCUS Models</b>						
Double Taper FocusLiner™ 	Trace analysis of dirty samples	S/SL	5 x 105	Standard	<a href="#">AGO-4679</a> <a href="#">AGO-7863</a>	5/pk 25/pk
Straight 	General use	S/SL	3 x 105	Standard	<a href="#">AGO-4645</a>	5/pk
Single Taper 	Trace analysis	S/SL	5 x 105	Standard	<a href="#">AGO-7852</a>	5/pk
Straight 	General use	S/SL	5 x 105	Standard	<a href="#">AGO-8669</a>	5/pk
Single Taper FocusLiner 	General use, Dirty samples	S/SL	5 x 105	Standard	<a href="#">AGO-8671</a>	5/pk
Single Taper 	Small injection, Trace analysis	S/SL	3 x 105	Standard	<a href="#">AGO-8672</a>	5/pk
Straight FocusLiner 	General use, Dirty samples	S/SL	5 x 105	Standard	<a href="#">AGO-8673</a>	5/pk

## Liners Compatible with Bruker/Varian® GC Systems

### Ordering Information

#### GC Liners

Description	Application	Inlet Style	Dimensions ID x L (mm)	Deactivation	Part No.	Unit
<b>For 1093 / 1094 Models</b>						
Straight 	Large injection, Trace analysis	S/SL	4 x 75	Standard	<a href="#">AGO-4673</a>	5/pk
<b>For 1078 / 1079 Models</b>						
Straight 	Trace analysis	S/SL	0.5 x 54	Standard	<a href="#">AGO-8665</a>	5/pk
Single Taper FocusLiner™ 	General use or Dirty samples	S/SL	3.4 x 54	Standard	<a href="#">AGO-8666</a>	5/pk
Single Taper 	Large injection, Trace analysis	S/SL	3.4 x 54	Standard	<a href="#">AGO-8667</a>	5/pk
Single Taper 	Small injection, Trace analysis	S/SL	2 x 54	Standard	<a href="#">AGO-8668</a>	5/pk
<b>For 1075 / 1077 Models</b>						
Straight 	For 0.25 and 0.32 mm ID Column	SPI	0.5 x 54	Standard	<a href="#">AGO-4675</a>	5/pk
Straight 	For 0.53 mm ID Column	SPI	0.8 x 54	Standard	<a href="#">AGO-4677</a>	5/pk

	<b>Inlet Styles Key</b>
	S/SL: Split/Splitless
	PTV: Programmed-Temperature Vaporization
	PSS: Programmed-Temperature Split/Splitless
	SPI: Single Point Injection

## Inlet Consumables Are Available Online!

Need inlet seals, septa, or syringes? Explore hundreds of available parts online at:

[www.phenomenex.com/InletGC](http://www.phenomenex.com/InletGC)



## Column Unions, Mini-Unions, and Splitters

### Selection Guide

Use the Union or Mini-Union for:	Use the Y-Connector (splitter) for:
<ul style="list-style-type: none"> <li>Connecting a guard column to an analytical column</li> <li>Connecting columns of different selectivities</li> <li>Connecting transfer lines to, e.g., mass spec</li> <li>Repairing a broken column</li> </ul>	<ul style="list-style-type: none"> <li>Splitting a sample onto two columns (perform confirmational analysis in a single injection)</li> <li>Splitting the column eluent to two detectors</li> </ul>

### Mini-Unions

- High-precision unions for connecting capillary GC columns of same or dissimilar sizes
- Inert and precise glass-lined bore
- Low dead volume



### Graphite/Vespel® Ferrule Mini-Unions

- 15% Graphite / 85% Vespel ferrules, Rated to 350 °C
- Includes 1 mini-union, 2 nuts, and 5 ferrules

### Ordering Information

#### Graphite/Vespel Ferrule Mini-Unions

Column 1 ID (mm)	Column 2 ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.10-0.53	0.4	103431	<a href="#">AG0-5160</a>	ea
0.28-0.35	0.32-0.53	0.5	103432	<a href="#">AG0-5161</a>	ea
0.45-0.53	0.45-0.53	0.8	103433	<a href="#">AG0-5162</a>	ea

#### Replacement Ferrules

Column ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.4	072696	<a href="#">AG0-7033</a>	10/pk
0.28-0.35	0.5	072697	<a href="#">AG0-7034</a>	10/pk
0.45-0.53	0.8	072698	<a href="#">AG0-7035</a>	10/pk

### SilTite™ Mini-Unions

- Supplied with SilTite ferrules – no more leaks and no need to re-tighten after installation
- Recommended for high temperature analysis. Stable above 450 °C.

### Ordering Information

#### SilTite Mini-Unions

Column 1 ID (mm)	Column 2 ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.10-0.53	0.4	073550	<a href="#">AG0-8763</a>	ea
0.28-0.35	0.32-0.53	0.5	073551	<a href="#">AG0-8764</a>	ea
0.45-0.53	0.45-0.53	0.8	073554	<a href="#">AG0-8825</a>	ea

#### Replacement Ferrules

Column ID (mm)	Ferrule ID (mm)	Similar to Mfr. No.*	Part No.	Unit
0.10-0.25	0.4	073470	<a href="#">AG0-8759</a>	10/pk
0.28-0.35	0.5	073471	<a href="#">AG0-8760</a>	10/pk
0.45-0.53	0.8	073473	<a href="#">AG0-8824</a>	10/pk

\* Similar to but not always an exact equivalent to the original manufacturer's product.

### Press-Fit Unions and Splitters

- Connect fused silica capillary tubing of the same or different diameter, from 0.10 to 0.53 mm ID
- Patented laser-formed linear taper
- Provides leak-free seal without tools, glue, or fittings
- Stays sealed even at high temperatures and pressures
- Laser-cut smooth ends prevent column damage during insertion



### Ordering Information

#### Capillary Unions and Splitters

Part No.	Description	Unit
<a href="#">AG0-4716</a>	Universal Capillary Column Union, Fused Quartz	5/pk
<a href="#">AG0-4717</a>	GC Column Y-Splitter, Borosilicate for 0.10 to 0.32 mm ID columns	ea
<a href="#">AG0-9193</a>	GC Column Y-Splitter, Borosilicate for 0.53 mm ID columns	ea

### Polyimide Resins

- Permanently connects unions and splitters to capillary tubing
- Prevents connections from dislodging due to vibration or shock



### Ordering Information

#### Polyimide Resins

Part No.	Description	Unit
<a href="#">AG0-5722</a>	Polyimide Resin, 350 °C, 0.5 mL	ea
<a href="#">AG0-8514</a>	High Temperature, 400 °C, Polyimide Resin, 0.5 mL	ea



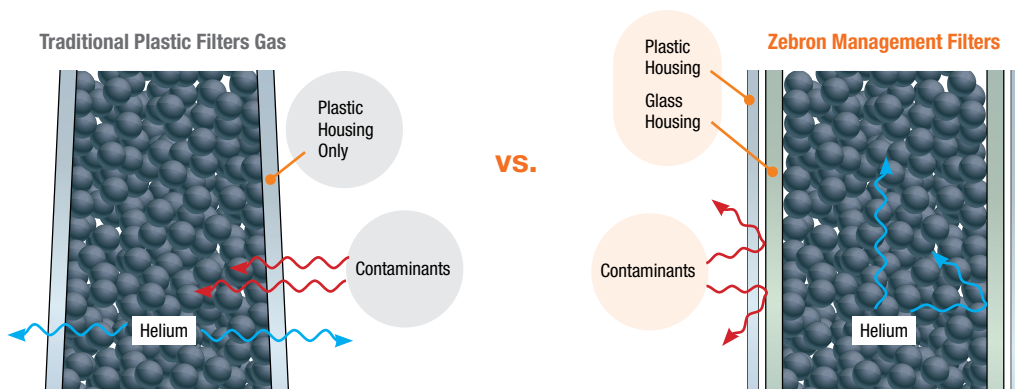
For GC Retention Gaps and Guard Column Kits, see p. 164



## Zebtron™ Gas Management

### UPGRADE Your Gas Filter System!

Improved design with a dual wall housing (plastic outside and glass inside). Glass prevents diffusion, ensuring a leak and contaminant free system.



### Plug-In GC and LC-MS Gas Filters

- Easy to use
- Dual filter housing prevents diffusion and increases safety
- Incredible high capacity
- Ensures high gas purity (99.9999% pure)
- 4 filter types



Universal



Oxygen



Moisture



Hydrocarbon



### Click-On GC Gas Traps

- Easy to use, Click-On GC Gas Traps
- Serves multiple GC instruments at once
- Incredible high capacity
- Ensures high gas purity (99.9999% pure)
- 5 trap types



Universal



Oxygen



Moisture



Hydrocarbon



Carbon Dioxide



### Protect Your LC-MS using Zebtron LC-MS Gas Filters

- Removes water, organic compounds, and other foreign material from LC-MS nebulizer gas
- Dual filter: Moisture and Hydrocarbon
- To be used in combination with a high flow 2-position connecting unit (Part No.: [AG6-2204](#)) and Particle Filter (Part No.: [AG6-2205](#))



Moisture



Hydrocarbon



### Save Time and Money!

#### Zebtron Electronic Indicator

Easily know when to replace the Gas Filter and Trap by using the NEW Zebtron Electronic Indicator

## Zebron Gas Management

### Ordering Information

#### Zebron Gas Management Filters

Part No.	Description	Unit
<a href="#">AG6-1010</a>	Gas Filter Oxygen	ea
<a href="#">AG6-1020</a>	Gas Filter Moisture	ea
<a href="#">AG6-1030</a>	Gas Filter Hydrocarbon	ea
<a href="#">AG6-1040</a>	Gas Filter Universal	ea
<a href="#">AG6-1070</a>	Gas Filter Universal (Helium specific)	ea
<a href="#">AG6-1050</a>	Gas Filter Hydrocarbon/moisture for LC-MS	2/pk
<a href="#">AG6-1060</a>	Ring nut for Gas Filter	ea



### Ordering Information

#### Zebron Gas Management Traps

Part No.	Description	Unit
<a href="#">AG6-3110</a>	Click-On Oxygen Trap	ea
<a href="#">AG6-3120</a>	Click-On Moisture Trap	ea
<a href="#">AG6-3130</a>	Click-On Hydrocarbon Trap	ea
<a href="#">AG6-3140</a>	Click-On Universal Trap	ea
<a href="#">AG6-3150</a>	Click-On Carbon Dioxide Trap	ea



### Ordering Information

#### Zebron Connecting Units

Part No.	Description	Unit
<a href="#">AG6-2101</a>	1-position Connecting Unit 1/4 in. Brass	ea
<a href="#">AG6-2102</a>	2-position Connecting Unit 1/4 in. Brass	ea
<a href="#">AG6-2103</a>	4-position Connecting Unit 1/4 in. Brass	ea
<a href="#">AG6-2201</a>	1-position Connecting Unit 1/8 in. Brass	ea
<a href="#">AG6-2202</a>	2-position Connecting Unit 1/8 in. Brass	ea
<a href="#">AG6-2203</a>	4-position Connecting Unit 1/8 in. Brass	ea
<a href="#">AG6-2204</a>	High flow 2-position connecting unit for LC-MS	ea
<a href="#">AG6-2205</a>	Particle Filter for LC-MS	ea
<a href="#">AG6-2206</a>	O-ring replacement for gas filter baseplate	20/pk

### Ordering Information

#### Zebron Connecting Units (cont'd)

Part No.	Description	Unit
<a href="#">AG6-2301</a>	1-position Connecting Unit 1/4 in. Stainless Steel	ea
<a href="#">AG6-2302</a>	2-position Connecting Unit 1/4 in. Stainless Steel	ea
<a href="#">AG6-2303</a>	4-position Connecting Unit 1/4 in. Stainless Steel	ea
<a href="#">AG6-2304</a>	1-position Connecting Unit 1/8 in. Stainless Steel	ea
<a href="#">AG6-2305</a>	2-position Connecting Unit 1/8 in. Stainless Steel	ea
<a href="#">AG6-2306</a>	4-position Connecting Unit 1/8 in. Stainless Steel	ea

### Ordering Information

#### Zebron Base Electronic Indicator and Other Accessories

Part No.	Description	Unit
<a href="#">AG6-3160</a>	1/8 in. Brass Click-On Connector Set	2/pk
<a href="#">AG6-3170</a>	1/4 in. Brass Click-On Connector Set	2/pk
<a href="#">AG6-4150</a>	1/8 in. Stainless Steel Click-On Connector Set	2/pk
<a href="#">AG6-4160</a>	1/4 in. Stainless Steel Click-On Connector Set	2/pk
<a href="#">AG6-3180</a>	Wall-mounting Clamp Set for Gas Traps	2/pk
<a href="#">AG6-3190</a>	O-ring replacement set for Gas Trap	20/pk
<a href="#">AG6-4110</a>	Electronic Indicator for Gas Trap	ea
<a href="#">AG6-4120</a>	Electronic Indicator for Gas Filter	ea
<a href="#">AG6-4130</a>	Electronic Indicator for LC-MS Filter	ea



## First time ordering Zebron Click-On Gas Traps?

Be sure to order the brass or stainless steel connector with your first trap.



## Moisture, Oxygen, and Hydrocarbon Gas Traps/Purifiers






- Extends column lifetimes
- Protects columns from irreversible damage
- Improve analytical reliability (identification and quantitation results)
- Reliable and affordable high-capacity, high-performance purifiers


### Recommended Gas Traps


Use	Gas	Recommended Trap(s)
Carrier Gas	Helium, Hydrogen, or Nitrogen	Moisture, Hydrocarbon, Oxygen
	Air	Hydrocarbon
FID, NPD	Make-up	Hydrocarbon
	Hydrogen	Hydrocarbon
ECD	Make-up	Water, Oxygen
TCD	Same as carrier	Moisture, Hydrocarbon, Oxygen

### Ordering Information

#### Moisture, Oxygen, and Hydrocarbon Gas Traps / Purifiers

Type	Media	Max Pressure	Purity	Capacity	Indicating	Fittings	Part No.	Unit
Moisture	Molecular Sieve 13x	100 psi	≤10 ppb water	 100 cc	Yes	1/8 in.	<a href="#">AG0-4766</a>	ea
				250 cc	Yes	1/8 in.	<a href="#">AG0-4768</a>	ea
				250 cc	Yes	1/4 in.	<a href="#">AG0-4769</a>	ea
Hydrocarbon	Impregnated carbon filter media	250 psi	Call for specific compounds	 100 cc	No	1/8 in.	<a href="#">AG0-4770</a>	ea
				100 cc	No	1/4 in.	<a href="#">AG0-4771</a>	ea
				200 cc	No	1/8 in.	<a href="#">AG0-4772</a>	ea
				200 cc	No	1/4 in.	<a href="#">AG0-4773</a>	ea
Oxygen	Proprietary	50 psi	≤1 ppb oxygen	 50 cc	Yes	1/8 in.	<a href="#">AG0-4774</a>	ea
				150 cc	Yes	1/8 in.	<a href="#">AG0-4776</a>	ea
				150 cc	Yes	1/4 in.	<a href="#">AG0-4777</a>	ea
		250 psi	≤5 ppb oxygen	 5.5 x 2 in.	No	1/8 in.	<a href="#">AG0-4792</a>	ea
				5.5 x 2 in.	No	1/4 in.	<a href="#">AG0-4791</a>	ea
Oxygen / Moisture	Proprietary	250 psi	≤15 ppb oxygen and water	 150 cc	No	1/8 in.	<a href="#">AG0-4778</a>	ea
				150 cc	No	1/4 in.	<a href="#">AG0-4779</a>	ea




 To get the greatest lifetime out of gas traps, try placing a large capacity non-indicating trap in-line before an indicating trap. Replace the large capacity trap only when the indicating trap starts to change color. Mark the color transition on the indicating trap with a marker. The color transition moves only when the large capacity trap is saturated. This gives long term savings by eliminating unnecessary maintenance and maintains quality gas.

 For maximum efficiency, flow rates for any trap should not exceed 3 L/min. Trapping efficiency will drop-off rapidly as flow rates increase.

## Tools & Maintenance Kits

### Ordering Information

#### Tools & Maintenance Kits

Description	Part No.	Unit
<b>Ferrule Remover Tool Kit</b> <ul style="list-style-type: none"> <li>• Simple, effective tools effectively remove stuck ferrules</li> <li>• Spiral-cut ratchet grabs ferrules tightly</li> <li>• Includes two tools for removing ferrules from 0.4 to 0.8 mm ID</li> </ul> 	<a href="#">AD0-4725</a>	ea
<b>Ceramic Scoring Wafers</b> <ul style="list-style-type: none"> <li>• High-quality ceramic cutting tool for fused silica columns</li> </ul> 	<a href="#">AG0-4718</a>	2/pk
<b>Flame Detector Jet Cleaning Kit</b> <ul style="list-style-type: none"> <li>• For routine maintenance of FIDs</li> <li>• Use either while flame jet has been taken apart or still installed</li> <li>• Includes: 3 jet reamers (0.008, 0.08, 0.02 in.); 1 stainless steel and 1 brass brush; 1 dual-ended pin vise</li> </ul> 	<a href="#">AD0-4723</a>	ea

**Replace. Reorder. Relax.**

Explore the new product and get the support you need  
[www.phenomenex.com/GasManagement](http://www.phenomenex.com/GasManagement)

**Zebtron™**  
Gas Management

# GC Accessories

## Test the Performance of GC Columns

- Convenient way to check column performance
- Essential tool for GC troubleshooting
- Affordable and easy to use
- Suitable for Phenomenex Zebron™ and equivalent brands
- Sealed in 2 mL glass ampules—prevent evaporation and increase shelf life
- All test mixes supplied with Certificate of Analysis

App ID 15840

**Zebtron ZB-1<sup>PLUS</sup>**  
**Part No.:** [AGO-7805](#)  
 500 µg/mL each in acetone:

1. Decane	5. Tridecane
2. 2-Ethylhexanoic Acid	6. 1-Undecanol
3. 4-Chlorophenol	7. Dicyclohexylamine
4. Naphthalene	8. Pentadecane

App ID 5160, App ID 10714

**Zebtron ZB-1, ZB-5, ZB-1HT, and ZB-5HT**  
**Part No.:** [AGO-5155](#)  
 250 µg/mL each in hexane:

1. Undecane	4. 1-Undecanol
2. 4-Chlorophenol	5. Dicyclohexylamine
3. Tridecane	6. Pentadecane

App ID 14386

**Guardian™ Integrated Guard / ZB-5**  
**Part No.:** [AGO-7549](#)  
 250 µg/mL each in acetone:

1. Decane	6. 1-Methylnaphthalene
2. 2-Ethylhexanoic Acid	7. 1-Undecanol
3. 1,6-Hexanediol	8. Tetradecane
4. 4-Chlorophenol	9. Dicyclohexylamine
5. Tridecane	

App ID 16439

**Zebtron ZB-5<sup>PLUS</sup>**  
**Part No.:** [AGO-8362](#)  
 250 µg/mL each in acetone:

1. Decane	6. 1,8-Octanediol
2. Methyl Caprylate	7. Dihexylamine
3. 1,6-Hexanediol	8. 1-Undecanol
4. 4-Chlorophenol	9. Dicyclohexylamine
5. Tridecane	10. Pentadecane

App ID 14973

**Zebtron ZB-5ms, ZB-SemiVolatiles, ZB-XLB, and ZB-XLB-HT**  
**Part No.:** [AGO-7578](#)  
 250 µg/mL each in acetone:

1. Decane	6. 1-Methylnaphthalene
2. 2-Ethylhexanoic Acid	7. 1-Undecanol
3. 1,6-Hexanediol	8. Tetradecane
4. 4-Chlorophenol	9. Dicyclohexylamine
5. Tridecane	10. Pentadecane

App ID 5162, App ID 5161

**Zebtron ZB-35, ZB-35HT, ZB-1701, and ZB-1701P**  
**Part No.:** [AGO-5156](#)  
 250 µg/mL each in hexane:

1. Undecane	5. 1-Undecanol
2. 2,4-Dimethylphenol	6. 1-Methylnaphthalene
3. 2,6-Dimethylaniline	7. Hexadecane
4. Tetradecane	

App ID 5163

**Zebtron ZB-50**  
**Part No.:** [AGO-5157](#)  
 250 µg/mL each in hexane:

1. Undecane	5. 1-Undecanol
2. Tridecane	6. 1-Methylnaphthalene
3. 2,4-Dimethylphenol	7. Hexadecane
4. 2,6-Dimethylaniline	



App ID 24917

**Zebtron ZB-624<sup>PLUS</sup>**  
**Part No.:** [AGO-9203](#)  
 250 µg/mL each in hexane:

1. Dodecane	5. 1-Methylnaphthalene
2. 2,4-Dimethylphenol	6. 1-Undecanol
3. 2,6-Dimethylaniline	7. Pentadecane
4. Tridecane	

App ID 5165

**Zebtron ZB-624**  
**Part No.:** [AGO-5159](#)  
 1000 µg/mL each in methanol:

1. 1,2-Dichloropropane	4. Chlorobenzene
2. Octane	5. Nonane
3. Tetrachloroethylene	

App ID 16214

**Zebtron ZB-WAX<sup>PLUS</sup>**  
**Part No.:** [AGO-7869](#)  
 250 µg/mL each in hexane:

1. 2-Octanone	6. Methyl decanoate	11. Methyl dodecanoate
2. Tetradecane	7. Heptadecane	12. 2,6-Dimethylaniline
3. Pentadecane	8. Methyl undecanoate	13. Nonadecane
4. 1-Octanol	9. 1-Decanol	14. 2,6-Dimethylphenol
5. Hexadecane	10. Octadecane	

App ID 5164, App ID 14326, App ID 5164

**Zebtron ZB-WAX and ZB-FFAP**  
**Part No.:** [AGO-5158](#)  
 250 µg/mL each in hexane:

1. 2-Octanone	6. 1-Decanol
2. Tetradecane	7. Methyl dodecanoate
3. 1-Octanol	8. 2,6-Dimethylaniline
4. Methyl decanoate	9. 2,6-Dimethylphenol
5. Methyl undecanoate	

App ID 18461

**Zebtron ZB-Drug-1**  
**Part No.:** [AGO-8431](#)  
 250 µg/mL each in acetone:

1. Dodecane	5. 1-Undecanol
2. Tridecane	6. 1-Methylnaphthalene
3. 4-Chlorophenol	7. Dicyclohexylamine
4. Tetradecane	8. Hexadecane

App ID 19305

**Zebtron ZB-1XT SimDist**  
**Part No.:** [AGO-8645](#)  
 1000 µg/mL each in hexane:

1. Undecane	4. 1-Undecanol
2. Dodecane	5. Dicyclohexylamine
3. Tridecane	6. Pentadecane

App ID 5158

**Grob Test Mixture**  
**Part No.:** [AGO-5154](#)  
 400 µg/mL each in methylene chloride:

1. 2,3-Butanediol	5. 1-Nonanal	9. Methyl decanoate
2. Decane	6. 2-Ethylhexanoic acid	10. Methyl undecanoate
3. Undecane	7. 2,6-Dimethylphenol	11. Dicyclohexylamine
4. 1-Octanol	8. 2,6-Dimethylaniline	12. Methyl dodecanoate

Test mix components are shown in order of elution



## Chiral LC

Chiral LC Column Types.....	188
Polysaccharide Chiral Columns.....	301
<b>Lux</b> .....	301
Additional Chiral LC Columns	
Chiral CD-Ph .....	Inquire
Chirex .....	232
Hypercarb.....	Inquire
Sumichiral OA .....	Inquire
Ultron ES .....	354

## HPLC Column Selection

Column Selection Tree .....	189
Column Selection by Application .....	190
Column Selection by Manufacturer .....	191 -192
Column Selection by Separation Mode.....	193
Column Selection by USP Specifications .....	194-197
Column Selection by Ph. Eur. Listing .....	198-203

## HPLC Column Protection

Column Performance Check Standards .....	424-425
SecurityGuard Cartridge System.....	330

## HPLC/UHPLC Columns

<b>Aeris</b> .....	204
Aqua.....	208
Asahipak .....	Inquire
<b>Axia Packed Columns</b> .....	384
BioSep .....	209
<b>Biozen</b> .....	210
Bondclone.....	231
Capcell Pak.....	Inquire
Chiral CD-Ph.....	Inquire
Chirex .....	232
<b>Clarity</b> .....	404
Columbus.....	Inquire
Cosmosil .....	Inquire
Curosil .....	Inquire
Develosil .....	Inquire
EnviroSep.....	Inquire
EZ:faast.....	Inquire
<b>Gemini</b> .....	234
Hamilton.....	Inquire
Hypercarb .....	Inquire
HyperClone.....	241
Hypersil .....	Inquire
Hypersil BDS.....	Inquire

IB-Sil.....	Inquire
InertClone .....	243
Inertsil .....	Inquire
Jupiter .....	244
<b>Kinetex</b> .....	246
Kromasil.....	Inquire
LiChrosorb .....	275
LiChrospher .....	275
<b>Luna</b> .....	276
<b>Luna Omega</b> .....	290
<b>Lux</b> .....	301
<b>Lux AMP</b> .....	311
Merck KGaA.....	Inquire
Nucleosil .....	Inquire
<b>Onyx</b> .....	313
<b>Phenogel</b> .....	315
PhenoSphere .....	Inquire
PhenoSphere-NEXT.....	Inquire
PLgel, PLRP-S.....	Inquire
PolymerX.....	321
PolySep-GFC-P .....	322
PREP/Preparative .....	383
Prodigy.....	323
<b>Rezex</b> .....	324
<b>SecurityGuard</b> .....	330
<b>SecurityGuard ULTRA</b> .....	335
Selectosil .....	Inquire
Shodex.....	338
SphereClone .....	341
Spherex.....	Inquire
Spherisorb .....	Inquire
STAR-ION A300 .....	342
Sumichiral OA Chiral .....	Inquire
<b>Synergi</b> .....	343
Ultracarb .....	354
Ultremex.....	354
Ultron ES Chiral .....	354
<b>Yarra</b> .....	355

## HPLC Accessories and Lab Safety .....

<b>SecurityCAP LC Solvent Safety Products</b> .....	417-418
-----------------------------------------------------	---------

## Nano and Micro LC

<b>Biozen nano</b> .....	225
Micro LC Columns, Traps, and Fittings .....	359





## Proteins/Peptides

Aeris .....	204
BioSep .....	209
Biozen .....	210
Jupiter .....	244
Yarra .....	355
Yarra PREP .....	358

## UHPLC Columns

Biozen for Analysis of Biologics .....	210
Kinetex 1.3 $\mu$ m, 1.7 $\mu$ m and 2.6 $\mu$ m Core-Shell Technology Columns .....	246
Luna Omega 1.6 $\mu$ m Fully Porous Columns .....	290
Aeris Core-Shell Technology for RP-LC of Proteins & Peptides .....	204
Clarity Core-Shell Columns for Synthetic DNA/RNA .....	404
SecurityGuard ULTRA Column Protection .....	335

“ At first, I honestly didn't believe the marketing claim that their Core-Shell 5 $\mu$  particles had greater efficiency than fully porous 3 $\mu$  particles. But wow! Now I can issue my awesome, cutting edge chromatography, and QC can have their jumbo, 5 $\mu$ , abuse-proof particles. Everybody wins.”

**Chester Chan**  
Nexgen Pharma, USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

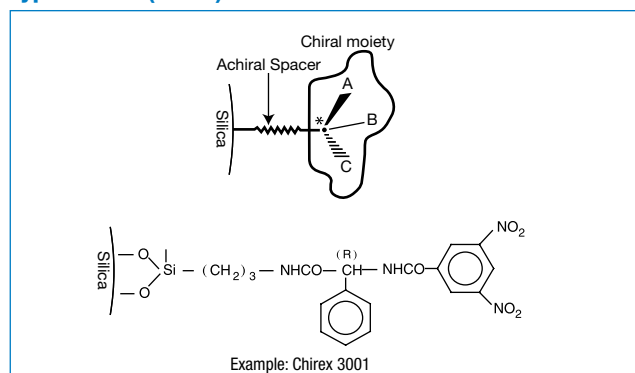
# Chiral LC Column Types

## LC Chiral Stationary Phase (CSP) Classification Diagram

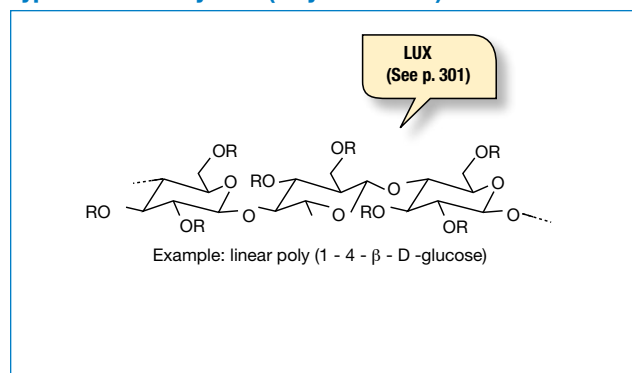
Type	Description	Chemistry	Mechanism	Brands	Page
I	Brush (Pirkle)	Low molecular weight chiral selectors Ionic or covalent bonding	Attractive interactions Hydrogen bonding Charge transfer ( $\pi$ - $\pi$ interaction) Dipole stacking	Chirex Sumichiral OA	232 Inquire
II	Helical Polymers	Cellulose and amylose derivatives	Attractive interactives Insertion complexes	Lux Cellulose and Amylose	301
III	Cavity	Cyclodextrins, Crown ether	Inclusion complexes	Chiral CD-Ph Sumichiral OA	Inquire Inquire
IV	Ligand Exchange	Amino acid-metal complex	Diastereomeric metal complex	Chirex Sumichiral OA	232 Inquire
V	Protein	$\alpha$ -acid glycoprotein Bovine Serum Albumin	Hydrophobic interactions Polar interactions	Ultron ES	354
VI	Macrocyclic	Antibiotics Glycopeptides	Hydrogen bonding Charge transfer ( $\pi$ - $\pi$ interaction) Inclusion complexation Ionic interactions Peptide bonding	None	

**Other Types** Carbon-Based (Hypercarb) and Ceramic-based (Ceramospher)

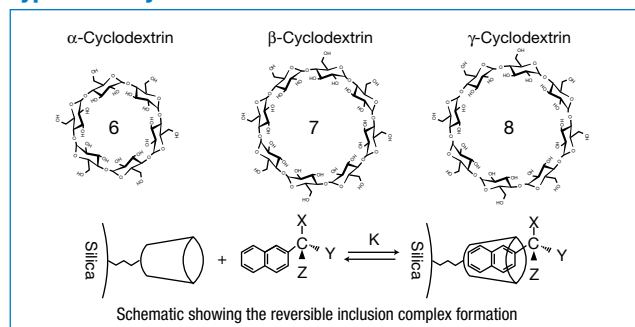
### Type I Brush (Pirkle)



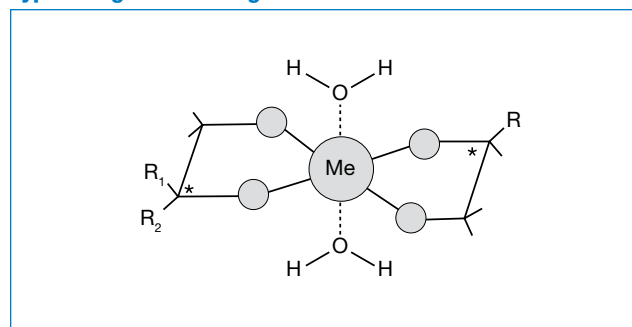
### Type II Helical Polymers (Polysaccharide)



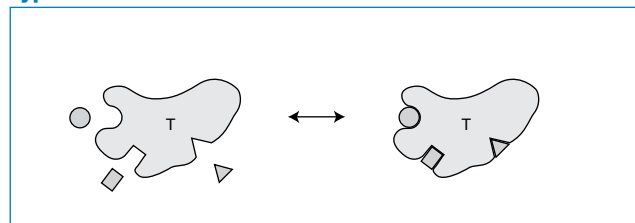
### Type III Cavity



### Type IV Ligand Exchange



### Type V Protein



# HPLC Column Selection Tree

Sample MW	Sample Solubility	Separation Mode	Our Recommended Column	Page
MW < 5000	Organic-Soluble	Hexane-Soluble	Normal Phase Adsorption	Kinetex HILIC _____ 246
			Luna Silica(2) _____ 276	
		Methanol/Methanol/H <sub>2</sub> O Soluble	Normal Phase Bonded	Luna CN, NH <sub>2</sub> , HILIC _____ 276
			Reversed Phase Bonded	Kinetex C18, EVO C18, XB-C18, C8, Phenyl-Hexyl, Biphenyl, F5, Polar C18, PS C18 _____ 246
				Synergi Max-RP, Fusion-RP _____ 343
	Chiral	Luna C8(2), C18(2) _____ 276		
	THF-Soluble	Gel Permeation GPC	Luna Omega C18, Omega PS C18, Omega Polar C18 _____ 290	
			Gemini C18, NX-C18, C6-Phenyl _____ 234	
	Aqueous-Soluble	Non ionic	Reversed Phase	Lux _____ 301
				Phenogel 50 Å, 100 Å _____ 315
			Chiral	Kinetex C18, EVO C18, XB-C18, C8, Phenyl-Hexyl, Biphenyl, F5, Polar C18, PS C18 _____ 246
				Synergi Polar-RP, Hydro-RP _____ 343
				Luna C8(2), C18(2), Luna PFP(2) _____ 276
		Ionic	Reversed Phase	Luna Omega C18, Omega PS C18, Omega Polar C18 _____ 290
				Gemini C18, NX-C18 _____ 234
Chiral			Onyx C18 _____ 313	
			Lux _____ 301	
			Ion Pairing / Reversed Phase	Kinetex C18, EVO C18, XB-C18, C8, Polar C18, PS C18 _____ 246
Ion-Exchange	Ion-Exchange	Synergi Max-RP, Hydro-RP _____ 343		
		Luna SCX, NH <sub>2</sub> _____ 276		
	HILIC	Luna C8(2), C18(2) _____ 276		
		Luna Omega C18, Omega PS C18, Omega Polar C18 _____ 290		
Chiral	Chiral	Gemini C18, NX-C18 _____ 234		
		Onyx C18 _____ 313		
Peptides	Reversed Phase	Biozen WCX _____ 210		
		Luna SCX, NH <sub>2</sub> _____ 276		
MW > 5000	Organic-Soluble	Gel Permeation Chromatography (GPC)	PhenoSphere SAX _____ Inquire	
			Unknown MW Range	Kinetex HILIC _____ 246
			Phenogel Linear (2) _____ 315	
			Known MW Range	Luna HILIC, NH <sub>2</sub> , Silica(2) _____ 276
			Shodex GPC _____ 338	
	Aqueous-Soluble	Gel Filtration Aqueous GFC/SEC	pH 2-7.5	Biozen Intact XB-C8 _____ 210
				Yarra SEC Series _____ 355
				BioSep-SEC-S Series _____ 209
			pH > 7.5	PolySep-GFC-P _____ 322
				Ion-Exchange
		Anion-Exchange	Luna SCX _____ 276	
		Reversed Phase	pH 2-9	Shodex IEC DEAE _____ 338
				Biozen Intact XB-C8 _____ 210
				Aeris WIDEPORE C4, XB-C8, XB-C18 _____ 204
			pH > 9	Jupiter 300 C4, C5, C18 _____ 244
Hamilton PRP-3 _____ Inquire				
Hydrophobic Interaction (HIC)	Hydrophobic Interaction (HIC)	Shodex HIC _____ 338		

# HPLC Column Selection by Application

This table is to aid you in selecting the right column for your application. For application notes or method development assistance please call your technical representative.

Amino Acids	Page
Phenomenex EZ:faast (GC and LC-MS)	Inquire
Phenomenex Chirex (chiral)	232
Phenomenex Lux (chiral)	301
Phenomenex Kinetex EVO C18 ( FMOc or OPA derivatized)	246
Anions	
Phenomenex Luna NH <sub>2</sub>	276
Phenomenex STAR-ION A300	342
Phenomenex Lux (chiral)	301
Phenomenex PhenoSphere SAX	Inquire
Hamilton PRP	Inquire
Shodex IC	338
Phenomenex Rezex ROA-Organic Acid	324
Antibiotics	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Synergi	343
Biotechnology/Life Sciences	
Phenomenex Aeris WIDEPORE / PEPTIDE	204
Phenomenex Biozen WidePore C4	210
Phenomenex Biozen Intact XB-C8	210
Phenomenex Clarity	404
Phenomenex Jupiter 300/Jupiter Proteo	244
Phenomenex Biozen dSEC-2	210
Phenomenex BioSep-SEC-S	209
Phenomenex Yarra SEC	355
Phenomenex PolySep-GFC-P	322
Phenomenex Luna SCX	276
Phenomenex Biozen Peptide PS-C18/XB-C18	210
Phenomenex Luna NH <sub>2</sub>	276
Phenomenex Biozen Glycan	210
Phenomenex Biozen WCX	210
Shodex GFC, KW	338
Carbohydrates	
Phenomenex Rezex	324
Phenomenex Luna Omega SUGAR	290
Phenomenex Luna NH <sub>2</sub>	276
Shodex SUGAR	338
Cations	
Phenomenex Luna SCX	276
Phenomenex Biozen WCX	210
Hamilton PRP	Inquire
Enantiomers (Chiral)	
Phenomenex Lux	301
Phenomenex Chirex	232
Environmental (Carbamates, PAHs, Explosives)	
Phenomenex Zebron (GC)	87
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Synergi	343
Foods, Flavors and Fragrances	
Phenomenex Rezex	324
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Luna	276
Phenomenex Luna Omega SUGAR	290
Phenomenex Lux (chiral)	301
Phenomenex Synergi	343
Phenomenex Zebron (GC)	87

Nucleosides and Nucleotides	Page
Phenomenex Kinetex EVO C18	246
Phenomenex Luna NH <sub>2</sub> , SCX	276
Phenomenex Luna Omega Polar C18, Luna Omega PS C18	290
Phenomenex Synergi Polar-RP	343
Phenomenex PhenoSphere SAX	Inquire
Oligonucleotides	
Phenomenex Biozen Oligo	210
Phenomenex Clarity Oligo-XT	404
Phenomenex Clarity Oligo-RP	404
Phenomenex Clarity Oligo-MS	404
Phenomenex Aeris WIDEPORE	204
Organic Acids	
Phenomenex Luna Omega PS C18	290
Phenomenex Rezex	324
Phenomenex Synergi Hydro-RP	343
Peptides/Proteins	
Phenomenex Aeris WIDEPORE / PEPTIDE	204
Phenomenex Biozen Peptide PS-C18/XB-C18	210
Phenomenex Biozen WidePore C4	210
Phenomenex Jupiter 300/Jupiter Proteo	244
Phenomenex Biozen dSEC-2	210
Phenomenex Biozen Glycan	210
Phenomenex Biozen Intact	210
Phenomenex Luna SCX, NH <sub>2</sub>	276
Phenomenex Yarra SEC	355
Phenomenex BioSep-SEC-S	209
Phenomenex Biozen WCX	210
Pesticides, Herbicides, and Dioxins	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Zebron (GC)	87
Pharmaceuticals	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Lux (chiral)	301
Phenomenex Chirex (chiral)	232
Polymers, Plastics, Rubber	
Phenomenex Zebron (GC)	87
Phenomenex Phenogel	315
Vitamins	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Taxanes	
Phenomenex Kinetex F5	246
Phenomenex Luna PFP(2)	276
Textiles/Dyes	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Phenogel GPC	315



# HPLC Column Selection by Manufacturer

In recognizing the tremendous difficulty the chromatographer has in choosing from literally hundreds of columns and to aid in your selection of alternative materials from different manufacturers, an HPLC column selection guide is presented below.

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list, and the accuracy of the data is not guaranteed.

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
<b>Agilent Technologies / Varian / Polymer Labs</b>		
Advanced AAA	Gemini	Kinetex EVO
Advanced Bio Glycan	Biozen Glycan	—
Advanced Bio SEC	Yarra	Biozen dSEC
Advanced Bio PEPTIDE plus	Biozen Peptide XB-C18	Biozen Peptide PS-C18
Advanced Bio RP-Ab	Aeris WIDEPORE	Biozen WidePore C4
Advanced Bio Oligonucleotide	Clarity Oligo-XT	Biozen Oligo
Bio MAb (WCX)	Biozen WCX	—
Bio SEC	BioSep-SEC-S	Biozen dSEC-2
Chiradex	Shiseido Chiral CD-pH	—
HC-C18(2)	Luna C18(2)	Synergi Hydro-RP
MetaSil	Prodigy	Luna
MetaSil AQ C18	Aqua C18	Synergi Hydro-RP
Microsorb	Luna	Synergi
Microsorb 300 Å	Jupiter 300	Aeris WIDEPORE
PL-Aquagel-OH	PolySep GFC-P	Shodex OHPak SB-800H
PLgel	Phenogel	Phenogel
PL Hi-PLEX	Rezex	Rezex
PLRP-S	PolymerX RP-1	Gemini NX-C18
PLRP-S 300 Å	Hamilton PRP-3	Aeris WIDEPORE
PlusPore	Phenogel	Phenogel
Polaris C18 Amide, C8 Ether	Luna Omega Polar C18	Synergi Fusion-RP
Poroshell 300	Aeris WIDEPORE	Biozen WidePore C4
Poroshell 120	Kinetex	Kinetex
ProSEC 300S	Yarra	Biozen dSEC
Pursuit	Luna	Synergi
Pursuit DiPhenyl	Kinetex Biphenyl	Gemini C6-Phenyl
Pursuit PAH	Kinetex PAH	—
Pursuit XRs	Luna	Kinetex
Taxsil (1, 2, 3)	Luna PFP(2)	Kinetex F5
TC-C18(2)	Synergi Hydro-RP	Luna C18(2)
ZORBAX Eclipse AAA	Gemini C18	Kinetex EVO
ZORBAX Eclipse-XDB	Luna	Kinetex
ZORBAX Eclipse Plus	Gemini	Kinetex EVO C18
ZORBAX Rapid Resolution HT	Kinetex	Luna Omega
ZORBAX PrepHT	Luna(3) 10 µm	Luna 10 µm PREP
ZORBAX Rx	HyperClone	Luna
ZORBAX SB 80 Å	Kinetex XB-C18	Luna
ZORBAX SB 300 Å	Jupiter 300	Aeris WIDEPORE / Biozen Intact
ZORBAX SB Aq	Synergi Hydro-RP	Synergi Hydro-RP
ZORBAX GF (BioSeries)	BioSep-SEC-S	Biozen dSEC-2
ZORBAX Extend-C18	Gemini NX-C18	Kinetex EVO C18
ZORBAX 300 Extend	Jupiter 300	Aeris WIDEPORE
ZORBAX Bonus RP	Synergi Fusion-RP	Synergi Hydro-RP
ZORBAX Oligo	Clarity Oligo-RP	Clarity Oligo-MS
ZORBAX Carbohydrate	Luna NH <sub>2</sub> / Luna Omega SUGAR	Rezex
<b>Hichrom Ltd.</b>		
Alltima	Luna	Luna Omega
Alltima HP	Luna	Kinetex
Apex	Luna	Kinetex
Apollo	Luna	Kinetex
Genesis	Luna	Gemini
Prevail	Synergi	Luna Omega Polar
Vydac	Jupiter	Aeris
<b>Bio-Rad</b>		
Aminex	Rezex	Rezex
Macro-Prep	Biozen WCX	Shodex IEC
Nuvia	—	Shodex IEC
UNOsphere	Biozen WCX	Shodex IEC

\* Alternative - This category indicates an alternative column which will likely give a similar selectivity.

\*\* Recommended Alternative - This category indicates an alternative column which may yield somewhat different selectivity but may also lead to improved resolution.

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
<b>Chiral Technologies/DAICEL Corporation</b>		
CHIRALCEL AY-H	Lux Amylose-2	Lux Cellulose-2
CHIRALCEL OD-H	Lux Cellulose-1	Lux Cellulose-2
CHIRALCEL OJ-H	Lux Cellulose-3	Lux Cellulose-4
CHIRALCEL OX-H	Lux Cellulose-4	Lux Cellulose-2
CHIRALCEL OZ-H	Lux Cellulose-2	Lux Cellulose-4
CHIRALPAK AD-H	Lux Amylose-1	Lux Amylose-2
CHIRALPAK IA	Lux i-Amylose-1	—
CHIRALPAK IC	Lux i-Cellulose-5	—
CHIRALPAK IG	Lux i-Amylose-3	—
<b>E.S. Industries</b>		
Aquasep	Synergi Fusion-RP	Synergi Hydro-RP
Chromegabond	Nucleosil	Luna
Chromegabond HC	Ultracarb ODS (30)	Synergi Hydro-RP
Chromegabond BAS	Synergi Fusion-RP	Synergi Hydro-RP
Chromegabond WR	Luna	Gemini
Chromegapore	Yarra	Biozen dSEC
Epic	Synergi 2.5 µm	Kinetex
Epic Polar	Kinetex Biphenyl	Synergi Hydro-RP
FluoroSep-RP Phenyl	Luna Phenyl-Hexyl	Kinetex Phenyl-Hexyl
FluoroSep-RP Octyl	—	Kinetex C8
Gammabond C1	PhenoSphere C1	—
Gammabond C8, C18	Luna C8(2), C18(2)	Kinetex C8, C18
MacroSep BIO-Gold	Aeris	Biozen
MacroSep	Jupiter	Aeris WIDEPORE
Protec-RP	Synergi Fusion-RP	Synergi Hydro-RP
RingSep	Kinetex PAH	—
<b>GL Sciences</b>		
Inertsil ODS-Prep-100 Å	Luna 10 µm PREP C18(2)	Luna 10 µm C18(2)
Inertsil ODS(2)	Prodigy ODS(2)	Luna C18(2)
Inertsil ODS(3)	Prodigy ODS(3)	Luna C18(2)
Inertsil ODS(4)	Kinetex XB-C18	Synergi Max-RP
Inertsil Peptide C18	Aeris PEPTIDE	Luna Omega PS C18
Inertsil 300 Å WP300 C8	Jupiter C5	Aeris WIDEPORE C8 / Biozen Intact XB-C8
InertSustain	Gemini NX-C18	Kinetex EVO C18
InertSustain AQC18	Luna Omega Polar C18	Kinetex Polar C18
InertSustain Swift C18 (200Å)	Gemini NX-C18	Kinetex EVO C18
<b>MAC-MOD/Bischoff/ACT/Advanced Materials Technology</b>		
ACE C18	Gemini NX-C18	Kinetex XB-C18
ACE-AQ	Synergi Fusion-RP	Luna Omega Polar C18
ACE-300 A	Jupiter 300	Aeris WIDEPORE
ACE Excel	Gemini NX-C18	Kinetex EVO
ACE Ultracore	Kinetex	Luna Omega
HALO	Kinetex	Luna Omega
HALO Bioclass	Aeris	Biozen
HALO Glycan	Biozen Glycan	Biozen Glycan
HALO Peptide ES-C18	Aeris WIDEPORE XB-C18	Biozen Peptide
HALO Protein	Aeris WIDEPORE	Biozen WidePore C4
HALO Penta-HILIC	Kinetex HILIC	Luna HILIC
Hydrobond	Synergi Fusion-RP	Luna Omega Polar C18
Pronto Pearl	Luna Omega	Kinetex
ProntoSIL 120 Å	Luna C18(2)	Kinetex
ProntoSIL 300 Å	Jupiter 300	Aeris WIDEPORE
ProntoSIL Aq 120 Å	Synergi Hydro-RP	—
ProntoSIL Aq PLUS	Synergi Hydro-RP	Luna Omega Polar C18
ProntoSIL SH 120 Å	Gemini NX-C18	Luna C18(2)
ProntoSIL ACE-EPS	Synergi Hydro-RP	Luna Omega Polar C18
ProntoSIL Chiral AX	—	Chirex
ProntoSIL C30	Develosil C30	Luna Phenyl-Hexyl
Partisil	Luna	Synergi
Partisphere	Luna	Synergi
Ultrasphere	Luna	Synergi
<b>Restek</b>		
Allure	Ultracarb ODS (30)	Luna C18(2)
Force	Luna Omega	Kinetex
Pinnacle DB	HyperClone	Luna C18(2)
Pinnacle Ultra C18	Ultracarb ODS (20)	Luna C18(2)
Pinnacle II	HyperClone BDS	Luna C18(2)
Roc	Luna	Luna Omega
Raptor	Kinetex	Synergi
Ultra Aqueous	Synergi Hydro-RP	Luna Omega Polar C18
Ultra Aromax	Luna Phenyl-Hexyl	Kinetex Biphenyl
Ultra II	Kinetex	Synergi
Viva	Aeris WIDEPORE	Biozen WidePore C4

continued



# HPLC Column Selection by Manufacturer

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list, and the accuracy of the data is not guaranteed.

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
<b>Supelco / Sigma-Aldrich / MilliporeSigma / Sepax Technologies</b>		
Ascentis	Synergi	Gemini NX-C18
Ascentis Express	Kinetex	Luna Omega
Ascentis Peptide	Biozen Peptide	Aeris PEPTIDE
Astec	Lux	—
BIOShell	Aeris WIDEPORE	Jupiter
Chromolith	Onyx	Onyx
Discovery Bio	Biozen Intact	Aeris WIDEPORE
Discovery HSF5	Luna PFP(2)	Kinetex F5
Discovery HSC18	Luna C18(2)	Kinetex C18
Discovery C18	Luna C18(2)	Kinetex C18
Discovery RP C16 Amide	Synergi Fusion-RP	Synergi Fusion-RP
Discovery (C18, C16)	Synergi Hydro-RP	Luna Omega
Supelco ABZ, ABZ+	Luna C8(2)	Luna C18(2)
Supelco LC-18-T	Prodigy (3)	Luna C18(2)
Supelco LC-18-S	Prodigy (3)	Luna C18(2)
Supelco LC-F	Luna PFP(2)	Kinetex F5
Supelco LC-PAH	—	Synergi Hydro-RP
Supelcosil LC	Luna C18(2)	Synergi Hydro-RP
Supelcogel	Rezex	Rezex
Supelcogel ODP-50	Asahipak ODP-50	Luna C18(2)
Supelcosil LC-DB	HyperClone BDS	Synergi Hydro-RP
Supelcosil LC-304/308/318	Jupiter 300	Aeris WIDEPORE
Supelcosil LC-NH <sub>2</sub> -NP	—	Luna NH <sub>2</sub>
Supelcosil LC-PCN	Luna CN	—
Supelcosil LC-SAX	PhenoSphere SAX	—
Supelcosil LC-SCX	PhenoSphere SCX	Luna SCX
Titan	Luna Omega	Kinetex
Unix SEC	Yarra	Yarra
SRT GFC	Yarra	Yarra
Zenix GFC	Yarra	Yarra
<b>Thermo Fisher Scientific / Thermo Scientific Dionex</b>		
Acclaim 120	Luna	Kinetex
Acclaim 300	Jupiter	Aeris WIDEPORE
Acclaim HILIC-10	Luna HILIC	Kinetex HILIC
Acclaim PA	Synergi Fusion-RP	Luna Omega Polar C18
Acclaim PA 2	Synergi Fusion-RP	Luna Omega Polar C18
Acclaim PepMap 300Å	Biozen	Aeris
Acclaim OA	Synergi Hydro-RP	Synergi Fusion-RP
Acclaim Surfactant	—	Gemini
Accucore	Kinetex	Luna Omega PS C18
Accucore Vanquish C18+	Kinetex EVO	Luna Omega PS C18
AminoPac PA	—	—
Aquasil	Synergi Hydro-RP	—
BetaBasic	Luna	Kinetex
BioBasic SEC	Yarra	Biozen dSEC
BioBasic IEX	Shodex IEC	Biozen WCX
BioBasic RP	Jupiter 300	Aeris WIDEPORE
BETASIL	Prodigy (3)	Luna
BetaMax	Luna	Gemini
BETASIL Phenyl-Hexyl	Luna Phenyl-Hexyl	Kinetex Phenyl-Hexyl
Carbamate	Synergi Fusion-RP	Synergi Hydro-RP
CarboPac (MA, PA)	—	Rezex
Deltabond	Luna C18(2)	Synergi Max-RP
DNAPac	Asahipak IEC	—
DNASwift	Clarity Oligo-RP	Biozen Oligo
Fluophase	Luna PFP(2)	Kinetex F5
GlycanPac	Biozen Glycan	Biozen Glycan
Hypercarb	—	Gemini
HyperREZ XP	Rezex	Rezex
Hypersil GOLD	Luna	Kinetex
Hypersil GOLD aQ C18	Luna Omega Polar C18	Synergi Hydro-RP
Hypersil Green	—	Synergi Hydro-RP
Hypersil	HyperClone	Synergi Max-RP
HYPURITY	Luna	Kinetex
HYPURITY ADVANCE	Synergi Fusion-RP	Luna Omega
HYPURITY AQUASTAR	Synergi Fusion-RP	Luna Omega

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
<b>Thermo Fisher Scientific / Thermo Scientific Dionex (cont'd)</b>		
Ionpac AS series	STAR-ION A300	Shodex IC series
IonPac CS series	Shodex IC series	Hamilton PRP-X200
IonPac ICE AS series	Rezex ROA	Rezex ROA
IonPac IonSwift	—	Star-Ion
MAB Pac SEC-1	Biozen dSEC	Yarra
OmniPac	—	Luna SCX
Pep Map 300	Biozen Intact	Aeris
Prism RP	Synergi Hydro-RP	Luna Omega Polar C18, PS C18
ProPac	Biozen WCX	Shodex IEC
Synchronis	Luna	Kinetex
<b>Waters</b>		
ACQUITY APC	—	Phenogel
ACQUITY BEH	Luna Omega C18	Synergi 2.5 µm
ACQUITY CSH	Luna Omega PS C18	Kinetex EVO
ACQUITY Protein BEH SEC	Yarra	Yarra
ACQUITY UPC2	—	Kinetex
ACQUITY UPLC Glycan BEH Amide	Biozen Glycan	—
ACQUITY UPLC PEPTIDE BEH	Biozen Peptide XB-C18	Aeris PEPTIDE XB-C18
ACQUITY UPLC PEPTIDE CSH	Biozen Peptide PS-C18	Aeris PEPTIDE XB-C18
ACQUITY UPLC Oligonucleotide BEH C18	Clarity	Biozen Oligo
Atlantis	Synergi Fusion-RP	Synergi Hydro-RP
BioSuite IEX	Shodex IEC	—
BioSuite SEC	Yarra	Biozen dSEC
BioSuite RPC	—	Jupiter 300
Carbamate	—	Synergi Hydro-RP
Carbohydrate	Luna NH <sub>2</sub>	Luna Omega SUGAR
CORTECS	Kinetex	Kinetex
Deltapak 100A	—	Luna
Deltapak 300A	Aeris	Biozen Intact
GST	—	Luna HILIC
IC-pak	Hamilton PRP-X100	STAR-ION A300
µBondapak	Bondclone	Synergi Hydro-RP
µPorasil	Bondclone Silica	Luna Silica
µStyragel	Phenogel	Phenogel
Novapak 4 µm	—	Synergi Hydro-RP
OST	Clarity Oligo-XT	Biozen Oligo
PAH C18	Kinetex PAH	—
Protein-Pak IEC	Shodex IEC	—
Protein-Pak SW	Yarra	Biozen dSEC
PrST	Aeris WIDEPORE	Biozen WidePore C4
PST	Aeris PEPTIDE	Biozen Peptide
Resolve	PhenoSphere	Luna
Spherisorb	SphereClone	Synergi Hydro-RP
Sugar-pak	Rezex	Rezex
SunFire	Luna	Kinetex
Symmetry C18, C8	Luna C18(2), C8(2)	Synergi Max-RP
Symmetry Shield C18, C8	Synergi Fusion-RP	Synergi Hydro-RP
Symmetry 300	Jupiter	Biozen WidePore
Styragel	Phenogel	Phenogel
UltraStyragel	Phenogel	Phenogel
Ultrahydrogel	PolySep-GFC-P	Shodex OHPak SB
XBridge	Gemini NX-C18	Kinetex EVO C18
XBridge Glycan BEH Amide	Biozen Glycan	—
XBridge Oligonucleotide BEH C18	Clarity	Clarity
XSelect	Luna Omega PS C18	Kinetex
XTerra MS	Gemini	Kinetex EVO C18
XTerra RP	Gemini	Kinetex EVO C18

\* Alternative - This category indicates an alternative column which will likely give a similar selectivity.

\*\* Recommended Alternative - This category indicates an alternative column which may yield somewhat different selectivity but may also lead to improved resolution.

# HPLC Column Selection by Separation Mode

This table is to aid you in selecting the right column from Phenomenex for the separation mode you desire. For specific application notes or method development assistance please call your Phenomenex technical consultant.

Separation Mode	Page
<b>Adsorption Chromatography</b>	
Phenomenex Kinetex HILIC	246
Phenomenex Luna Silica(2)	276
<b>Chiral Chromatography</b>	
Phenomenex Lux	301
Phenomenex Chirex	232
Shinwa Ultron ES	354
Sumika Sumichiral OA	Inquire
<b>Gel Filtration Chromatography</b>	
Phenomenex Biozen dSEC	210
Phenomenex Yarra SEC (silica)	355
Phenomenex BioSep SEC/GFC (silica)	209
Phenomenex PolySep GFC-P (polymer)	322
Shodex GFC OHpak SB, Sugar KS, Protein KW	338
<b>Gel Permeation Chromatography</b>	
Phenomenex Phenogel	315
Shodex GPC, KF	338
<b>Hydrophilic Interaction Chromatography (HILIC)</b>	
Phenomenex Biozen Glycan	210
Phenomenex Kinetex HILIC	246
Phenomenex Luna HILIC	276
Phenomenex Luna NH <sub>2</sub>	276
Phenomenex Luna Silica(2)	276
Phenomenex Luna Omega SUGAR	290
<b>Hydrophobic Interaction Chromatography (HIC)</b>	
Shodex HIC	338
<b>Ion-Exclusion Chromatography</b>	
Phenomenex Rezex	324
Shodex RSpak, SUGAR	338
<b>Ion-Exchange Chromatography</b>	
Phenomenex Biozen WCX	210
Phenomenex Luna SCX, Luna NH <sub>2</sub>	276
Phenomenex PhenoSphere SAX	Inquire
Phenomenex Rezex	324
Macherey-Nagel Nucleosil SAX, SB	Inquire
Shodex IEC	338
Shodex RSpak KC-811	338
<b>Ion Chromatography</b>	
Phenomenex STAR-ION A300	342
Hamilton PRP	Inquire
Shodex IC	338
<b>Ligand Exchange Chromatography</b>	
Phenomenex Rezex	324
Phenomenex Biozen WCX	210
Shodex SUGAR	338

Separation Mode	Page
<b>Multi-Mode Chromatography</b>	
Phenomenex Luna SCX	276
Phenomenex Luna NH <sub>2</sub>	276
<b>Normal Phase Chromatography</b>	
Phenomenex Kinetex HILIC	246
Phenomenex Luna CN, NH <sub>2</sub> , Silica(2)	276
<b>Reversed Phase Chromatography</b>	
Phenomenex Kinetex	246
Phenomenex Luna Omega	290
Phenomenex Luna	276
Phenomenex Biozen	210
Phenomenex Gemini	234
Phenomenex Synergi	343
Phenomenex Aeris	204
Phenomenex Bondclone	231
Phenomenex Clarity	404
Phenomenex Gemini NX	234
Phenomenex HyperClone	241
Phenomenex Jupiter	244
Phenomenex Onyx	313
Phenomenex PolymerX	321
Phenomenex Prodigy	323
Phenomenex SphereClone	341
GL Sciences Inertsil	Inquire
Hamilton PRP	Inquire
Macherey-Nagel Nucleosil	Inquire
Merck KGaA LiChrospher, Superspher	275
Waters Spherisorb	Inquire

# HPLC Column Selection by USP Listing

For each United States Pharmacopeia (USP) column specification, you will find listed the most suitable Phenomenex column.

It is widely understood that all HPLC packings are not alike, and no single column can perform a myriad of desired separations. HPLC packings differ in hydrophobicity, surface coverage, surface area, pore size and particle shape.

The USP does give chromatographers the flexibility to make adjustments to Monographs. As you can read below, column manufacturers or sources and materials stated in USP Monographs are only recommendations. Chromatographers can and should change and adapt the Monograph's specifications to yield the most satisfactory analytical results.

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
L1 Octadecyl silane chemically bonded to porous or non-porous silica or ceramic microparticles, 1.5 to 10 µm in diameter, or a monolithic rod.	Kinetex® C18	Core-Shell	246
	Kinetex EVO C18	Core-Shell	246
	Kinetex Polar C18	Core-Shell	246
	Kinetex PS C18	Core-Shell	246
	Kinetex XB-C18	Core-Shell	246
	Luna® C18(2)	Spherical	276
	Luna Omega C18	Spherical	290
	Luna Omega PS C18	Spherical	290
	Luna Omega Polar C18	Spherical	290
	Gemini® NX-C18	Spherical	234
	Gemini C18	Spherical	234
	Synergi™ Hydro-RP	Spherical	343
	Synergi Fusion-RP	Spherical	343
	Biozen™ Peptide PS-C18	Spherical	210
	Onyx™ C18	Monolith	313
	Jupiter® C18	Spherical	244
	Clarity® Oligo-RP	Spherical	404
Clarity Oligo-MS	Core-Shell	404	
Clarity Oligo-XT	Core-Shell	404	
Aeris™ WIDEPORE XB-C18	Core-Shell	204	
Biozen Peptide XB-C18	Core-Shell	210	
L2 Octadecyl silane chemically bonded to silica gel of a controlled surface porosity that has been bonded to a solid spherical core, 30 to 50 µm in diameter.			
L3 Porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex HILIC	Core-Shell	246
	Luna Silica(2)	Spherical	276
	Onyx Silica	Monolith	313
L4 Silica gel of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter.			
L5 Alumina of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter.			
L6 Strong cation-exchange packing: sulfonated fluorocarbon polymer coated on a solid spherical core, 30 to 50 µm in diameter.			
L7 Octyl silane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex C8	Core-Shell	246
	Luna C8(2)	Spherical	276
	Onyx C8	Monolith	313
	Biozen Intact XB-C8	Core-Shell	210
L8 An essentially monomolecular layer of aminopropyl-silane chemically bonded to totally porous silica gel support, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna NH <sub>2</sub>	Spherical	276
	Luna Omega SUGAR	Spherical	290
L9 Irregular or spherical, totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating, 3 to 10 µm in diameter.	Luna SCX	Spherical	276
L10 Nitrile groups chemically bonded to porous silica particles or superficially porous particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna CN	Spherical	276
L11 Phenyl groups chemically bonded to porous silica particles or superficially porous particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex Biphenyl	Core-Shell	246
	Kinetex Phenyl-Hexyl	Core-Shell	246
	Synergi Polar-RP	Spherical	343
	Luna Phenyl-Hexyl	Spherical	276
	Gemini C6-Phenyl	Spherical	234
	Prodigy PH-3	Spherical	323
L12 Strong anion-exchange packing made by chemically bonding a quaternary amine to a solid silica spherical core, 30 to 50 µm in diameter.			
L13 Trimethylsilane chemically bonded to porous silica particles, 3 to 10 µm in diameter.	Develosil® TMS-UG (C1) 130 Å	Spherical	Inquire
L14 Silica gel having a chemically bonded, strongly basic quaternary ammonium anion-exchange coating, 5 to 10 µm in diameter.	PhenoSphere™ SAX	Spherical	Inquire
L15 Hexyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter.	PhenoSphere C6	Spherical	Inquire
L16 Dimethyl silane chemically bonded to porous silica particles, 5 to 10 µm in diameter.			
L17 Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 6 to 12 µm in diameter.	Rezex™ RHM-Monosaccharide	Spherical	324
	Rezex ROA-Organic Acid	Spherical	324
L18 Amino and cyano groups chemically bonded to porous silica particles, 3 to 10 µm in diameter.			
L19 Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 5 to 15 µm in diameter.	Rezex RCM-Monosaccharide	Spherical	324
	Rezex RCU-Sugar Alcohols	Spherical	324
L20 Dihydroxypropane groups chemically bonded to porous silica or hybrid particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna HILIC	Spherical	276
	BioSep™-SEC-S	Spherical	209
	Yarra™ SEC	Spherical	355
L21 A rigid, spherical styrene-divinylbenzene copolymer, 3 to 30 µm in diameter.	PolymerX™ RP-1	Spherical	321
	Phenogel™ 100 Å	Spherical	315
L22 A cation-exchange resin made of porous polystyrene gel with sulfonic acid groups, 5 to 15 µm in diameter.	Rezex ROA-Organic Acid	Spherical	324
L23 An anion-exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, 7-12 µm in size.	Shodex® IEC QA-825	Spherical	338
L24 Polyvinylalcohol chemically bonded to porous silica particles, 5 µm in diameter.			
L25 Packing having the capacity to separate compounds with a MW range from 100 to 5000 daltons (as determined by polyethylene oxide), applied to neutral, anionic, and cationic water-soluble polymers. A polymethacrylate resin base, crosslinked with poly-hydroxylated ether (surface contained some residual carboxyl functional groups) was found suitable.	PolySep™-GFC-P2000	Spherical	322
	Shodex OHpak SB-802.5HQ	Spherical	338

# HPLC Column Selection by USP Listing

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
L26	Butyl silane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter.	Jupiter 300 C4 Biozen WidePore C4	Spherical Core-Shell 244 210
L27	Porous silica particles, 30 to 50 µm in diameter.	Sepra Silica	Irregular 401
L28	A multifunctional support, which consists of a high purity, 100Å, spherical silica substrate that has been bonded with anionic exchanger, amine functionality in addition to a conventional reversed phase C8 functionality.		
L29	Gamma alumina, reversed phase, low carbon percentage by weight, alumina-based polybutadiene spherical particles, 5 µm diameter with a pore volume of 80Å.		
L30	Ethyl silane chemically bonded to a totally porous silica particle, 3 to 10 µm in diameter.		
L31	A hydroxide-selective, strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 8.5 µm macroporous particles having a pore size of 2000Å and consisting of ethylvinylbenzene cross-linked with 55% divinyl benzene.		
L32	A chiral ligand-exchange resin packing-L-proline copper complex covalently bonded to irregularly shaped silica particles, 5 to 10 µm in diameter.		
L33	Packing having the capacity to separate dextrans by molecular size over a range of 4,000 to 500,000 daltons. It is spherical, silica-based and processed to provide pH stability.	Yarra SEC-2000 BioSep-SEC-S2000 Yarra SEC-3000 BioSep-SEC-S3000	Spherical Spherical Spherical Spherical 355 209 355 209
L34	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, 7 to 9 µm in diameter.	Rezex RPM-Monosaccharide	Spherical 324
L35	A zirconium-stabilized spherical silica packing with a hydrophilic (diol-type) molecular monolayer bonded phase having a pore size of 150Å.	(BioSep-SEC-S2000 or Yarra SEC-2000 may be used)	Spherical Spherical 209 355
L36	3,5-dinitrobenzoyl derivative of L-phenylglycine covalently bonded to 5 µm aminopropyl silica.		
L37	Polymethacrylate gel packing having the capacity to separate proteins by molecular size over a range of 2,000 to 40,000 daltons.	PolySep-GFC-P3000 Shodex OHpak SB-803HQ	Spherical Spherical 322 338
L38	Methacrylate-based size-exclusion packing for water-soluble samples.	PolySep-GFC-P series Shodex OHpak SB-800HQ	Spherical Spherical 322 338
L39	Hydrophilic polyhydroxymethacrylate gel of totally porous spherical resin.	PolySep-GFC-P series Shodex OHpak SB-800HQ series Shodex RSpak DM-614	Spherical Spherical Spherical 322 338 338
L40	Cellulose tris-3,5-dimethylphenylcarbamate coated porous silica particles, 3 µm to 20 µm in diameter.	Lux Cellulose-1	Spherical 301
L41	Immobilized α <sub>1</sub> -acid glycoprotein on spherical silica particles, 5 µm in diameter.		
L42	Octylsilane and octadecylsilane groups chemically bonded to porous silica particles, 5 µm in diameter.		
L43	Pentafluorophenyl groups chemically bonded to silica particles or superficially porous particles, by a propyl spacer, 1.5 to 10 µm in diameter.	Kinetex F5 Luna PFP(2)	Core-Shell Spherical 246 276
L44	A multifunctional support, which consists of a high purity, 60Å, spherical silica substrate that has been bonded with a cationic exchanger, sulfonic acid functionality in addition to a conventional reversed phase C8 functionality.		
L45	Beta cyclodextrin, R, S-hydroxypropyl ether derivative, bonded to porous silica particles, 3 to 10 µm in diameter	Shiseido Chiral CD-Ph	Spherical Inquire
L46	Polystyrene/divinylbenzene substrate agglomerated with quaternary amine functionalized latex beads, about 9 to 11 µm in diameter.		
L47	High capacity anion-exchange microporous substrate, fully functionalized with a trimethylamine group, 8 µm in diameter.		
L48	Sulfonated, cross-linked polystyrene with an outer layer of submicron, porous, anion-exchange microbeads, 5 to 15 µm in diameter.		
L49	A reversed phase packing made by coating a thin layer of polybutadiene on to spherical porous zirconia particles, 3 to 10 µm in diameter.		
L50	Multifunction resin with reversed phase retention and strong anion-exchange functionalities. The resin consists of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 3 to 15 µm in diameter, and a surface area of not less than 350 m <sup>2</sup> /g. Substrate is coated with quaternary ammonium functionalized latex particles consisting of styrene cross-linked with divinylbenzene.		
L51	Amylose tris-3,5-dimethylphenylcarbamate-coated, porous, spherical, silica particles, 3 to 10 µm in diameter.	Lux Amylose-1	Spherical 301
L52	A strong cation-exchange resin made of porous silica with sulfoethyl or sulfoethyl groups, 1 to 10 µm in diameter.		
L53	Weak cation-exchange resin consisting of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 3 to 15 µm diameter. Substrate is surface grafted with carboxylic acid and/or phosphoric acid functionalized monomers. Capacity not less than 500 µEq/column.		
L54	A size exclusion medium made of covalent bonding of dextran to highly cross-linked porous agarose beads, 5 to 15 µm in diameter.		
L55	A strong cation-exchange resin made of porous silica coated with polybutadiene-maleic acid copolymer, about 5 µm in diameter.		
L56	Propyl silane chemically bonded to totally or superficially porous silica particles, 3 to 10 µm in diameter.		
L57	A chiral-recognition protein, ovomucoid, chemically bonded to silica particles, about 5 µm in diameter, with a pore size of 120Å.	Ultron ES-OVM	Spherical 354
L58	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 6 to 30 µm in diameter.	Rezex RNM-Carbohydrate	Spherical 324
L59	Size-exclusion separations of proteins (separation by molecular weight) over the range of 5 to 7000 kDa. Spherical (1.5 to 10 µm), silica or hybrid packing with a hydrophilic coating.	Yarra SEC-2000 BioSep-SEC-S2000 Yarra SEC-3000 BioSep-SEC-S3000	Spherical Spherical Spherical Spherical 355 209 355 209
L60	Spherical, porous silica gel, 10 µm or less in diameter, surface has been covalently modified with alkyl amide groups and endcapped.		
L61	Hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 µm microporous particles, pore size less than 10Å, and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 85 nm diameter microbeads bonded with alkanol quaternary ammonium ions (6%).		



# HPLC Column Selection by USP Listing

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
L62 C30 silane bonded phase on a fully porous spherical silica or superficially porous particles, 3 to 15 µm in diameter.	Develosil Combi-RP Develosil RP-Aqueous Develosil RP-Aqueous-AR	Spherical Spherical Spherical	Inquire Inquire Inquire
L63 Glycopeptide teicoplanin linked through multiple covalent bonds to a 100 Å spherical silica.			
L64 Strongly basic anion-exchange resin consisting of 8% crosslinked styrene divinylbenzene copolymer with a quaternary ammonium group in the chloride form, 45 to 180 µm in diameter.			
L65 Strongly acidic cation-exchange resin consisting of 2% sulfonated crosslinked styrene divinylbenzene copolymer with a sulfonic acid group in the hydrogen form, 63 to 250 µm in diameter.			
L66 A crown ether coated on a 5 µm particle size silica gel substrate. The active site is (S)-18-crown-6-ether.			
L67 Porous vinyl alcohol copolymer with a C18 alkyl group attached to the hydroxyl group of the polymer, 2 to 10 µm in diameter.	Asahipak ODP-50	Spherical	Inquire
L68 Spherical, porous silica, 10 µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and not endcapped.			
L69 Ethylvinylbenzene/divinylbenzene substrate agglomerated with quaternary amine functionalized 130 nm latex beads, about 6.5 µm in diameter.			
L70 Cellulose tris (phenyl carbamate) coated on 5 µm silica.			
L71 A rigid, spherical polymethacrylate 4 to 6 µm in diameter.	Shodex RSpak DE-413 Shodex RSpak DE-613	Spherical Spherical	338 338
L72 (S)-phenylglycine and 3,5-dinitroaniline urea linkage covalently bonded to silica.			
L73 A rigid, spherical polydivinylbenzene particle 5 to 10 µm in diameter.			
L74 A strong anion-exchange resin consisting of a highly cross-linked core of 7 µm macroporous particles having a 100 Å average pore size and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene and an anion-exchange layer grafted to the surface, which is functionalized with alkyl quaternary ammonium ions.			
L75 A chiral-recognition protein, bovine serum albumin (BSA), chemically bonded to silica particles, about 7 µm in diameter, with a pore size of 300 Å.			
L76 Silica-based weak cation-exchange material, 5 µm in diameter. Substrate is surface polymerized polybutadiene-maleic acid to provide carboxylic acid functionalities. Capacity not less than 29 µEq/column.			
L77 Weak cation-exchange resin consisting of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 6 to 9 µm diameter. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 500 µEq/column (4 mm x 25 cm).			
L78 A silane ligand that consists of both reversed phase (an alkyl chain longer than C8) and anion-exchange (primary, secondary, tertiary, or quaternary amino groups) functional groups chemically bonded to porous or non-porous or ceramic micro-particles, 1.0 to 50 µm in diameter or a monolithic rod.			
L79 A chiral-recognition protein, human serum albumin (HSA), chemically bonded to silica particles, about 5 µm in diameter.			
L80 Cellulose tris(4-methylbenzoate)-coated, porous, spherical, silica particles, 5 to 20 µm in diameter.	Lux Cellulose-3	Spherical	301
L81 A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 9 µm porous particles having a pore size of 2000 Å units and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 70 nm diameter microbeads (6% crosslinked) bonded with alkanol quaternary ammonium ions.			
L82 Polyamine chemically bonded to cross-linked polyvinyl alcohol polymer, 4 - 5 µm in diameter	Asahipak NH <sub>2</sub> -P-50	Spherical	Inquire
L83 A hydroxide-selective, strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 10.5 µm microporous particles having a pore size of 10 Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene.			
L84 Weak cation-exchange resin consisting of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 5 µm diameter. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 8400 µEq column (5 mm x 25 cm).			
L85 A silane ligand that consists of both reversed phase (an alkyl chain longer than C8) and weak cation-exchange (carboxyl groups) functional groups chemically bonded to porous or non-porous particles, 1.0 to 50 µm in diameter.			
L86 Fused core particle with a highly polar ligand possessing multiple hydroxyl groups tethered to the silica gel outer layer.			
L87 Dodecyl silane chemically bonded to porous or superficially porous silica particles, 1.5 to 10 µm in diameter.	Synergi Max-RP	Spherical	343
L88 Glycopeptide vancomycin linked through multiple covalent bonds to 100 Å spherical silica.			
L89 Packing having the capacity to separate compounds with a molecular weight range from 100 - 3000 dalton (as determined by polyethylene oxide), applied to neutral and anionic water-soluble polymers. A polymethacrylate resin base, cross-linked with polyhydroxylate ether (surface contains some residual cationic functional groups).	Shodex OHpak SB-802.5 HQ	Spherical	338
L90 Amylose tris-[(S)-alpha-methylbenzylcarbamate] coated on porous, spherical silica particles, 3 to 10 µm in diameter.			
L91 Strong anion-exchange resin consisting of monodisperse porous polystyrene/divinylbenzene beads coupled with quaternary amine. Bead size is 3 to 10 µm.			
L92 A strong anion-exchange resin consisting of a highly cross-linked core of 5-9 µm macroporous particles having a 100 Å average pore size and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene and an anion-exchange layer grafted to the surface, which is functionalized with alkanol quaternary ammonium ions.			
L93 Cellulose tris (3,5-dimethylphenylcarbamate) reversed phase chiral stationary phase coated on 3 or 5 µm silica gel particles.	Lux Cellulose-1	Spherical	301
L94 A strong anion-exchange resin consisting of highly cross-linked 15 µm microporous particles functionalized with very low cross-linked latex (0.5%) to provide alkanol quaternary ammonium ion-exchange sites.			
L95 Highly polar alkyl ligand comprising five hydroxyl groups that are chemically bonded to totally porous or superficially porous silica, or a monolithic silica rod.			
L96 Alkyl chain, reversed phase bonded to totally or superficially porous silica designed to retain hydrophilic and other polar compounds when using highly aqueous mobile phases, including 100% aqueous, 1.5 µm to 10 µm in diameter.	Kinetex Polar C18 Kinetex PS C18 Luna Omega Polar C18 Luna Omega PS C18 Kinetex EVO C18 Synergi Hydro-RP Synergi Fusion-RP	Core-Shell Core-Shell Spherical Spherical Core-Shell Spherical Spherical	246 246 290 290 246 343 343



# HPLC Column Selection by USP Listing

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
<b>L97</b> Weak cation-exchange resin consisting of a highly cross-linked core of 5.5 µm porous particles having a pore size of 2000Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 2400 µEq/column (4 mm x 25 cm).			
<b>L98</b> Weak cation-exchange resin consisting of a highly cross-linked core of 8 µm microporous particles having an average pore size of 10Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 46 µEq/column (4 mm x 5 cm).			
<b>L99</b> Amylose tris-(3,5- dimethylphenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 µm in diameter	Lux i-Amylose-1	Spherical	301
<b>L100</b> A 55% cross-linked, microporous, hydrophobic resin core (9 µm microporous particles having a pore size of 10Å) that consists of a bilayer of anion and cation-exchange latex. The first layer is fully sulfonated (140 nm) and the second layer is fully aminated (76 nm).			
<b>L101</b> Cholesteryl groups chemically bonded to porous or non-porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter, or a monolithic rod.			
<b>L102</b> (Naproxen, (S,S)Whelk-O 1) 1-(3,5- dinitrobenzamido)-1,2,3,4- tetrahydrophenanthrene covalently bonded to porous spherical silica particles, 5 to 10 µm in diameter.			
<b>L103</b> A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 7.5 µm porous particles having a pore size of 2000Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene electrostatically bonded with hyperbranched alkanol quaternary ammonium ions.			
<b>L104</b> Triazole groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter.			
<b>L105</b> A strong anion-exchange resin consisting of a highly cross-linked 9 µm supermacroporous (2000Å) particles functionalized with very low cross-linked latex (0.2%) to provide alkyl quaternary ammonium ion sites.			
<b>L106</b> Weak cation-exchange resin consisting of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 5-8 µm diameter, macroporous particles having an average pore size of 100Å units. Substrate is surface grafted with carboxylic acid and phosphonic acid functional groups. Capacity not less than 2800 µEq/column (4 mm x 25 cm).			
<b>L107</b> Cellulose tris(4-methylbenzoate)-coated porous spherical particles, 3 to 5 µm in diameter, for use with reversed phase mobile phases.	Lux Cellulose-3	Spherical	301
<b>L108</b> A chiral-recognition protein, cellobiohydrolase (CBH), chemically bonded to silica particles, about 5 µm in diameter.			
<b>L109</b> Spherical particles of porous graphitic carbon, 1.5 to 30 µm in diameter.			
<b>L110</b> A strong anion-exchange resin consisting of a highly cross-linked 13 µm microporous (less than 10Å) particles coated with very low cross-linked latex (0.5%) to provide alkanol quaternary ammonium ion-exchange sites.			
<b>L111</b> Polyamine chemically bonded to porous spherical silica particles, 5 µm in diameter.			
<b>L112</b> A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 8.5 µm porous particles having a pore size of 2000Å units and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 65 nm diameter microbeads (5% cross-linked) bonded with alkanol quaternary ammonium ions.			
<b>L113</b> A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 7.5 µm porous particles having a pore size of 2000Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 65 nm diameter microbeads (5% crosslinked) bonded with alkanol quaternary ammonium ions.			
<b>L114</b> Sulfobetaine graft-polymerized to totally or superficially porous silica, 1.5 to 10 µm in diameter, or a monolithic rod. Packing having densely bonded zwitterionic groups with 1:1 charge balance.			
<b>L115</b> Ethylvinylbenzene/divinylbenzene substrate (55% cross-linked) agglomerated with quaternary amine functionalized 275 nm latex microbeads (6% cross-linked), about 8.5 µm in diameter.			
<b>L116</b> Sulfonated ethylvinylbenzene/divinylbenzene substrate agglomerated with hydrophilic quaternary amine functionalized glycidyl-derivative methacrylate microbeads, approximately 2 to 50 µm in diameter.			
<b>L117</b> A crown ether coated on a 5 µm particle size silica gel substrate. The active site is (R)-18-crown-6-ether.			
<b>L118</b> Aqueous polymerized C18 groups on silica particles, 1.2 to 5 µm in diameter.	Kinetex PAH	Core-Shell	246
<b>L119</b> Cellulose tris-(3,5-dichlorophenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 µm in diameter.	Lux i-Cellulose-5	Spherical	301
<b>L120</b> A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 µm microporous particles having a pore size of less than 10 Å units and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 65 nm diameter microbeads (8% cross-linked) bonded with alkanol quaternary ammonium ions. Capacity not less than 10 µEq/column (4 mm x 5 cm).			
<b>L121</b> A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 11 µm porous particles having a pore size of less than 10Å units and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene electrostatically bonded with hyperbranched alkanol quaternary ammonium ions.			
<b>L122</b> Sulfobetaine graft-polymerized to totally or superficially porous hydrophilic polymer particles, 1.0 to 10 µm in diameter, or a monolithic rod. Packing having densely bonded zwitterionic groups with 1:1 charge balance.			
<b>L123</b> Cellulose tris(3-chloro-4-methylphenylcarbamate) coated porous silica particles, 3 to 20 µm in diameter.	Lux Cellulose-2	Spherical	301
<b>L124</b> Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the silver form, average 9 µm in diameter.	Rezex RSO-Oligosaccharide	Spherical	324
<b>L125</b> Polyvinyl alcohol polymer gel weak cation-exchange packing material, 5 µm porous particles. The surface is polymerized with polybutadiene-maleic acid to provide carboxylic acid functionalities. The Capacity is not less than 1 mEq/column.	Shodex IC YS-50	Spherical	338
<b>L126</b> Amylose tris (3-chlorophenylcarbamate), immobilized on porous, spherical, silica particles, 1 µm to 20 µm in diameter.			
<b>L127</b> A crown ether chemically bonded to a 5 µm particle size silica gel substrate. The active site is (S)- pseudo-18-crown-6-ether.	Sumichiral OA-8000	Spherical	Inquire
<b>L128</b> Porous particles of polystyrene divinyl benzene with linear molecular weight operating range from 200 to 2,000,000 g/mol (polystyrene equivalent), 5 µm in diameter.			

# HPLC Column Selection by Ph. Eur. Listing

The European Pharmacopoeia (*Ph. Eur.*), of the Council of Europe is a pharmacopoeia, listing a wide range of active substances and excipients used to prepare pharmaceutical products in Europe. It includes general and specific monographs that give quality standards for all the main medicines used in Europe. All medicines sold in the 38 Member States of the European Pharmacopoeia must comply with these quality standards so that consumers have a guarantee for products obtained from pharmacies and other legal suppliers.

It is widely understood that all HPLC packings are not alike, and no single column can perform a myriad of desired separations. HPLC packings differ in hydrophobicity, surface coverage, surface area, pore size, and particle shape.

For each European Pharmacopoeia (*Ph. Eur.*) description of the HPLC stationary phase, you will find listed the most suitable Phenomenex HPLC column. Other possible columns can also be used for these analyses. Please contact Phenomenex for your specific LC column needs.

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Silica gel $\pi$ -acceptor / $\pi$ -Donor for chiral separations (1-(3,5-dinitrobenzamide)-1,2,3,4-tetrahydrophenanthrene).	1160100		
Silica gel AGP for chiral chromatography. (alpha 1-acid glycoprotein).	1148700		
Silica gel BC for chiral chromatography. (Beta-Cyclodextrin).	1161300	Sumichiral OA-7000	Inquire
Silica gel for chiral chromatography, urea type derivative: (R)-phenylglycin and 3, 5-dinitroaniline; 5 $\mu$ m.	1181000	Chirex 3012	Inquire
Silica gel for chiral separation, amylose derivative of substituted amylose coated on very finely divided silica gel.	1171700	Lux Amylose-1 and -2	301
Silica gel for chiral separation, cellulose derivative of substituted cellulose coated on very finely divided silica gel.	1110300	Lux Cellulose-1, -2, -3 and -4	301
Silica gel for chromatography, human albumin coated.	1138500		
Silica gel for chiral separation, protein derivative of	1196300		
Silica gel for chiral separation, vancomycin-bonded	1205300		
Silica gel for CR+ for chiral chromatography (crown-ether)	1192400	Sumichiral OA-8000	Inquire
Silica gel for chiral separation, L-Penicillamine coated silica gel.	1200050	Sumichiral OA-5000L	Inquire
Silica gel for chromatography.	1076900	Kinetex HILIC Luna Silica(2)	246 276
Silica gel for chromatography, alkyl bonded for use with highly aqueous mobile phases.	1160200	Luna Omega Polar C18 Luna Omega PS C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	290 290 343 343 234 234 246 246 246 246 246
Silica gel for chromatography, alkyl bonded for use with highly aqueous mobile phases, endcapped. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1176900	Luna Omega Polar C18 Luna Omega PS C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	290 290 343 343 234 234 246 246 246 246 246
Silica gel for chromatography, alkylsilyl, solid core, endcapped. Spherical silica particles containing a non-porous solid silica core surrounded by a thinner outer porous silica coating with alkylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1194300	Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex C8 Kinetex Polar C18	246 246 246 246 246
Silica gel for chromatography, amidoalkylsilyl	1205400		
Silica gel for chromatography, amidohexadecylsilyl.	1170400		
Silica gel for chromatography, amidohexadecylsilyl, endcapped	1201100		
Silica gel for chromatography, aminopropylmethylsilyl.	1102400	SphereClone NH <sub>2</sub> (Amino) PhenoSphere NH <sub>2</sub> (Amino)	341 Inquire
Silica gel for chromatography, aminopropylsilyl.	1077000	SphereClone NH <sub>2</sub> (Amino) PhenoSphere NH <sub>2</sub> (Amino)	341 Inquire
Silica gel for chromatography, aminopropylsilyl R1 particle size of ~55 $\mu$ m.	1077001	Strata NH <sub>2</sub>	70
Silica gel for chromatography, Amylose derivative of.	1109800	Lux Amylose-1 Lux Amylose-2	301 301
Silica gel for chromatography, butylsilyl. Spheroidal 300 Å; pore volume: 0.6 cm <sup>3</sup> /g; area: 80 m <sup>2</sup> /g.	1076200	Biozen Intact C4 Aeris WIDEPORE C4	210 204

# HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, butylsilyl, endcapped.	1170500	Biozen WidePore C4 Aeris WIDEPore C4 Jupiter 300 C4	210 204 244
Silica gel for chromatography, carbamoylsilyl. Chemically modified at the surface by the bonding of carbamoylsilyl groups.	1210400		
Silica gel for chromatography compatible with 100% aqueous mobile phase, octadecylsilyl, endcapped.	1188400	Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Kinetex EVO C18 Kinetex Polar C18	290 343 343 246 246
Silica gel for chromatography compatible with 100% aqueous mobile phase, octadecylsilyl.	1203900	Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18	290 290 343 343 246 246 246
Silica gel for chromatography compatible with highly aqueous mobile phase, octadecylsilyl diol, endcapped.	1207500		
Silica gel for chromatography, crown-ether.	1178000	Sumichiral OA-8000	Inquire
Silica gel for chromatography, cyanopropylsilyl, endcapped, base-deactivated pre-treated by various techniques before the bonding of cyanopropyl-silyl groups. To minimize any interaction with basic compounds, it's carefully endcapped to cover most of the remaining silanol groups.	1194200	Luna CN (Cyano)	276
Silica gel for chromatography, cyanosilyl.	1109900	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire
Silica gel for chromatography, cyanopropylsilyl, endcapped.	1195000	Luna CN (Cyano)	276
Silica gel for chromatography, cyanolsilyl, endcapped, base-deactivated.	1211200	Luna CN (Cyano)	276
Silica gel for chromatography, di-isobutyloctadecylsilyl.	1140000	Kinetex XB-C18	246
Silica gel for chromatography, diisopropylcyanopropylsilyl.	1168100		
Silica gel for chromatography, 4-dimethylaminobenzylcarbamidesilyl. Chemically modified at the surface by bonding of 4-dimethylaminobenzylcarbamidesilyl groups.	1204000		
Silica gel for chromatography, dimethyloctadecylsilyl. irregular; area: 300 m <sup>2</sup> /g.	1115100	Bondclone C18	231
Silica gel for chromatography, diol dihydroxypropyl, 100 Å; 10 µm.	1110000	Spherex OH (Diol)	Inquire
Silica gel for chromatography, dodecylsilyl, endcapped.	1179700	Synergi Max-RP	343
Silica gel for chromatography, hexadecylamidylsilyl with hexadecylcarboxamidopropyl dimethylsilyl groups; 5 µm.	1162500		
Silica gel for chromatography, hexadecylamidylsilyl, endcapped with hexadecylcarboxamidopropyl dimethylsilyl groups; 5 µm.	1172400		
Silica gel for chromatography, hexylsilyl.	1077100	SphereClone C6 PhenoSphere C6	341 Inquire
Silica gel for chromatography, hexylsilyl, endcapped.	1174400	SphereClone C6 PhenoSphere C6	341 Inquire
Silica gel for chromatography, (hybrid material), octadecylsilyl, ethylene-bridged, charged surface, endcapped. Synthetic, spherical ethylene-bridged hybrid particles with a charged surface, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of octadecylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1202800	Kinetex EVO C18	246
Silica gel for chromatography, octadecylsilyl, ethylene-bridged (hybrid material), endcapped. Synthetic, spherical ethylene-bridged hybrid particles, containing both organic (organosiloxanes) and inorganic (silica) components.	1190500	Kinetex EVO C18 Gemini NX-C18	246 234
Silica gel for chromatography, octylsilyl, ethylene-bridged (hybrid material) endcapped. Synthetic, spherical ethylene-bridged hybrid particles with a charged surface, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of octadecyl-silyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1208800		
Silica gel for chromatography, (hybrid material), phenylsilyl, ethylene-bridged, charged surface, endcapped. Synthetic, spherical ethylene-bridged hybrid particles with a charged surface, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of phenylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1204100		
Silica gel for chromatography, (hybrid material), phenylsilyl, ethylene-bridged, endcapped. Synthetic, spherical ethylene-bridged hybrid particles containing both organic (organosiloxanes) and inorganic (silica) components, chemically modified at the surface by bonding of phenylsilyl groups. To minimize the interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1200700	Gemini C6-Phenyl	234
Silica gel for chromatography, (hybrid material), polar-embedded, octadecylsilyl, ethylene-bridged, endcapped. Synthetic, spherical ethylene-bridged hybrid particles, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of polar embedded octadecylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1200800		
Silica gel for chromatography, hydrophilic surface has been modified to provide hydrophilic characteristics.	1077200	Luna HILIC Kinetex HILIC	276 246
Silica gel for chromatography, hydroxypropylsilyl chemically modified at the surface by bonding of hydroxypropylsilyl groups.	1210500		

# HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, nitrile cyanopropylsilyl.	1077300	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire
Silica gel for chromatography, nitrile R1 chemically bonded nitrile groups.	1077400	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire
Silica gel for chromatography, nitrile R2 ultrapure silica (<20 ppm metal) with cyanopropylsilyl groups.	1119500	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire
Silica gel for chromatography, nitrile, endcapped with cyanopropylsilyl groups.	1174500	Luna CN (Cyano)	276
Silica gel for chromatography, 4-nitrophenylcarbamidesilyl. A very finely divided silica gel, chemically modified at the surface by bonding with 4-nitrophenylcarbamide groups.	1185200		
Silica gel for chromatography, octadecanoylamino-propylsilyl amino-propylsilyl groups which are acylated with octadecanoyl groups.	1115200		
Silica gel for chromatography, octadecylsilyl, endcapped. A very finely divided silica gel, chemically modified at the surface by bonding of octadecylphenylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1199300		
Silica gel for chromatography, octadecylsilyl.	1077500	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 HyperClone C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18 SphereClone C18 ODS(1) or (2)	276 290 290 290 343 343 234 234 241 246 246 246 246 246 246 341
Silica gel for chromatography, octadecylsilyl R1. A very finely divided ultrapure silica gel, chemically modified at the surface by the bonding of octadecylsilyl groups.	1110100	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Jupiter C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 343 343 234 234 244 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl R2 ultrapure silica; 150 Å pore size; 20% C-load; optimized for the analysis of PAHs.	1115300	EnviroSep-PP Prodigy ODS-2	Inquire 323
Silica gel for chromatography, octadecylsilyl, base-deactivated pretreated by various techniques before the bonding of octadecylsilyl groups to minimize the interaction with basic components.	1077600	Luna C18(2) Luna Omega C18 Luna Omega Polar C18 Luna Omega PS C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 234 234 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl, cross-linked, endcapped. Chemically modified at the surface by cross-linking and bonding of octadecylsilyl groups. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1204200	Kinetex PAH	246
Silica gel for chromatography, octadecylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1115400	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 234 234 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl, endcapped R1 ultrapure silica (<20 ppm metal), 100Å pore size; 19% C-load. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1115401	Luna C18(2)	276

# HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, octadecylsilyl, endcapped, base-deactivated; pretreated by various techniques before the bonding of octadecylsilyl groups. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1108600	Luna C18(2) Prodigy ODS-3 Gemini C18 Gemini NX-C18	276 323 234 234
Silica gel for chromatography, octadecylsilyl, extra-dense bonded, endcapped.	1188500	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 234 234 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl, for separation of polycyclic aromatic hydrocarbons. A very finely divided ultrapure silica gel, chemically modified at the surface by the bonding of octadecylsilyl groups, optimized for the analysis of polycyclic aromatic hydrocarbons.	1202900	Kinetex PAH	246
Silica gel for chromatography, octadecylsilyl, monolithic.	1154500	Onyx C18	313
Silica gel for chromatography, octadecylsilyl, endcapped, base-deactivated R1; pretreated before the bonding by careful washing and hydrolyzing most of the superficial siloxane bridges. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1162600	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 234 234 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl, polar endcapped.	1205500	Synergi Hydro RP Luna Omega Polar C18	343 290
Silica gel for chromatography, octadecylsilyl, solid core.	1205600	Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18 Aeris PEPTIDE XB-C18 Aeris WIDEPOR XB-C18	246 246 246 246 246 204 204
Silica gel for chromatography, octadecylsilyl, solid core, endcapped with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octadecylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1193900	Biozen Peptide XB C18 Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18 Aeris PEPTIDE XB-C18 Aeris WIDEPOR XB-C18	210 246 246 246 246 246 204 204
Silica gel for chromatography, octadecylsilyl, with polar embedded groups, endcapped; a very finely divided silica gel, chemically modified at the surface by the bonding of polar-embedded octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1177900	Synergi Fusion-RP	343
Silica gel for chromatography, octadecylsilyl, with extended pH range, endcapped (resistant to bases up to pH 11)	1196700	Gemini C18 Gemini NX-C18 Kinetex EVO C18	234 234 246
Silica gel for chromatography, octadecylsilyl, with polar incorporated groups, endcapped; the particles are based on silica, chemically modified with a reagent providing a surface with chains having polar incorporated groups and terminating octadecyl groups.	1165100	Synergi Fusion-RP	343
Silica gel for chromatography, octylsilyl.	1077700	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (MOS) SphereClone C8	246 276 323 241 341
Silica gel for chromatography, octylsilyl R1. Bonding of octylsilyl and methyl groups (double bonded phase).	1077701	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (MOS) SphereClone C8	246 276 323 241 341
Silica gel for chromatography, octylsilyl R2 ultrapure silica (<20 ppm metal); pore size 100Å; C-load: 19%.	1077702		
Silica gel for chromatography, octylsilyl R3 ultrapure silica, bonding of octasilyl groups and sterically protected with branched hydrocarbons at the silanes.	1155200	Biozen Intact XB-C8	210
Silica gel for chromatography, octylsilyl, base-deactivated pretreated by various techniques before the bonding of octylsilyl groups to minimize the interaction with basic components.	1131600	Luna C8(2) Prodigy C8 HyperClone C8 (BDS) Kinetex C8	276 323 241 246



# HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, octylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1119600	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (BDS)	246 276 323 241
Silica gel for chromatography, octylsilyl, endcapped, base-deactivated pretreated by various techniques before the bonding with octylsilyl groups. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1148800	Luna C8(2) Prodigy C8 Kinetex C8 HyperClone C8 (BDS)	276 323 246 241
Silica gel for chromatography, octylsilyl, with embedded polar groups, endcapped; a very finely divided silica gel, chemically modified at the surface by the bonding of polar-embedded octylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1152600		
Silica gel for chromatography, octylsilyl, extra-dense bonded, endcapped.	1200900	Luna C8(2) Kinetex C8	276 246
Silica gel for chromatography, octylsilyl, solid core, endcapped. Silica gel with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octyl-silyl groups. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1208600	Biozen Intact XB-C8 Kinetex C8 Aeris WIDEPORE XB-C8	210 246 204
Silica gel for chromatography, octylsilyl, solid core. Silica gel with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octylsilyl groups.	1209900	Biozen Intact XB-C8 Kinetex C8 Aeris WIDEPORE XB-C8	210 246 204
Silica gel for chromatography, oxypropionitrilsilyl	1184700		
Silica gel for chromatography, palmitamidopropylsilyl, endcapped bonding with palmitamidopropyl groups and endcapped with acetamidopropyl groups.	1161900		
Silica gel for chromatography, pentafluorophenylpropylsilyl, solid core, endcapped.	1207600	Kinetex F5 Kinetex PFP	246 246
Silica gel for chromatography, phenylhexylsilyl.	1153900	Kinetex Phenyl-Hexyl Luna Phenyl-Hexyl Gemini C6-Phenyl	246 276 234
Silica gel for chromatography, phenylhexylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1170600	Kinetex Phenyl-Hexyl Luna Phenyl-Hexyl Gemini C6-Phenyl	246 276 234
Silica gel for chromatography, phenylhexylsilyl, solid core, endcapped. Silica gel with spherical silica particles containing a non-porous solid core surrounded by a thin outer porous silica coating with phenylhexylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1198900	Kinetex Phenyl-Hexyl	246
Silica gel for chromatography, phenylsilyl.	1110200	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	343 276 234 323 246 246
Silica gel for chromatography, phenylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1154900	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	343 276 234 323 246 246
Silica gel for chromatography, phenylsilyl, endcapped, base-deactivated.	1197900	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	343 276 234 323 246 246
Silica gel for chromatography, phenylsilyl, extra-dense bonded, endcapped.	1207700	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6 Phenyl Prodigy Phenyl PH3 Kinetex Phenyl-Hexyl Kinetex Biphenyl	343 276 234 323 246 246
Silica gel for chromatography, propoxybenzene, endcapped.	1174600	Synergi Polar-RP	343
Silica gel for chromatography, propylsilyl.	1170700		
Silica gel for chromatography, strong anion-exchange bonding of quaternary ammonium groups; pH limit of use: 2 to 8.	1077800	PhenoSphere SAX	Inquire
Silica gel for chromatography, strong cation-exchange bonding of sulfonic acid groups.	1161400	Luna SCX	276
Silica gel for chromatography, trimethylsilyl.	1115500	Develosil TMS-UG (C1) Capcell Pak C1 UG PhenoSphere C1	Inquire Inquire Inquire
Silica for size-exclusion chromatography. 10 µm silica with a very hydrophilic surface. Pore size average: 30 nm; pH stability 2 to 8; exclusion range for proteins: 1 x 10 <sup>3</sup> to 3 x 10 <sup>6</sup> ; 10 µm.	1077900	BioSep-SEC-S3000 Yarra SEC-3000	209 355
Silica gel OC for chiral separations. Coated with cellulose tris (phenylcarbamate); 5 µm.	1146800		
Silica gel OD for chiral separations.	1110300	Lux Cellulose-1	301
Silica gel OJ for chiral separations. Coated with cellulose tris (4-methylbenzoate).	1179800	Lux Cellulose-3	301

# HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10.6 4.1.1. Reagents 2021	Number	Recommended Phenomenex Column	Page
Organosilica polymer, amorphous, octadecylsilyl. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by trifunctionally bonded octadecylsilyl groups.	1144200	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234
Organosilica polymer, amorphous, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by trifunctionally bonded octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1178600	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234
Organosilica polymer, amorphous, polar embedded, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of polar embedded octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1150600		
Organosilica polymer, amorphous, polar embedded propyl-2-phenylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of polar embedded propyl-2-phenylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1178100		
Organosilica polymer for mass spectrometry, amorphous, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1164900	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234
Organosilica polymer compatible with 100 % aqueous mobile phases, octadecylsilyl, solid core, endcapped.	1201700	Kinetex EVO C18	246
Organosilica polymer, multi-layered, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles, multi-layered, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1202500	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234
Vinyl polymer for chromatography, amino alkyl. Spherical particles (5 µm) of a vinyl alcohol copolymer, bonding of amino alkyl groups.	1191500	Asahipak NH <sub>2</sub> -P	Inquire
Vinyl polymer for chromatography, octadecyl. Spherical particles (5 µm) of a vinyl alcohol copolymer, bonding of octadecyl groups on the hydroxyl groups.	1155400	Asahipak ODP-50	Inquire
Vinyl polymer for chromatography, octadecylsilyl. Spherical particles (5 µm) of a vinyl alcohol copolymer bonded to an octadecylsilane. C-load: 17 %.	1121600	Asahipak ODP-50	Inquire
Ion-exclusion resin for chromatography. A resin with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1131000	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	324 324
Cation-exchange resin, strong. Strong cation-exchange resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1156800	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	324 324
Cation-exchange resin. A resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 8 % divinylbenzene. Available as spherical beads.	1016700	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	324 324
Cation-exchange resin R1. A resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 4 % divinylbenzene. Available as spherical beads.	1121900		
Cation-exchange resin R2. Resin containing strongly acidic propylsulfonic acid groups.	1195400		
Cation-exchange resin (Calcium form), strong. Resin in calcium form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 8 % divinylbenzene	1104600	Rezex RCM-Monosaccharide Rezex RCU-USP Sugar Alcohols	324 324
Cation-exchange resin (Sodium form), strong. Resin in sodium form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1176100	Rezex RNM-Carbohydrate	324
Cation-exchange resin, weak. Weak cation-exchange resin in protonated form with carboxylate functional groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1203200	Biozen WCX	210
Anion-exchange resin. Resin in chlorinated form containing quaternary ammonium groups [CH <sub>2</sub> N+(CH <sub>3</sub> ) <sub>3</sub> ] attached to a polymer lattice consisting of polystyrene cross-linked with 2 % of divinylbenzene. Available as spherical beads.	1007200		
Anion-exchange resin R1. Resin containing quaternary ammonium groups [CH <sub>2</sub> N+(CH <sub>3</sub> ) <sub>3</sub> ] attached to a lattice consisting of methacrylate.	1123400		
Anion-exchange resin R2. Conjugate of homogeneous 10 µm hydrophilic polyether particles, and a quaternary ammonium salt, providing a matrix suitable for strong anion-exchange chromatography of proteins.	1141900		
Anion-exchange resin R3. Resin with quaternary ammonium groups attached to a lattice of ethylvinyl-benzene crosslinked with 55 % of divinylbenzene.	1180900		
Anion-exchange resin for chromatography, strongly basic with quaternary ammonium groups attached to a lattice of latex cross-linked divinylbenzene.	1112700		
Anion-exchange resin for chromatography, strongly basic R1. Non-porous resin agglomerated with a 100 nm alkyl quaternary ammonium functionalized latex.	1187400		
Anion-exchange resin, weak resin with diethylaminoethyl groups attached to lattice consisting of poly(methyl methacrylate).	1146700		

## Core-Shell HPLC / UHPLC Columns for Proteins and Peptides

Find newer methods in our Biozen Portfolio

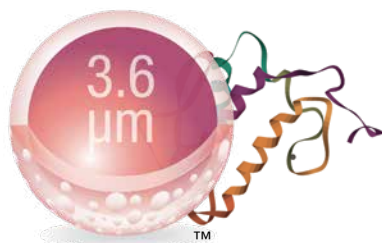
See pp. 210-230

### Ultra-High Resolution and Performance

Introducing Aeris, a specialized line of reversed phase core-shell HPLC / UHPLC columns, built exclusively for the ultra-high performance separation and analysis of proteins and peptides.

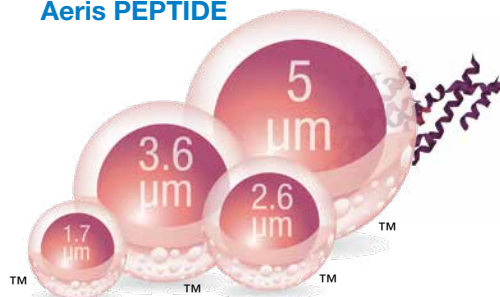
These columns can provide improved resolving power, selectivity, throughput, sensitivity, column lifetime, and method flexibility compared to other fully porous and core-shell columns typically used for bioseparations.

#### Aeris WIDEPORE



Large pore optimized for intact proteins and polypeptides

#### Aeris PEPTIDE



Small pore optimized for peptides and for peptide mapping

### The precise architecture of Aeris core-shell particles provides dramatic leaps in performance in two important ways:

**1** The thin, porous layer, or “shell”, decreases the diffusion path length, thus reducing the time it takes for biomolecules to adsorb/desorb into and out of the particle.

**2** Expert manufacturing combined with tight packing specifications and high particle density reduces losses in efficiency and performance due to band broadening.

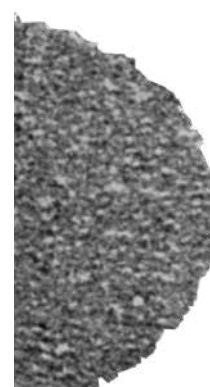
#### Aeris Core-Shell Particle

- High particle density helps create optimal bed structure which reduces band broadening effects of Eddy Diffusion
- Ultra-high performance on HPLC and UHPLC systems alike
- Reduced diffusion path improves efficiency



#### Fully Porous Particle

- Less homogenous bed structure leads to performance loss
- Ultra-high performance limited to sub-2µm particles on UHPLC systems
- Diffusion path limits efficiencies



### The result is:

- **3.6µm core-shell particles** that can perform like sub-2µm columns on both HPLC and UHPLC systems at a fraction of the pressure
- **5µm core-shell particles** allow scale up to preparative dimensions
- **1.7µm and 2.6µm core-shell particles** that can provide higher peak capacities compared to fully porous sub-2µm columns on UHPLC systems



To see our entire BioSeparations column and accessory portfolio, visit: [www.phenomenex.com/biopharm](http://www.phenomenex.com/biopharm)

## Selecting the Optimal Aeris Column for Your Applications

Aeris core-shell columns are designed for the separation of complex protein and peptide mixtures. Chromatographers can easily narrow down the column(s) that has a high probability of success for their separation by selecting from a variety of phase, pore size, and particle size options.

### Aeris PEPTIDE

Recommended for the separation of low molecular weight peptides and for peptide mapping.

- **XB-C18 chemistry best suited for resolving peptides**
- **1.7 μm, 2.6 μm, and 3.6 μm particles for method development flexibility between HPLC and UHPLC systems**
- **5 μm particle for peptide purification**
- **Small pore optimized for peptide diffusion**

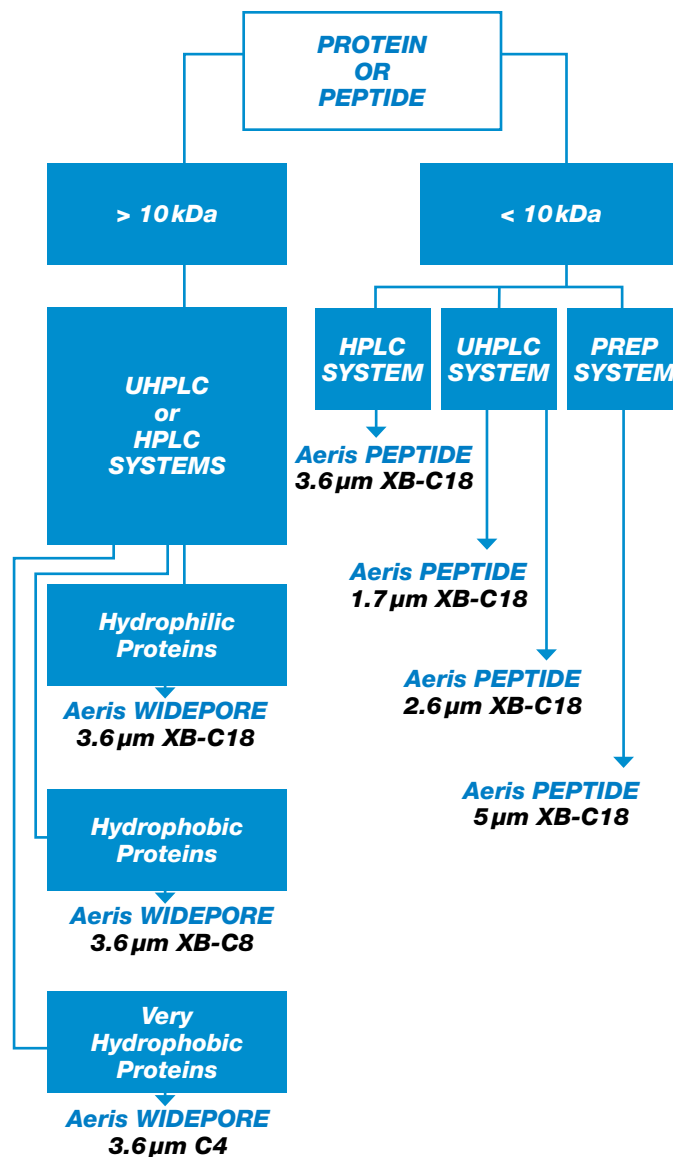
For increased resolving power, use a longer column, preferably a 250mm (or 150mm for the Aeris 1.7 μm XB-C18). Due to the lower backpressure of Aeris 3.6 μm, one can easily run 250mm columns on both HPLC and UHPLC systems, AND one can couple multiple 250mm columns together and run them inline for even better results. For maximum UHPLC resolution, the 150mm length Aeris 1.7 μm or 250mm length Aeris 2.6 μm columns are excellent choices.

### Aeris WIDEPORE

Recommended for the separation of intact proteins and polypeptides.

- **XB-C18, XB-C8, and C4 phases for alternate selectivities**
- **3.6 μm particle for system flexibility**
- **Large pore optimized for fast protein adsorption/desorption**

Because of the reduced hydrophobicity compared to fully porous 300Å columns, one should start gradients with reduced organic concentrations compared to other columns to improve peak shape of polar proteins and peptides. Shallower gradients compared to other fully porous columns may be appropriate.



### Material Characteristics

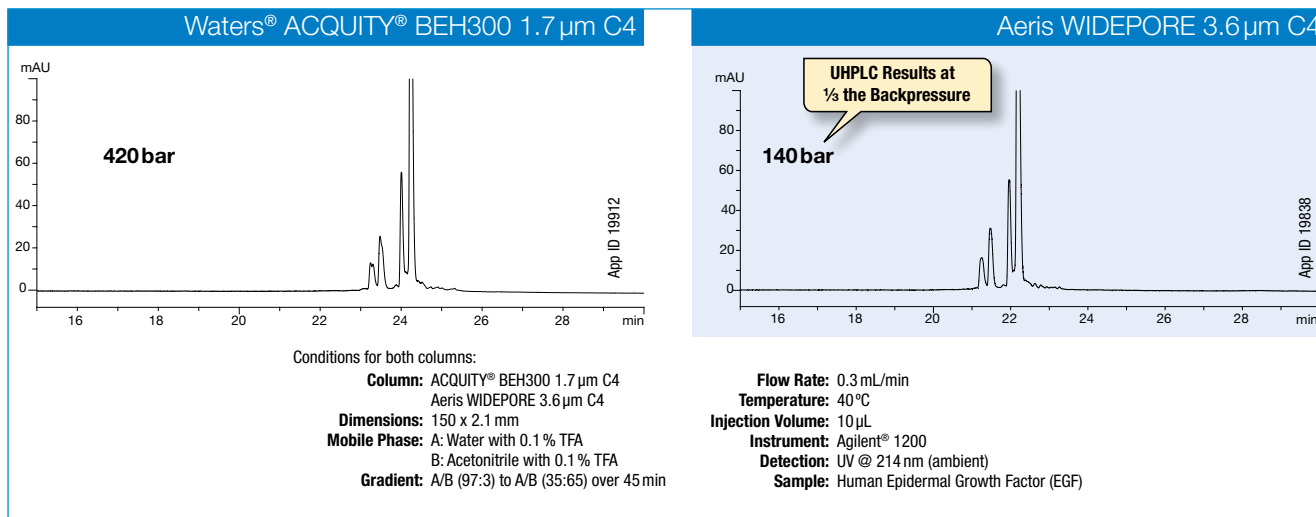
Packing Material	Total Particle Size (μm)	Porous Shell (μm)	Core Size (μm)	pH Stability	Temp Stability °C	Pressure Stability bar
Aeris WIDEPORE	3.6	0.2	3.2	1.5 - 9	90	600
Aeris PEPTIDE	1.7	0.22	1.25	1.5 - 9	90	1000
Aeris PEPTIDE	2.6	0.35	1.9	1.5 - 9	90	1000
Aeris PEPTIDE	3.6	0.5	2.6	1.5 - 9	90	600
Aeris PEPTIDE	5	0.6	3.8	1.5 - 9	90	600

## Maximize Resolving Power with Unique Wide-Pore 3.6 μm Core-Shell Particle

3.6 μm core-shell technology combined with inert surface chemistries and tight packing specifications results in Aeris WIDEPORÉ columns delivering exceptional resolving power at significantly lower backpressures. Chromatographers now have the ability to

generate higher quality data than typically produced by columns packed with fully porous particles for every protein analysis – on HPLC or UHPLC systems.

### Performance Equivalent to Sub-2 μm Particle at Low Backpressure

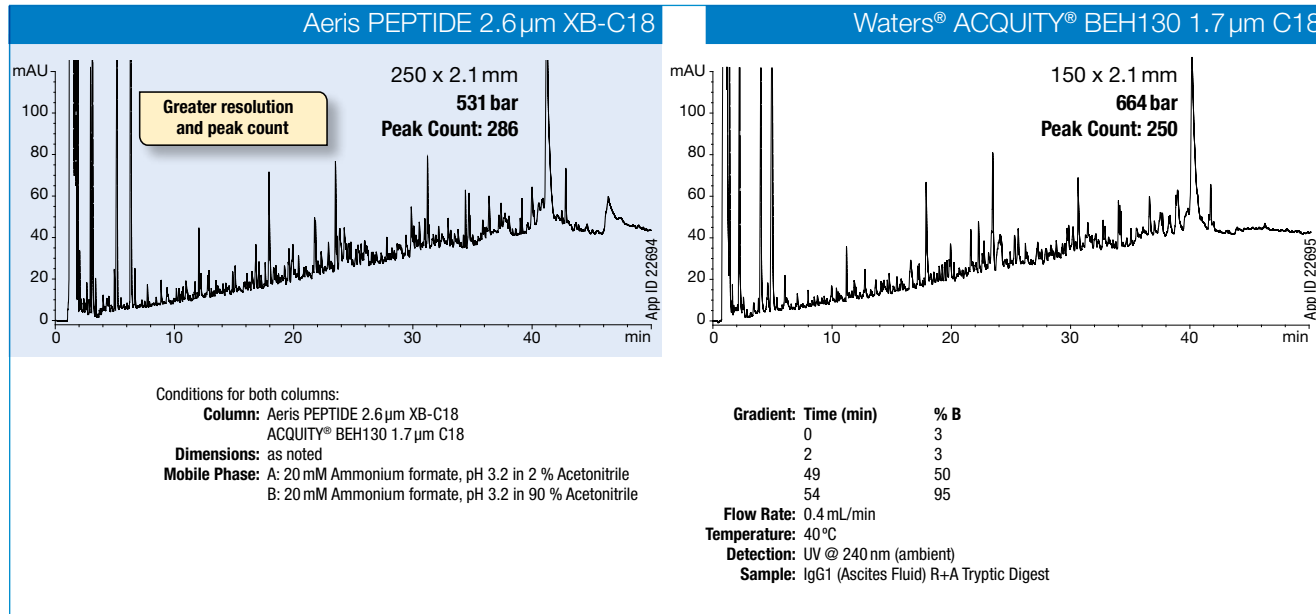


## Ultra-High Resolving Power on UHPLC Systems with Aeris PEPTIDE 2.6 μm Columns of 250mm Length

The Aeris PEPTIDE 2.6 μm core-shell particle was designed with one purpose in mind: to enhance the separation and maximize the peak count of complex peptide maps on UHPLC systems. Because the 2.6 μm core-shell particle reduces backpressure on UHPLC

systems while maintaining similar efficiencies to sub-2 μm fully porous particles, longer columns can be used to further maximize the separation power while still being well within the backpressure constraints of the instrumentation.

### Increase UHPLC Performance with Aeris PEPTIDE 2.6 μm Columns





# Aeris™ Core-Shell LC Columns for Proteins & Peptides

## Ordering Information

Aeris PEPTIDE 1.7 µm Minibore Columns (mm)				SecurityGuard™ ULTRA Cartridges*
Phase	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
XB-C18	<a href="#">00B-4506-AN</a>	<a href="#">00D-4506-AN</a>	<a href="#">00F-4506-AN</a>	<a href="#">AJ0-8948</a>

for 2.1 mm ID

Aeris PEPTIDE 2.6 µm Minibore Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	<a href="#">00B-4505-AN</a>	<a href="#">00D-4505-AN</a>	<a href="#">00F-4505-AN</a>	<a href="#">00G-4505-AN</a>	<a href="#">AJ0-8948</a>

for 2.1 mm ID

Aeris PEPTIDE 2.6 µm MidBore™ and Analytical Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	150 x 3.0	150 x 4.6	250 x 4.6	3/pk	3/pk
XB-C18	<a href="#">00F-4505-Y0</a>	<a href="#">00F-4505-E0</a>	<a href="#">00G-4505-E0</a>	<a href="#">AJ0-8947</a>	<a href="#">AJ0-8946</a>

for 3.0 mm ID

for 4.6 mm ID

Aeris PEPTIDE 3.6 µm Minibore Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	<a href="#">00B-4507-AN</a>	<a href="#">00D-4507-AN</a>	<a href="#">00F-4507-AN</a>	<a href="#">00G-4507-AN</a>	<a href="#">AJ0-8948</a>

for 2.1 mm ID

Aeris PEPTIDE 3.6 µm Analytical Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
XB-C18	<a href="#">00B-4507-E0</a>	<a href="#">00D-4507-E0</a>	<a href="#">00F-4507-E0</a>	<a href="#">00G-4507-E0</a>	<a href="#">AJ0-8946</a>

for 4.6 mm ID

Aeris PEPTIDE 5 µm Analytical Scout and Semi-Prep Columns (mm)				SecurityGuard ULTRA Cartridges*	SecurityGuard SemiPrep Cartridges**	
Phase	150 x 4.6	250 x 4.6	150 x 10.0	250 x 10.0	3/pk	10 x 10 /3pk
XB-C18	<a href="#">00F-4632-E0</a>	<a href="#">00G-4632-E0</a>	<a href="#">00F-4632-N0</a>	<a href="#">00G-4632-N0</a>	<a href="#">AJ0-8946</a>	<a href="#">AJ0-9317</a>

for 4.6 mm ID

for 10 mm ID

Aeris PEPTIDE 5 µm Axia™ Packed Preparative Columns (mm)			SecurityGuard PREP Cartridges†
Phase	150 x 21.2	250 x 21.2	15 x 21.2 /ea
XB-C18	<a href="#">00F-4632-PO-AX</a>	<a href="#">00G-4632-PO-AX</a>	<a href="#">AJ0-9318</a>

for 21.2 mm ID

Aeris WIDEPORE 3.6 µm Minibore Columns (mm)				SecurityGuard™ ULTRA Cartridges*	
Phases	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	<a href="#">00B-4482-AN</a>	<a href="#">00D-4482-AN</a>	<a href="#">00F-4482-AN</a>	<a href="#">00G-4482-AN</a>	<a href="#">AJ0-8783</a>
XB-C8	<a href="#">00B-4481-AN</a>	<a href="#">00D-4481-AN</a>	<a href="#">00F-4481-AN</a>	<a href="#">00G-4481-AN</a>	<a href="#">AJ0-8785</a>
C4	<a href="#">00B-4486-AN</a>	<a href="#">00D-4486-AN</a>	<a href="#">00F-4486-AN</a>	<a href="#">00G-4486-AN</a>	<a href="#">AJ0-8899</a>

for 2.1 mm ID

Aeris WIDEPORE 3.6 µm Analytical Columns (mm)				SecurityGuard ULTRA Cartridges*
Phases	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
XB-C18	<a href="#">00D-4482-E0</a>	<a href="#">00F-4482-E0</a>	<a href="#">00G-4482-E0</a>	<a href="#">AJ0-8769</a>
XB-C8	<a href="#">00D-4481-E0</a>	<a href="#">00F-4481-E0</a>	<a href="#">00G-4481-E0</a>	<a href="#">AJ0-8771</a>
C4	<a href="#">00D-4486-E0</a>	<a href="#">00F-4486-E0</a>	<a href="#">00G-4486-E0</a>	<a href="#">AJ0-8901</a>

for 4.6 mm ID



SecurityGuard ULTRA  
Holder with cartridge



Cartridge Holder

\*SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

\*\*SemiPREP SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

†PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)



For HPLC Column Performance Check Standards, see pp. 424-425



Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 417-418

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

For more about SecurityGuard ULTRA, see p. 335

For Core-Shell Performance Enhancement Kit, see p. 421

## A C18 Column with Polar Endcapping

Use Synergi Hydro-RP, an Improved Alternative to Aqua 125 Å

See p. 343

### Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m <sup>2</sup> /g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m <sup>2</sup> )	End Capping
AQUA C18	Spher. 3, 5	125	1.05	320	15	N/A	Proprietary
AQUA C18	Spher. 5	200	1.15	215	11	N/A	Proprietary

### 125 Å Aqua C18 Column

Aqua's polar endcapping produces a surface chemistry that is well suited for the analysis of small peptides. This chemistry...

- makes it an excellent column for smaller, basic peptides
- allows for faster column equilibration in gradient analyses
- ensures a surface that can be "wetted" with aqueous trifluoroacetic acid (TFA)

### 200 Å Aqua C18 Column

- Increased pore size for enhanced diffusion of large pharmaceuticals and biomolecules
- Reduced surface area for faster analyses and greater sample throughput

### Ordering Information

3 µm Minibore, Analytical, LC-MS and CombiChem Columns (mm)						SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	75 x 2.0	150 x 2.0	100 x 4.6	150 x 4.6	4 x 2.0*	4 x 3.0*
C18 125 Å	<a href="#">00B-4311-B0</a>	<a href="#">00C-4311-B0</a>	<a href="#">00F-4311-B0</a>	<a href="#">00D-4311-E0</a>	<a href="#">00F-4311-E0</a>	<a href="#">AJ0-7510</a> /10pk	<a href="#">AJ0-7511</a> /10pk
						for ID: 2.0–3.0 mm    3.2–8.0 mm	

5 µm Minibore, MidBore™ and LC-MS Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	50 x 2.0	150 x 2.0	250 x 2.0	150 x 3.0	250 x 3.0	4 x 2.0*
C18 125 Å	<a href="#">00B-4299-B0</a>	<a href="#">00F-4299-B0</a>	<a href="#">00G-4299-B0</a>	<a href="#">00F-4299-Y0</a>	<a href="#">00G-4299-Y0</a>	<a href="#">AJ0-7510</a> /10pk
C18 200 Å	—	<a href="#">00F-4331-B0</a>	—	—	—	<a href="#">AJ0-7510</a> /10pk
						for ID: 2.0–3.0 mm

5 µm Analytical, CombiChem, SemiPrep and Preparative Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phases	150 x 4.6	250 x 4.6	250 x 10	4 x 3.0*	10 x 10 <sup>‡</sup>
C18 125 Å	<a href="#">00F-4299-E0</a>	<a href="#">00G-4299-E0</a>	<a href="#">00G-4299-N0</a>	<a href="#">AJ0-7511</a> /10pk	<a href="#">AJ0-7512</a> /3pk
C18 200 Å	<a href="#">00F-4331-E0</a>	<a href="#">00G-4331-E0</a>	—	<a href="#">AJ0-7511</a>	<a href="#">AJ0-7512</a>
				for ID: 3.2–8.0 mm	9–16 mm



For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334

\*SecurityGuard Analytical Cartridges require holder, Part No.: [KJ0-4282](#)  
<sup>‡</sup>SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

## Aqueous Size Exclusion (SEC)/Gel Filtration (GFC) for Protein and Peptide Analysis

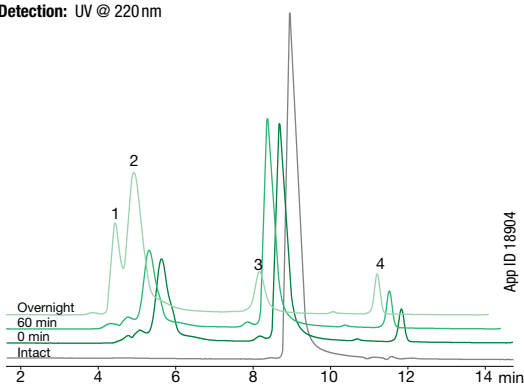
Gel Filtration Chromatography is used to analyze and/or characterize proteins, peptides, and other biomolecules; including antibodies, immunoglobulins, protein complexes, protein aggregates, and desalting. BioSep GFC columns offer many important benefits for your separation needs.

### Low MW Proteins and Peptides on BioSep-SEC-s2000

#### PEGylated $\beta$ -Lactoglobulin A (N-Terminal PEG 20 kDa)

**Column:** BioSep-SEC-s2000  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** [00H-2145-K0](#)  
**Mobile Phase:** 100 mM Sodium Phosphate pH 6.8  
**Flow Rate:** 1 mL/min  
**Temperature:** Ambient  
**Detection:** UV @ 220 nm

**Sample:** 1. 2 PEG Modified Complex  
 2. PEGylated  $\beta$ -Lactoglobulin  
 3.  $\beta$ -Lactoglobulin  
 4. PEG Reagent

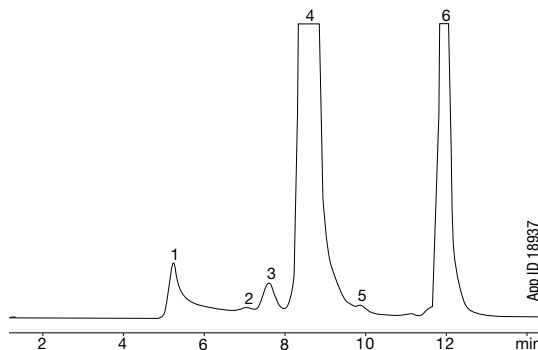


### Medium MW Proteins on BioSep-SEC-s3000

#### Murine IgG1 Aggregates

**Column:** BioSep-SEC-s3000  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** [00H-2146-K0](#)  
**Mobile Phase:** 50 mM Sodium Phosphate pH 6.8, 300 mM Sodium Chloride  
**Flow Rate:** 1 mL/min  
**Temperature:** Ambient  
**Detection:** UV @ 220 nm

**Sample:** 1. HMW aggregates  
 2. IgG1 dimer 1  
 3. IgG1 dimer 2  
 4. IgG Monomer  
 5. Low MW impurity  
 6. Void Volume Peak

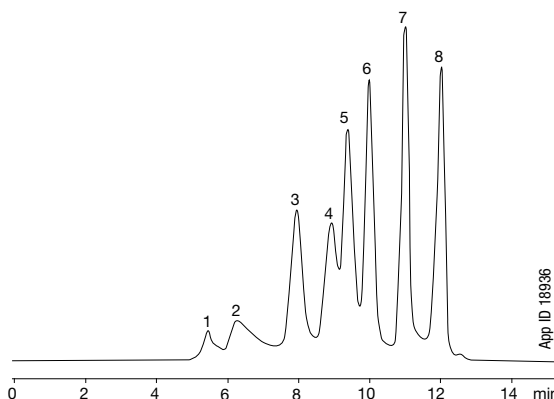


### Large MW Proteins on BioSep-SEC-s4000

#### High MW Protein Mixture

**Column:** BioSep-SEC-s4000  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** [00H-2147-K0](#)  
**Mobile Phase:** 100 mM Sodium Phosphate pH 7.0, 300 mM Sodium Chloride  
**Flow Rate:** 1 mL/min  
**Temperature:** Ambient  
**Detection:** UV @ 214 nm

**Sample:** 1. HMW impurity  
 2. IgM 900 kDa  
 3. Thyroglobulin 669 kDa  
 4. IgA 380 kDa  
 5.  $\beta$ -Amylase 200 kDa  
 6. BSA 66 kDa  
 7. Ribonuclease A 13.7 kDa  
 8. Uridine 244 Da



#### Ordering Information

Columns (mm)	Analytical			SecurityGuard™ Cartridges (mm)
	Narrow Bore	300 x 7.8	600 x 7.8	4 x 3.0*
BioSep-SEC-s2000	<a href="#">00H-2145-E0</a>	<a href="#">00H-2145-K0</a>	<a href="#">00K-2145-K0</a>	<a href="#">AJ0-4487</a>
BioSep-SEC-s3000	<a href="#">00H-2146-E0</a>	<a href="#">00H-2146-K0</a>	<a href="#">00K-2146-K0</a>	<a href="#">AJ0-4488</a>
BioSep-SEC-s4000	<a href="#">00H-2147-E0</a>	<a href="#">00H-2147-K0</a>	<a href="#">00K-2147-K0</a>	<a href="#">AJ0-4489</a>

\*SecurityGuard Analytical cartridges require holder, Part No.: [KJO-4282](#)

for ID: 4.6-7.8 mm

Guard Columns (mm)	Narrow Bore	Express	Analytical
Phases	30 x 4.6	35 x 7.8	75 x 7.8
BioSep-SEC-s2000	<a href="#">03A-2145-E0</a>	<a href="#">03Q-2145-K0</a>	<a href="#">03C-2145-K0</a>
BioSep-SEC-s3000	<a href="#">03A-2146-E0</a>	<a href="#">03Q-2146-K0</a>	<a href="#">03C-2146-K0</a>
BioSep-SEC-s4000	—	<a href="#">03Q-2147-K0</a>	<a href="#">03C-2147-K0</a>



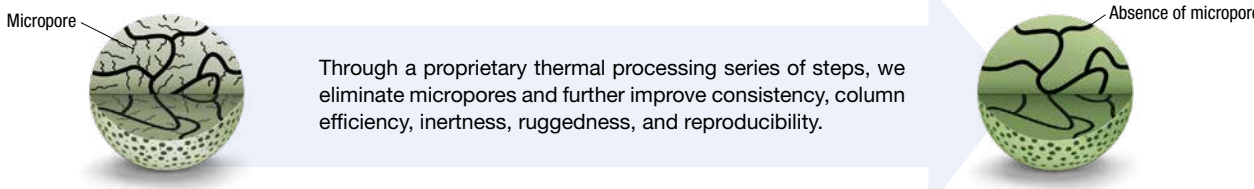
For Aqueous SEC1 Column Check Standard, see p. 424

## 4 Advanced Particle Platforms

All four of the Biozen particle platforms were individually designed and built by Phenomenex to take advantage of integral levels of performance, ruggedness, and reproducibility for protein char-

acterization applications. Individually, each platform differs in the proprietary processing techniques used to control particle size and morphology.

### Thermally Modified Fully Porous

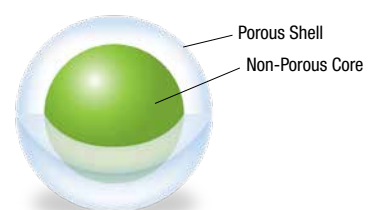


Micropore

Absence of micropores

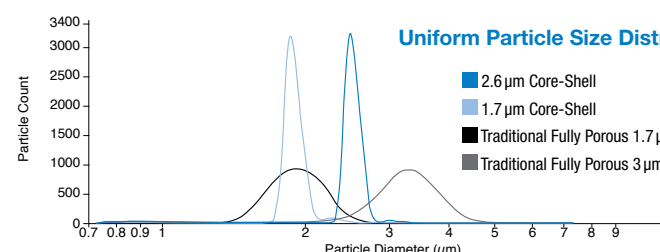
Through a proprietary thermal processing series of steps, we eliminate micropores and further improve consistency, column efficiency, inertness, ruggedness, and reproducibility.

### Core-Shell Technology



Porous Shell

Non-Porous Core

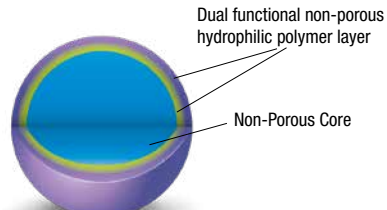


Uniform Particle Size Distribution

- 2.6 µm Core-Shell
- 1.7 µm Core-Shell
- Traditional Fully Porous 1.7 µm
- Traditional Fully Porous 3 µm

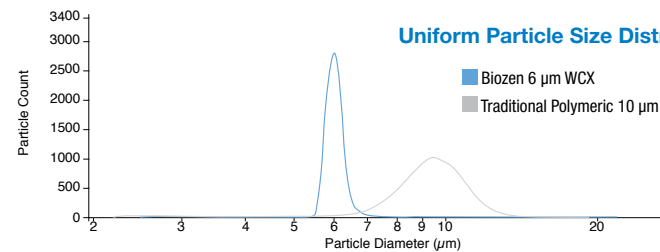
Using sol-gel processing techniques that incorporate nano structuring technology, a durable, homogeneous porous shell is grown on a solid silica core. This highly optimized process combined with industry leading column packing technology produces highly reproducible columns that generate extremely high efficiencies and sensitivity.

### Monosized Polymeric Non-Porous



Dual functional non-porous hydrophilic polymer layer

Non-Porous Core

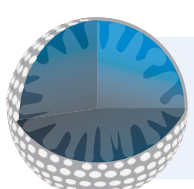


Uniform Particle Size Distribution

- Biozen 6 µm WCX
- Traditional Polymeric 10 µm WCX

Meticulously controlled monosized particle technology secures incredible particle consistency that leads to improved and reliable efficiency. This innovative non-porous particle serves as the perfect backbone for complex ion-exchange chemistries.

### Pore Controlled Technology

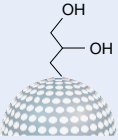


dSEC columns are packed with low pore volume silica coupled with a proprietary hydrophilic diol-type bonded surface chemistry that prevents the silica surface from interacting with protein samples.

## 8 Particle Chemistries

With a single innovative product line spanning major biologics workflows, you can now gain some reprieve from juggling multiple catalogs, bookmarks, and vendors. Give yourself a break with high quality particle chemistries designed and tested for biologics.

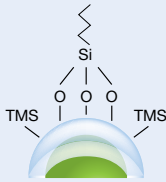
**dSEC**



**Biozen dSEC**  
1.8 μm and 3 μm

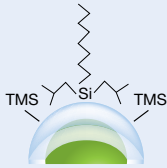
Inert, high-strength porous particle for the separation and quantitation of monoclonal antibody aggregate and fragments

**Intact**



**Biozen WidePore C4**  
2.6 μm


Core-shell particle with butyl stationary phase and optimal wide pore size distribution for better resolution of large biologics, including monoclonal antibodies and subunit analysis.



**Biozen Intact XB-C8**  
3.6 μm

Large pore core-shell particle for fast intact and subunit biologic entry. C8 provides highly useful moderate hydrophobic selectivity.

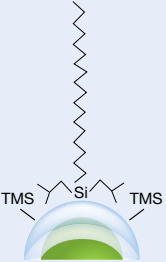
**Glycan**



**Biozen Glycan**  
2.6 μm

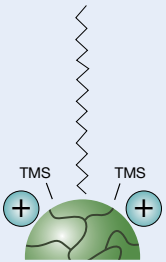
Provides optimal combination of high efficiency and selectivity for released glycans.

**Peptide**



**Biozen Peptide XB-C18**  
1.7 μm and 2.6 μm

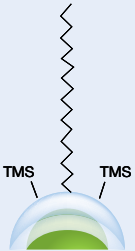
Overall retention of both acidic and basic peptides through C18 stationary phase with di-isobutyl side chains.



**Biozen Peptide PS-C18**  
1.6 μm and 3 μm

Excellent retention by combined positively charged surface ligand and C18 ligand.

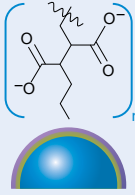
**Oligonucleotides**



**Biozen Oligo**  
1.7 μm and 2.6 μm

Organo-silica core-shell particle bonded with a C18 stationary phase offers high selectivity for even minute oligo differences alongside high and low pH robustness.

**Ion-Exchange**



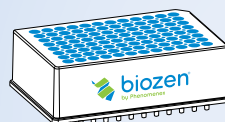
**Biozen WCX**  
6 μm

Monosized particles grafted with linear polycarboxylate chains to envelop and separate proteins from acidic/basic variants

 Learn More:  
[www.phenomenex.com/Biozen](http://www.phenomenex.com/Biozen)

## Sample Preparation Solutions

### N-Glycan Clean-Up

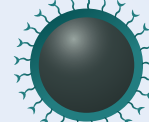


**HILIC Solid Phase Extraction (SPE)**  
High recovery of labeled, released N-glycans in a microelution format allowing for streamlined processing and clean-up of small sample volumes.



To learn more, see p. 78

### MagBeads



**Streptavidin Coated**  
Higher binding capacity magnetic particles result in faster and reliable purification, clean-up, and isolation of proteins and peptide molecules.



U.S. Patent Nos. 7,563,367 and 8,658,038 and foreign counterparts.

## Oligo Characterization and Quantitation

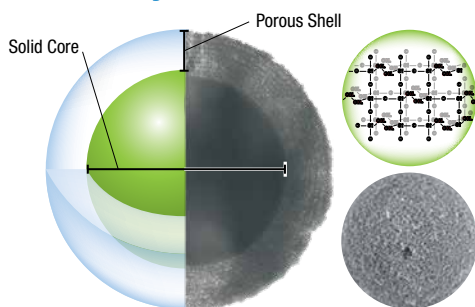
### Advanced Oligonucleotide Analysis for Increased Recovery and Reproducibility

The Biozen Oligo LC Column brings a unique combination of core-shell versatility and high pH ruggedness necessary for oligonucleotide separations. Additionally, Biozen Oligo is packed in a unique bio-inert titanium hardware designed to minimize the sample loss and adsorption issues typically seen with stainless steel hardware, demonstrating this column's optimal utility for oligonucleotide characterization and quantitation.

- **BioTi™ Hardware Reduces Sample Loss and Adsorption**
- **Robustness at High pH and Temperature**
- **Core-Shell Advantage for High Efficiency**

### Patented Technology and Advanced Core-Shell Particle Chemistry

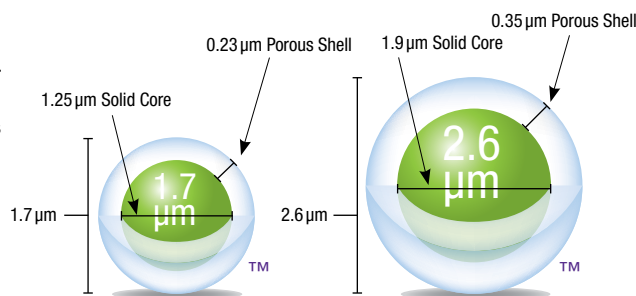
#### Patented Core-Shell Particle Chemistry



Biozen Oligo uses a patented organo-silica grafting process that incorporates uniform stabilizing ethylene cross-linking to provide resistance to high pH and temperature which are fundamental to reversed phase analysis of oligonucleotides.

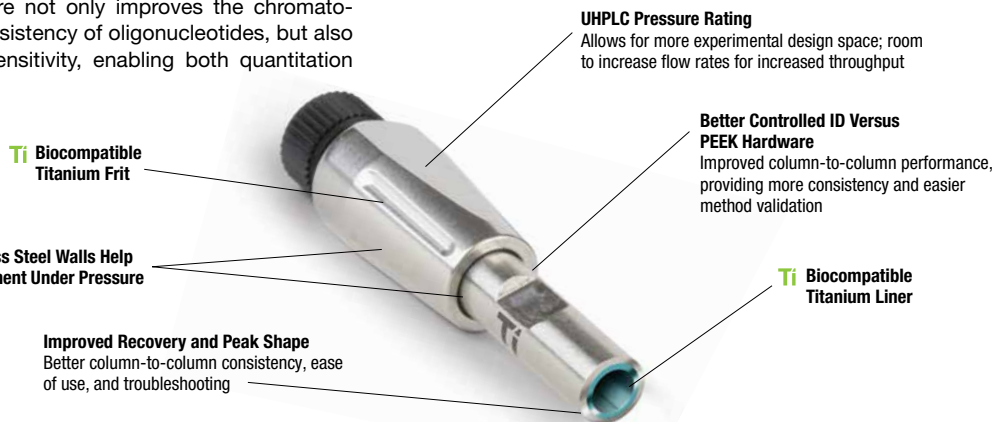
### High Efficiency Core-Shell Particle

After meticulous core construction, a uniform porous silica layer is grown around the spherical solid silica core. This unique combination of precise particle architecture and particle size provides dramatic leaps in performance.



### Inside the Biozen Oligo Biocompatible Hardware Difference

The use of bio-inert hardware not only improves the chromatographic performance and consistency of oligonucleotides, but also provides improvements in sensitivity, enabling both quantitation and characterization.



U.S. Patent Nos. 7,563,367 and 8,658,038 and foreign counterparts.

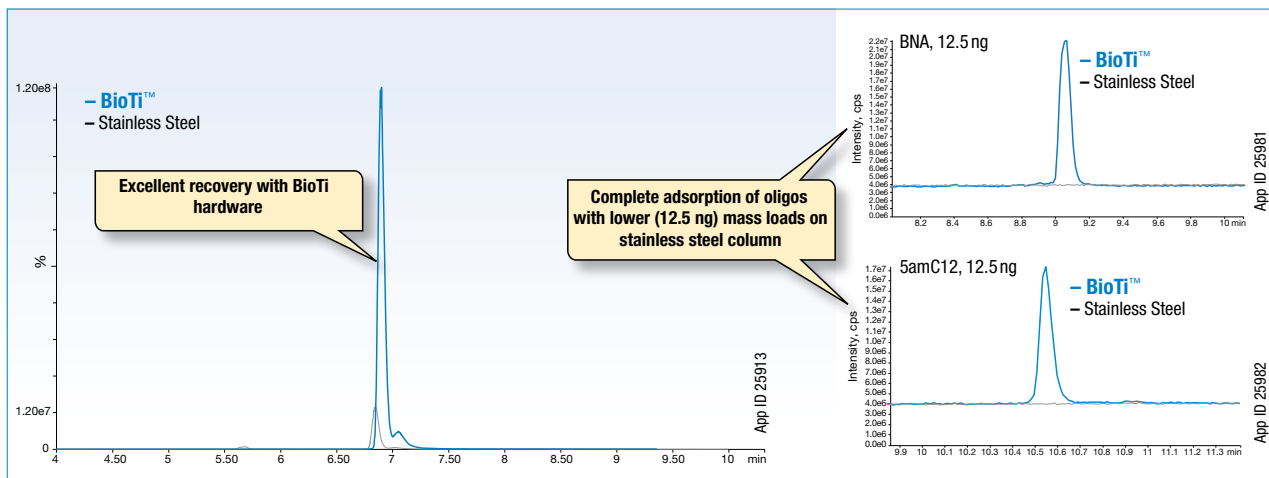
## Oligo Characterization and Quantitation (cont'd)

### BioTi versus Traditional Stainless Steel Hardware

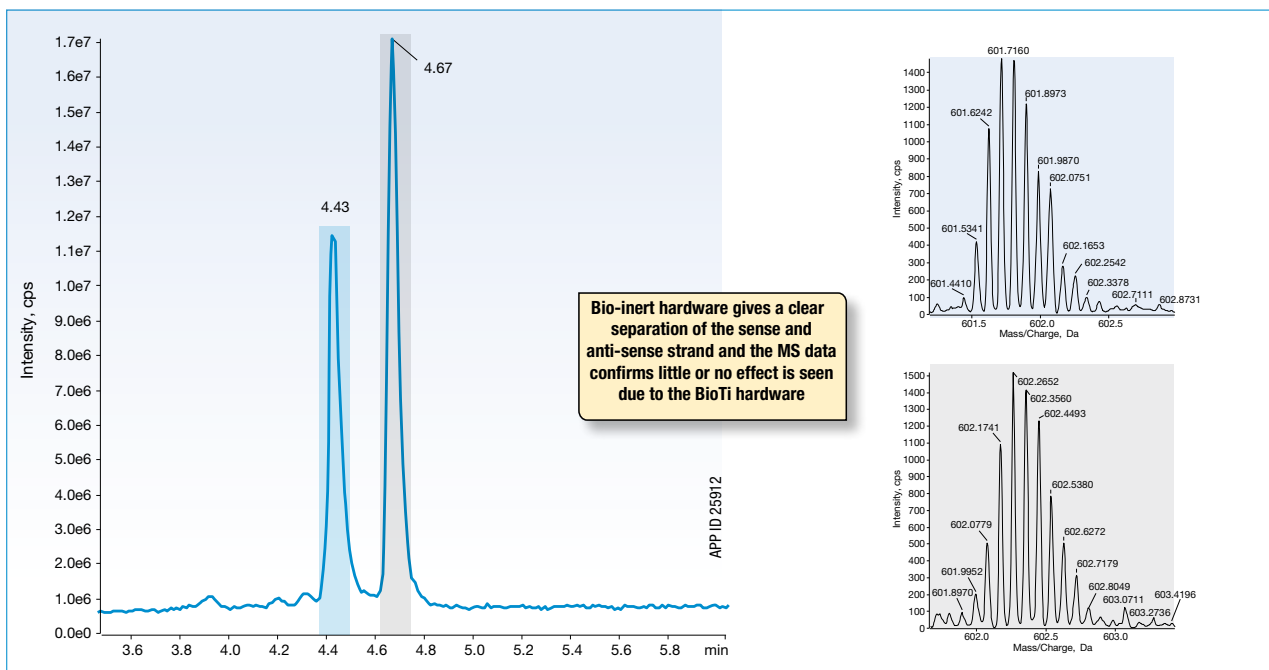
Oligos can chelate to trace heavy metals in stainless steel column hardware, leading to poor recovery, inconsistent chromatography and problematic carryover. The Biozen Oligo bio-inert hardware

provides greater sensitivity as well as improved recovery, demonstrating this column's optimal utility for oligonucleotide characterization and quantitation.

#### BioTi Ensures Method Robustness and Consistency from Injection-to-Injection!



#### LC-MS Analysis of siRNA using Bio-Inert Hardware



#### Ordering Information

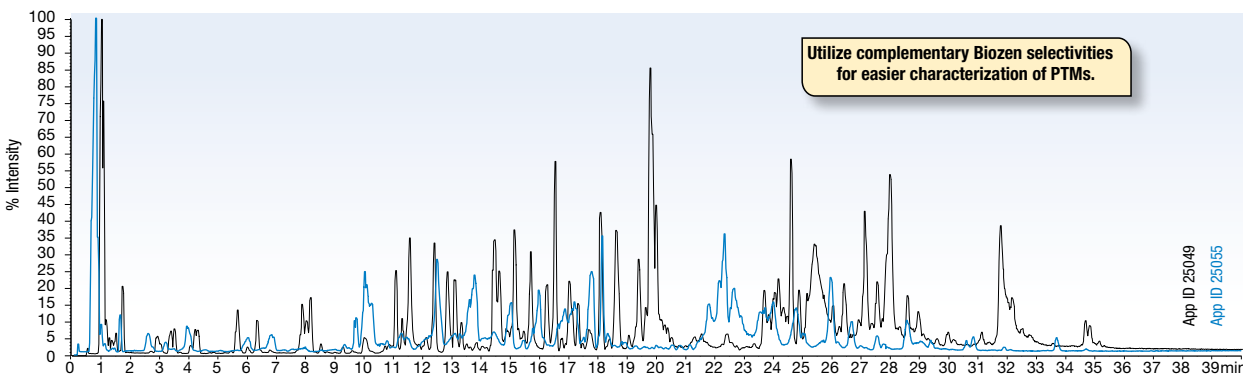
Biozen Columns (mm)	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	Biocompatible Guard Cartridges		
							for 2.1 mm /3pk	for 4.6 mm /3pk	Holder ea
Biozen 1.7 µm Oligo	<a href="#">00B-4791-AN</a>	<a href="#">00D-4791-AN</a>	<a href="#">00F-4791-AN</a>	—	—	—	<a href="#">AJ0-9820</a>	<a href="#">AJ0-9822</a>	<a href="#">AJ0-9000</a>
Biozen 2.6 µm Oligo	<a href="#">00B-4790-AN</a>	<a href="#">00D-4790-AN</a>	<a href="#">00F-4790-AN</a>	<a href="#">00B-4790-E0</a>	<a href="#">00D-4790-E0</a>	<a href="#">00F-4790-E0</a>	<a href="#">AJ0-9820</a>	<a href="#">AJ0-9822</a>	<a href="#">AJ0-9000</a>

## Peptide Mapping

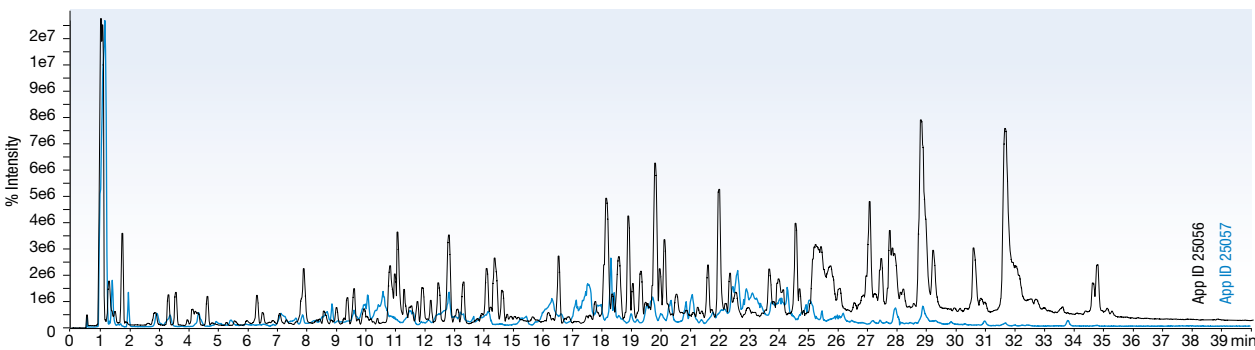
Digested mAbs or ADCs typically include a large body of compounds which are crucial to understanding post translation modifications. So we designed two Biozen Peptide columns to offer highly useful and unique retention profiles. Each allows for fast and

effective elution windows by utilizing either high efficiency core-shell or thermally modified fully porous particles to gain sharper peaks, better peak capacities, and overall higher sensitivity.

### Trastuzumab Biosimilar Peptide Map



### Infliximab Biosimilar Peptide Map



#### Conditions for all columns:

<b>Columns:</b>	■ Biozen 1.6 μm Peptide PS-C18	<b>Gradient:</b>	<b>Time (min)</b>	<b>% B</b>
	■ Biozen 2.6 μm Peptide XB-C18		0	1
<b>Dimension:</b>	150 x 2.1 mm		0.5	1
<b>Part No.:</b>	<a href="#">00F-4770-AN</a>		50	50
	<a href="#">00F-4768-AN</a>		55	50
<b>Mobile Phase:</b>	A: 0.1 % Formic Acid in Water		56	95
	B: 0.1 % Formic Acid in Acetonitrile	<b>Flow Rate:</b>	0.3 mL/min	
		<b>Temperature:</b>	40 °C	
		<b>Detection:</b>	QTOF (SCIEX® X500B)	

### Ordering Information

Biozen Columns (mm)						Biocompatible Guard Cartridges		Holder
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	
Biozen 1.6 μm Peptide PS-C18	<a href="#">00B-4770-AN</a>	<a href="#">00D-4770-AN</a>	<a href="#">00F-4770-AN</a>	—	—	<a href="#">AJ0-9803</a> /10pk	— /10pk	<a href="#">AJ0-9000</a> ea
Biozen 3 μm Peptide PS-C18	<a href="#">00B-4771-AN</a>	—	<a href="#">00F-4771-AN</a>	<a href="#">00B-4771-E0</a>	<a href="#">00F-4771-E0</a>	<a href="#">AJ0-7605</a> /3pk	<a href="#">AJ0-7606</a> /10pk	<a href="#">KJ0-4282</a> ea
Biozen 1.7 μm Peptide XB-C18	<a href="#">00B-4774-AN</a>	<a href="#">00D-4774-AN</a>	<a href="#">00F-4774-AN</a>	—	—	<a href="#">AJ0-9806</a> /3pk	— /3pk	<a href="#">AJ0-9000</a> ea
Biozen 2.6 μm Peptide XB-C18	<a href="#">00B-4768-AN</a>	<a href="#">00D-4768-AN</a>	<a href="#">00F-4768-AN</a>	<a href="#">00B-4768-E0</a>	<a href="#">00F-4768-E0</a>	<a href="#">AJ0-9806</a> /3pk	<a href="#">AJ0-9808</a> /3pk	<a href="#">AJ0-9000</a> ea

## Aggregate Analysis

With mAb aggregate often at very low levels (<0.1% by peak area compared to monomer) and fragment separation a requirement, adequate resolution and peak shape have become even more crucial method outcomes. To address this need, the robust set

of Biozen SEC columns were developed with a combination of UHPLC efficiency and higher sensitivity, to drive resolution and identification of even lower level targets.

## Biozen Size-Exclusion Chromatography (dSEC) Columns

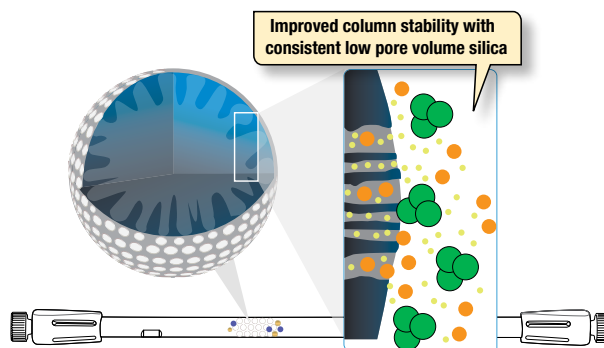
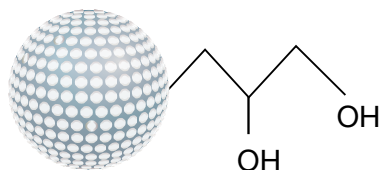
### Advanced SEC Silica Particle Technology and Surface Chemistry for Characterization Biomolecules

The Biozen dSEC columns are packed with low pore volume silica coupled with a proprietary hydrophilic diol-type bonded surface chemistry that prevents the silica surface from interacting with protein samples.

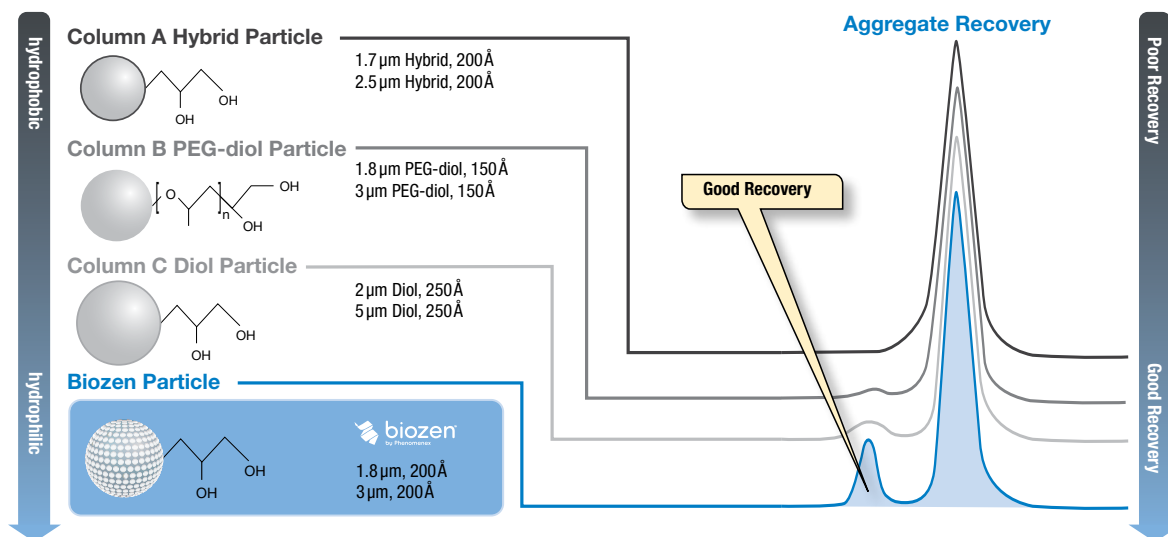
- Exceptionally Robust, Pore Controlled SEC Particle
- Extreme Stability and Exceptional Lifetime
- Reproducible Separations

### Biozen SEC Proprietary Silica Particle Technology

The Biozen dSEC columns are packed with low pore volume silica coupled with a proprietary hydrophilic diol-type bonded surface chemistry that prevents the silica surface from interacting with protein samples.



### Biozen SEC Hydrophilic Surface Chemistry Improves Aggregate Analysis



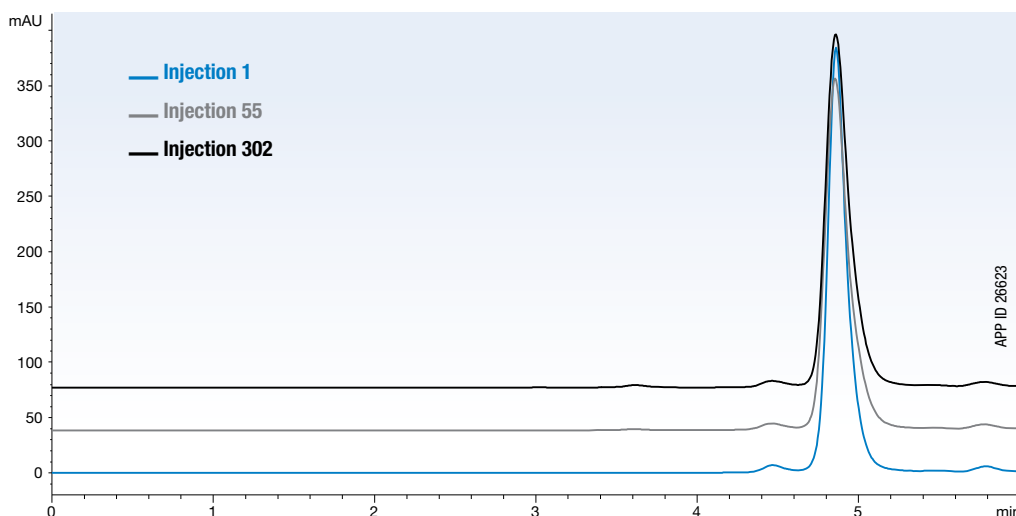
Comparative separations may not be representative of all applications.

## Aggregate Analysis (cont'd)

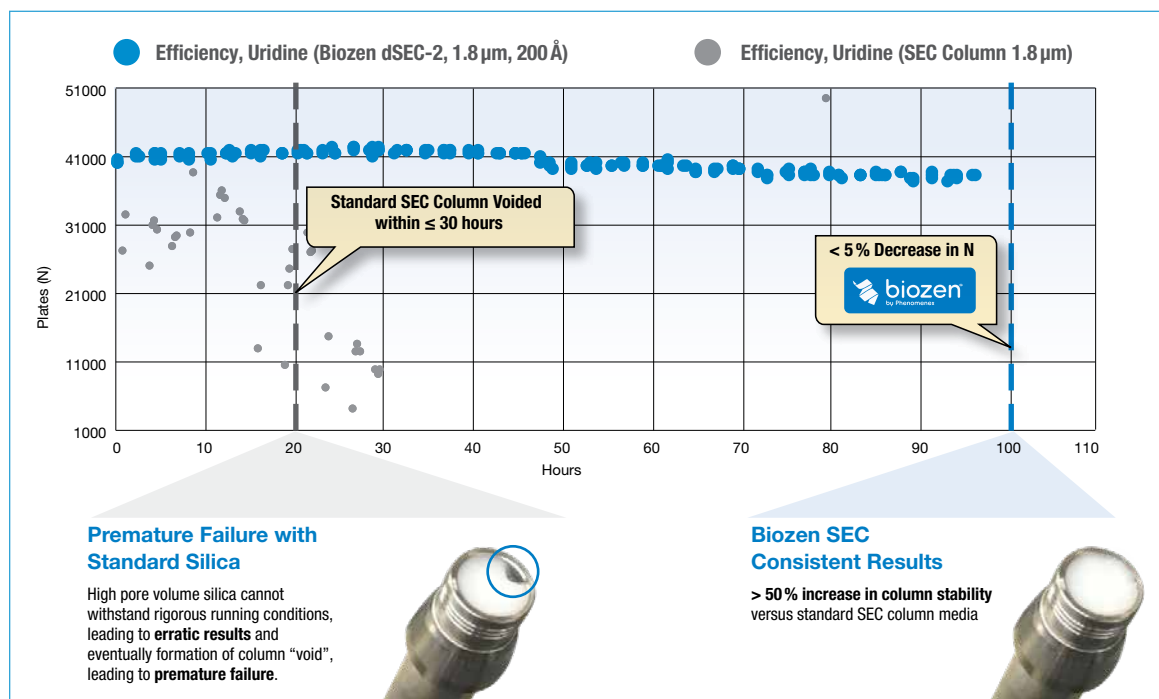
### Improved Column Lifetime and Performance Stability

Phenomenex's optimized SEC column loading technology has significantly improved the overall packing density and silica distribution of the columns leading to improved chromatographic lifetime and stability.

#### Unchanged Performance After 300 Injections



#### Unchanged Performance After 100 Hours of Extreme Running Conditions



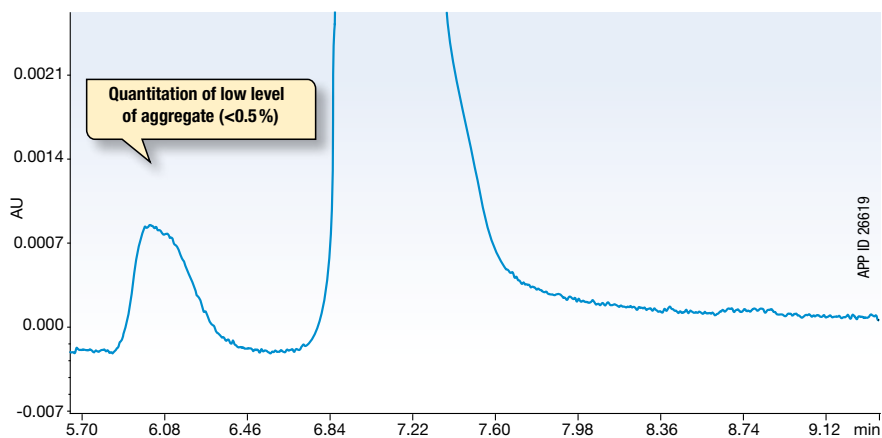


## Aggregate Analysis (cont'd)

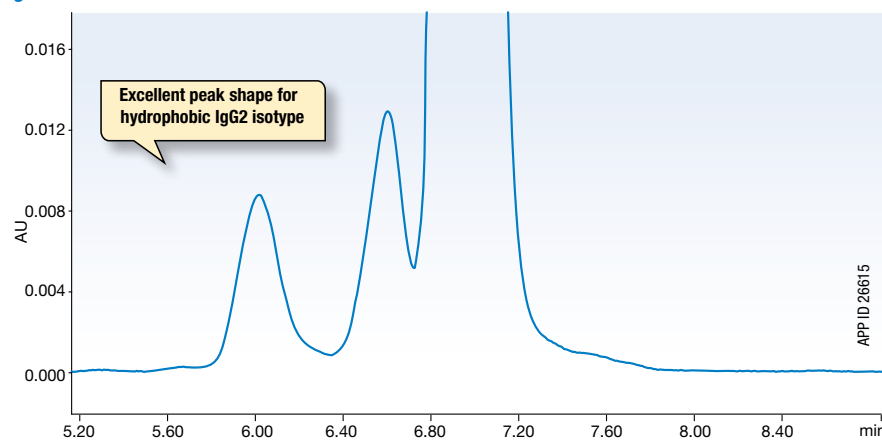
### New Standard for Platform SEC Methods

Whether IgG2 or IgG4 isotypes, bispecifics, or Fc-Fusions, dSEC-2 provides excellent separation and sample recovery for many different classes of antibodies and related recombinant proteins.

#### Bispecific Emicizumab



#### IgG2 Panitumumab



**Conditions for both columns:**

- Column: Biozen dSEC-2, 200Å
- Dimension: 300 x 4.6 mm
- Part No.: [00H-4787-E0](#)
- Mobile Phase: 200 Potassium Phosphate + 250 mM KCl, pH 6.2
- Flow Rate: 0.35 mL/min
- Injection Volume: 10 µL
- Detector: UV @ 280 nm
- Temperature: 25 °C
- Sample: Various, 10 mg/mL

#### Ordering Information

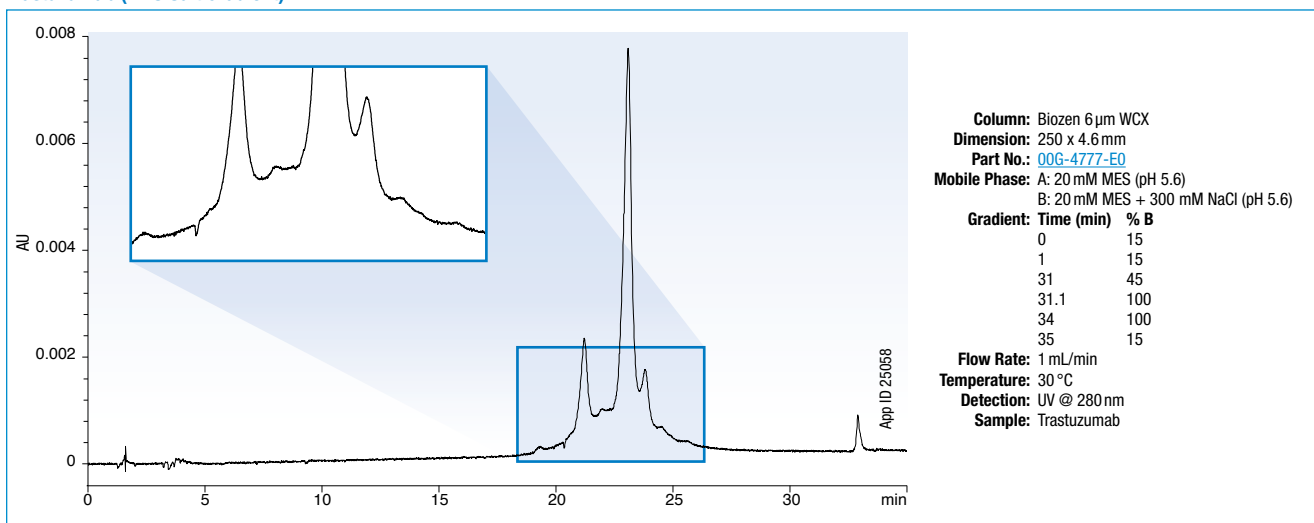
Biozen Columns (mm)	Biozen Columns (mm)						Biocompatible Guard Cartridges	
	50 x 2.1	150 x 2.1	150 x 4.6	300 x 4.6	150 x 7.8	300 x 7.8	for 4.6 mm	Holder
Biozen 1.8 µm dSEC-2	<a href="#">00B-4787-AN</a>	<a href="#">00F-4787-AN</a>	<a href="#">00F-4787-E0</a>	<a href="#">00H-4787-AN</a>	—	—	/3pk <a href="#">AJ0-9851</a>	ea <a href="#">AJ0-9000</a>
Biozen 3 µm dSEC-2	—	—	<a href="#">00F-4788-E0</a>	<a href="#">00H-4788-E0</a>	<a href="#">00F-4788-K0</a>	<a href="#">00H-4788-K0</a>	<a href="#">AJ0-9850</a>	<a href="#">AJ0-9000</a>

## Charge Variant Analysis

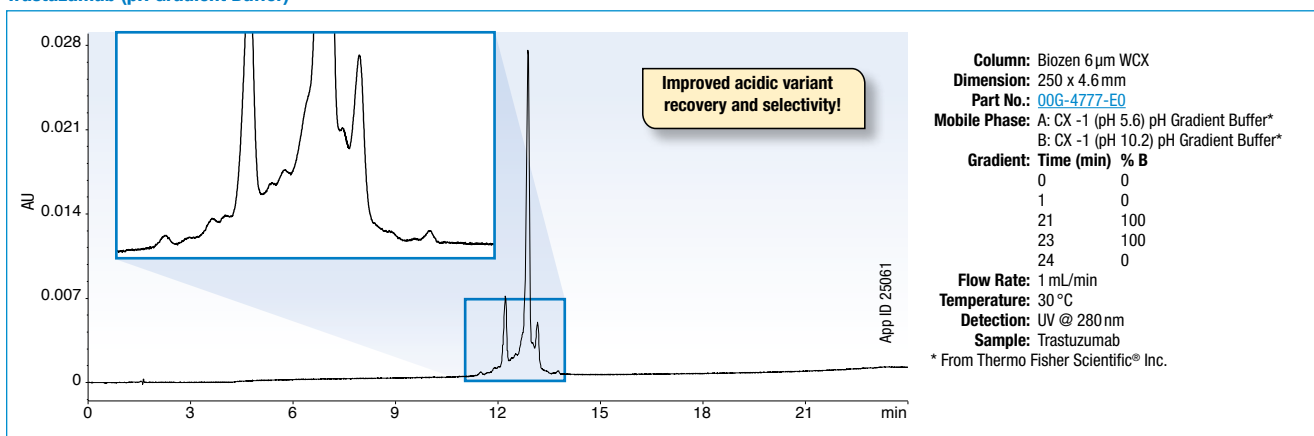
Biozen WCX was crafted to consistently decipher between native protein variants that arise from PTMs within a therapeutics creation and development. The linear polycarboxylate chains grafted to monosized non-porous polymeric particles, envelop and separate proteins from acidic and basic protein variants. With such a highly

tuned and controlled manufacturing process, Biozen WCX media affords scientists a way to reproducibly characterize heterogeneity while taking advantage of excellent recovery through high particle inertness and bioinert titanium BioTi™ column hardware.

### Trastuzumab (MES Salt Gradient)



### Trastuzumab (pH Gradient Buffer)



### Ordering Information

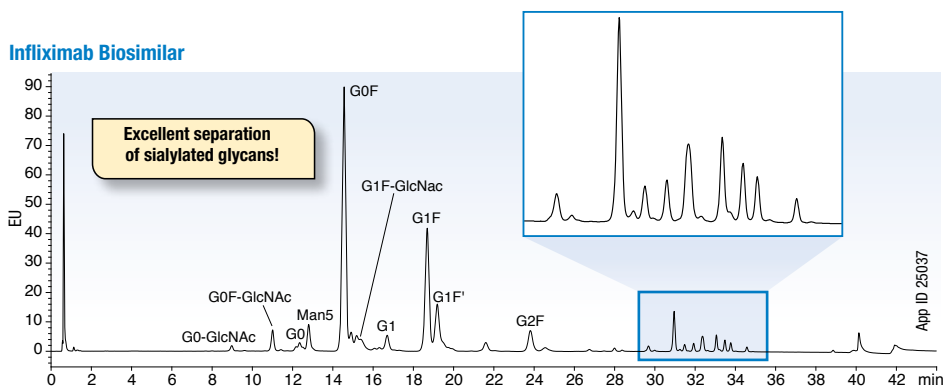
Biozen Columns (mm)					Biocompatible Guard Cartridges	
	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	for 2.1 mm	Holder
Biozen 6 μm WCX	00B-4777-AN	00D-4777-AN	00F-4777-AN	00G-4777-AN	AJO-9401	KJO-4282
	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	for 4.6 mm	Holder
					/10pk	ea
Biozen 6 μm WCX	00B-4777-E0	00D-4777-E0	00F-4777-E0	00G-4777-E0	AJO-9400	KJO-4282

## Glycan Analysis

The unique selectivity of the Biozen Glycan was designed to provide higher order separations of released and labeled glycans. With a 2.6µm core-shell particle size, customers using either HPLC or UHPLC systems can draw upon a high efficiency Biozen Glycan

particle run at higher linear velocities, to easily provide sharper peak shapes and faster elution windows, without high UHPLC pressures. Under HILIC-FLR or HILIC-MS conditions, the Biozen Glycan excels with increased polar retention and selectivity.

### Infliximab Biosimilar



#### Conditions for both separations:

Column: Biozen 2.6 µm Glycan

Dimensions: 150 x 2.1 mm

Part No.: 00F-4773-AN

Mobile Phase: A: 100 mM Ammonium Formate, pH 4.5

B: Acetonitrile

Gradient: Time (min)	% B
0	78
10	74.5
24	72
38.5	55.9
38.6	40
40.6	40
40.7	78
48	78

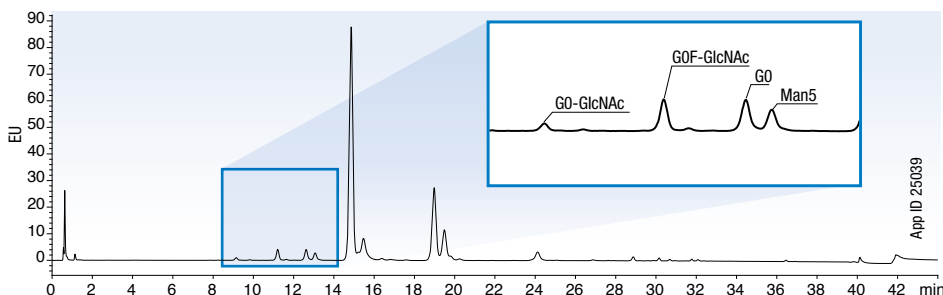
Flow Rate: 0.5 mL/min

Temperature: 50 °C

Detection: FLD ex/em 285/345 nm

Sample: As noted

### Trastuzumab



### Ordering Information

Biozen Columns (mm)	Biocompatible Guard Cartridges				
	50 x 2.1	100 x 2.1	150 x 2.1	for 2.1 mm	Holder
Biozen 2.6 µm Glycan	00B-4773-AN	00D-4773-AN	00F-4773-AN	AJO-9800	AJO-9000

## Sample Preparation

### Ordering Information

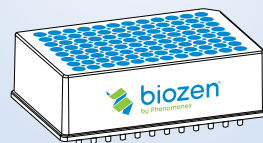
Format	Biozen Solid Phase Extraction	Sorbent Mass	Part Number	Unit
Microelution 96-Well Plate	Biozen N-Glycan Clean-Up	5 mg/well	8M-S009-NGA	1/box



## Biozen N-Glycan Clean-Up

Novel solid phase extraction (SPE) HILIC stationary phase that excels at retention and recovery of labeled, released N-glycans! Available in microelution 96-well plate format that works extremely well for processing and clean-up of small sample volumes.

[www.phenomenex.com/GlycanSPE](http://www.phenomenex.com/GlycanSPE)



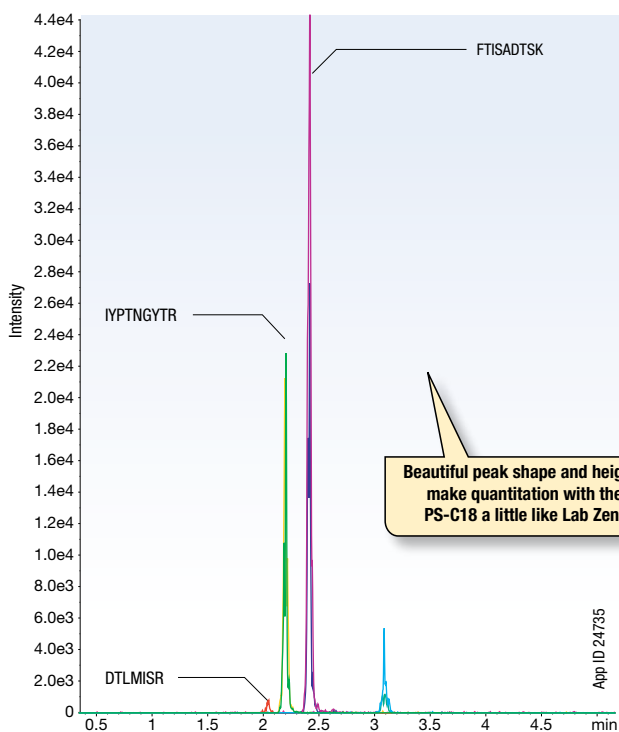
## Peptide Quantitation

When quantitating signature peptides from biological matrices, you need sharp peak shape and sufficient retention of hydrophilic peptides to prevent any signal loss from matrix suppression regions. Both Biozen Peptide columns were developed to deliver excellent selectivity for even closely related peptides. Additionally, they build

on this body of valuable characteristics with unique ways of delivering sharper peak shape for basic peptides; Biozen Peptide XB-C18 blocks secondary surface interactions via isobutyl side chains, while the Biozen Peptide PS-C18 contains a positively charged weak base that repels other basic species.

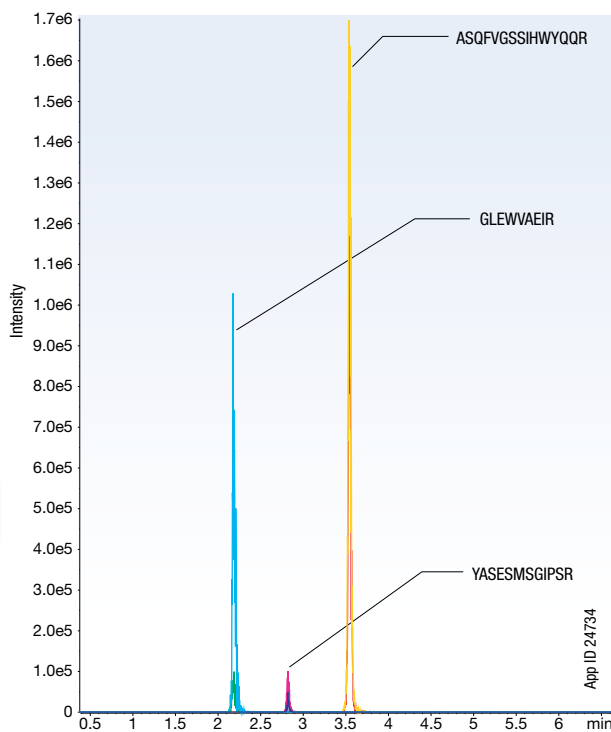
### Kadcyla

(4 Signature Peptides)



### Infliximab

(3 Signature Peptides)



Conditions same for both samples:

Column: Biozen 3µm Peptide PS-C18

Dimensions: 50 x 2.1 mm

Part No.: [00B-4771-AN](#)

Mobile Phase: A: 0.1 % Formic Acid in Water

B: 0.1 % Formic Acid in Acetonitrile

Gradient	Time (min)	% B
	0	3
	1	3
	4.5	25

Flow Rate: 0.5 mL/min

Temperature: 22 °C

LC System: ExionLC™ AD HPLC

Detection: MS/MS

Detector: SCIEX® QTRAP® 5500

Sample: As noted

### Ordering Information

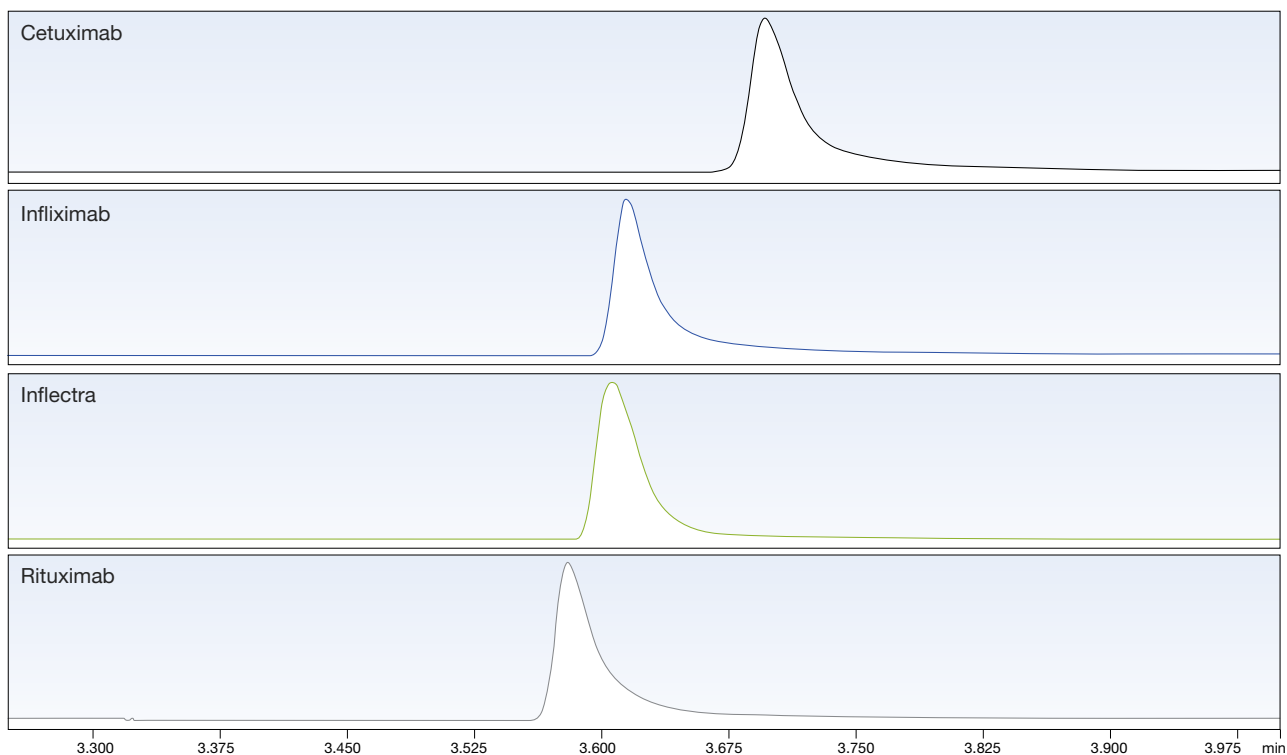
Biozen Columns (mm)	Biozen Columns (mm)					Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
Biozen 1.6 µm Peptide PS-C18	<a href="#">00B-4770-AN</a>	<a href="#">00D-4770-AN</a>	<a href="#">00F-4770-AN</a>	—	—	<a href="#">AJ0-9803</a> /3pk	—	<a href="#">AJ0-9000</a> ea
Biozen 3 µm Peptide PS-C18	<a href="#">00B-4771-AN</a>	—	<a href="#">00F-4771-AN</a>	<a href="#">00B-4771-EQ</a>	<a href="#">00F-4771-EQ</a>	<a href="#">AJ0-7605</a> /10pk	<a href="#">AJ0-7606</a> /10pk	<a href="#">KJ0-4282</a> ea
Biozen 1.7 µm Peptide XB-C18	<a href="#">00B-4774-AN</a>	<a href="#">00D-4774-AN</a>	<a href="#">00F-4774-AN</a>	—	—	<a href="#">AJ0-9806</a> /3pk	—	<a href="#">AJ0-9000</a> ea
Biozen 2.6 µm Peptide XB-C18	<a href="#">00B-4768-AN</a>	<a href="#">00D-4768-AN</a>	<a href="#">00F-4768-AN</a>	<a href="#">00B-4768-EQ</a>	<a href="#">00F-4768-EQ</a>	<a href="#">AJ0-9806</a> /3pk	<a href="#">AJ0-9808</a> /3pk	<a href="#">AJ0-9000</a> ea

## Intact mAbs and Subunit Analysis

Impurity profiling and characterization of intact biologic fragments is a challenging undertaking because of the need to identify very small differences between variants. Biozen WidePore C4 columns contain skillfully manufactured large pore core-shell particles that

provide narrower, taller peaks in conjunction with higher resolution between the target HC/LC, Fc/Fab, or isoforms and are ideal for large biologics to optimize analysis.

### Diverse mAb Comparison with Chromatographic Performance Suitable for Intact MS Analysis



App ID 25840

HPLC/UHPLC | BIOZEN | ANALYSIS OF BIOLOGICS

#### Conditions same for all samples:

**Column:** Biozen 2.6 μm WidePore C4  
**Dimension:** 100 x 2.1 mm  
**Part No.:** [00D-4786-AN](#)  
**Mobile Phase:** A: 0.1 % Formic Acid in Water  
 B: 0.1 % Formic Acid in Acetonitrile  
**Gradient:** Time (min) % B  
 0 10  
 4 90  
**Flow Rate:** 0.3 mL/min  
**Temperature:** 80 °C  
**Detection:** UV @ 280 nm  
**Sample:** mAbs, Various (1 mg/mL)

Improved peak shape for intact mass applications by high resolution MS.

Sample	Retention Time (min)	Width @ (50%)
Rituximab	3.580	0.0233
Infliximab Biosimilar	3.606	0.0272
Cetuximab	3.696	0.0270
Infliximab	3.615	0.0222

### Ordering Information

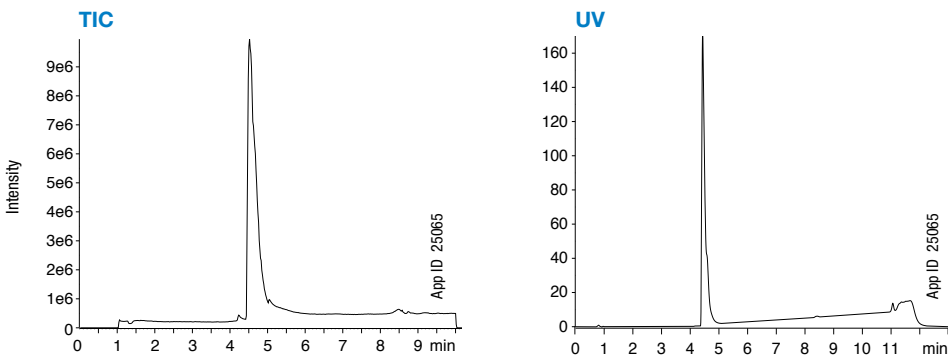
Biozen Columns (mm)	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	Biocompatible Guard Cartridges		
								for 2.1 mm	for 4.6 mm	Holder
Biozen 2.6 μm WidePore C4	<a href="#">00B-4786-AN</a>	<a href="#">00D-4786-AN</a>	<a href="#">00F-4786-AN</a>	<a href="#">00B-4786-E0</a>	<a href="#">00D-4786-E0</a>	<a href="#">00F-4786-E0</a>	<a href="#">00G-4786-E0</a>	<a href="#">AJ0-9816</a>	<a href="#">AJ0-9818</a>	<a href="#">AJ0-9000</a>
Biozen 3.6 μm Intact XB-C8	<a href="#">00B-4766-AN</a>	<a href="#">00D-4766-AN</a>	<a href="#">00F-4766-AN</a>	<a href="#">00B-4766-E0</a>	—	<a href="#">00F-4766-E0</a>	—	<a href="#">AJ0-9812</a>	<a href="#">AJ0-9814</a>	<a href="#">AJ0-9000</a>



## Intact Mass

Intact Mass can give indications not only of relative abundance of glycoforms, but also stability as degraded mAbs will not give good charge envelope by ESI-MS. Intact Mass with a high resolution MS to identify PTMs, especially relative abundance of glycoforms, combines extremely well with the fast run times and tight peak shapes provided by the Biozen Intact XB-C8 and Biozen WidePore C4.

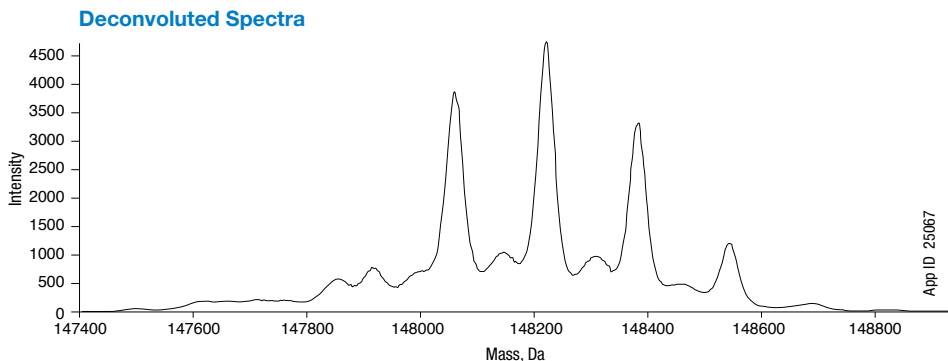
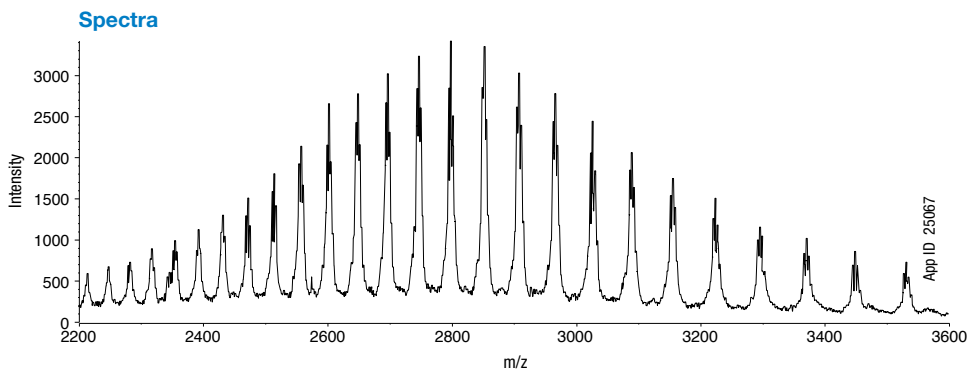
## Intact Mass of Trastuzumab Biosimilar using a Biozen Intact XB-C8 and SCIEX® X500B



**Columns:** Biozen 3.6 µm Intact XB-C8  
**Dimension:** 150 x 2.1 mm  
**Part No.:** [00F-4766-AN](#)  
**Mobile Phase:** A: 0.1% Formic Acid in Water  
 B: 0.1% Formic Acid in Acetonitrile / Isopropyl alcohol (50:50)  
**Gradient:**

Time (min)	% B
2.5	20
10	65
10.1	95

**Flow Rate:** 0.3 mL/min  
**Temperature:** 90 °C  
**Detection:** QTOF (SCIEX X500B)  
**Sample:** Trastuzumab



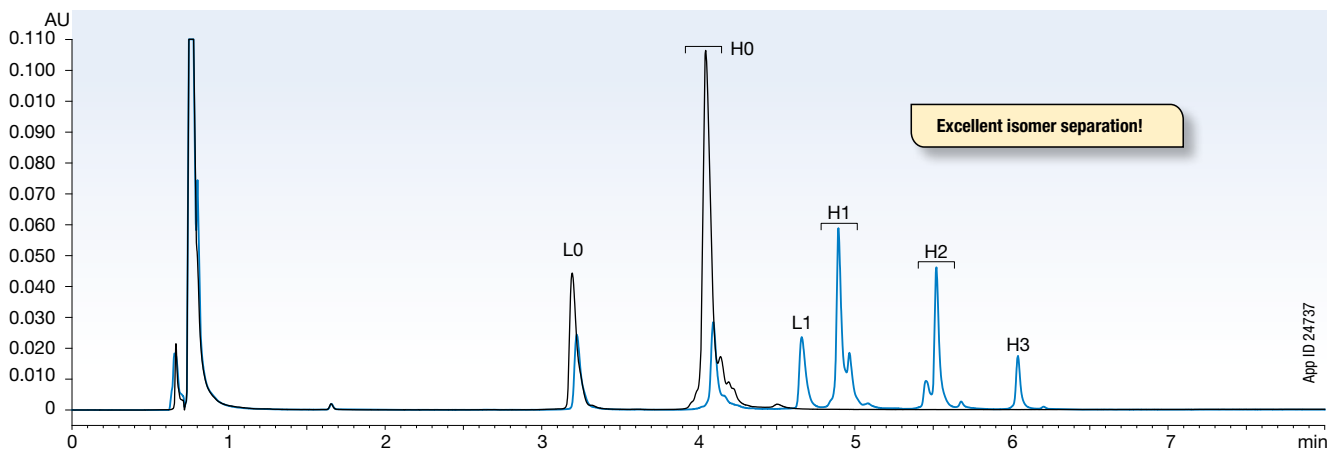
### Ordering Information

Biozen Columns (mm)	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	Biocompatible Guard Cartridges		
								for 2.1 mm	for 4.6 mm	Holder
Biozen 2.6 µm WidePore C4	<a href="#">00B-4786-AN</a>	<a href="#">00D-4786-AN</a>	<a href="#">00F-4786-AN</a>	<a href="#">00B-4786-E0</a>	<a href="#">00D-4786-E0</a>	<a href="#">00F-4786-E0</a>	<a href="#">00G-4786-E0</a>	<a href="#">AJ0-9816</a>	<a href="#">AJ0-9818</a>	<a href="#">AJ0-9000</a>
Biozen 3.6 µm Intact XB-C8	<a href="#">00B-4766-AN</a>	<a href="#">00D-4766-AN</a>	<a href="#">00F-4766-AN</a>	<a href="#">00B-4766-E0</a>	—	<a href="#">00F-4766-E0</a>	—	<a href="#">AJ0-9812</a>	<a href="#">AJ0-9814</a>	<a href="#">AJ0-9000</a>

## Drug Antibody Ratio (DAR)

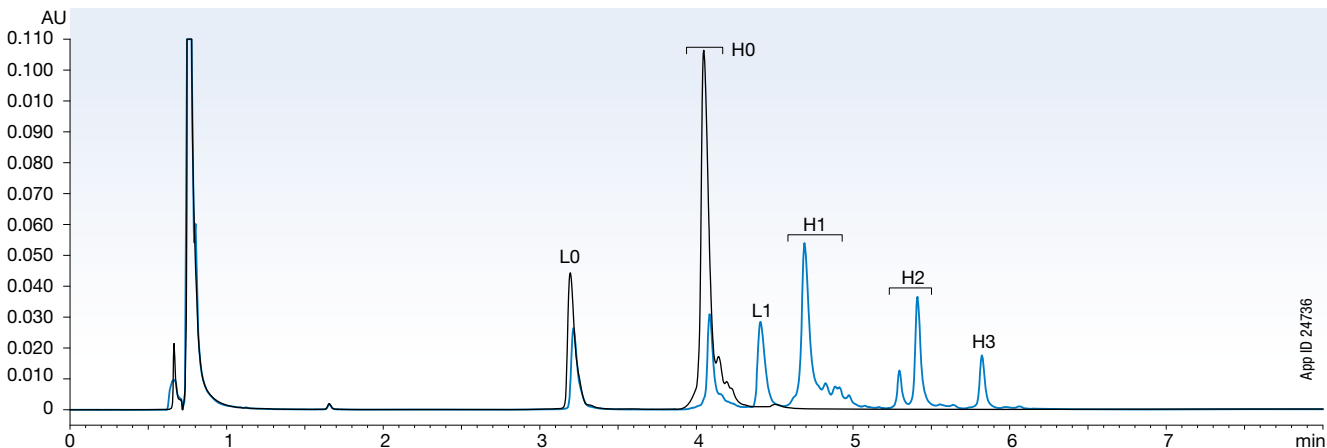
With a direct effect on efficacy and safety, conjugation for each ADC must be well understood. The Biozen Intact XB-C8 provides an excellent vehicle for determining drug load distribution and DAR for ADCs. Its large pore size allows intact ADCs to interact with a moderately retentive stationary phase while the core-shell particle supplies increased efficiency to deliver the required resolution between ADC species with differing drug loads.

Herceptin—vcMMAE using Biozen 3.6 µm Intact XB-C8



App ID 24737

Herceptin—mcMMAF using Biozen 3.6 µm Intact XB-C8



App ID 24736



**Acknowledgment**  
We would especially like to thank Colin McKee and ADC Biotechnology LTD for their support and ADC samples for this application.



Find the conditions online at:  
[www.phenomenex.com/Biozen](http://www.phenomenex.com/Biozen)

### Ordering Information

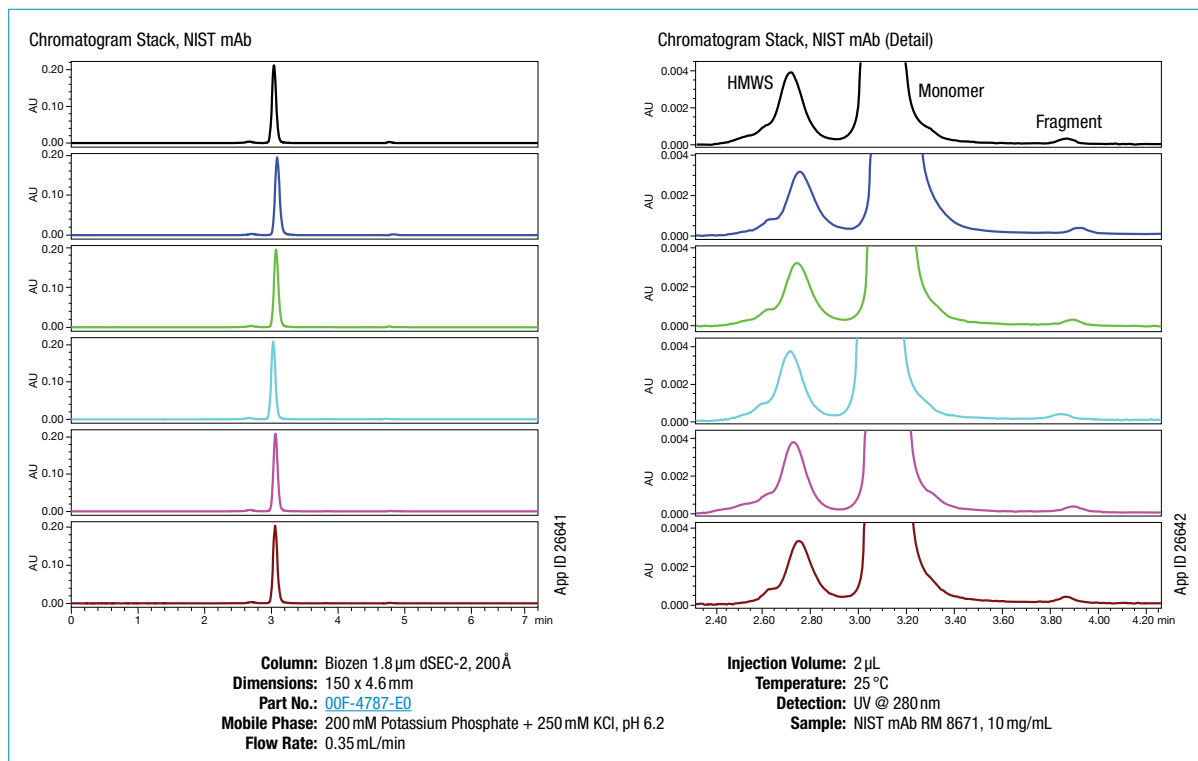
Biozen Columns (mm)	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	Biocompatible Guard Cartridges		
								for 2.1 mm	for 4.6 mm	Holder
Biozen 2.6 µm WidePore C4	<a href="#">00B-4786-AN</a>	<a href="#">00D-4786-AN</a>	<a href="#">00F-4786-AN</a>	<a href="#">00B-4786-EQ</a>	<a href="#">00D-4786-EQ</a>	<a href="#">00F-4786-EQ</a>	<a href="#">00G-4786-EQ</a>	<a href="#">AJ0-9816</a>	<a href="#">AJ0-9818</a>	<a href="#">AJ0-9000</a>
Biozen 3.6 µm Intact XB-C8	<a href="#">00B-4766-AN</a>	<a href="#">00D-4766-AN</a>	<a href="#">00F-4766-AN</a>	<a href="#">00B-4766-EQ</a>	—	<a href="#">00F-4766-EQ</a>	—	<a href="#">AJ0-9812</a>	<a href="#">AJ0-9814</a>	<a href="#">AJ0-9000</a>

## Bio QC Testing

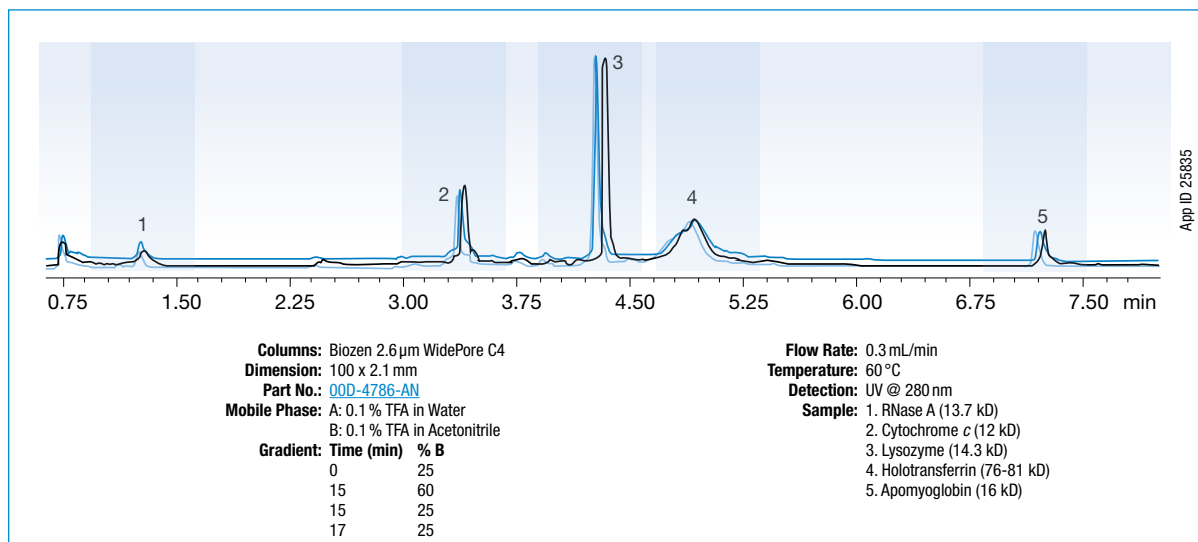
At every stage of our manufacturing and quality testing we keep you and your biologics analysis in mind. We initially focus on innovative products that will enhance workflows, then we work tirelessly to ensure that those products are reliably made time and time again. To further enrich the quality of these products, we assign very specific application-oriented testing protocols that properly mimic the conditions that you and other customers ultimately require.

Each batch of media and each column goes through a gambit of testing to ensure that you're getting our highest level of science, so that you can kick down the door of progress.

### Chromatographic Results for NIST mAb, 6 Batch Robustness Assessment using Biozen 1.8 μm dSEC-2



### Batch-to-Batch Results—Biozen 2.6 μm WidePore C4



## Biozen Nano LC Columns

### Omics Analysis

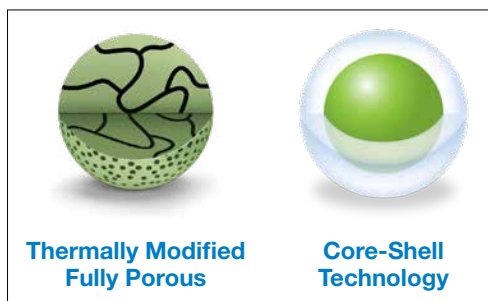
Biozen Nano Columns offer a powerful combination of two advanced particle platforms, three unique column chemistries, and fully integrated SecurityLINK Fitting Technology for a zero dead-volume connection.

- **Integrated SecurityLINK™ fittings for easy installation and leak-free connections**
- **Maximized resolution for improved protein/peptide identification**
- **Increased robustness and sensitivity**

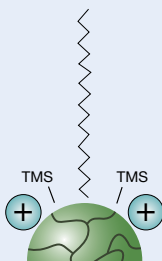
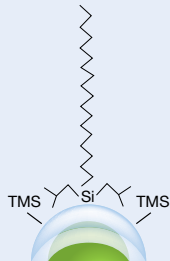
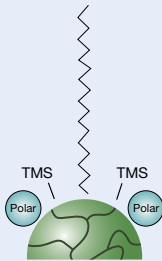
### 2 Advanced Particle Platforms

Both Biozen particle platforms were individually designed and built by Phenomenex to take advantage of integral levels of performance, ruggedness, and reproducibility for omics applications. Individually, each platform differs in the proprietary processing techniques used to control particle size and morphology.

- **High Efficiency**
- **Excellent Inertness**
- **Increased Sensitivity**
- **Exceptional Quality and Robustness**



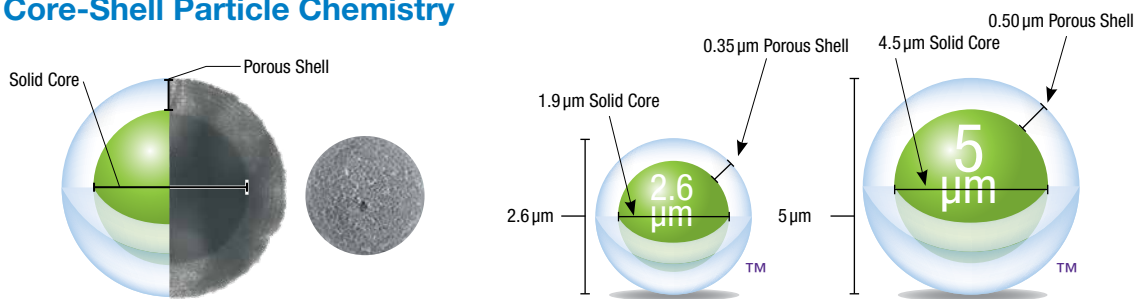
### 3 Nano Chemistries and Growing!

Peptide	Polar
	
<p><b>Biozen Peptide PS-C18</b> Excellent retention by combined positively charged surface ligand and C18 ligand.</p>	<p><b>Biozen Peptide XB-C18</b> Overall retention of both acidic and basic peptides through C18 stationary phase with di-isobutyl side chains.</p>
	
<p><b>Biozen Polar C18</b> Enhanced selectivity / retention for polar analytes without diminishing useful non-polar retention</p>	

## Advanced Core-Shell Particle in Nano Format

The Biozen Nano columns utilize core-shell particles with a highly consistent morphology that minimizes band broadening associated with diffusion and mass transfer, leading to higher efficiency and minimal peak widths, which enhances the separation for omics analysis.

## Core-Shell Particle Chemistry



High Efficiency Core-Shell Particle	Fully Porous	VS	Biozen Nano Core-Shell	Average Efficiency Gain with Biozen Nano Core-Shell
	Using a rigorous core construction process, a uniform porous silica layer is grown around the spherical solid silica core. This unique combination of precise particle architecture and particle size provides dramatic leaps in performance.	5 μm		5 μm
	3 μm		2.6 μm	85% Higher
	1.7 μm		2.6 μm	Equivalent Efficiency

## Better Performance than Fully Porous Particles

Core-Shell Technology provides extremely high efficiencies for omics analysis. Industry leading column packing technology in combination with high particle consistency produces highly reproducible columns that generate greater performance compared to

fully porous particles. This ultra-high efficiency can be leveraged to achieve increased resolution, improved sensitivity, and higher productivity.

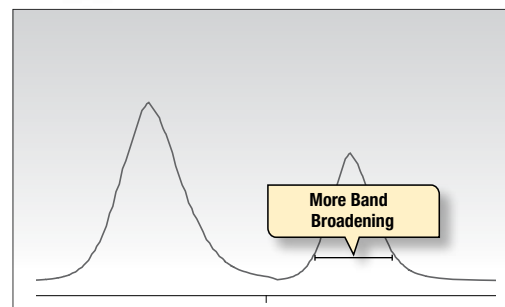
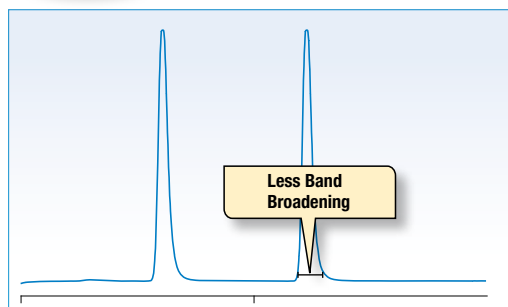
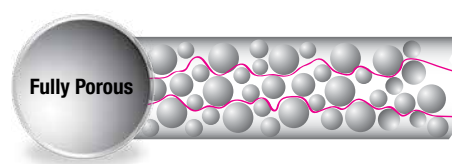
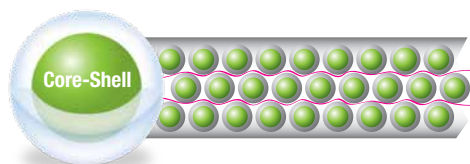


Illustration - not actual test data



## Zero Dead-Volume Nano LC Connections in a CLICK

Biozen Nano's fully integrated SecurityLINK™ fingertight fitting system simplifies your system connections while providing consistent performance through Torque Limiting Technology that prevents overtightening or undertightening making every connection leak-free.



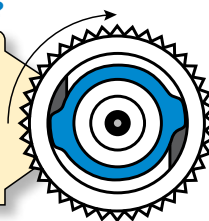
**Fingertight**  
Easy fingertight installation, the "CLICK" feedback confirms connection is secure

**Click n' Done**  
Torque Limiting Technology prevents overtightening or undertightening

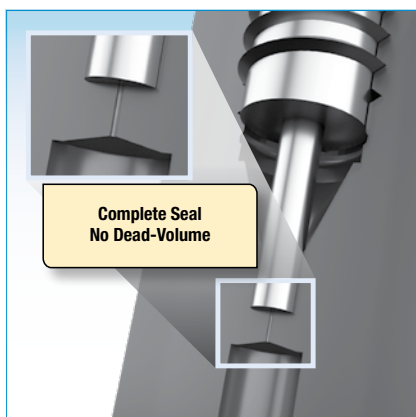
**Zero Dead-Volume**  
Sealing technology eliminates extra internal volume

### What is Torque Limiting Technology?

Once the perfect connection has been made through fingertightening, the SecurityLINK fitting offers a haptic "CLICK" to confirm that optimum torque has been reached. This ensures a consistent connection each and every time and prevents over or undertightening that may cause column performance issues.



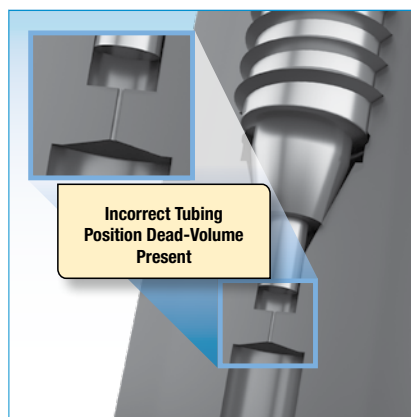
### Biozen Nano Column with Integrated SecurityLINK Fingertight Fittings



**Complete Seal**  
No Dead-Volume

VS.

### Nano Columns using Standard Nut Ferrule Fittings



**Incorrect Tubing**  
Position Dead-Volume Present

## Biozen Nano LC Columns with Integrated SecurityLINK™ Fitting

### Ordering Information

Biozen Nano LC Columns (mm)			
Phases	150 x 0.075 mm	250 x 0.075 mm	500 x 0.075 mm
Biozen 3 µm Peptide PS-C18	<a href="#">00F-4771-AW-21</a>	<a href="#">00G-4771-AW-21</a>	—
Biozen 2.6 µm Peptide XB-C18	<a href="#">00F-4768-AW-21</a>	<a href="#">00G-4768-AW-21</a>	—
Biozen 3 µm Polar-C18	<a href="#">00F-4782-AW-21</a>	<a href="#">00G-4782-AW-21</a>	—
Biozen 5 µm Peptide XB-C18	—	—	<a href="#">00J-4605-AW-21</a>



## Biozen Nano LC Columns with Open Fused-Silica Inlet Fitting

### Ordering Information

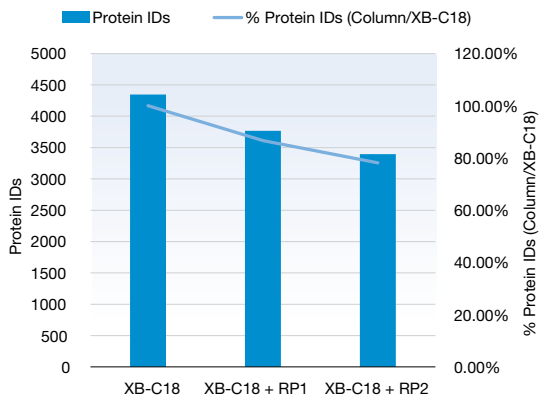
Biozen Nano LC Columns (mm)			
Phases	150 x 0.075 mm	250 x 0.075 mm	500 x 0.075 mm
Biozen 3 µm Peptide PS-C18	<a href="#">00F-4771-AW-11</a>	<a href="#">00G-4771-AW-11</a>	—
Biozen 2.6 µm Peptide XB-C18	<a href="#">00F-4768-AW-11</a>	<a href="#">00G-4768-AW-11</a>	—
Biozen 3 µm Polar-C18	<a href="#">00F-4782-AW-11</a>	<a href="#">00G-4782-AW-11</a>	—
Biozen 5 µm Peptide XB-C18	—	—	<a href="#">00J-4601-AW-11</a>



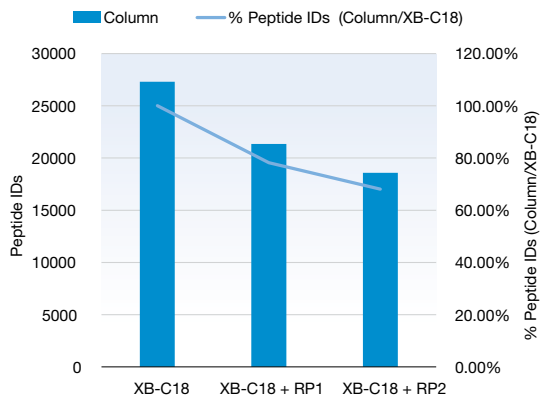
## Complementary Column and Trap Selectivity Portfolio for Improved IDs of Complex Omics Samples

Number of proteins and peptides that were identified on a nano LC-MS analysis of a digested HeLa sample using a Biozen 2.6 μm Peptide XB-C18 column formatted in direct inject, trap and elute using a RP-1 trap and a RP-2 trap respectively.

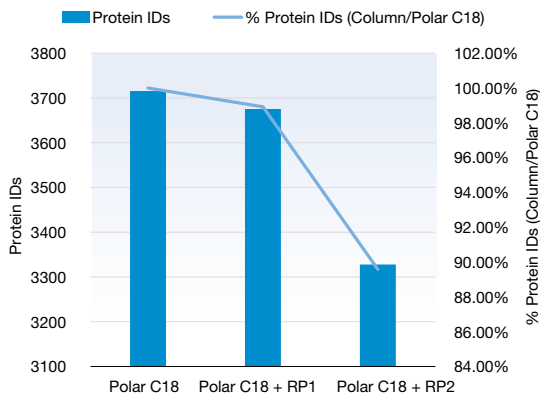
### XB-C18 + Trap Selectivity Protein Identifications



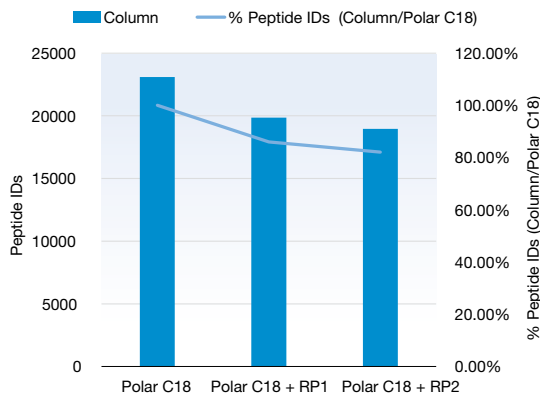
### XB-C18 + Trap Selectivity Peptide Identifications



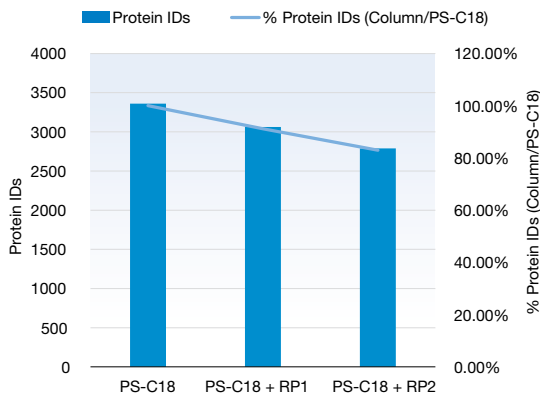
### Polar C18 + Trap Selectivity Protein Identifications



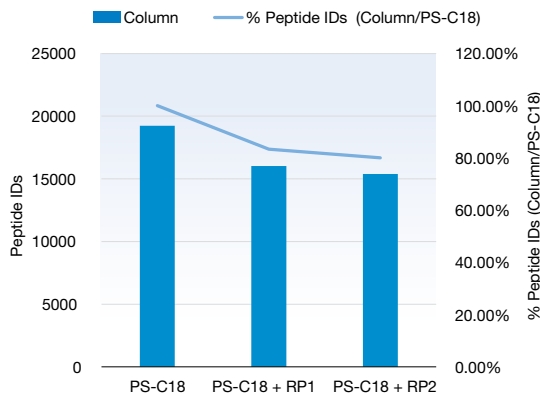
### Polar C18 + Trap Selectivity Peptide Identifications



### PS-C18 + Trap Selectivity Protein Identifications



### PS-C18 + Trap Selectivity Peptide Identifications



## Complementary Nano LC Column and Trap Selectivity

Similar to analytical scale LC, the performance and optimization of your separation is directly affected by the chosen stationary phase. By utilizing different combinations of column and trap selectivities you can positively alter relative recovery and separation performance

### Nano Trap Columns

#### Ordering Information

Trap Columns (mm)		
Phases	10 x 0.075	Unit
RP-1 (General RP)	05N-4252-AW	ea
RP-2 (Aqueous Stable RP)	05N-4754-AW	ea



### Trap Fitting Guide

Threads per Inch	Pitch (inches)	Pitch (mm)
32	0.0313	0.794
40	0.025	0.635

#### Caution

The installation of an improper nut could potentially cause cross-threading or damage to the port and fitting. Verify fit: Traps are available for 1/16" connections (10-32 thread) or with 1/32" connections (6-40 or 6-32 thread).

### Fittings

#### Ordering Information

Trap Fittings		
Part No.	Description	Unit
AQO-7602	PEEKlok™ fittings with 6-40 thread for 1/32" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQO-7603	PEEKlok fittings with 6-32 thread for 1/32" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
AQO-7600	PEEKlok fittings with 10-32 thread for 1/16" OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea



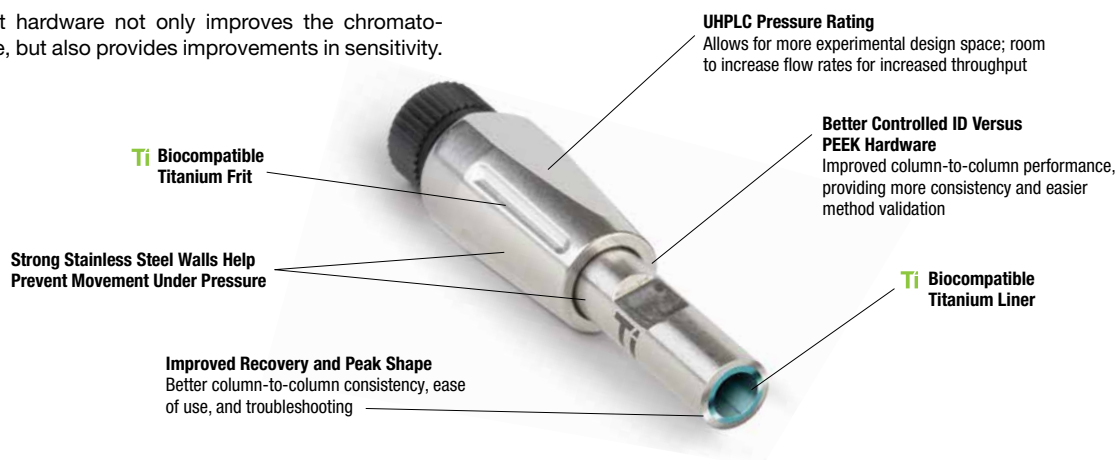
## Biozen High pH Fractionation Column

### Bio-Inert Hardware

The Biozen High pH Fractionation HPLC Column provides superior performance with its titanium hardware which minimizes nonspecific adsorption resulting in increased confidence in your peptide identifications.

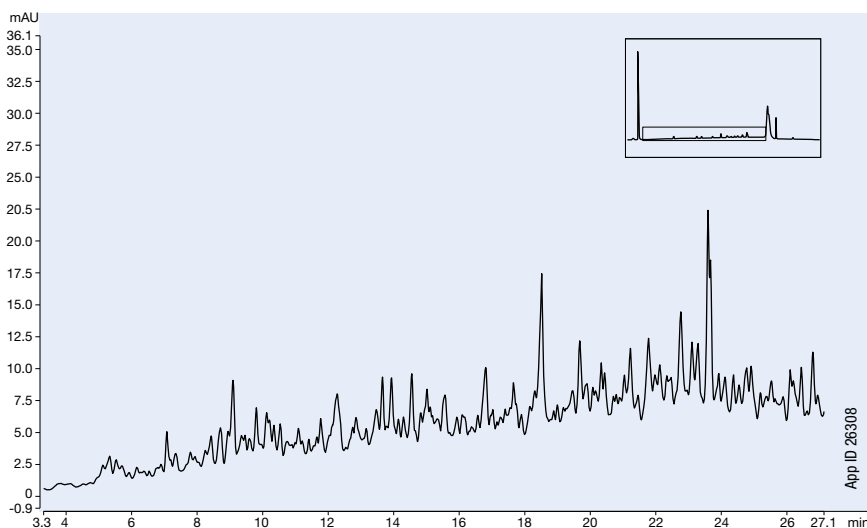
### Inside the Biozen Biocompatible Hardware Difference

The use of bio-inert hardware not only improves the chromatographic performance, but also provides improvements in sensitivity.



## Deep Proteome Coverage on HeLa Lysate using a Biozen Fractionation Column for High pH

UV trace of a 30 minute basic pH reversed phase separation using 100 µg of HeLa tryptic digest.



#### Fractionation LC Conditions

**Column:** Biozen 3 µm High pH Fractionation Column  
**Dimension:** 150 x 2.1 mm  
**Part No.:** [00F-4793-AN](#)  
**Pressure (bar):** 150 bar  
**Mobile Phase:** A: 10 mM Ammonium formate in Water  
 B: 10 mM Ammonium formate in 90 % Acetonitrile and 10 % Water  
**Gradient:**

Time (min)	% B
0	1
1	1
25	25
27	60
28	70
33	70
34	1

**Flow Rate:** 300 µL/min  
**Temperature:** 50 °C  
**LC System:** Vanquish™ Flex UHPLC  
**Detection:** UV @ 280 nm  
**Injection Volume:** 100 µL  
**µg on Column:** 100 µg

## High pH Fractionation Column

### Ordering Information

Fractionation Column		
Part Number	Description	Dimension
00F-4793-AN	Biozen 3 µm High pH Fractionation Column	150 x 2.1 mm



## Guaranteed Replacement to μBondapak®

- Highly reproducible
- Long column life
- Mimics performance of Waters® μBondapak®

Phenomenex Bondclone columns have been developed to provide chromatographic behavior that mimics that of Waters μBondapak columns. For comparative applications, please contact your local Phenomenex representative.

### Bondclone Silica Physical Properties

Nominal Particle Size	BET Surface Area	Pore Volume*	Pore Size**
10 μm	296.0 m <sup>2</sup> /g	1.1 cc/g	148.7 Å

\*Single point total pore volume.

\*\*Average pore diameter (4V/A by BET).

Data provided by an independent laboratory.

### Ordering Information and Cross-Reference Chart

Ordering Information and Cross-Reference Chart				SecurityGuard™ Cartridges (mm)
Waters		Phenomenex		4 x 3.0
Description (mm)	Part No.	Part No.	Description (mm)	/ 10pk
μBondapak C18 300 x 3.9	WAT027324	<a href="#">00H-2117-C0</a>	Bondclone C18 300 x 3.9	<a href="#">AJ0-4287</a>
μBondapak C18 150 x 3.9	WAT086684	<a href="#">00F-2117-C0</a>	Bondclone C18 150 x 3.9	<a href="#">AJ0-4287</a>
—	—	<a href="#">00G-2117-E0</a>	Bondclone C18 250 x 4.6	<a href="#">AJ0-4287</a>
μBondapak C18 Radial-Pak Cartridge 100 x 8	WAT085721	<a href="#">00D-2117-L0</a>	Bondclone C18 100 x 8 (S.S. Column)	<a href="#">AJ0-4287</a>
μBondapak Phenyl 300 x 3.9	WAT027198	<a href="#">00H-3129-C0</a>	Bondclone Phenyl <sup>†</sup> 300 x 3.9	<a href="#">AJ0-4351</a>
—	—	<a href="#">00H-3127-C0</a>	Bondclone CN 300 x 3.9	<a href="#">AJ0-4305</a>
μBondapak NH <sub>2</sub> 300 x 3.9	WAT084040	<a href="#">00H-3128-C0</a>	Bondclone NH <sub>2</sub> 300 x 3.9	<a href="#">AJ0-4302</a>
μPorasil Silica 300 x 3.9	WAT02 7477	<a href="#">00H-2119-C0</a>	Bondclone Silica 300 x 3.9	<a href="#">AJ0-4348</a>

<sup>†</sup>Bondclone phenyl phase uses a different silica than other phases in the Bondclone series.

for ID: 3.2-8.0 mm

SecurityGuard™ Analytical Cartridges require universal holder Part No.: [KJ0-4282](#)

### Guard Column

Size (mm)	C18
Conventional Guard Column 30 x 3.9	<a href="#">03A-2117-C0</a>



- High enantioselectivity
- Fast run times
- Rugged, long-lived columns
- Easy scale-up to preparative
- Allow direct/indirect resolution of enantiomeric amines, amino acids, hydroxy acids, alcohols, carboxylic acids, ketones, ethers, and esters



Hundreds of applications demonstrate the performance of Chirex phases for a multitude of pharmaceutical and agrochemical compounds. For a complete list, please contact your Phenomenex technical consultant.

Chiral separations are extremely important to the pharmaceutical and biotechnology industries, as well as most other areas of natural products chemistry. Optically active therapeutic drugs require selective and sensitive techniques. Government regulations also continue to spur and require the development of rapid, accurate and reproducible methods for the analysis and purification of enantiomeric compounds.

The challenge is to provide selective yet versatile HPLC columns for both trace analysis and the purification of bulk drug.

Phenomenex meets these challenges with Chirex brand HPLC columns. Chirex is available in 7 different stationary phases. These chemically rugged, versatile columns are used for the direct and indirect resolution of enantiomeric amines, alcohols, carboxylic acids, hydroxy acids, amino acids, ketones, lactones, ethers, esters, and other biologically active compounds.

## Which Chirex Stationary Phase?

Stationary phase selection depends on presence/absence of chemical groupings in the chiral molecule.

### Chirex Column Selection Guide

Presence of Chemical Groupings in Chiral Molecule							Recommended Columns:	
Class	Aromatic	-N-	-COOH	-OH	Other	Comment	First Choice	Second Choice
Group 1	Y	Y	Y			Aromatic $\alpha$ -amino acids, $\alpha$ -hydroxy acids	3126	3001
Group 2	Y	Y		Y			3022 or 3020	3014
Group 3	Y	Y			Y		3014 or 3020	3022
Group 4	Y		Y					3001
Group 5	Y			Y			3001 or 3014	3020 or 3022
Group 6	Y				Y		3001	3019 or 3020
Group 7		Y	Y			Aliphatic $\alpha$ -amino acids, $\alpha$ -hydroxy acids and their derivatives	3126	
Group 8			Y				3126	
Group 9					Y		3014	3019 or 3020
Group 10					Y	Asymmetric other than carbon. Chiral center at N,S,P,B, etc	3014	



For broader enantioselectivity, see Lux on p. 301

### Ordering Information

5 $\mu$ m Starter Columns (mm)				
Phase	Chirex Phase Description	Bond Type	Linkage Type	50 x 4.6
3014	(S)-VAL and (R)-NEA	Covalent	Urea	<a href="#">00B-3014-E0</a>
3020	(S)-LEU and (R)-NEA	Covalent	Urea	<a href="#">00B-3020-E0</a>
3126	(D)-Penicillamine	Ion-Metal	Lig Exchange	<a href="#">00B-3126-E0</a>



Preparative Columns and Bulk Media are available in 15 and 30  $\mu$ m particle sizes. Call for information on pricing and availability. Detailed notes on Care and Use, as well as performance testing, are provided with each column.



For Chiral Column Performance Check Standards, see p. 425

5 $\mu$ m Analytical and Guard Columns (mm)					Guards		
Phase	Chirex Phase Description	Bond Type	Linkage Type	150 x 4.6	250 x 4.6	30 x 4.6	
3001	(R)-PGLY and DNB	Covalent	Amide	<a href="#">00F-3001-E0</a>	—	—	
3011	(S)-LEU and DNAN	Covalent	Urea	—	<a href="#">00G-3011-E0</a>	—	
3014	(S)-VAL and (R)-NEA	Covalent	Urea	—	<a href="#">00G-3014-E0</a>	—	
3019	(S)-LEU and (S)-NEA	Covalent	Urea	—	<a href="#">00G-3019-E0</a>	—	
3022	(S)-ICA and (R)-NEA	Covalent	Urea	<a href="#">00F-3022-E0</a>	<a href="#">00G-3022-E0</a>	—	
3126	(D)-Penicillamine	Ion-Metal	Lig Ex	<a href="#">00F-3126-E0</a>	<a href="#">00G-3126-E0</a>	<a href="#">03A-3126-E0</a>	



## Chiral HPLC of Amino Acids

- Pirkle-concept and Ligand Exchange type columns
- High enantioselectivity
- Excellent efficiency

Chirex HPLC columns are an excellent choice for underivatized and derivatized amino acids.

### Separations of Amino Acid Derivatives

Compound	Chirex Phase	Separation Factor ( $\alpha$ )	App ID No.
<b>N-FMOC Derivatives (9-Fluorenylmethoxycarbonyl)</b>			
N-FMOC-Leucine	3011	1.20	13800
N-FMOC-Phenylalanine	3011	1.10	13796
N-FMOC-Valine	3011	1.12	13798
<b>Z-Derivatives (Benzyloxycarbonyl)</b>			
Z-Alanine	3011	1.16	13729
Z-Leucine	3011	1.17	13731
Z-Norvaline	3011	1.13	13755
Z-Serine	3011	1.09	13758
Z-Valine	3011	1.13	13753
<b>N-Acetyl Derivatives</b>			
N-Acetylalanine	3126	1.17	14052
N-Acetylleucine	3126	1.39	14058
N-Acetylmethionine	3126	1.27	13728
N-Acetylvaline	3126	1.50	14055
<b>N-Formyl Derivatives</b>			
N-Formylvaline	3126	1.37	13721
N-Formylmethionine	3126	1.25	13722
<b>N-Dansyl Derivatives (5-5-Dimethyl-aminonaphthalene-1-sulfonyl derivative)</b>			
N-Dansylnorvaline	3011	1.24	13766
N-Dansylphenylalanine	3011	1.27	13771
N-Dansylvaline	3011	1.28	13763
<b>PTH Derivatives (Phenylthiohydantoin)</b>			
PTH-Valine	3014	1.12	13921



Separation potential of some other amino acid derivatives:  
 (Recommended columns: Chirex 3011, 3014)  
 CBZ-Derivatives (carbobenzoxy; benzyloxycarbonyl);  
 IC-Derivatives (phenylisocyanate);  
 Dabsyl Derivatives (4-4-dimethylaminoazobenzene-4'-sulfonyl)

### Separations of Underivatized "Free" Amino Acids

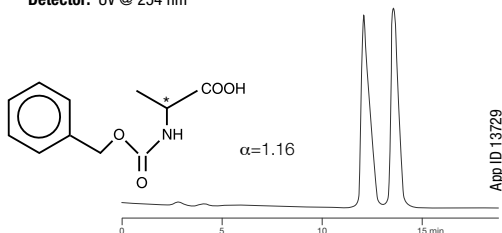
Compound	Chirex Phase	Separation Factor ( $\alpha$ )	App ID No
Alanine	3126	1.66	14004
Alanylglycine	3126	2.26	14080
Alanylglycyl-glycine	3126	1.62	14082
Alloisoleucine	3126	1.67	14038
Allothreonine	3126	1.19	14046
Arginine	3126	2.15	14027
Asparagine	3126	1.10	14049
Aspartic acid	3126	1.42	14019
Baclofen	3126	1.23	13785
p-Boronophenylalanine	3126	1.36	13790
2-amino-n-Butyric acid	3126	1.80	14034
Cystine	3126	2.47	14085
2,6-Diaminopimelic acid	3126	2.77	14066
3-(3,4-Dihydroxyphenyl)-alanine (DOPA)	3126	1.22	13750
Glutamic acid	3126	1.11	14047
Glutamine	3126	1.71	14022
Glycylalanine	3126	1.78	14079
Glycylvaline	3126	1.69	14081
Histidine	3126	1.32	13745
Isoleucine	3126	1.70	14035
Leucine	3126	1.56	14009
Leucylglycyl-glycine	3126	1.36	14083
Lysine	3126	1.83	14018
Methionine	3126	1.42	14024
$\alpha$ -Methyl Leucine	3126	1.59	14457
$\alpha$ -Methyl Tryptophan	3126	1.18	14456
Naphthylglycine	3126	1.42	13789
Norvaline	3126	1.95	14029
Ornithine	3126	1.38	14041
Phenylalanine	3126	1.44	13740
Phenylglycine	3126	1.78	13748
Pipecolic acid	3126	1.77	14031
Proline	3126	2.50	14011
Serine	3126	1.17	14016
Threonine	3126	1.20	14043
dl-Threo-3-phenylserine	3126	1.15	13787
Tryptophan	3126	1.11	13737
Tyrosine	3126	1.34	13743
Valine	3126	1.91	14006



Alpha ( $\alpha$ ) = Separation Factor =  $k_2/k_1$

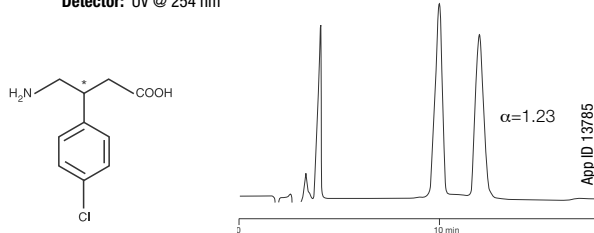
#### Z-Alanine

**Column:** Chirex 3011  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3011-00  
**Mobile Phase:** 0.01 M Ammonium Acetate in Methanol  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 254 nm



#### Baclofen

**Column:** Chirex 3126  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** 00F-3126-E0  
**Mobile Phase:** 2 mM Copper (II) sulfate in water / Isopropanol (85:15)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 254 nm



U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

## pH Flexibility Expands Robustness and Reproducibility

Gemini columns are rugged reversed phase HPLC columns that offer extended lifetime at extreme pH conditions and excellent stability for reproducible, high efficiency separations.

- Take full advantage of high and low pH conditions (pH 1-12) to manipulate selectivity
- Expect longer column lifetime with patented TWIN-NX<sup>™</sup> technology
- For analytical and preparative separations of basic and acidic compounds

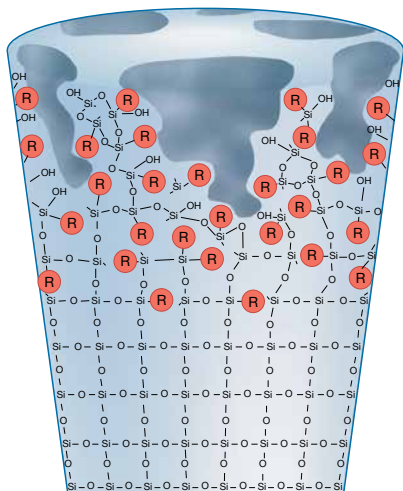
Phase	Description	USP Classification
NX-C18	The most rugged Gemini column, offering 5 times the durability of previous generation hybrid columns	L1
C6-Phenyl	A low bleed phenyl phase. For UV and MS detection, which offers an aromatic selectivity complementary to C18 phases	L11
C18	Selectivity, high structural integrity and increased loadability for preparative and purification applications in pre-packed columns and bulk media	L1



### TWIN<sup>™</sup> (Two-In-One) Technology

#### Gemini C18 and C6-Phenyl

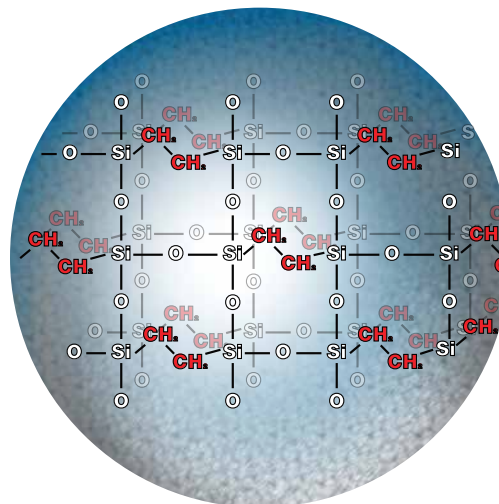
During the final stage of silica manufacturing a unique silica-organic layer is grafted to create a completely new composite particle. Since the internal base silica is unaltered by this manufacturing process, the particle retains its mechanical strength and rigidity along with excellent efficiency, while the silica-organic shell protects the particle from chemical attack.



### Second-Generation TWIN-NX Technology

#### Gemini NX-C18

TWIN-NX technology uses an improved patented organo-silica grafting process which incorporates highly stabilizing ethylene cross-linking. These organic groups are evenly incorporated into the grafted layers on the silica surface while maintaining a pure silica core. This not only provides resistance to high pH attack, but also maintains the high efficiency and mechanical strength of a silica particle.



U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

## Gemini NX-C18

- pH stable 1-12 for durability
- Consistent performance in both volatile and non-volatile buffers
- High sample loading capacity for metabolite identification and preparative purification

### Gemini NX-C18

USP: L1

LC-MS Certified

**pH Stability:** 1.0 – 12.0

Particle Size: 3 µm, 5 µm, and 10 µm

Phase: C18

Application: Small molecules, basic compounds

Strength: Extremely durable pH stable particle

Pore Size (Å): 110

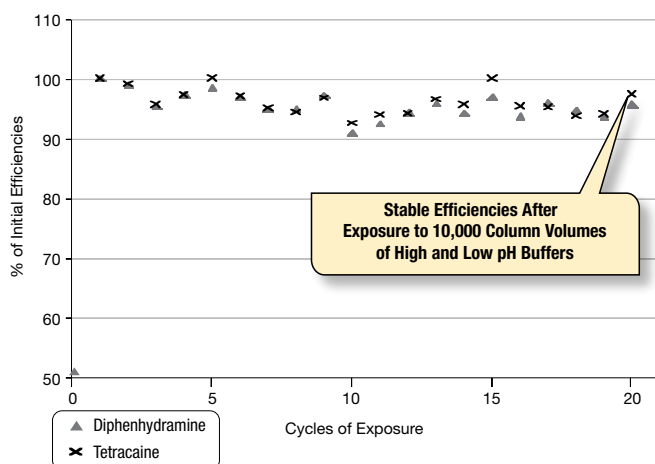
Surface Area (m<sup>2</sup>/g): 375

Carbon Load %: 14

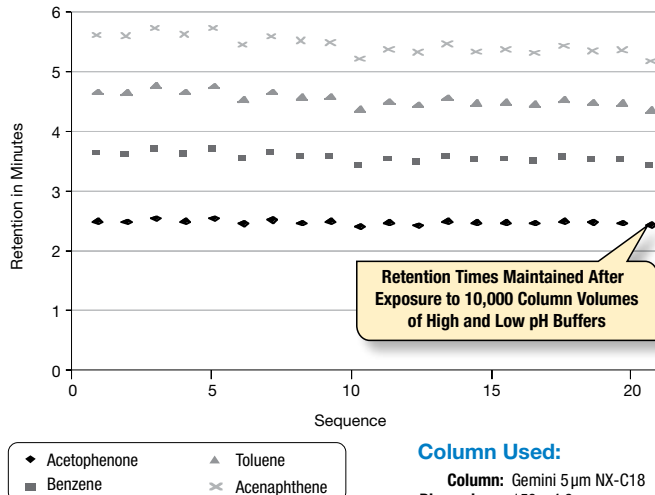
End Capping: TMS

## Gemini NX-C18 Tested for Extreme Durability in Changing Mobile Phase pH

Column Efficiencies Maintained in High Testing for 20 Cycles



## Retention Times of Four Probes Maintained in Neutral pH Testing for 20 Cycles



### Column Used:

Column: Gemini 5 µm NX-C18  
 Dimensions: 150 x 4.6 mm  
 Part No.: [00F-4454-E0](#)

## Column Testing Cycle

### Step 1

#### 24x High pH Flush Procedures

**Mobile Phase:** A: 10 mM Ammonium Bicarbonate pH 10.5  
 B: Acetonitrile

**Gradient:** 5% to 95% B in 6 min Hold at 95% B for 2 min

**Re-equilibrate:** 5% B for 2 min

**Flow Rate:** 1.5 mL/min

### Step 2

#### High pH Testing

**Isocratic:** 10 mM Ammonium Bicarbonate pH 10.5 / Acetonitrile (50:50)

**Flow Rate:** 1.5 mL/min

**Detection:** UV @ 230 nm

**Samples:** 1. Tetracaine  
 2. Diphenhydramine

### Step 3

#### 1x Neutral Flush Procedure

**Mobile Phase:** A: Water  
 B: Acetonitrile

**Gradient:** 5% B for 2 min

5% to 100% B in 3 min Hold at 100% B for 5 min

**Flow Rate:** 1.5 mL/min

### Step 4

#### Neutral pH Testing

**Isocratic:** Water / Acetonitrile (35:65)

**Flow Rate:** 1.0 mL/min

**Detection:** UV @ 254 nm

**Samples:** 1. Acetophenone  
 2. Benzene  
 3. Toluene  
 4. Acenaphthene

### Step 5

#### 24x Low pH Flush Procedure

**Mobile Phase:** A: 0.5% Formic Acid in Water  
 B: 0.5% Formic Acid in Acetonitrile, pH 2.0

**Gradient:** 5% to 95% B in 6 min Hold at 95% B for 2 min

**Re-equilibrate:** 5% B for 2 min

**Flow Rate:** 1.5 mL/min

### Step 6

Neutral pH Flush Repeats  
 Repeats for 20 Cycles

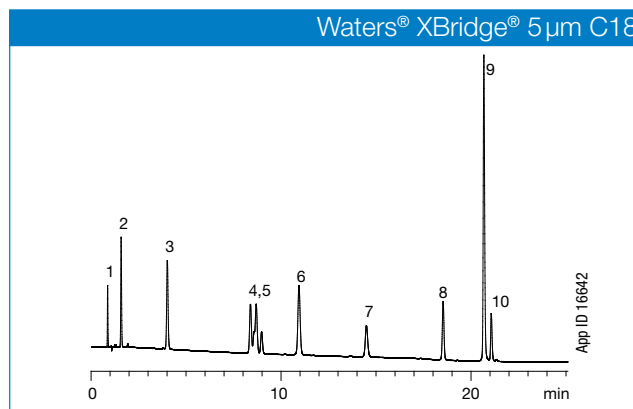
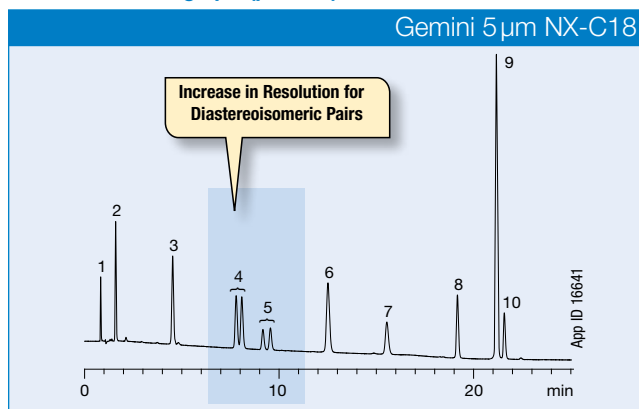


# Gemini<sup>®</sup> pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

## Gemini NX-C18 (cont'd)

### Polar Bases at High pH (pH 10.5)



Y-axis normalized for all chromatograms.

### Polar Bases (Beta Blockers) at High pH

Conditions for all columns:

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** A: 10 mM Ammonium Bicarbonate pH 10.5  
B: Acetonitrile

**Gradient:** A/B (85:15) to (70:30) in 15 min to (50:50) in 5 min, Hold for 5 min

**Flow Rate:** 1.5 mL/min

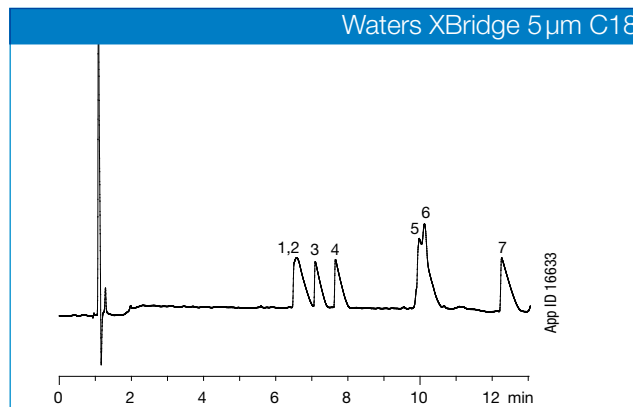
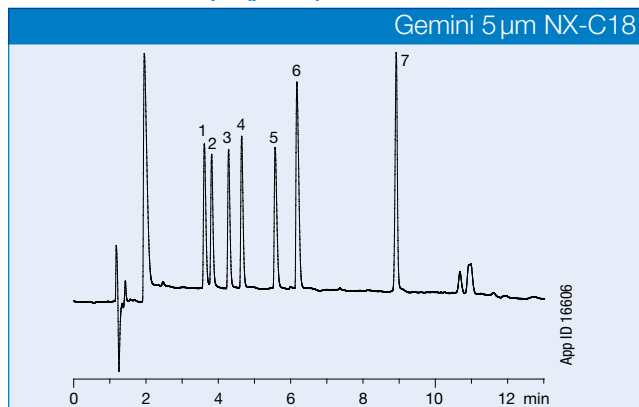
**Temperature:** Ambient

**Detection:** UV @ 230 nm

- Sample:**
1. Bisoprolol Contaminant
  2. Sotalol
  3. Atenolol
  4. Labetalol (Diastereoisomeric Pair)
  5. Nadolol (Diastereoisomeric Pair)
  6. Pindolol
  7. Metoprolol
  8. Bisoprolol
  9. Propranolol
  10. Alprenolol



### Polar Bases at Low pH (pH 2.7)



Y-axis normalized for all chromatograms.

### Polar Bases (Antihistamines) in Formic Acid

Conditions for all columns:

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** A: 0.1% Formic Acid in Water  
B: 0.1% Formic Acid in Acetonitrile

**Gradient:** A/B (90:10) to (50:50) in 10 min

**Flow Rate:** 1.5 mL/min

**Temperature:** Ambient

**Detection:** UV @ 210 nm

- Sample:**
1. Pyrilamine
  2. Triplennamine
  3. Chlorpheniramine
  4. Brompheniramine
  5. Chloropyramine
  6. Diphenhydramine
  7. Loratadine

Comparative chromatograms may not be representative of all applications.



# Gemini<sup>®</sup> pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

## Gemini C18

- Increased loading and retention of basic compounds
- Silica efficiency and mechanical strength
- pH stable 1-12 for durability

### Gemini C18

USP: L1

LC-MS Certified

**pH Stability: 1.0 – 12.0**

Particle Size: 3 µm, 5 µm, and 10 µm

Phase: C18

Application: Small molecules, basic compounds

Strength: Wide pH stability, high efficiency

Pore Size (Å): 110

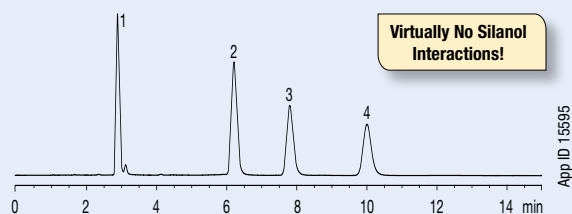
Surface Area (m<sup>2</sup>/g): 375

Carbon Load %: 14

End Capping: TMS

### Chromatographic Comparisons

#### Gemini 5 µm C18 110 Å



#### Tricyclic Antidepressants at Neutral pH

Conditions for all columns:

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** 20 mM Phosphate buffer pH 7.0/Acetonitrile/  
Methanol (30:35:35)

**Flow Rate:** 1.5 mL/min

**Detection:** UV @ 254 nm

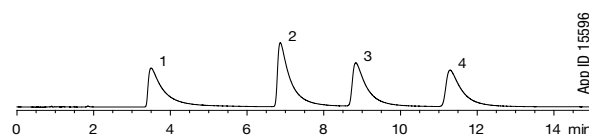
**Sample:** 1. Nortriptyline

2. Imipramine

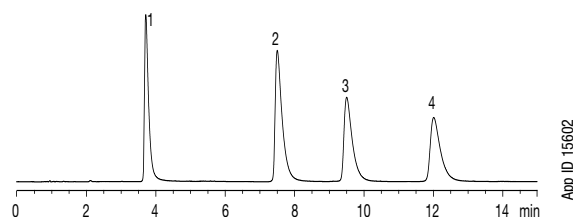
3. Amitriptyline

4. Clomipramine

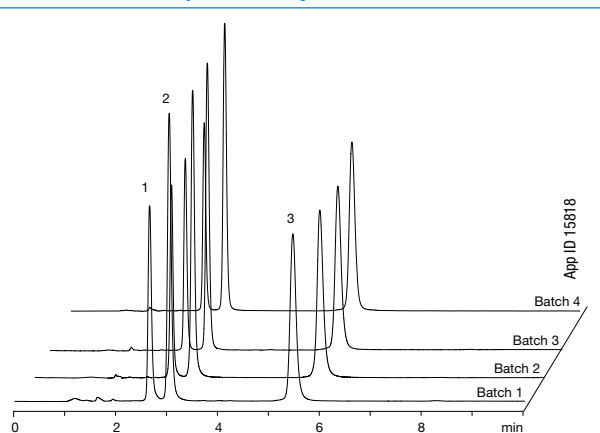
#### Agilent Technologies<sup>®</sup> ZORBAX<sup>®</sup> 5 µm Extend-C18 80 Å



#### Advanced Chromatography Technologies<sup>®</sup> ACE<sup>®</sup> 5 µm C18 100 Å



### Batch-to-Batch Reproducibility



Conditions for all separations:

**Column:** Gemini 5 µm C18

**Dimension:** 150 x 4.6 mm

**Part No.:** 00F-4435-E0

**Mobile Phase:** 10 mM Ammonium Bicarbonate,  
pH 10.5/Acetonitrile (50:50)

**Flow Rate:** 1.0 mL/min

**Temperature:** Ambient

**Detection:** UV @ 230 nm

**Sample:** 1. Pindolol

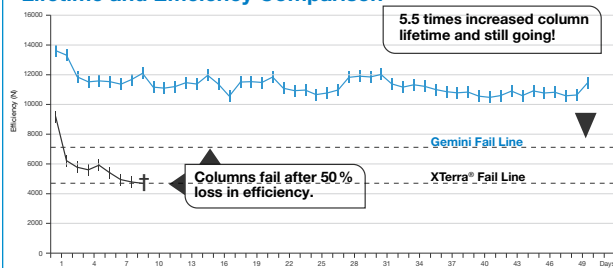
2. Metoprolol

3. Propranolol

### Extended Column Lifetime

The TWIN™ Technology engineering of Gemini provides stability and increased column lifetime. Whether used under isocratic or gradient conditions, Gemini columns out-perform and outlasts pH stable columns. This is illustrated below.

#### Lifetime and Efficiency Comparison\*\*



\*\*Efficiency and lifetime comparison based on average of two columns each run in parallel.

Conditions for all columns:

**Columns:** Gemini 5 µm C18

Waters<sup>®</sup> XTerra<sup>®</sup> 5 µm MS C18

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** Acetonitrile/50 mM Methylpyrrolidine  
Buffer, pH 11.5 (50:50)

**Flow Rate:** 1 mL/min

**Temperature:** Ambient

**Detection:** UV @ 254 nm

**Sample:** Diphenhydramine

The comparative data presented here may not be representative for all applications.

# Gemini<sup>®</sup> pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

## Gemini C6-Phenyl

- pH stable 1-12 for durability
- Great aromatic selectivity
- Extremely low UV and MS bleed

### Gemini C6-Phenyl

USP: L11

LC-MS  
Certified

**pH Stability:** 1.0 – 12.0

Particle Size: 3 µm and 5 µm

Phase: Phenyl with C6 linker

Application: Aromatic, polar, or basic compounds

Strength: High aromatic selectivity with exceptional peak shape even in neutral conditions. Extremely low bleed phenyl column.

Pore Size (Å): 110

Surface Area (m<sup>2</sup>/g): 375

Carbon Load %: 12

End Capping: TMS

### Enhanced Performance for Aromatic Compounds

#### Sulfa Drug Application

Resolution	Pursuit 5 µm DiPhenyl	Gemini 5 µm C6-Phenyl
RS <sub>1,2</sub>	1.0	4.0
RS <sub>2,3</sub>	9.8	16.0

Conditions for all columns:

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** 0.1 % Formic Acid in Water/  
Methanol (70:30)

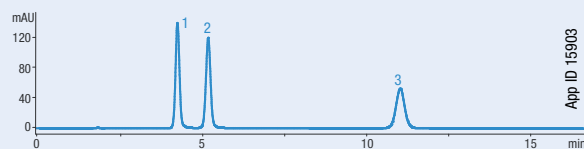
**Flow Rate:** 1.0 mL/min

**Temperature:** Ambient

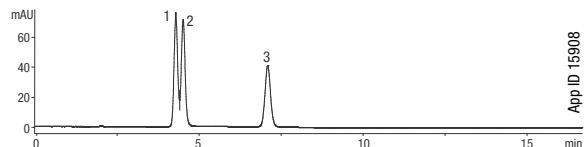
**Detection:** UV @ 254 nm

**Sample:** 1. Sulfathiazole  
2. Sulfamerazine  
3. Sulfamethoxazole

#### Phenomenex Gemini 5 µm C6-Phenyl

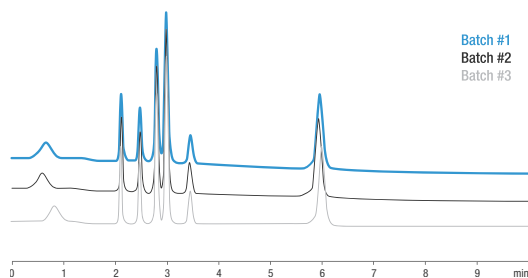


#### Agilent Technologies® Pursuit® 5 µm DiPhenyl



### Reproducible Phenyl Phase

#### Aliphatic Acid Application



Conditions for all columns:

**Column:** Gemini 5 µm C6-Phenyl

**Dimensions:** 150 x 4.6 mm

**Part No.:** 00F-4444-EO

**Mobile Phase:** 20 mM Phosphate buffer,  
pH 2.5/Methanol (97:3)

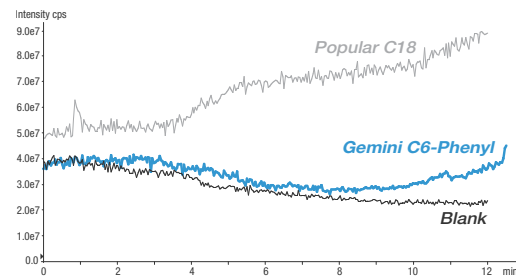
**Flow Rate:** 1.0 mL/min

**Temperature:** Ambient

**Detection:** UV @ 220 nm

**Sample:** 1. Tartaric Acid 4. Acetic Acid  
2. Malic Acid 5. Citric Acid  
3. Lactic Acid 6. Propionic Acid

### Low Bleed Phenyl Phase



Conditions for all columns:

**Dimensions:** 150 x 3.0 mm

**Mobile Phase:** A: 0.1 % Formic acid in Water

B: 0.1 % Formic acid in Acetonitrile  
**Gradient:** 5 % B to 95 % B in 10 min, then hold  
95 % B for 2 min

**Flow Rate:** 0.6 mL/min

**Temperature:** Ambient

**MS Detection:** ESI + ion mode,  
M/Z 100-700

Comparative chromatograms may not be representative for all applications.

# Gemini<sup>®</sup> pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

## Gemini C8(3)

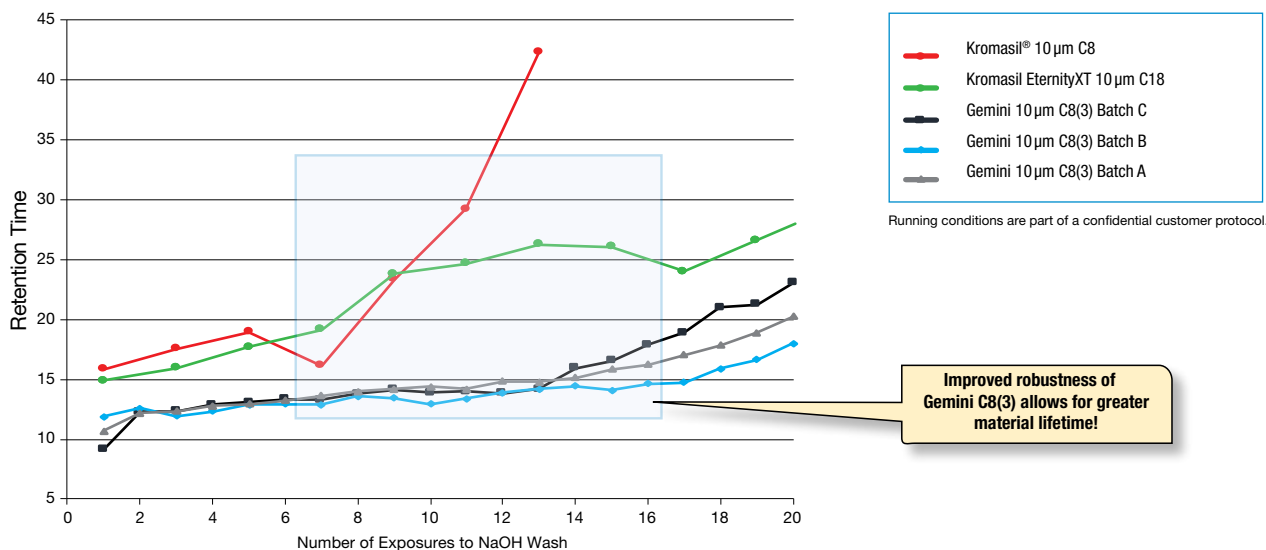
### The Material Developed for High pH Insulin Purification

Many products can separate human insulin and its degradant, while few can withstand high pH caustic washes for aggregate removal. Now, there is a clear media choice. Gemini C8(3) provides the needed separation, the needed low/high pH robustness, and the overall consistency in terms of efficiency and retention cycle to cycle. You don't have to choose between consistent performance or robustness; Gemini C8(3) was developed to give you the best of both worlds.

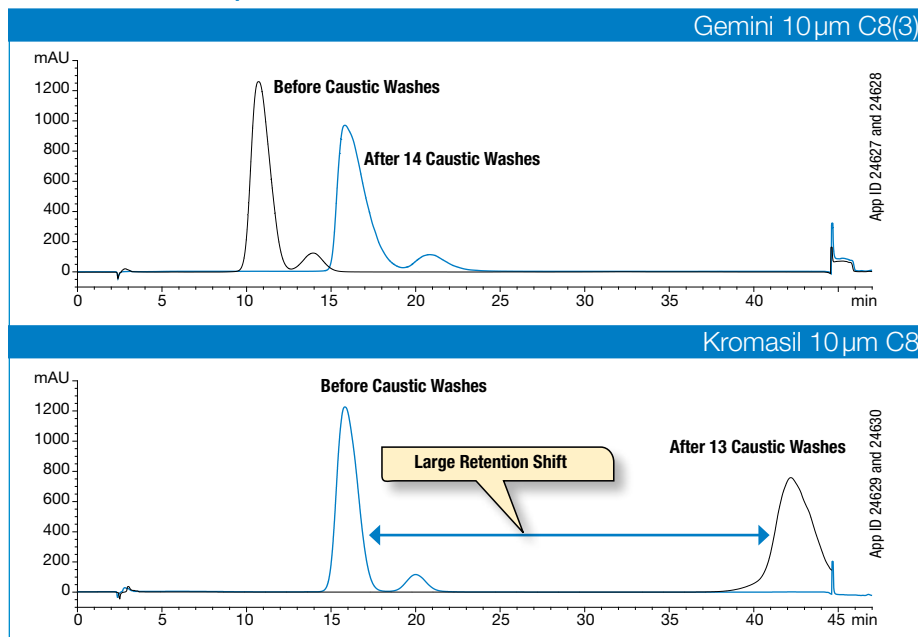
### Gemini C8(3)

<b>pH Stability:</b>	1.0 – 12.0
Particle Size:	10 µm
Phase:	C8
Application:	Small molecules, peptides, proteins, oligonucleotides
Strength:	Elevated pH stability; Increased reproducibility; Enhanced robustness
Pore Size (Å):	100
Surface Area (m <sup>2</sup> /g):	400
Carbon Load %:	13
End Capping:	TMS

### Insulin Retention vs. Exposures to NaOH Wash



### Insulin Retention Comparison



Comparative separations may not be representative of all applications.

# Gemini<sup>®</sup> pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

## Ordering Information

3 µm Micro LC Columns (mm)			
Phases	50 x 0.30	150 x 0.30	50 x 0.50
C18	00B-4439-AC	00F-4439-AC	00B-4439-AF



For information on Micro LC Columns, Traps, and Fittings, see pp. 359-361

3 µm Microbore, Minibore and MidBore™ Columns (mm)										SecurityGuard™ Cartridges (mm)	
Phases	50 x 1.0	20 x 2.0	30 x 2.0	50 x 2.0	100 x 2.0	150 x 2.0	50 x 3.0	100 x 3.0	150 x 3.0	4 x 2.0* /10pk	
C18	00B-4439-A0	00M-4439-B0	00A-4439-B0	00B-4439-B0	00D-4439-B0	00F-4439-B0	00B-4439-Y0	00D-4439-Y0	00F-4439-Y0	AJO-7596	
C6-Phenyl	—	—	—	00B-4443-B0	00D-4443-B0	00F-4443-B0	00B-4443-Y0	00D-4443-Y0	00F-4443-Y0	AJO-7914	
NX-C18	00B-4453-A0	00M-4453-B0	00A-4453-B0	00B-4453-B0	00D-4453-B0	00F-4453-B0	00B-4453-Y0	00D-4453-Y0	00F-4453-Y0	AJO-8367	

for ID: 2.0-3.0 mm

3 µm Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0* /10pk
C18	00A-4439-E0	00B-4439-E0	00D-4439-E0	00F-4439-E0	00G-4439-E0	AJO-7597
C6-Phenyl	00A-4443-E0	00B-4443-E0	00D-4443-E0	00F-4443-E0	00G-4443-E0	AJO-7915
NX-C18	—	00B-4453-E0	00D-4453-E0	00F-4453-E0	00G-4453-E0	AJO-8368

for ID: 3.2-8.0 mm



5 µm Minibore and MidBore Columns (mm)								SecurityGuard™ Cartridges (mm)	
Phases	30 x 2.0	50 x 2.0	150 x 2.0	250 x 2.0	50 x 3.0	100 x 3.0	150 x 3.0	250 x 3.0	4 x 2.0* /10pk
C18	00A-4435-B0	00B-4435-B0	00F-4435-B0	00G-4435-B0	00B-4435-Y0	00D-4435-Y0	00F-4435-Y0	00G-4435-Y0	AJO-7596
C6-Phenyl	—	00B-4444-B0	00F-4444-B0	—	—	—	—	00G-4444-Y0	AJO-7914
NX-C18	00A-4454-B0	00B-4454-B0	00F-4454-B0	—	00B-4454-Y0	00D-4454-Y0	00F-4454-Y0	00G-4454-Y0	AJO-8367

for ID: 2.0-3.0 mm

5 µm Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0* /10pk
C18	00A-4435-E0	00B-4435-E0	00D-4435-E0	00F-4435-E0	00G-4435-E0	AJO-7597
C6-Phenyl	—	00B-4444-E0	00D-4444-E0	00F-4444-E0	00G-4444-E0	AJO-7915
NX-C18	—	00B-4454-E0	00D-4454-E0	00F-4454-E0	00G-4454-E0	AJO-8368

for ID: 3.2-8.0 mm



5 µm Semi-Prep Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	150 x 10	250 x 10	10 x 10 <sup>3</sup> /3pk
C18	00F-4435-N0	00G-4435-N0	AJO-7598
C6-Phenyl	—	00G-4444-N0	AJO-9156
NX-C18	00F-4454-N0	00G-4454-N0	AJO-8369

for ID: 9-16 mm

Axia™ Packed Preparative Columns (mm)							SecurityGuard™ Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	50 x 30	75 x 30	15 x 21.2**	15 x 30.0*
<b>5 µm</b>							/ea	/ea
C18	00B-4435-P0-AX	00D-4435-P0-AX	00F-4435-P0-AX	00G-4435-P0-AX	00B-4435-U0-AX	—	AJO-7846	AJO-8308
C6-Phenyl	—	00D-4444-P0-AX	00F-4444-P0-AX	00G-4444-P0-AX	—	—	AJO-9157	AJO-9158
NX-C18	00B-4454-P0-AX	00D-4454-P0-AX	00F-4454-P0-AX	00G-4454-P0-AX	00B-4454-U0-AX	00C-4454-U0-AX	AJO-8370	AJO-8371
<b>10 µm</b>							/ea	/ea
C18	—	00D-4436-P0-AX	00F-4436-P0-AX	00G-4436-P0-AX	—	—	AJO-7846	AJO-8308
NX-C18	00B-4455-P0-AX	00D-4455-P0-AX	00F-4455-P0-AX	00G-4455-P0-AX	—	—	AJO-8370	AJO-8371
C8(3)	—	—	—	00G-4763-P0-AX	—	—	—	—

for ID: 18-29 mm

30-49 mm

Axia™ Packed Preparative Columns (mm) continued						SecurityGuard™ Cartridges (mm)	
Phases	100 x 30	150 x 30	250 x 30	100 x 50	150 x 50	250 x 50	15 x 30.0*
<b>5 µm</b>							/ea
C18	00D-4435-U0-AX	00F-4435-U0-AX	00G-4435-U0-AX	—	—	—	AJO-8308
NX-C18	00D-4454-U0-AX	00F-4454-U0-AX	00G-4454-U0-AX	—	—	—	AJO-8371
<b>10 µm</b>							/ea
C18	00D-4436-U0-AX	00F-4436-U0-AX	00G-4436-U0-AX	—	00F-4436-V0-AX	00G-4436-V0-AX	AJO-8308
NX-C18	00D-4455-U0-AX	00F-4455-U0-AX	00G-4455-U0-AX	00D-4455-V0-AX	00F-4455-V0-AX	00G-4455-V0-AX	AJO-8371
C8(3)	—	—	00G-4763-U0-AX	—	—	00G-4763-V0-AX	—

for ID: 30-49 mm

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

For PREP Columns & Bulk Media, see pp. 383-401

For SecurityGuard Holders and Cartridges, see pp. 330-335

For MercuryMS LC-MS Columns, Cartridges, and Cartridge Holders, Inquire.

\*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJO-4282

†SemiPrep SecurityGuard™ Cartridges require holder, Part No.: AJO-9281

\*\*PREP SecurityGuard™ Cartridges require holder, Part No.: AJO-8223

◆PREP SecurityGuard™ Cartridges require holder, Part No.: AJO-8277



# HyperClone™ Guaranteed Replacement to Hypersil

## Guaranteed Replacement to Hypersil®

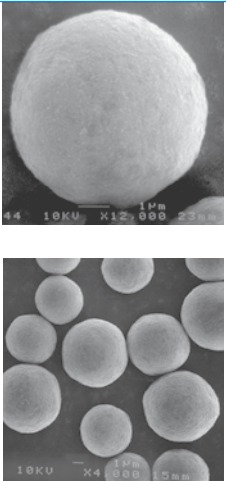
- Highly reproducible
- Long column life
- Mimics performance of Thermo Hypersil-Keystone Hypersil
- Economically priced

Phenomenex HyperClone columns have been developed to provide chromatographic behavior that mimics that of Thermo Hypersil columns. For comparative applications, please contact your local Phenomenex representative.

Comparisons of physical and chemical characteristics of HyperClone and Hypersil are listed below. As you can see, HyperClone and Hypersil compare very well for important specifications such as particle size, pore size, and carbon load.

### HyperClone

SEM of Base Silica

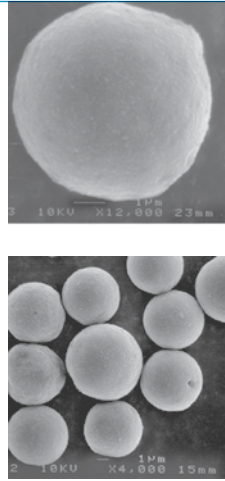


### VS.

#### Material Characteristics

### Hypersil

SEM of Base Silica



HyperClone (BDS silica)		Hypersil (BDS silica)†	
3, 5	Particle Size (µm)	3, 5	
130	Pore Size (Å)	130	
155	Surface Area (m <sup>2</sup> /g)	170	
0.6	Pore Volume (mL/g)	0.6	

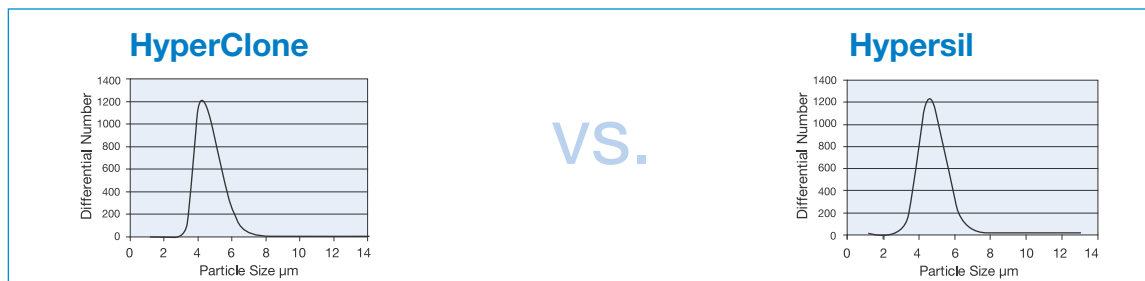
  

HyperClone (regular silica)		Hypersil† (regular silica)†	
3, 5	Particle Size (µm)	3, 5	
120	Pore Size (Å)	120	
155	Surface Area (m <sup>2</sup> /g)	170	
0.6	Pore Volume (mL/g)	0.6	

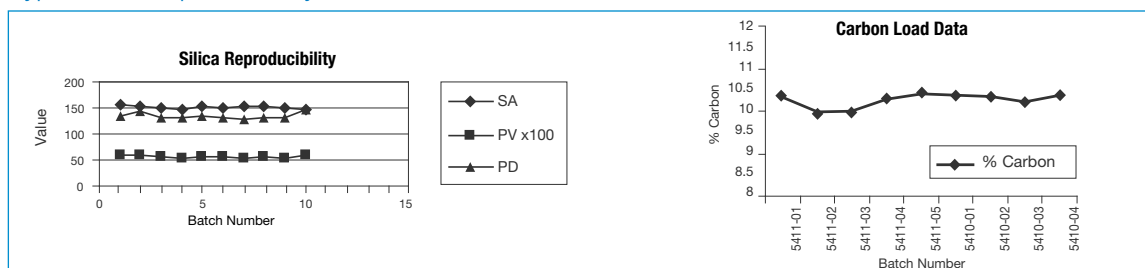
  

HyperClone		Hypersil†	
Carbon Load %			
7	BDS C8	7	
11	BDS C18	11	
6.5	MOS (C8)	6.5	
10	ODS (C18)	10	
4	CN (CPS)	4	

### Particle Size Distribution†



### HyperClone Reproducibility

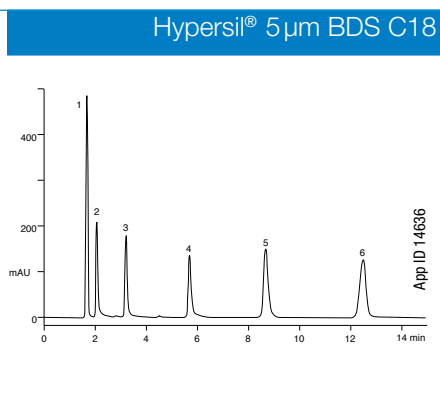
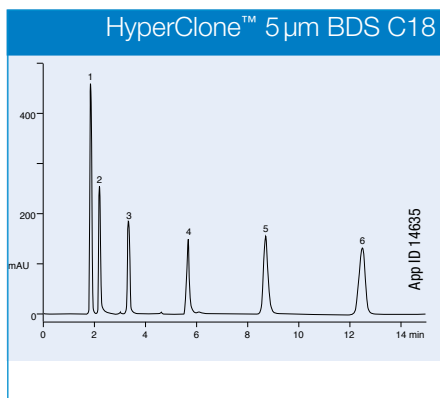


† All Hypersil information obtained from (then) Thermo Electron Corporation 2006-2007 catalog and 2012-2013 Thermo Scientific Chromatography Columns catalog.



# HyperClone™ Guaranteed Replacement to Hypersil

VS.



### Non-Polar Basic Compounds

Conditions for Both Columns  
**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** Methanol/50 mM  $\text{KH}_2\text{PO}_4$ , pH 3.5 (60:40)  
**Flow Rate:** 1.0 mL/min  
**Detection:** UV @ 254 nm  
**Sample:** 1. Uracil  
 2. Pyridine  
 3. Methylaniline  
 4. Dimethylaniline  
 5. Dichloronitroaniline  
 6. Toluene

### Ordering Information

3 μm Minibore and Analytical Columns (mm)	SecurityGuard™ Cartridges (mm)						
	50 x 2.0	150 x 2.0	100 x 4.6	125 x 4.0	150 x 4.6	4 x 2.0*	4 x 3.0*
ODS (C18)	—	00F-4356-B0	00D-4356-E0	00E-4356-D0	00F-4356-E0	/10pk AJ0-4286	/10pk AJ0-4287
BDS C8	00B-4417-B0	—	—	—	00F-4417-E0	AJ0-4289	AJ0-4290
BDS C18	00B-4419-B0	00F-4419-B0	00D-4419-E0	—	00F-4419-E0	AJ0-4286	AJ0-4287

for ID: 2.0-3.0 mm      3.2-8.0 mm

5 μm Minibore and Analytical Columns (mm)	SecurityGuard™ Cartridges (mm)									
	150 x 2.0	150 x 3.2	250 x 3.2	125 x 4.0	250 x 4.0	100 x 4.6	150 x 4.6	250 x 4.6	4 x 2.0*	4 x 3.0*
Silica	—	—	—	—	—	—	00F-4358-E0	00G-4358-E0	/10pk AJ0-4347	/10pk AJ0-4348
MOS (C8)	—	—	—	00E-4359-D0	—	00D-4359-E0	00F-4359-E0	00G-4359-E0	AJ0-4289	AJ0-4290
ODS (C18)	—	00F-4361-R0	00G-4361-R0	00E-4361-D0	00G-4361-D0	00D-4361-E0	00F-4361-E0	00G-4361-E0	AJ0-4286	AJ0-4287
CN (CPS)	—	—	—	—	—	—	00F-4422-E0	00G-4422-E0	AJ0-4304	AJ0-4305
BDS C8	—	—	—	—	—	—	00F-4418-E0	00G-4418-E0	/10pk AJ0-4289	/10pk AJ0-4290
BDS C18	00F-4420-B0	00F-4420-R0	—	00E-4420-D0	00G-4420-D0	00D-4420-E0	00F-4420-E0	00G-4420-E0	AJ0-4286	AJ0-4287

for ID: 2.0-3.0 mm      3.2-8.0 mm

5 μm SemiPrep Columns (mm)	SecurityGuard™ Cartridges (mm)
Phases	250 x 10      10 x 10 †
	/3pk
ODS (C18)	00G-4361-N0      AJ0-7221

for ID: 9-16 mm

\*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)  
 †SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJ0-9281](#)



Other dimensions available upon request.



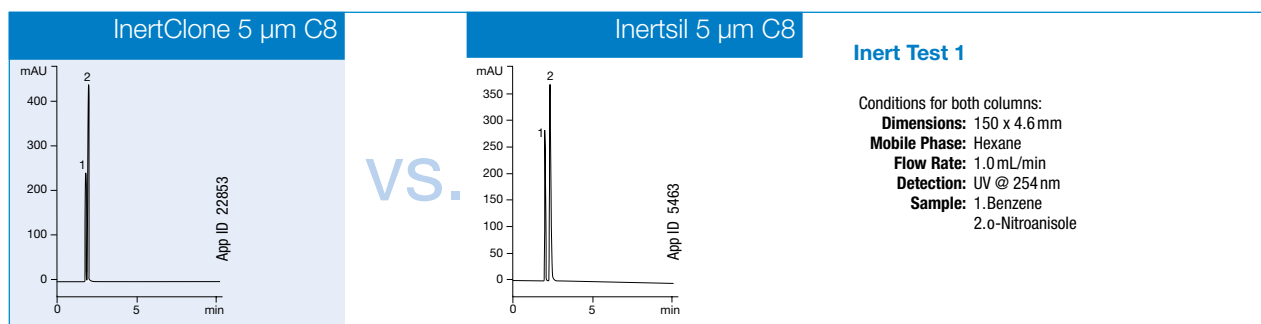
For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334.

Comparative separations may not be representative of all applications.

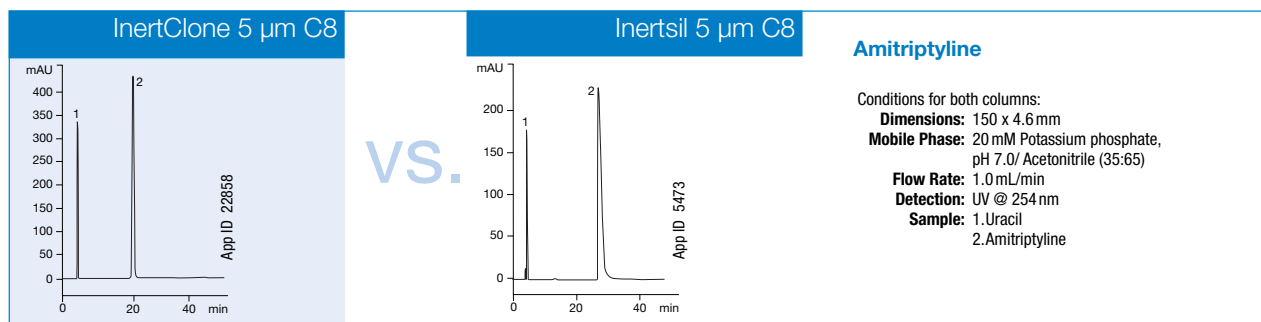
## Guaranteed Replacement to Inertsil®

### InertClone VS. Inertsil Material Characteristics

InertClone		Inertsil
<b>Particle Size (µm) and Shape</b>		
3, Spherical		3, Spherical
5, Spherical		5, Spherical
<b>Pore Size (Å)</b>		
150	Ph (Phenyl), C8, ODS-2	150
100	ODS-3	100
<b>Surface Area (m<sup>2</sup>/g)</b>		
310	Ph (Phenyl), C8, ODS-2	320
450	ODS-3	450
<b>Carbon Load %</b>		
12.6	C8	10.5
18.5	ODS-2	18.5
15.5	ODS-3	15.0
10.0	Ph (Phenyl)	10.0



Note: Inertsil columns were manufactured by GL Sciences, Inc., Japan



Comparative separations may not be representative of all applications.

### Ordering Information

3 µm Analytical Columns (mm)			SecurityGuard™ Cartridges (mm)	
Phase	100 x 4.6	150 x 4.6	4 x 3.0*	
ODS-3	100Å	00D-4340-E0	00F-4340-E0	/10 pk AJ0-4287

for ID: 3.2-8.0 mm

5 µm Analytical Columns (mm)				
Phases	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
ODS-2	150Å	00D-4342-E0	00F-4342-E0	/10pk AJ0-4287
C8	150Å	—	00F-4391-E0	AJ0-4290
Ph (Phenyl)	150Å	—	00F-4352-E0	00G-4352-E0 AJ0-4351
ODS-3	100Å	—	00F-4341-E0	/10pk AJ0-4287

for ID: 3.2-8.0 mm

\*SecurityGuard™ Analytical Cartridges require universal holder Part No.: [KJO-4282](#)

## RP-HPLC for Protein/Peptide Analysis and Purification

The Jupiter HPLC column portfolio, including Jupiter 300 and Jupiter Proteo, offers optimized reversed phase solutions for protein and peptide characterization and purification. With these columns, one can identify, purify, and analyze almost any protein.

**Jupiter 300 – 300 Å** columns designed to analyze and purify intact proteins

- For separation of intact proteins > 10,000 MW
- Available with C18, C5, and C4 bonded phases
- 1.5 – 10 pH stability for method ruggedness and easy protein removal
- Direct scale up to preparative and bulk materials

**Jupiter Proteo – 90 Å** columns engineered for increased peak capacity and resolution of peptide maps as well as peptide separations

- For separation of intact proteins and peptides < 10,000 MW
- Available with novel C12 bonded phase for excellent selectivity
- Identify post-translational modifications
- Capillary columns available for increased sensitivity

### Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m <sup>2</sup> )	End Capping
C4	Spher. 5, 10, 15	300	170	5.0	6.30	Yes
C5	Spher. 5, 10	300	170	5.5	5.30	Yes
C18	Spher. 3, 5, 10, 15	300	170	13.3	5.50	Yes
Proteo	Spher. 4, 10	90	475	15.0	—	Yes

## Engineered for Robustness, Reproducibility, and Quality

It is tough to compete with Jupiter standards. Each column has consistent specifications and thus consistent performance.

- pH 1.5-10 stability gives robust, method development opportunities
- Over 25 individual quality control tests performed on every batch of Jupiter material
- Every column reproducibility aspect is specified, tested, and reported in Materials Validation Document (MVD)

### pH 1.5 – 10 Stability

A wide pH range means opportunity for method development, in addition to longer column life. Jupiter columns are stable for over 2500 hours at pH extremes. Jupiter 300 and Jupiter Proteo provide excellent separations using various MS compatible buffers and provide good resolution down to 0.01 % TFA.

### Quality Proven

A Materials Validation Document (MVD) accompanies every Jupiter column. Each certificate documents the rigorous testing procedures performed on each batch of Jupiter material to ensure column-to-column and batch-to-batch reproducibility.

#### Silica physical tests and specifications

Pore size, particle size and distribution, metal content, surface area, carbon load and surface coverage specifications and results are all reported.

#### SEM analysis

Scanning Electron Microscopy (SEM) photos show surface smoothness and particle consistency as well as a visual representation of particle size distribution.



#### Diagnostic chromatography tests

Monitoring chromatographic specifications for silanol activity, hydrogen bonding capacity, hydrophobicity and peptide standards.

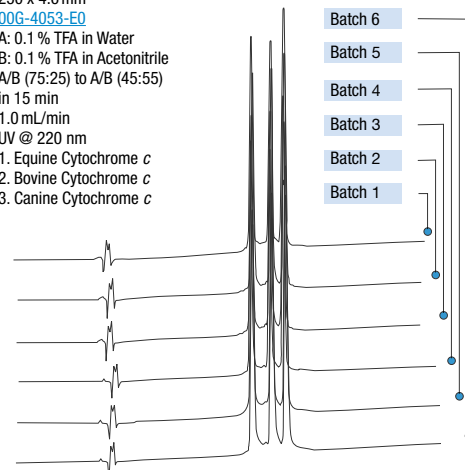
#### pH stability

Every batch goes through 1.5 and 10.0 pH testing before release, the results of which are reported on each MVD.

### Reproducibility Assured

Batch-to-batch and column-to-column is critical to HPLC column performance. Through great advances in silica, bonding, and material characterization technology, Jupiter columns set a benchmark in reproducibility.

**Column:** Jupiter 5 µm C18 300 Å  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** [00G-4053-E0](#)  
**Mobile Phase:** A: 0.1 % TFA in Water  
 B: 0.1 % TFA in Acetonitrile  
**Gradient:** A/B (75:25) to A/B (45:55) in 15 min  
**Flow Rate:** 1.0 mL/min  
**Detection:** UV @ 220 nm  
**Sample:** 1. Equine Cytochrome c  
 2. Bovine Cytochrome c  
 3. Canine Cytochrome c



App ID 16658

# Jupiter<sup>®</sup> LC Columns for Proteins & Peptides

## Ordering Information

4 µm & 5 µm Capillary Columns (mm)					Trap Column	Trap Column
Phases	50 x 0.30	150 x 0.30	50 x 0.50	150 x 0.50	20 x 0.30	20 x 0.50
5 µm C4 300 Å	<a href="#">00B-4167-AC</a>	—	<a href="#">00B-4167-AF</a>	—	<a href="#">05M-4167-AC</a>	<a href="#">05M-4167-AF</a>
5 µm C18 300 Å	<a href="#">00B-4053-AC</a>	—	<a href="#">00B-4053-AF</a>	—	—	—
4 µm Proteo 90 Å	<a href="#">00B-4396-AC</a>	<a href="#">00F-4396-AC</a>	—	<a href="#">00F-4396-AF</a>	—	—

3 µm, 4 µm & 5 µm Microbore and Minibore Columns (mm)					SecurityGuard <sup>™</sup> Cartridges (mm)		
Phases	50 x 1.0	150 x 1.0	250 x 1.0	50 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0*
5 µm C4 300 Å	<a href="#">00B-4167-A0</a>	<a href="#">00F-4167-A0</a>	<a href="#">00G-4167-A0</a>	<a href="#">00B-4167-B0</a>	<a href="#">00F-4167-B0</a>	<a href="#">00G-4167-B0</a>	<a href="#">AJ0-4329</a>
5 µm C5 300 Å	—	—	—	—	<a href="#">00F-4052-B0</a>	—	<a href="#">AJ0-4326</a>
5 µm C18 300 Å	—	—	—	<a href="#">00B-4053-B0</a>	<a href="#">00F-4053-B0</a>	<a href="#">00G-4053-B0</a>	<a href="#">AJ0-4320</a>
4 µm Proteo 90 Å	<a href="#">00B-4396-A0</a>	<a href="#">00F-4396-A0</a>	—	<a href="#">00B-4396-B0</a>	<a href="#">00F-4396-B0</a>	<a href="#">00G-4396-B0</a>	<a href="#">AJ0-6073</a>
							/10pk
3 µm C18 300 Å	—	—	—	<a href="#">00B-4263-B0</a>	<a href="#">00F-4263-B0</a>	—	<a href="#">AJ0-4320</a>

for ID: 2.0-3.0 mm

3 µm, 4 µm & 5 µm Analytical, Semi-Prep, and Preparative Columns (mm)						SecurityGuard <sup>™</sup> Cartridges (mm)		
Phases	50 x 4.6	150 x 4.6	250 x 4.6	250 x 10	250 x 21.2	4 x 3.0*	10 x 10 <sup>†</sup>	15 x 21.2**
5 µm C4 300 Å	<a href="#">00B-4167-E0</a>	<a href="#">00F-4167-E0</a>	<a href="#">00G-4167-E0</a>	<a href="#">00G-4167-N0</a>	<a href="#">00G-4167-P0</a>	<a href="#">AJ0-4330</a>	<a href="#">AJ0-7225</a>	<a href="#">AJ0-7231</a>
5 µm C5 300 Å	<a href="#">00B-4052-E0</a>	<a href="#">00F-4052-E0</a>	<a href="#">00G-4052-E0</a>	<a href="#">00G-4052-N0</a>	<a href="#">00G-4052-P0</a>	<a href="#">AJ0-4327</a>	<a href="#">AJ0-7371</a>	—
5 µm C18 300 Å	<a href="#">00B-4053-E0</a>	<a href="#">00F-4053-E0</a>	<a href="#">00G-4053-E0</a>	<a href="#">00G-4053-N0</a>	<a href="#">00G-4053-P0</a>	<a href="#">AJ0-4321</a>	<a href="#">AJ0-7224</a>	<a href="#">AJ0-7230</a>
4 µm Proteo 90 Å	<a href="#">00B-4396-E0</a>	<a href="#">00F-4396-E0</a>	<a href="#">00G-4396-E0</a>	<a href="#">00G-4396-N0</a>	—	<a href="#">AJ0-6074</a>	<a href="#">AJ0-7275</a>	—
						/10pk	—	—
3 µm C18 300 Å	—	<a href="#">00F-4263-E0</a>	<a href="#">00G-4263-E0</a>	—	—	<a href="#">AJ0-4321</a>	—	—

for ID: 3.2-8.0 mm      9-16 mm      18-29 mm

10 µm Analytical, Semi-Prep, and Preparative Columns (mm)				SecurityGuard <sup>™</sup> Cartridges (mm)		
Phases	250 x 4.6	250 x 10	250 x 21.2	4 x 3.0*	10 x 10 <sup>†</sup>	15 x 21.2**
				/10pk	/3pk	/ea
C4 300 Å	<a href="#">00G-4168-E0</a>	<a href="#">00G-4168-N0</a>	<a href="#">00G-4168-P0</a>	<a href="#">AJ0-4330</a>	<a href="#">AJ0-7225</a>	<a href="#">AJ0-7231</a>
C18 300 Å	<a href="#">00G-4055-E0</a>	<a href="#">00G-4055-N0</a>	<a href="#">00G-4055-P0</a>	<a href="#">AJ0-4321</a>	<a href="#">AJ0-7224</a>	<a href="#">AJ0-7230</a>
Proteo 90 Å	<a href="#">00G-4397-E0</a>	<a href="#">00G-4397-N0</a>	—	<a href="#">AJ0-6074</a>	<a href="#">AJ0-7275</a>	—

for ID: 3.2-8.0 mm      9-16 mm      18-29 mm

15 µm Analytical, Semi-Prep, and Preparative Columns (mm)						SecurityGuard <sup>™</sup> Cartridges (mm)			
Phases	250 x 4.6	250 x 10	250 x 21.2	250 x 30	250 x 50	4 x 3.0*	10 x 10 <sup>†</sup>	15 x 21.2**	15 x 30.0*
						/10pk	/3pk	/ea	/ea
C4 300 Å	<a href="#">00G-4169-E0</a>	<a href="#">00G-4169-N0</a>	<a href="#">00G-4169-P0</a>	—	<a href="#">00G-4169-V0</a>	<a href="#">AJ0-4330</a>	<a href="#">AJ0-7225</a>	<a href="#">AJ0-7231</a>	—
C18 300 Å	<a href="#">00G-4057-E0</a>	—	<a href="#">00G-4057-P0</a>	<a href="#">00G-4057-U0</a>	<a href="#">00G-4057-V0</a>	<a href="#">AJ0-4321</a>	<a href="#">AJ0-7224</a>	<a href="#">AJ0-7230</a>	<a href="#">AJ0-8313</a>

for ID: 3.2-8.0 mm      9-16 mm      18-29 mm      30-49 mm



For Jupiter Proteo Axia<sup>™</sup> Packed Preparative columns, see p. 393

## Ordering Information

### Bulk Material

#### 10 µm Bulk Packings

Phases	100 g	1 kg	10 kg
C4 300 Å	<a href="#">04G-4168</a>	<a href="#">04K-4168</a>	<a href="#">04M-4168</a>
C5 300 Å	—	<a href="#">04K-4054</a>	—
C18 300 Å	<a href="#">04G-4055</a>	<a href="#">04K-4055</a>	<a href="#">04M-4055</a>
Proteo 90 Å	<a href="#">04G-4397</a>	<a href="#">04K-4397</a>	—

#### 15 µm Bulk Packings

Phases	100 g	1 kg	5 kg	10 kg
C4 300 Å	<a href="#">04G-4169</a>	<a href="#">04K-4169</a>	<a href="#">04L-4169</a>	<a href="#">04M-4169</a>
C18 300 Å	<a href="#">04G-4057</a>	<a href="#">04K-4057</a>	—	<a href="#">04M-4057</a>



Effectively desalt acidic, basic, and neutral peptides with Strata<sup>®</sup>-X. See p. 61 for more information.



For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334



For Column Heater (25-90 °C), see p. 416



## Performance Gains on Any LC System

- Obtain higher throughput without sacrificing resolution
- Easy method transfer across LC system platforms
- Reduce solvent consumption with faster analysis
- Reach lower levels of detection and quantitation



### Complete scalable solution from UHPLC to HPLC to PREP LC

	UHPLC	HPLC	PREP	
	██████████			Incredible UHPLC efficiency and performance gains
	██████████			20% higher efficiency than fully porous 1.7 µm columns
	██████████	██████████		Achieve sub-2 µm performance on HPLC and UHPLC systems
		██████████		Instantly improve your pharmacopoeia (Ph. Eur. & USP) monographs that require 3.5 µm particle size
		██████████	██████████	3 µm or better efficiencies at 5 µm pressures for HPLC and PREP LC methods

KINETEX | HPLC/UHPLC



For more information on Kinetex PREP LC applications, see p. 391

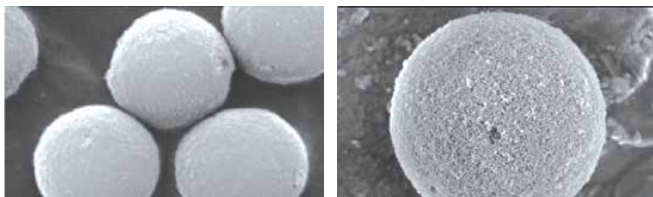


Kinetex has earned the Gold Seal of Quality!  
Learn more at:  
[www.phenomenex.com/Gold](http://www.phenomenex.com/Gold)

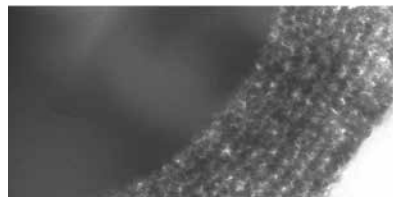
## Innovation in Particle Technology

Using sol-gel processing techniques that incorporate nano-structuring technology, a durable, homogenous porous shell is grown on a solid silica core. This highly optimized process combined with industry leading packing technology produces highly reproducible columns that generate extremely high plate counts.

### SEM of Kinetex Core-Shell Particles



### Cross Section of Kinetex Core-Shell Particle



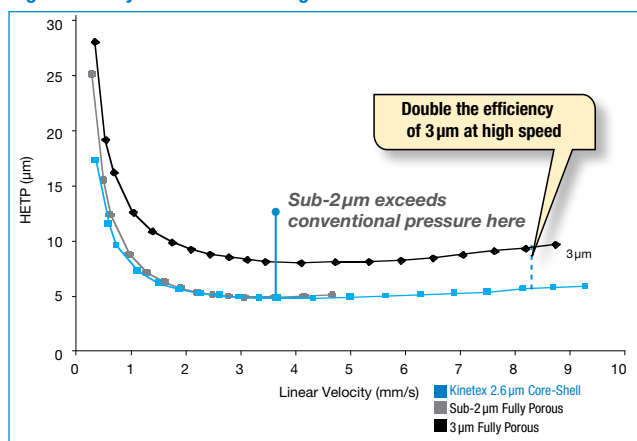


## Optimized for Ultra-High Performance

### High Efficiency, High Density Particle

Kinetex particles are built with a solid high density core that promotes the particles to settle into an optimal bed structure. This reduces the band broadening effects of Eddy Diffusion since the interstitial space between the particles is virtually homogeneous and results in ultra-high column efficiency and excellent reproducibility.

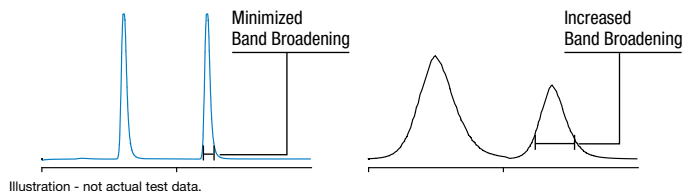
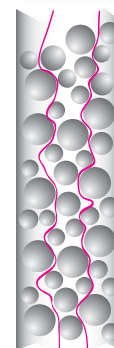
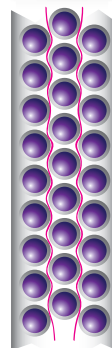
### High Efficiency over Extended Range of Flow Rates



## Illustration of Eddy Diffusion Effects

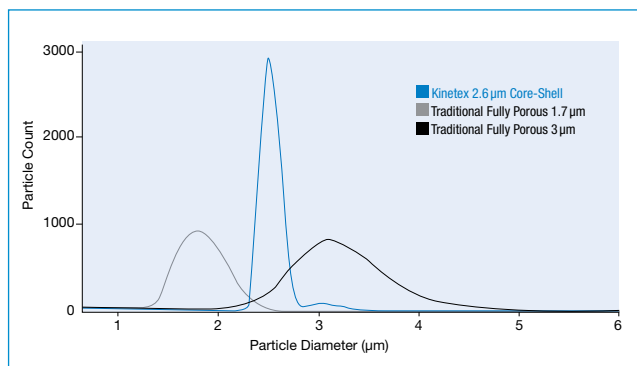
Kinetex Core-Shell

Fully Porous

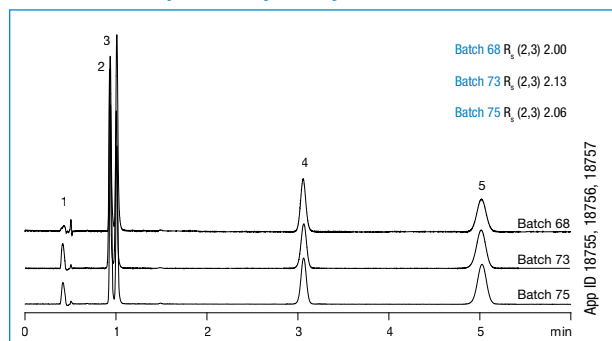


Kinetex particles are nearly monodispersed. This extremely narrow particle size distribution results in increased column efficiency and excellent reproducibility.

### Uniform Particle Size Distribution



### Batch-to-Batch Reproducibility Overlay

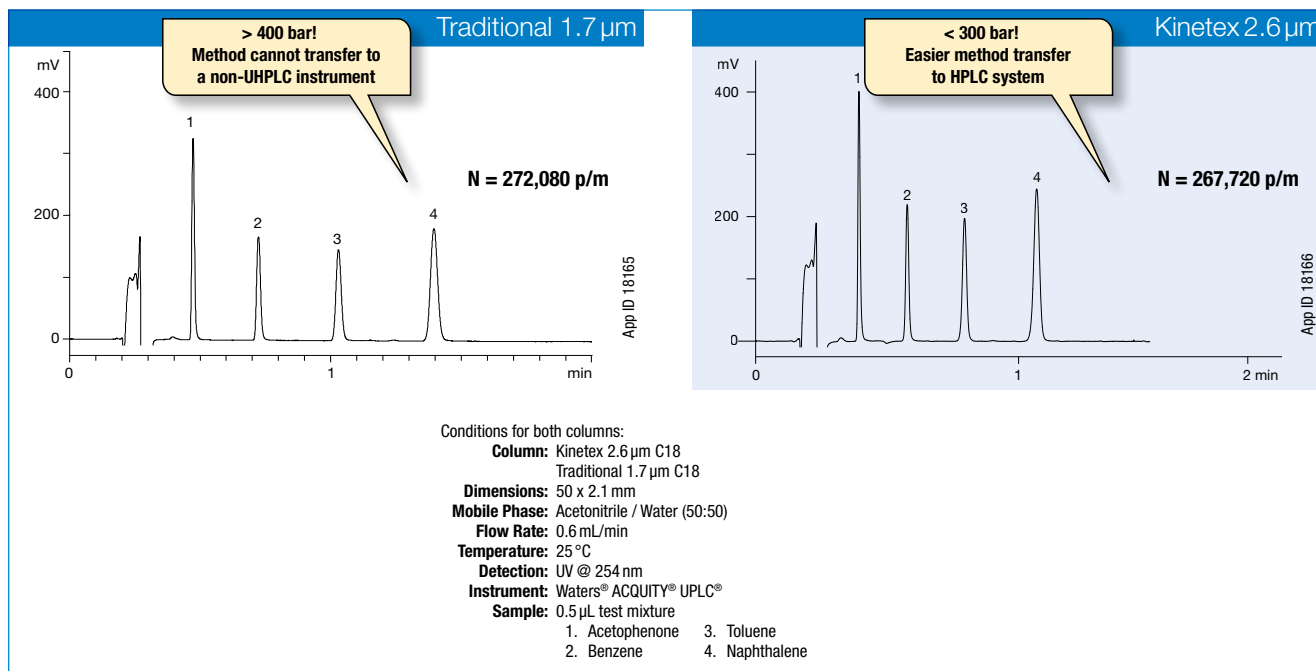


Conditions same for all batches:

- Column:** Kinetex 2.6 µm C18
- Dimensions:** 50 x 4.6 mm
- Part No.:** 00B-4462-E0
- Mobile Phase:** Water / Acetonitrile (65:35)
- Flow Rate:** 1.0 mL/min
- Detection:** UV @ 254 nm
- Sample:**
  - Uracil
  - Hydroxycortisone
  - Cortisone
  - Cortisone acetate
  - 17-Hydroxyprogesterone

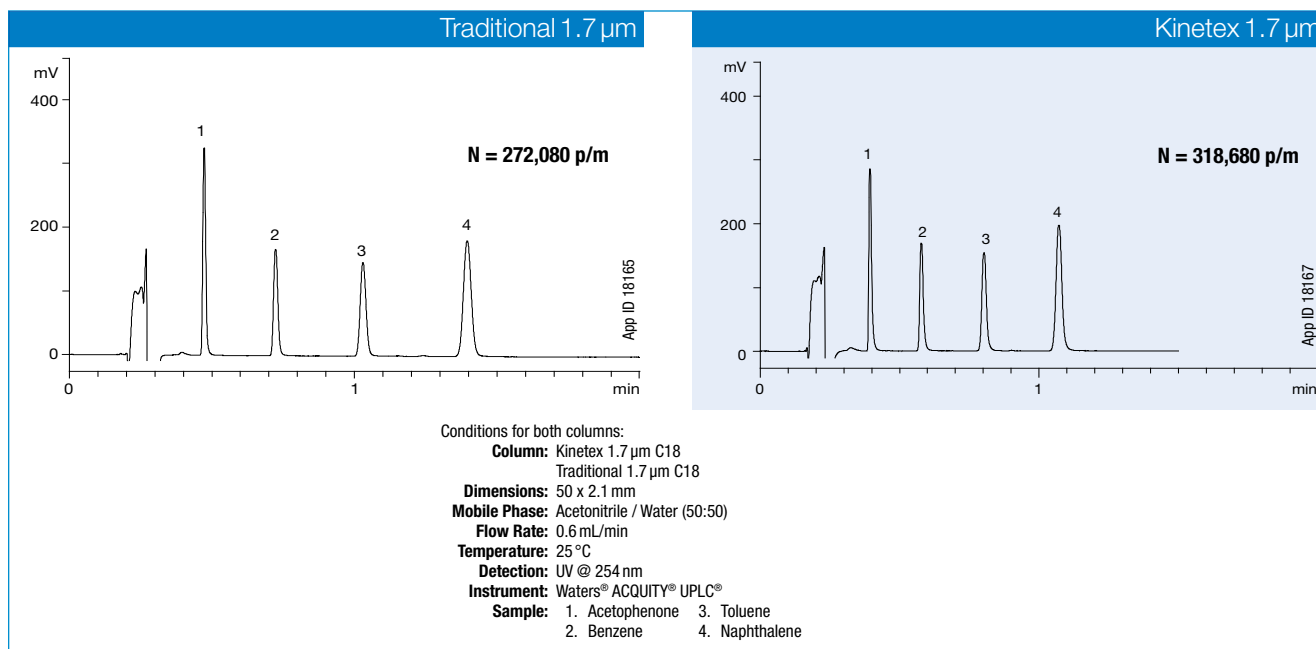
## Achieve Sub-2 $\mu$ m Performance within HPLC Backpressure Limitations

With the efficiency of a sub-2 $\mu$ m column and typical operating backpressure less than 400 bar<sup>†</sup>, you can achieve the promise of ultra-high performance on **any LC system**.



## Unparalleled Levels of Ultra-High Performance

For users of higher pressure capable instruments who want increased levels of efficiency, we offer the Kinetex 1.7 $\mu$ m column—the first sub-2 $\mu$ m core-shell particle to be available on the market.

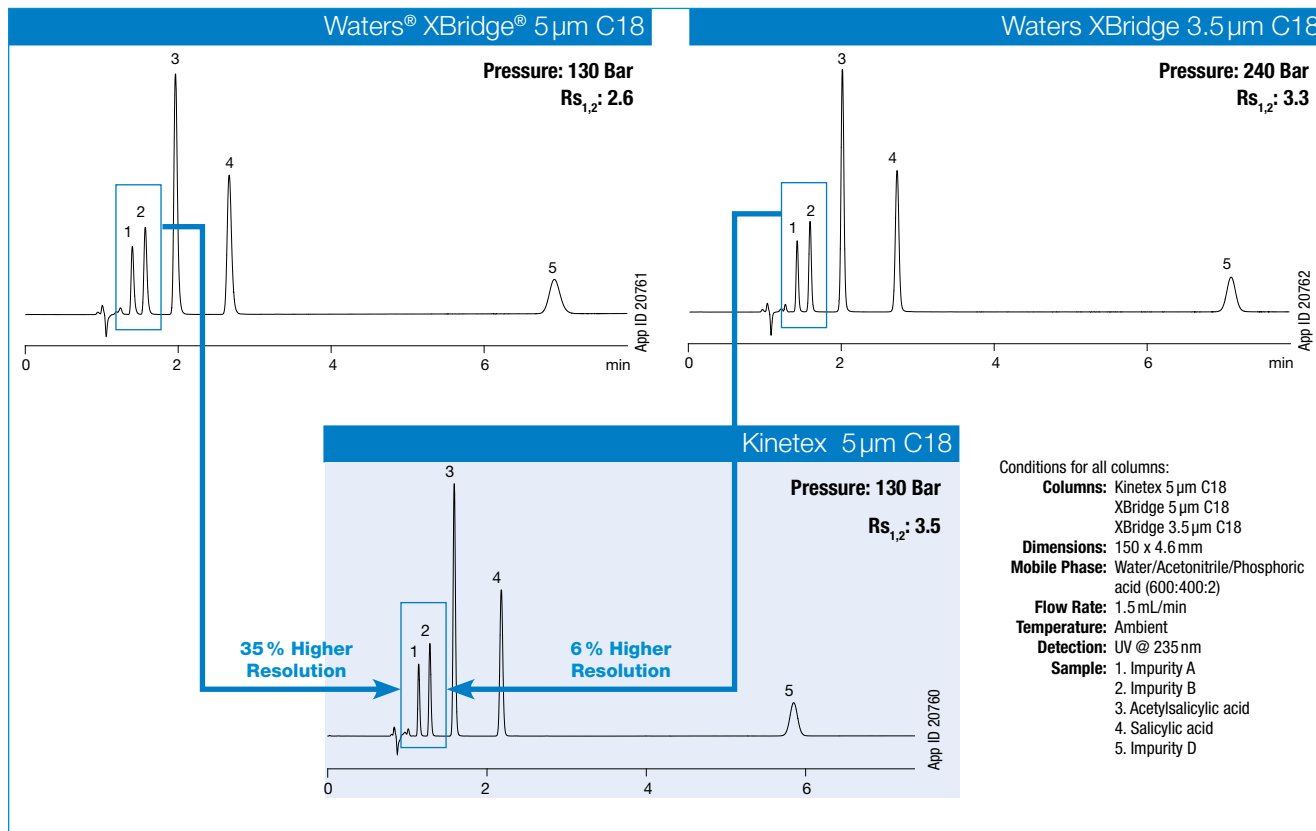


<sup>†</sup> Kinetex 2.6 $\mu$ m columns, 2.1 mm ID, are pressure rated to 1000 bar use on both HPLC and UHPLC instrumentation.

Comparative separations may not be representative of all applications.

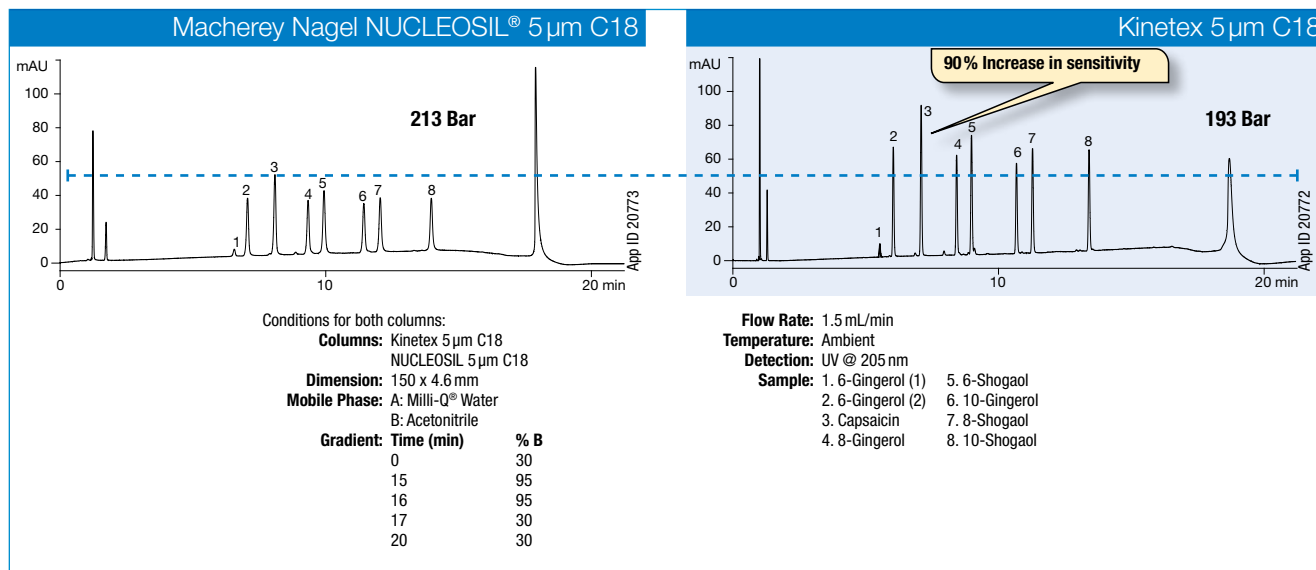
## Higher Resolution with No Pressure Increase

Replace traditional 3 and 5  $\mu\text{m}$  columns with Kinetex 5  $\mu\text{m}$  core-shell columns for immediate improvements in resolution, productivity, and sensitivity.



## Enhanced Sensitivity at 5 $\mu\text{m}$ Pressure

Kinetex 5  $\mu\text{m}$  core-shell columns easily provide enhanced sensitivity on any HPLC system without an increase in backpressure.



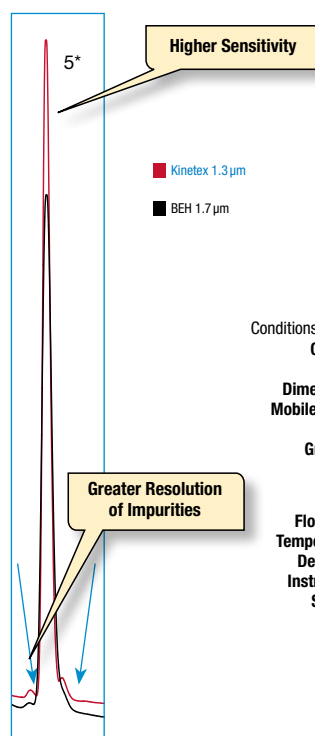
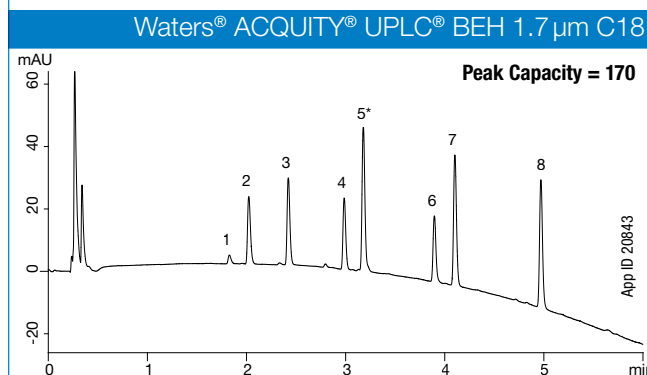
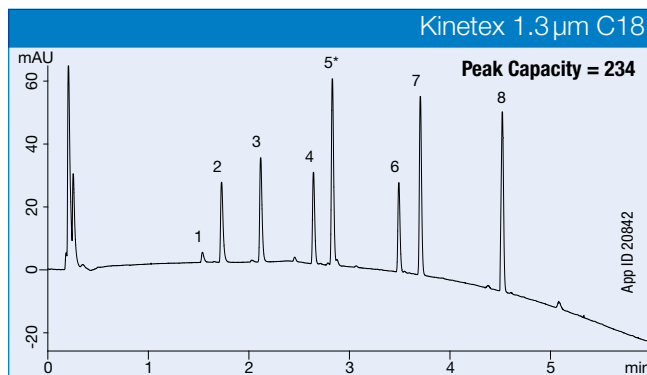
Comparative separations may not be representative of all applications.

## Get the Most Performance Out of Your UHPLC System

Kinetex 1.3  $\mu\text{m}$ , 1.7  $\mu\text{m}$ , and 2.6  $\mu\text{m}$  core-shell particles were engineered to provide incredible efficiency gains and improved performance compared to traditional fully porous sub-2  $\mu\text{m}$  particles on UHPLC systems.

- Increase resolution, throughput, and sensitivity
- Save time and money
- 1.3  $\mu\text{m}$ , 1.7  $\mu\text{m}$  and 2.6  $\mu\text{m}$  particles are directly scalable
- Available in C18, XB-C18, EVO C18, Polar C18, PS C18, C8, Biphenyl, HILIC, Phenyl-Hexyl, and F5 phases (1.3  $\mu\text{m}$  available in C18)

1.3  $\mu\text{m}$  and 1.7  $\mu\text{m}$  Kinetex core-shell columns are scalable sub-2  $\mu\text{m}$  core-shell particles, and produce up to 50 % and 20 % higher efficiencies respectively than sub-2  $\mu\text{m}$  fully porous particles, taking UHPLC to the next level.



Conditions for both columns:

**Column:** Kinetex 1.3  $\mu\text{m}$  C18  
ACQUITY UPLC BEH 1.7  $\mu\text{m}$  C18

**Dimensions:** 50 x 2.1 mm

**Mobile Phase:** A: 0.1 % TFA in Water  
B: 0.1 % TFA in Acetonitrile

Gradient Time (min)	% B
0	30
5	95

**Flow Rate:** 0.5 mL/min

**Temperature:** Ambient

**Detection:** UV @ 214 nm

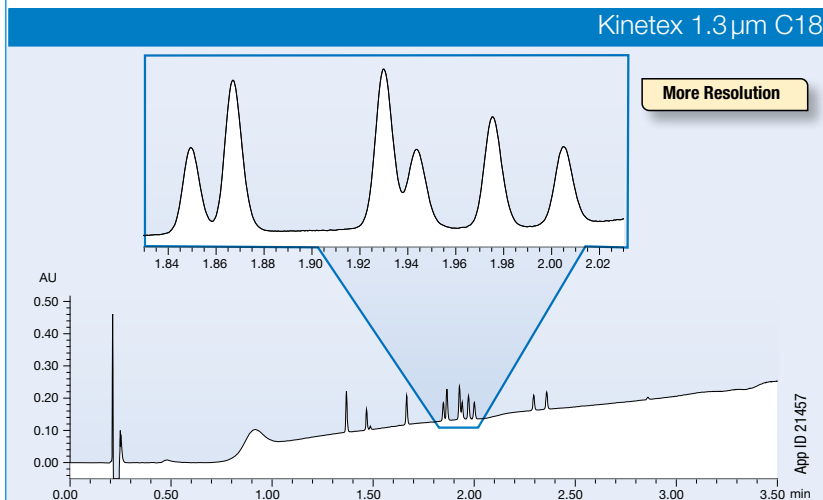
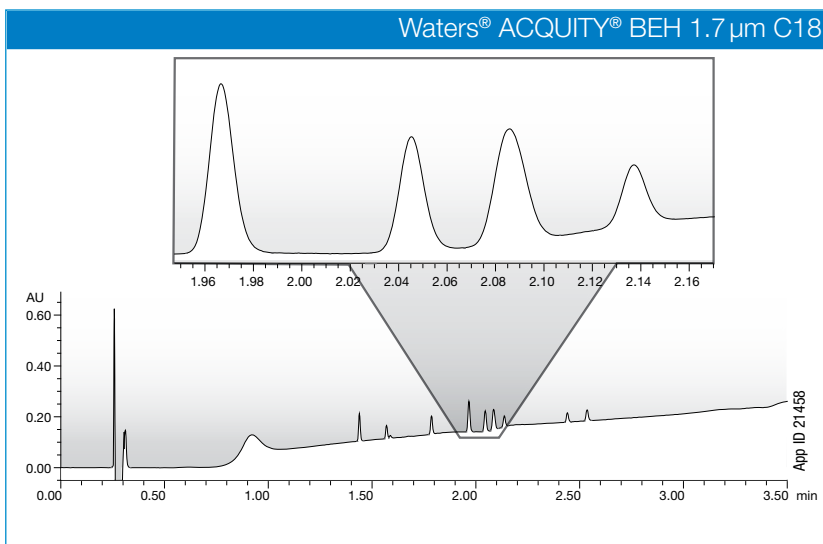
**Instrument:** Waters ACQUITY UPLC

**Sample:** 1. 6-Gingerol (1)  
2. 6-Gingerol (2)  
3. Capsaicin  
4. 8-Gingerol  
5. 6-Shogaol  
6. 10-Gingerol  
7. 8-Shogaol  
8. 10-Shogaol

Comparative separations may not be representative of all applications.

## Our New Standard for UHPLC

Bring your UHPLC analyses to the next level with the resolving power of Kinetex 1.3 $\mu$ m Core-Shell Technology. It's time you were able to see MORE!



Conditions for all columns same except where noted:

**Columns:** Waters ACQUITY UPLC<sup>®</sup> BEH 1.7  $\mu$ m C18  
Kinetex 1.3  $\mu$ m C18

**Dimensions:** 50 x 2.1 mm

**Mobile Phase:** A: 0.1% Formic acid in Water  
B: 0.1% Formic acid in Acetonitrile

Gradient:	Time (min)	% B
	0	5
	3.0	95
	3.5	95
	3.6	5

**Flow Rate:** 0.5 mL/min

**Temperature:** Ambient

**Detection:** UV @ 254 nm

**Instrument:** Waters ACQUITY UPLC

**Sample:**

1. Estriol
2. Hydrocortisone
3. Corticosterone
4. Cortisone acetate
5. 17-beta-estradiol
6. 17-alpha-estradiol
7. 21-OH-progesterone
8. 17-alpha-ethinylestradiol
9. Estrone
10. Deoxycorticosterone acetate
11. Progesterone

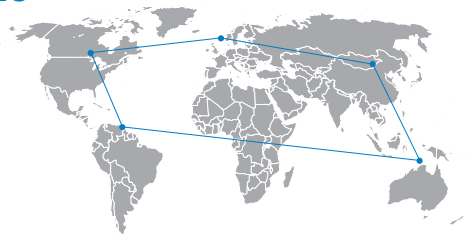
Comparative separations may not be representative of all applications.



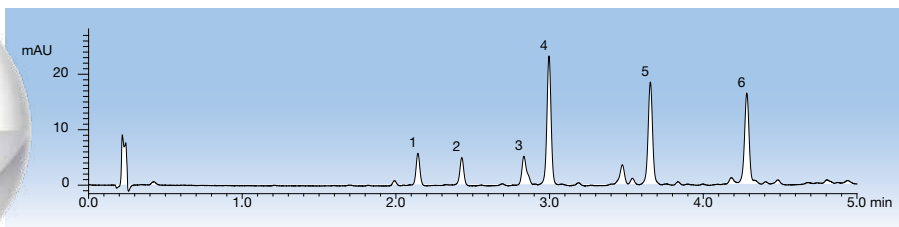
# Kinetex<sup>®</sup> Core-Shell LC Columns

## Analytical Scalability and Portability HPLC to UHPLC

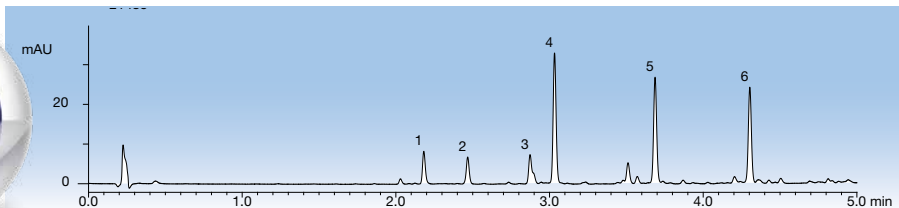
UHPLC methods developed with fully porous sub-2  $\mu\text{m}$  columns often generate backpressure higher than HPLC system limitations. With Kinetex 5  $\mu\text{m}$ , 2.6  $\mu\text{m}$ , 1.7  $\mu\text{m}$ , and 1.3  $\mu\text{m}$  core-shell technology, you are no longer restricted from developing high performance LC methods and transferring them anywhere. These four scalable Kinetex particle sizes offer you the ability to develop and transfer your method effortlessly from system to system.



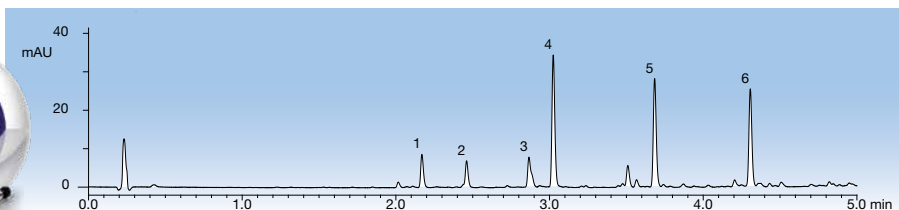
4 Kinetex particles give you full scalability HPLC  $\leftrightarrow$  UHPLC



**Kinetex 5  $\mu\text{m}$ :** 3  $\mu\text{m}$  or better efficiencies at 5  $\mu\text{m}$  pressures for HPLC and PREP LC methods



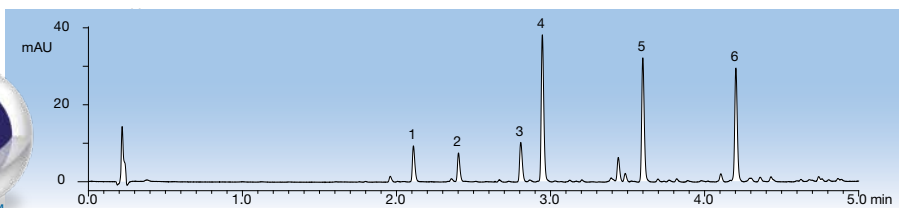
**Kinetex 2.6  $\mu\text{m}$ :** Achieve sub-2  $\mu\text{m}$  performance on HPLC and UHPLC systems



**Kinetex 1.7  $\mu\text{m}$ :** 20% higher efficiency than fully porous 1.7  $\mu\text{m}$  columns



for Kinetex 1.3  $\mu\text{m}$  UHPLC columns



**Kinetex 1.3  $\mu\text{m}$ :** Incredible UHPLC efficiency and performance gains

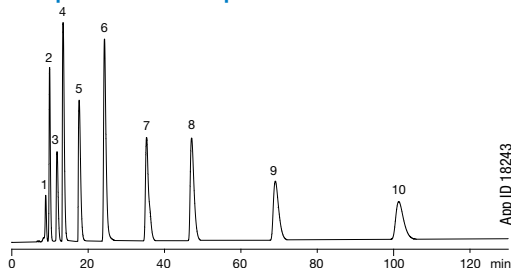
\*Gingerols analyzed on 50x2.1 mm columns

## Improve Performance, Save Solvent

When chromatographic column performance improves you can not only decrease your analysis time but also decrease your overall solvent consumption without compromising your separations. Use Kinetex core-shell technology to dramatically decrease the solvent consumption in your laboratory and increase sample throughput.

**Column:** Traditional 5 µm C18  
**Dimensions:** 250 x 4.6 mm  
**Flow Rate:** 1.0 mL/min

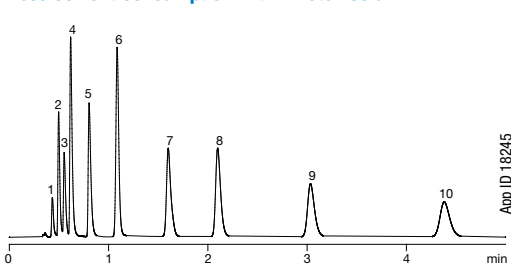
### Example Method Consumption



110 mL solvent per run!

**Column:** Kinetex 2.6 µm C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** 00B-4462-AN  
**Flow Rate:** 0.6 mL/min

### Less Solvent Consumption with Kinetex Column



< 4 mL solvent per run!

Conditions for both columns:

**Mobile Phase:** A: 20 mM Potassium phosphate pH 7  
 B: Methanol / Acetonitrile (50:50)  
 A/B (48:52)

**Temperature:** 40 °C

**Detection:** UV @ 254 nm

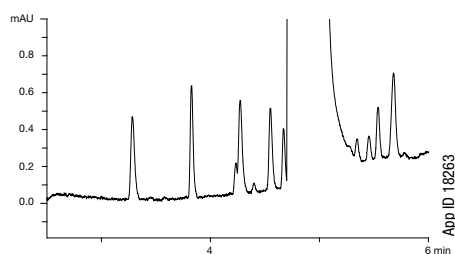
**Sample:**

- |                     |                  |
|---------------------|------------------|
| 1. Tianeptine       | 6. Amoxapine     |
| 2. Desmethyldoxepin | 7. Doxepin       |
| 3. Protriptyline    | 8. Nortriptyline |
| 4. Desipramine      | 9. Amitriptyline |
| 5. Imipramine       | 10. Clomipramine |

## Reach Lower Levels of Detection and Quantitation

The combination of the small particle size, narrow particle size distribution, and the significantly shorter diffusion path results in much higher column efficiencies and increased chromatographic resolution. The increased efficiencies provide an immediate benefit on sensitivity since higher chromatographic efficiencies translate into significantly narrower and taller peaks, making it easier to detect low level impurities.

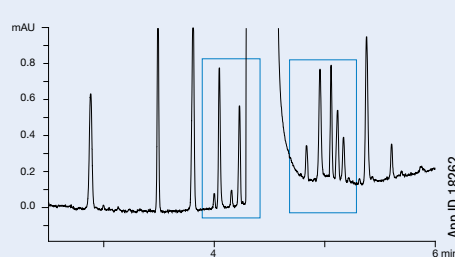
### Agilent Technologies<sup>®</sup> ZORBAX<sup>®</sup> 3.5 µm SB-C18



Conditions for both columns:

**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** A: Water  
 B: Acetonitrile  
**Gradient:** (95:5) A/B for 1.16 min, then to (5:95) A/B  
**Flow Rate:** 1.5 mL/min  
**Temperature:** 45 °C  
**Detection:** UV @ 254 nm  
**Instrument:** Agilent 1200

### Kinetex 2.6 µm C18



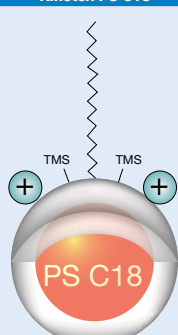
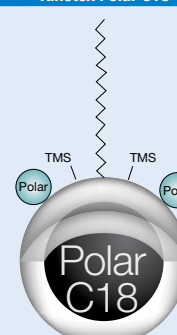
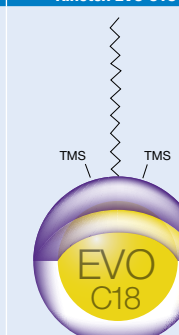
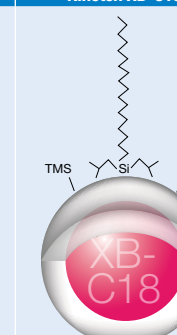
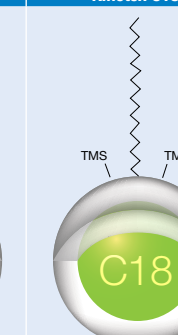
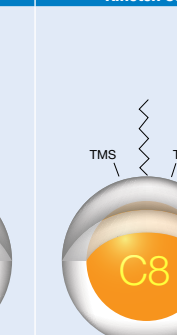
**Sample:**

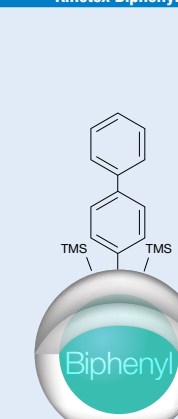
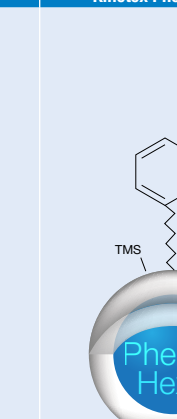
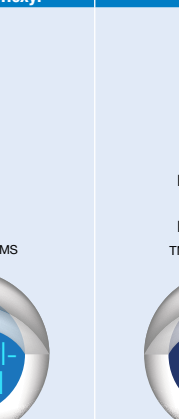
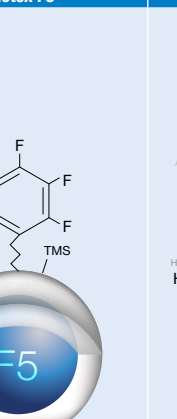
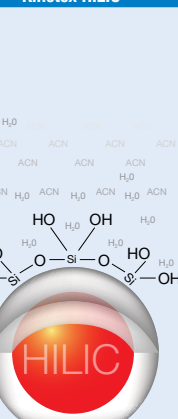
- |                     |                                     |
|---------------------|-------------------------------------|
| 1. Pyridine         | 9. Nortriptyline                    |
| 2. Acetaminophen    | 10. 4-Chlorobenzoic acid            |
| 3. Pindolol         | 11. 5-Methyl-2-hydroxy benzaldehyde |
| 4. Quinine          | 12. 4-Chlorocinnamic acid           |
| 5. Acebutolol       | 13. Diazepam                        |
| 6. Chlorpheniramine | 14. Diflunisal                      |
| 7. Triprolidine     | 15. Niflumic acid                   |
| 8. Prednisolone     | 16. Hexanophenone                   |

Comparative separations may not be representative of all applications.

## Complementary and Orthogonal Selectivities

To provide alternative and orthogonal selectivity phases, Kinetex columns are available in 11 selectivities: Polar C18, PS C18, EVO C18, XB-C18, C18, C8, Biphenyl, Phenyl-Hexyl, F5, PAH, and HILIC (Hydrophilic Interaction Liquid Chromatography), for resolution of a wide range of compounds from polar to hydrophobic, aromatic, and isomers.

Kinetex PS C18	Kinetex Polar C18	Kinetex EVO C18	Kinetex XB-C18	Kinetex C18	Kinetex C8
					
A multi-modal, 100% aqueous C18 column with a positive surface modification that demonstrates unique selectivity and improved peak shape for basic compounds	Combined C18 and polar modified surface that provides polar and non-polar retention alongside 100% aqueous stability	Novel pH 1-12 stable C18 that delivers robust methods and improved peak shape for bases	This unique C18 phase yields increased hydrogen bonding with hydrophobic selectivity, resulting in improved peak shape for basic compounds and increased retention of acidic compounds	Balanced C18 phase that provides the highest degree of hydrophobic selectivity relative to the other Kinetex phases	Moderate hydrophobic and steric selectivity is offered, bringing ultra-high performance to USP L7 and other octyl silane methods
<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L1 <b>Effective Carbon Load:</b> 9%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L1 <b>Effective Carbon Load:</b> 9%	<b>pH Range:</b> 1 – 12 <b>USP Classification:</b> L1 <b>Effective Carbon Load:</b> 11%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L1 <b>Effective Carbon Load:</b> 10%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L1 <b>Effective Carbon Load:</b> 12%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L7 <b>Effective Carbon Load:</b> 8%

Kinetex Biphenyl	Kinetex Phenyl-Hexyl	Kinetex F5	Kinetex HILIC	Kinetex PAH
				
100% aqueous stable reversed phase chemistry with hydrophobic, aromatic, and enhanced polar selectivity	Aromatic and moderate hydrophobic selectivity results in the great retention and separation of aromatic hydrocarbons	Highly reproducible pentafluorophenylpropyl phase, exceptional for halogenated, conjugated, isomeric, or highly polar compounds	Used under HILIC running conditions, this phase provides the highest polar selectivity for retention and separation of hydrophilic compounds	Polymerically bonded C18 phase specifically developed for the separation of EU and EPA priority PAHs
<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L11 <b>Effective Carbon Load:</b> 11%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L11 <b>Effective Carbon Load:</b> 11%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L43 <b>Effective Carbon Load:</b> 9%	<b>pH Range:</b> 2.0 – 7.5 <b>USP Classification:</b> L3 <b>Carbon Load:</b> –	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L118 <b>Carbon Load:</b> 12%

\*Columns are pH stable from 1.5-10 under isocratic conditions. Columns are pH stable 1.5-8.5 under gradient conditions.

## Selecting The Right Chemistry

Use the charts below to determine the best Kinetex core-shell chemistry for your work.

### Recommended Selectivities By Compound Classes:

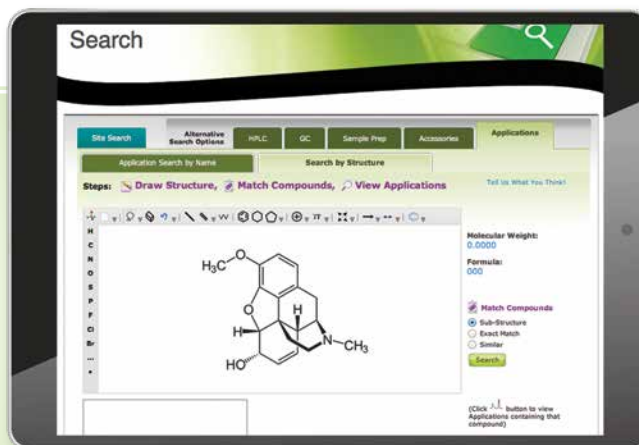
Acids	Bases	Neutrals	Aromatics	Acids, Bases, and Neutrals	Highly Polar Compounds	High pH	Isomers
Polar C18	PS C18	C18	Biphenyl	EVO C18	Polar C18	EVO C18	F5
F5	XB-C18	C8	Phenyl-Hexyl	Polar C18	F5		
HILIC		Biphenyl	F5	PS C18	Biphenyl		
				XB-C18	HILIC		

### Column Characteristics

Kinetex Phases	Shipping Solvent <sup>†</sup>	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	pH Stability	Reversed Phase	Normal Phase	HILIC	100% Aqueous Stable
Polar C18	Acetonitrile/Water (50:50)	2.6	100	200	9	1.5-8.5*	<input type="radio"/>			<input type="radio"/>
PS C18	Acetonitrile/Water (50:50)	2.6	100	200	9	1.5-8.5*	<input type="radio"/>			<input type="radio"/>
C18	Acetonitrile/Water (50:50)	1.3, 1.7, 2.6, 5	100	200	12	1.5-8.5*	<input type="radio"/>			
EVO C18	Acetonitrile/Water (45:55)	1.7, 2.6, 5	100	200	11	1-12	<input type="radio"/>			<input type="radio"/>
XB-C18	Acetonitrile/Water (50:50)	1.7, 2.6, 3.5, 5	100	200	10	1.5-8.5*	<input type="radio"/>			
C8	Acetonitrile/Water (45:55)	1.7, 2.6, 5	100	200	8	1.5-8.5*	<input type="radio"/>			
Biphenyl	Acetonitrile/Water w/ 0.1 % Formic Acid (50:50)	1.7, 2.6, 5	100	200	11	1.5-8.5*	<input type="radio"/>			<input type="radio"/>
Phenyl-Hexyl	Acetonitrile/Water (45:55)	1.7, 2.6, 5	100	200	11	1.5-8.5*	<input type="radio"/>			
F5	Acetonitrile/Water (40:60)	1.7, 2.6, 5	100	200	9	1.5-8.5*	<input type="radio"/>		<input type="radio"/>	<input type="radio"/>
HILIC	Acetonitrile/ 100 mM Ammonium Formate (93:7)	1.7, 2.6, 5	100	200	0	2.0-7.5		<input type="radio"/>	<input type="radio"/>	
PAH	Acetonitrile/Water (65:35)	3.5	—	—	12	1.5-8.5*	<input type="radio"/>			

<sup>†</sup> Shipping conditions may vary slightly in terms of organic to aqueous ratio, depending on column dimensions.  
\* pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

**Draw it. Find it.**  
Application search by  
compound structure!



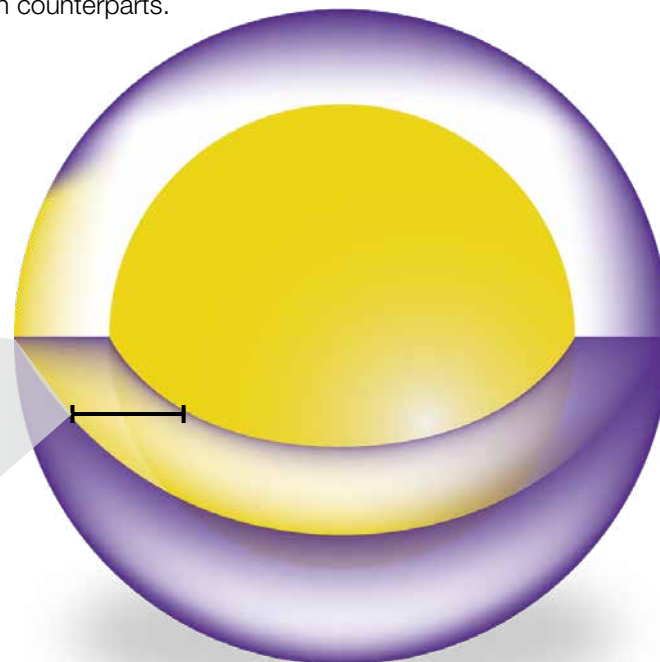
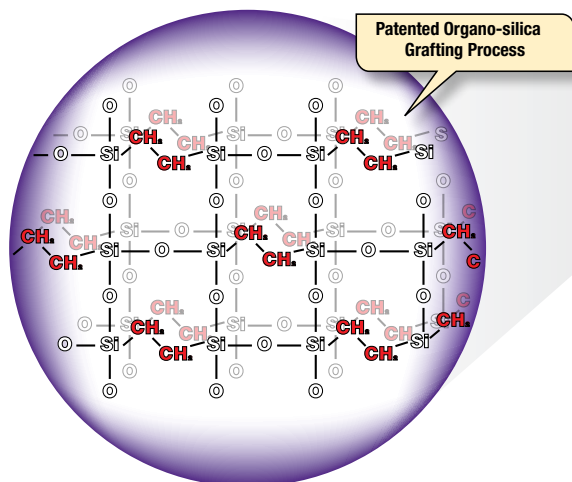
[www.phenomenex.com/application/structuresearch](http://www.phenomenex.com/application/structuresearch)

# Kinetex<sup>®</sup> Core-Shell LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

## Kinetex EVO C18

- Develop robust methods from pH 1-12
- Get improved peak shape for bases
- Easily reduce run times and increase sensitivity

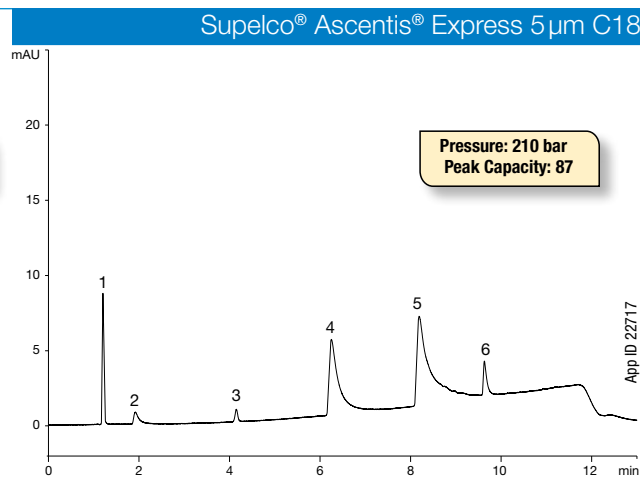
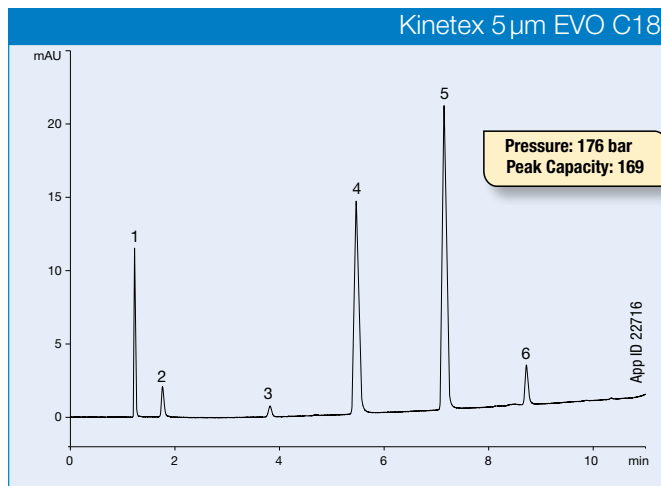


Kinetex EVO C18 uses a patented organo-silica grafting process which incorporates uniform stabilizing ethane cross-linking to provide resistance to high pH attack while maintaining mechanical strength of the core-shell particle.

## Improved Peak Shape for Bases Under Alkaline Conditions

The unique organo-silica layer of ethane cross-linking found within each Kinetex EVO C18 particle creates a highly inert surface which provides the additional benefit of better peak shape for bases.

KINETEX | HPLC/UHPLC



Conditions for both columns:

**Column:** Kinetex 5 μm EVO C18  
Ascentis Express 5 μm C18  
**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** A: 20 mM Sodium phosphate dehydrate pH 7.0  
B: Methanol  
**Gradient:** 40% to 90% B over 10 minutes  
**Flow Rate:** 1 mL/min

**Temperature:** Ambient  
**Detection:** UV @ 254 nm  
**Sample:** 1. Maleate  
2. Pseudoephedrine  
3. Scopolamine  
4. Doxylamine  
5. Chlorpheniramine  
6. Diphenhydramine

Comparative separations may not be representative of all applications.

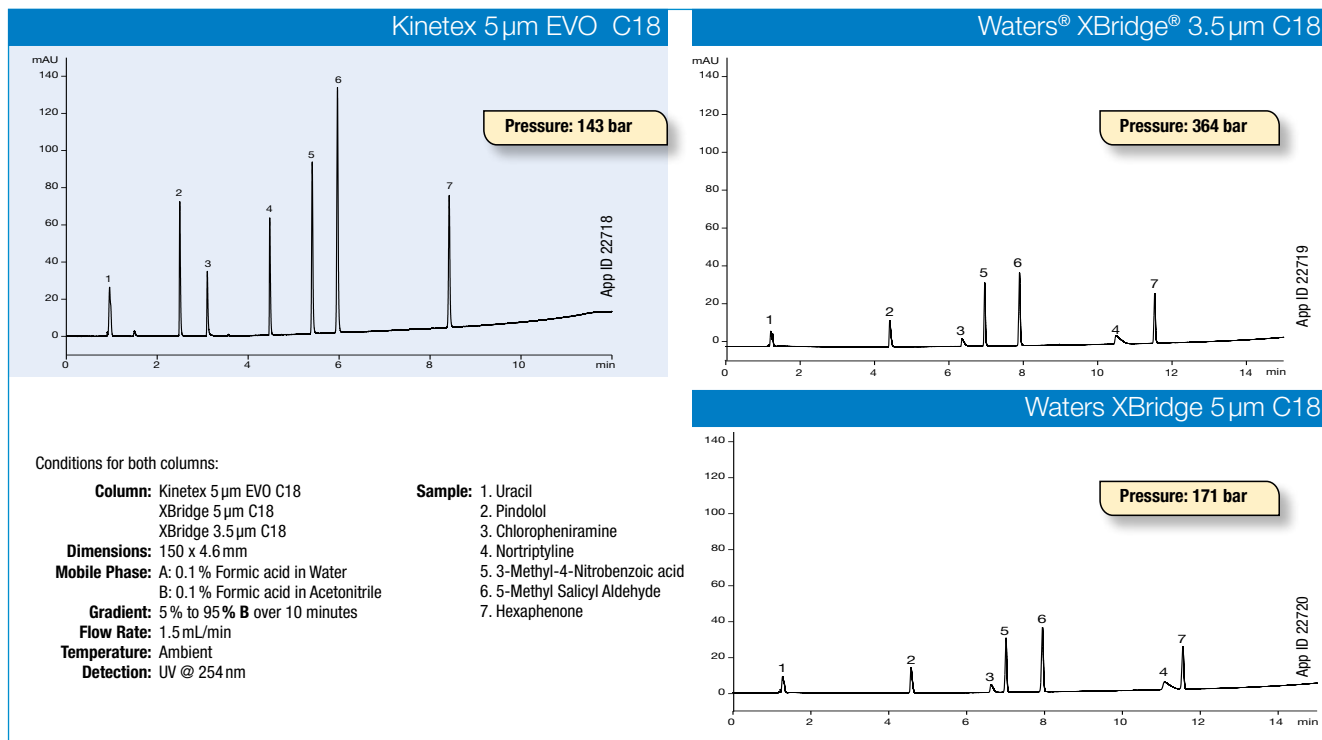


# Kinetex<sup>®</sup> Core-Shell LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

## Drop in a Kinetex EVO 5µm Column to Start Smiling

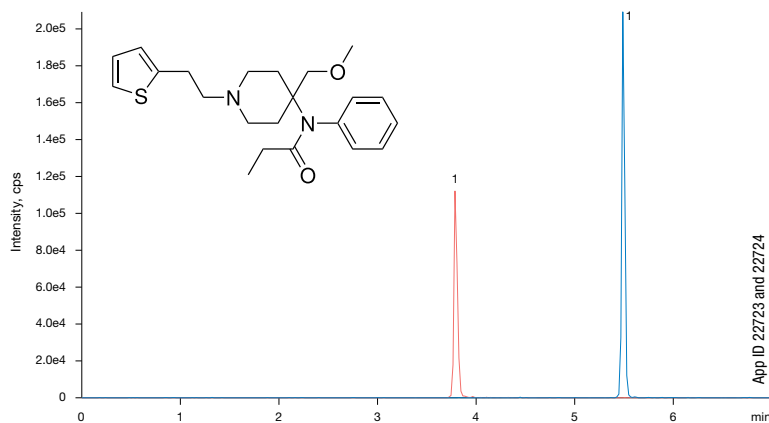
With the combination of rugged pH stability from 1-12 and the core-shell performance advantage, you can easily replace old hybrid silica columns and gain immediate method improvements without increasing backpressure.



Comparative separations may not be representative of all applications.

## Increased Sensitivity for LC-MS Applications

Alongside LC-UV analyses, the high performance and low pressure of the Kinetex EVO 5µm make it a tremendous tool for LC-MS and LC-MS/MS. Increased polar basic retention provided by the Kinetex EVO allows for greater use of organic within the mobile phase, subsequently leading to improved ionization and increased sensitivity.



**Column:** Kinetex 5µm EVO C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4633-AN](#)  
**Mobile Phase:** A: 0.1% Formic acid in Water, B: 0.1% Formic acid in Methanol  
**Mobile Phase:** A: 10 mM Ammonium Bicarbonate (pH 8.2), B: Methanol

Gradient: Time (min)	% B
0	10
0.5	10
2	25
4.5	80
4.51	85
5.5	85
5.51	10
7	10

**Flow Rate:** 0.5 mL/min  
**Temperature:** Ambient  
**Detection:** MS/MS (SCIEX<sup>®</sup>API 4000<sup>™</sup>)  
**Sample:** 1. Sufentanil

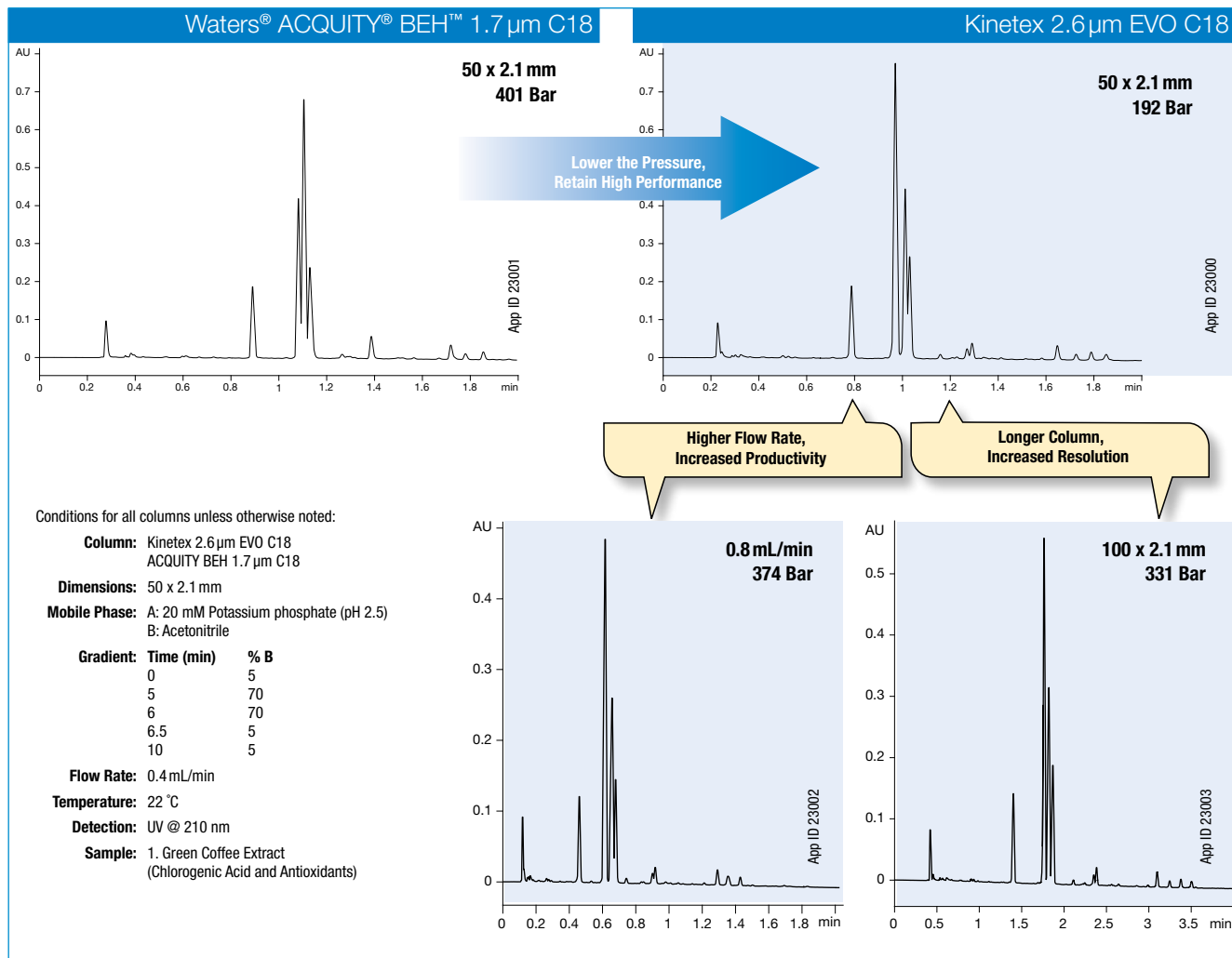
# Kinetex<sup>®</sup> Core-Shell LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

## A Simple Upgrade for Potential Greater Performance!

For scientists who are interested in high performance and fast run times, 2.6 $\mu$ m Kinetex EVO C18 columns are an amazing UHPLC solution. Start by matching a Kinetex 2.6 $\mu$ m column to the sub-2 $\mu$ m column you're currently using. With lower backpressure

and similar or better performance, you'll then have three options: keep the lower pressure for less system strain, increase the flow for higher productivity, or utilize a longer column length to increase potential resolving power.



Comparative separations may not be representative of all applications.

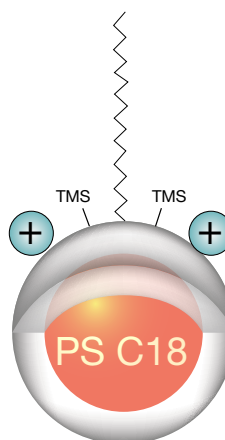
## Kinetex PS C18

- Enhanced polar retention
- Improved peak shape for bases
- Multi-modal interaction selectivity

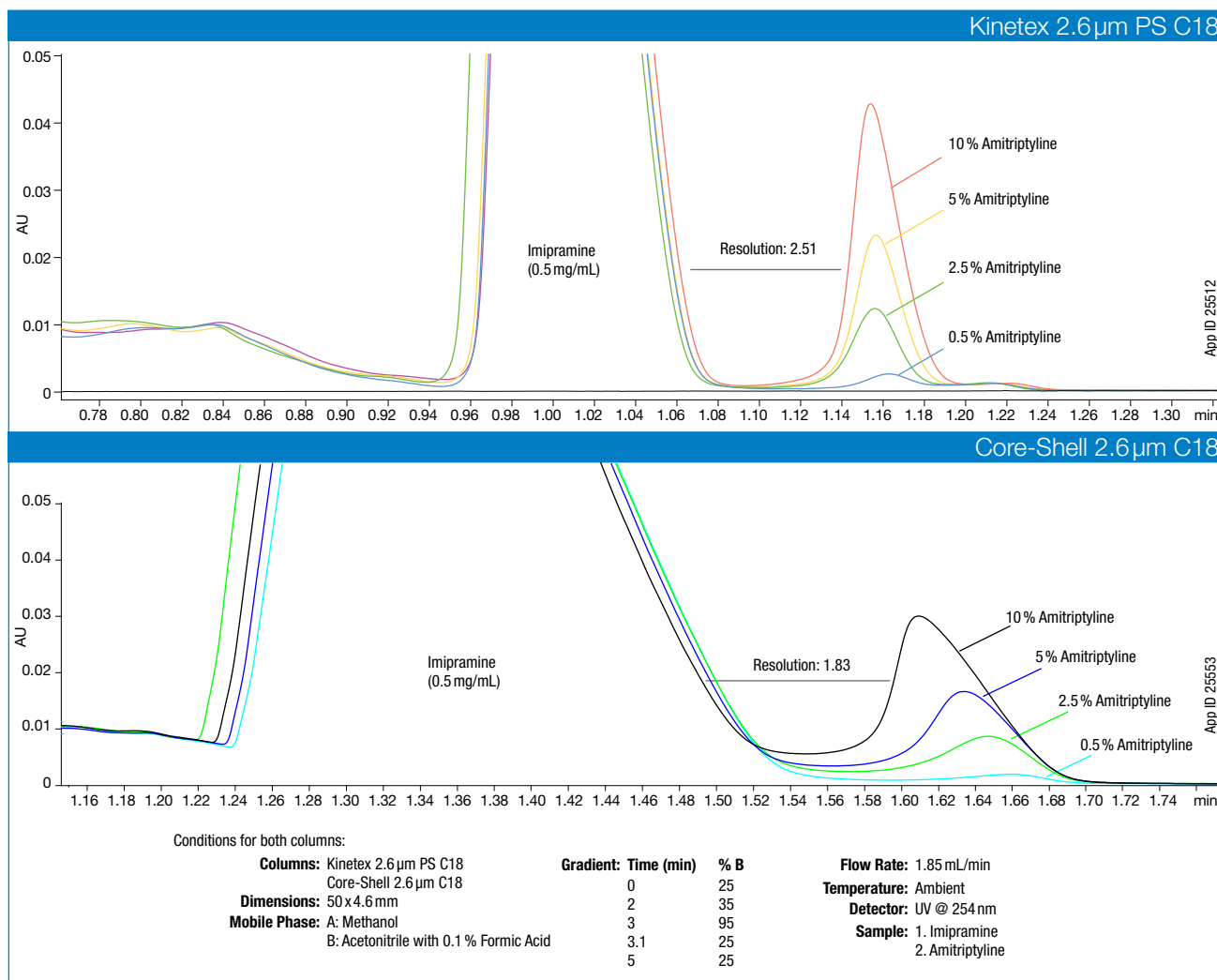
### A Versatile C18

A multi-modal, 100 % aqueous C18 column with a positive surface modification that demonstrates unique selectivity and improved peak shape for basic compounds.

## Kinetex PS C18



### Enhanced Peak Shape for Basic Compounds



Comparative separations may not be representative of all applications.

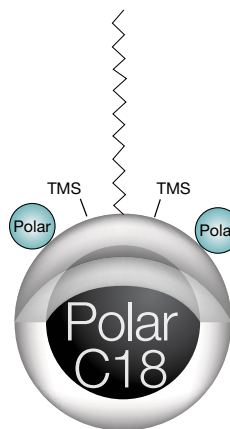
## Kinetex Polar C18

- 100% aqueous stable
- Enhanced selectivity for polar analytes
- Orthogonal selectivity to traditional C18 phases

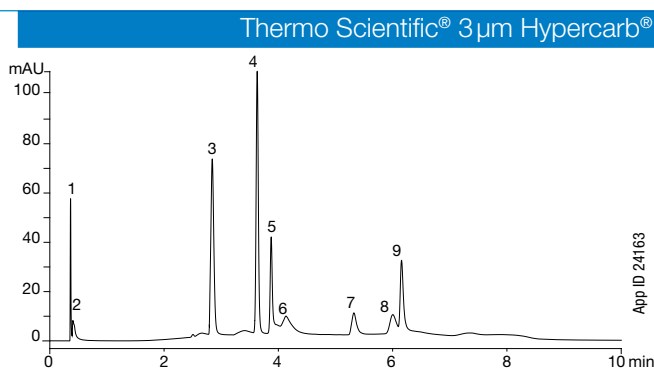
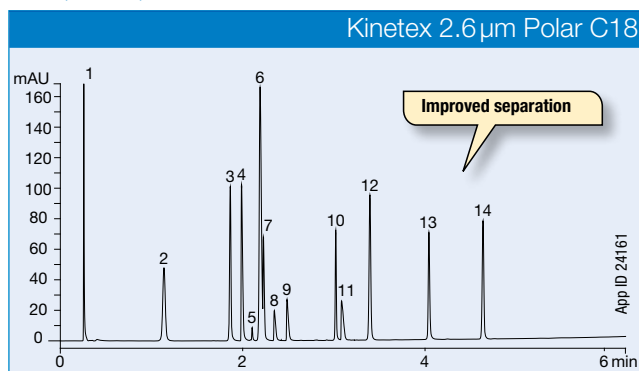
### A Versatile C18

Who said all C18's are the same? By combining C18 ligands with a polar-modified surface, you can now achieve greater retention of polar and nonpolar compounds while ensuring 100% aqueous stability.

## Kinetex Polar C18



### Acids, Bases, and Neutrals



Conditions for both columns:

**Columns:** Kinetex 2.6 μm Polar C18  
Thermo Scientific 3 μm Hypercarb

**Dimensions:** 50 x 4.6 mm

**Mobile Phase:** A: 0.1% Formic acid in Water  
B: 0.1% Formic acid in Acetonitrile

Gradient:	Time (min)	% B
	0	5
	0.5	5
	5.5	95
	7.51	5
	10	5

**Flow Rate:** 1.85 mL/min

**Temperature:** Ambient

**Detection:** UV @ 254 nm

Sample:	1. Pyridine	8. Chlorpheniramine
	2. Acetaminophen	9. Triprolidine
	3. Sulfathiazole	10. Prednisolone
	4. Quinidine	11. Nortriptyline
	5. Quinidine Impurity	12. 5-Methyl Salicyl Aldehyde
	6. Phenol	13. Diflunisal
	7. Acebutolol	14. Hexanophenone

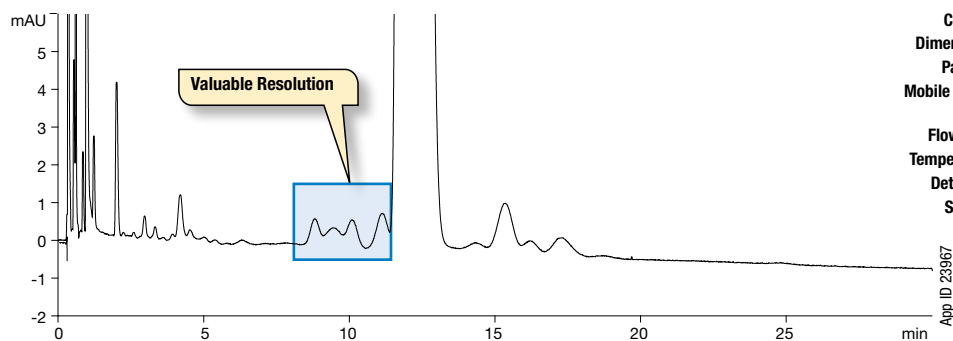
Comparative separations may not be representative of all applications.

## Enhanced Polar Selectivity

The Kinetex Polar C18 contains a C18 ligand alongside a polar modified surface that increases polar compound retention and improves resolution values. Additionally, the advanced proprietary bonding technology used with this phase ensures 100% aqueous stability as well as balanced retention on non-polar compounds.

This is an excellent all purpose phase for use with multi-compound mixes that contain polar and nonpolar compounds, or even single class methods that have closely related compounds, impurities, or metabolites.

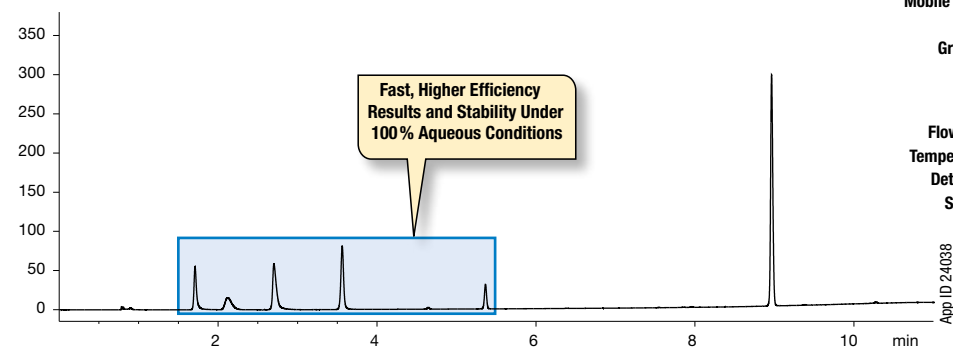
### UHPLC Analysis of Cyclosporine and Impurities



**Column:** Kinetex 2.6 μm Polar C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4759-AN](#)  
**Mobile Phase:** Acetonitrile/Tert-butyl methyl ether/  
 Water/Phosphoric acid (430:50:520:1)  
**Flow Rate:** 0.30 mL/min  
**Temperature:** 80 °C  
**Detection:** UV @ 210 nm  
**Sample:** Cyclosporine

App ID 23967

### Water Soluble Vitamins



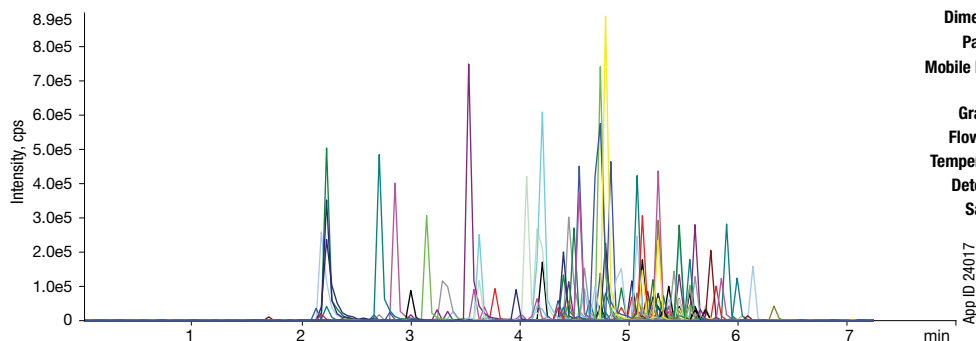
**Column:** Kinetex 2.6 μm Polar C18  
**Dimensions:** 100 x 4.6 mm  
**Part No.:** [00D-4759-E0](#)  
**Mobile Phase:** A: 20 mM Potassium Phosphate  
 B: Methanol  

Gradient:	Time (min)	% B
	0	0
	1	0
	10	60

**Flow Rate:** 1.2 mL/min  
**Temperature:** Ambient  
**Detection:** UV @ 210 nm  
**Sample:** 1. Thiamine  
 2. Nicotinamide  
 3. Pyridoxal  
 4. Pyridoxine  
 5. Pantothenic Acid  
 6. Riboflavin

App ID 24038

### Multi-Class 206 Pesticide Panel Screen



**Column:** Kinetex 2.6 μm Polar C18  
**Dimension:** 50 x 4.6 mm  
**Part No.:** [00B-4759-E0](#)  
**Mobile Phase:** A: Water  
 B: 0.1% Formic acid in Methanol  
**Gradient:** 5-100% B in 5 min, hold 1 min  
**Flow Rate:** 0.7 mL/min  
**Temperature:** Ambient  
**Detection:** MS/MS (SCIEX<sup>®</sup>API 4000<sup>™</sup>)  
**Sample:** 206 Pesticides.  
 Find the full compound list online at  
[www.phenomenex.com/Application/Detail/24017](http://www.phenomenex.com/Application/Detail/24017)

App ID 24017



## Kinetex Biphenyl

- Remarkable separation power
- Rugged and reliable
- 100% aqueous stable

### Selectivity That a C18 Just Can't Give You!

Think high performance, enhanced retention, and the ability to go where a traditional C18 can't. The Kinetex Biphenyl offers the high performance benefits of a core-shell particle with a unique stationary phase capable of becoming the go-to selectivity for reversed phase method development. Use Kinetex Biphenyl columns to get enhanced retention, higher sensitivity, and overall better results; especially for aromatic compounds.

#### Aromatic Pi-Pi Interactions

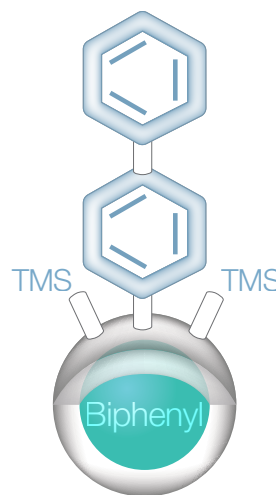
Between aromatic rings and pi electrons of target molecule and the double aromatic rings of the Biphenyl ligand

#### Hydrophobic Interactions

Between carbon skeleton of Biphenyl ligand and target analytes

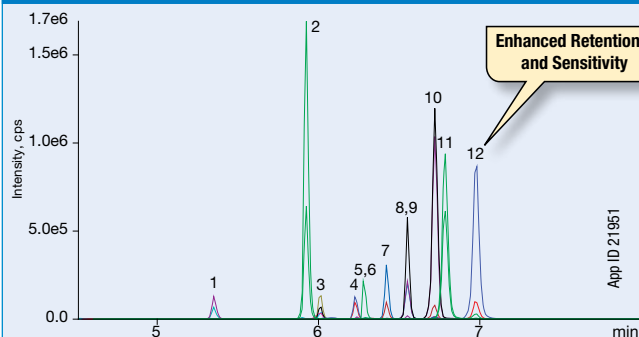
#### Weak Ionic or Dipole-Dipole Interactions

High electron density created by dual ring structure behaves similar to a weak cation exchanger, giving enhanced retention for basic analytes

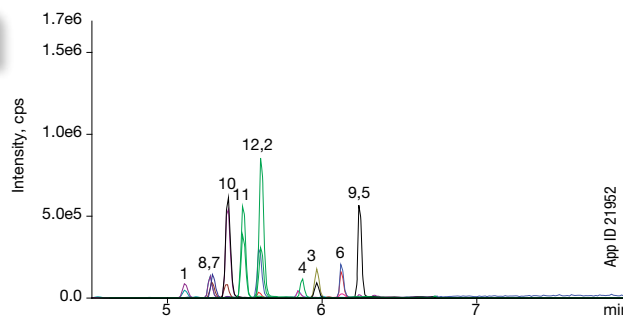


### Mycotoxins

Kinetex 2.6  $\mu$ m Biphenyl



Waters<sup>®</sup> SunFire<sup>®</sup> 3.5  $\mu$ m C18



Conditions for both columns:

<b>Column:</b>	Kinetex 2.6 $\mu$ m Biphenyl	
	Waters SunFire 3.5 $\mu$ m C18	
<b>Dimensions:</b>	50 x 2.1 mm	
<b>Mobile Phase:</b>	A: 5 mM Ammonium acetate with 0.1% Acetic acid	
	B: Methanol with 5 mM Ammonium acetate with 0.1% Acetic acid	
<b>Gradient:</b>	<b>Time (min)</b>	<b>% B</b>
	0	2
	2	2
	5	80
	5.2	98
	8	98
	8.01	2
	11	2

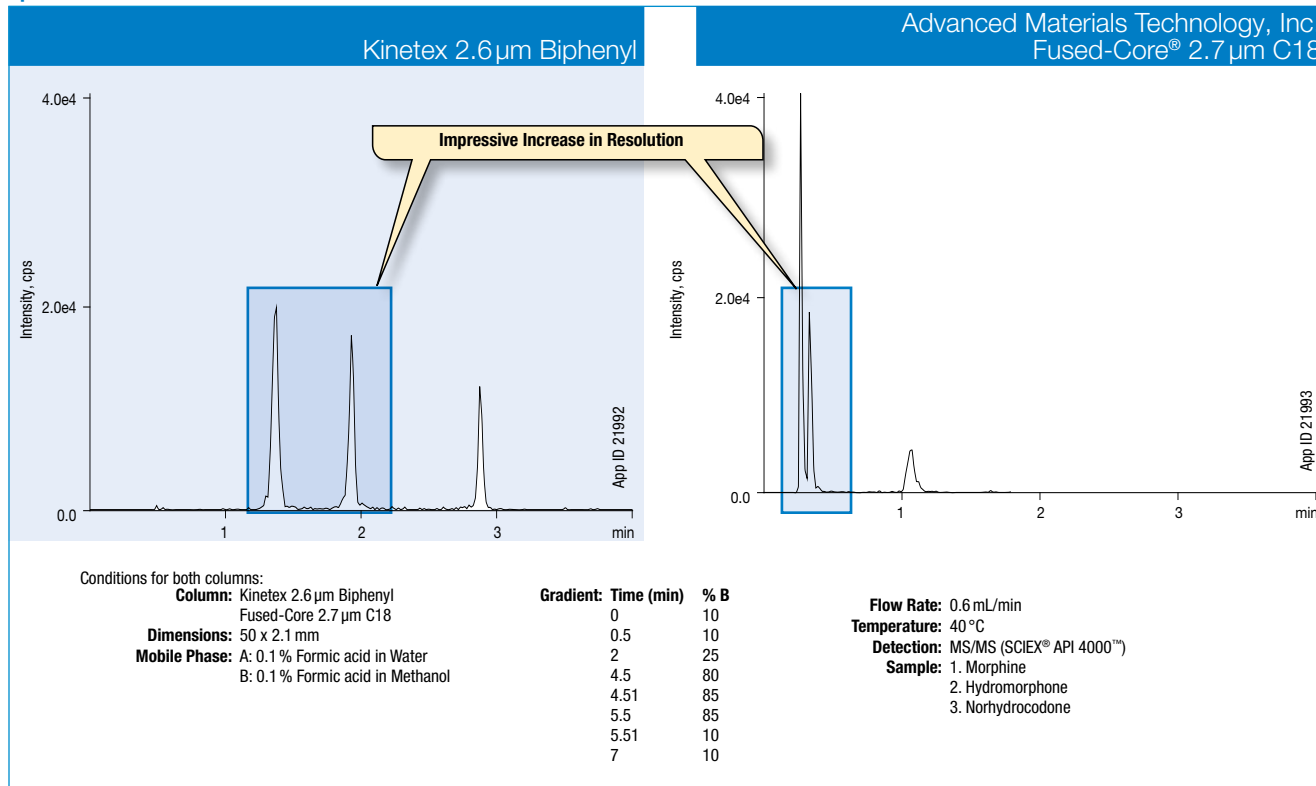
<b>Flow Rate:</b>	0.45 mL/min
<b>Temperature:</b>	40 °C
<b>Detection:</b>	MS/MS (SCIEX <sup>®</sup> API 4000 <sup>™</sup> )
<b>Sample:</b>	1. 15-Acetyldeoxyvalenol
	2. DAS
	3. FB1
	4. HT-2 Toxin
	5. FB2
	6. T-2 Toxin
	7. Aflatoxin M1
	8. Aflatoxin G2
	9. Ochratoxin A
	10. Aflatoxin G1
	11. Aflatoxin B2
	12. Aflatoxin B1

Comparative separations may not be representative of all applications.

## Enhanced Separation Power

Kinetex Biphenyl is a high efficiency core-shell product capable of adding extra separation power to your analysis of non-polar and polar compounds.

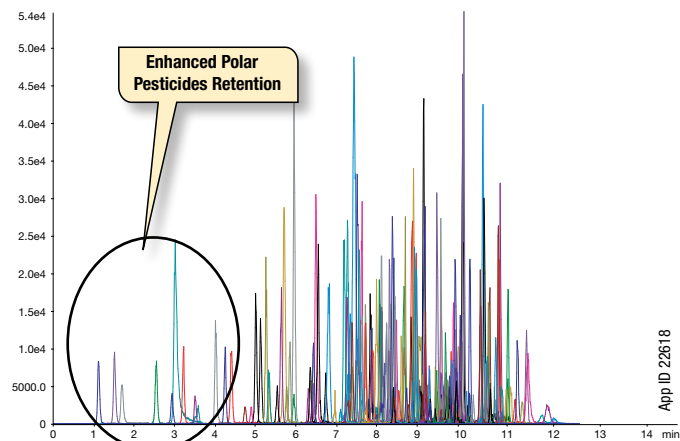
### Opiate Isomers



Comparative separations may not be representative of all applications.

## Excel With Your Multi-Compound, Multi-Class Screening

Increase the separation and analytical power of your HPLC/UHPLC compound screens with the multi-functional Kinetex Biphenyl stationary phase.



**Column:** Kinetex 5 μm Biphenyl  
**Dimensions:** 100 x 2.1 mm  
**Part No.:** [00D-4627-AN](#)  
**Mobile Phase:** A: 5 mM Ammonium formate in Water  
 B: 5 mM Ammonium formate in Methanol

<b>Gradient:</b>	<b>Time (min)</b>	<b>% B</b>
	0.01	10
	1	10
	10	90
	15	90
	15.1	10
	20	10

**Flow Rate:** 0.5 mL/min  
**Temperature:** 35 °C  
**Detection:** Tandem Mass Spectrometer (MS/MS)  
**Detector:** SCIEX<sup>®</sup> 4500 QTRAP<sup>®</sup>  
**Sample:** 175+ Pesticide Mix

## Kinetex F5

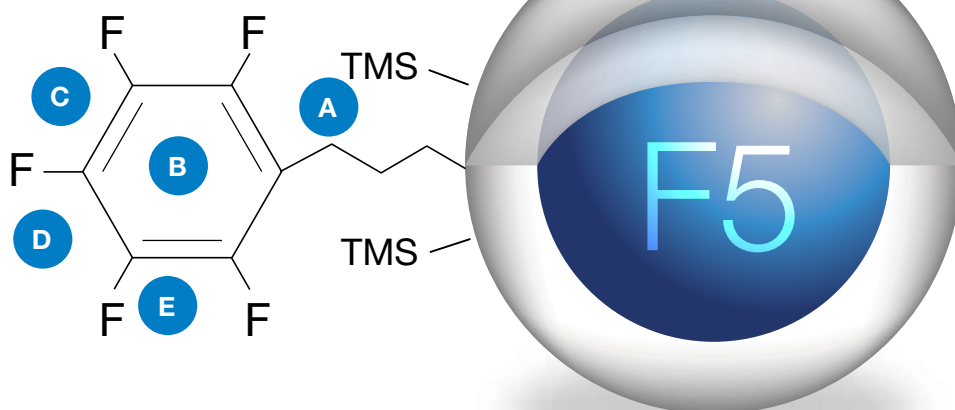
- Reduce method development time by days
- Greater reproducibility than other PFPs
- 5 glorious interaction mechanisms
- 5 valuable LC separation modes

### How I Work

With the astonishing combination of core-shell performance and 5 interaction mechanisms, Kinetex F5 columns will effortlessly drive your orthogonal HPLC/UHPLC development!

### Method Development Versatility— 5 Separation Modes

- Reversed Phase
- HILIC
- SFC
- 2D-LC
- 100% Aqueous



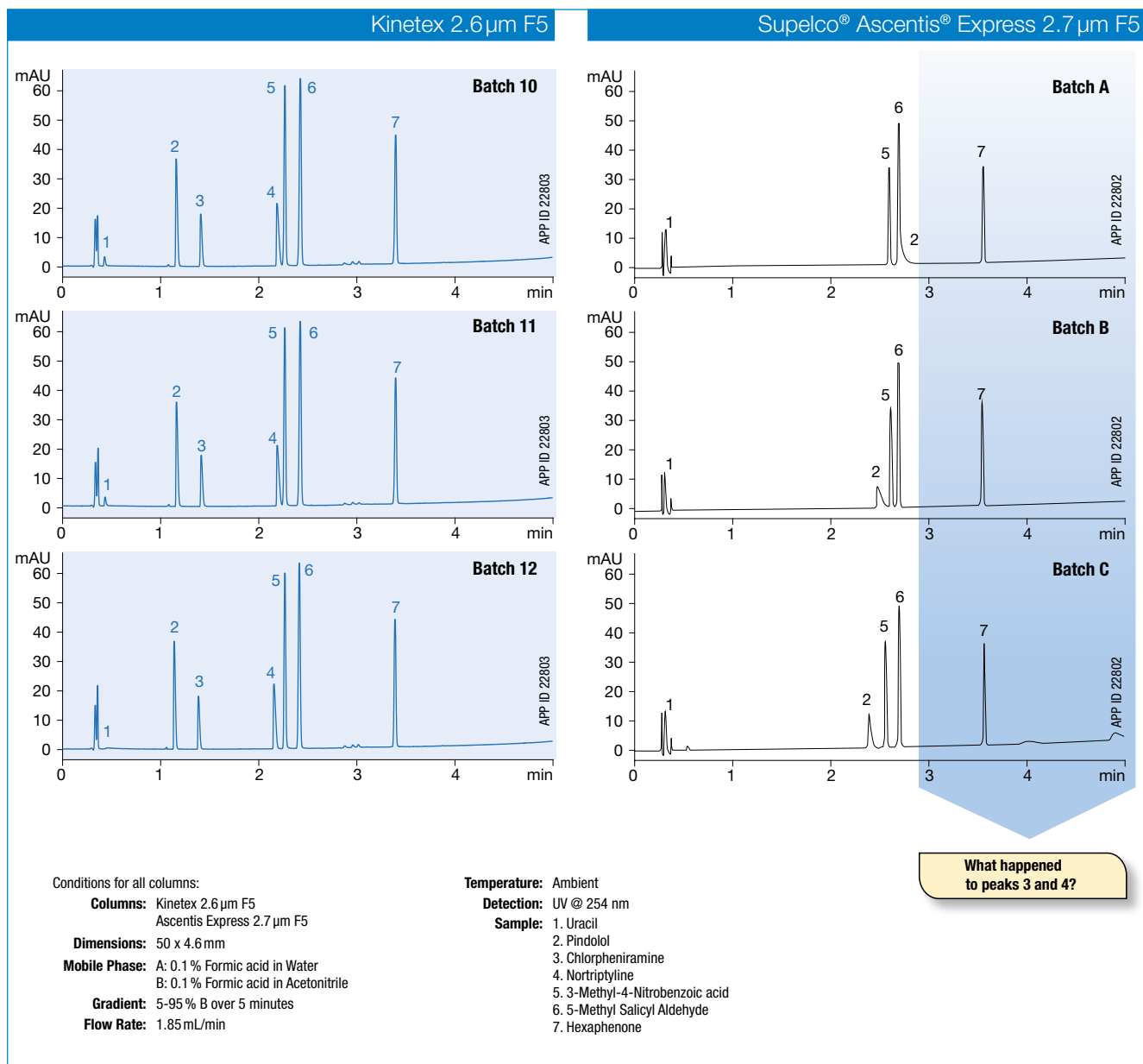
### 5 Interaction Mechanisms

- A Hydrophobic**  
Carbon skeleton of linker and ring encourage neutral/hydrophobic retention
- B Aromatic**  
In non-acetonitrile mobile phases,  $\pi$ - $\pi$  electrons of the carbon ring interact with analyte  $\pi$ - $\pi$  electrons and result in positive retention increase
- C Electrostatic**  
High electronegativity of the fluorine groups create dipole moments, aiding in polar compound retention. Induced dipole moments can also aid neutral compound retention.
- D Steric/Planar**  
Shape selectivity allows for isomeric separations that are otherwise impossible on traditional alkyl phases
- E Hydrogen Bonding**  
Extremely effective retention mechanism caused as polar functional groups of analyte interact with the electron greedy fluorine

## Dependability

### Batch-to-Batch, Column-to-Column

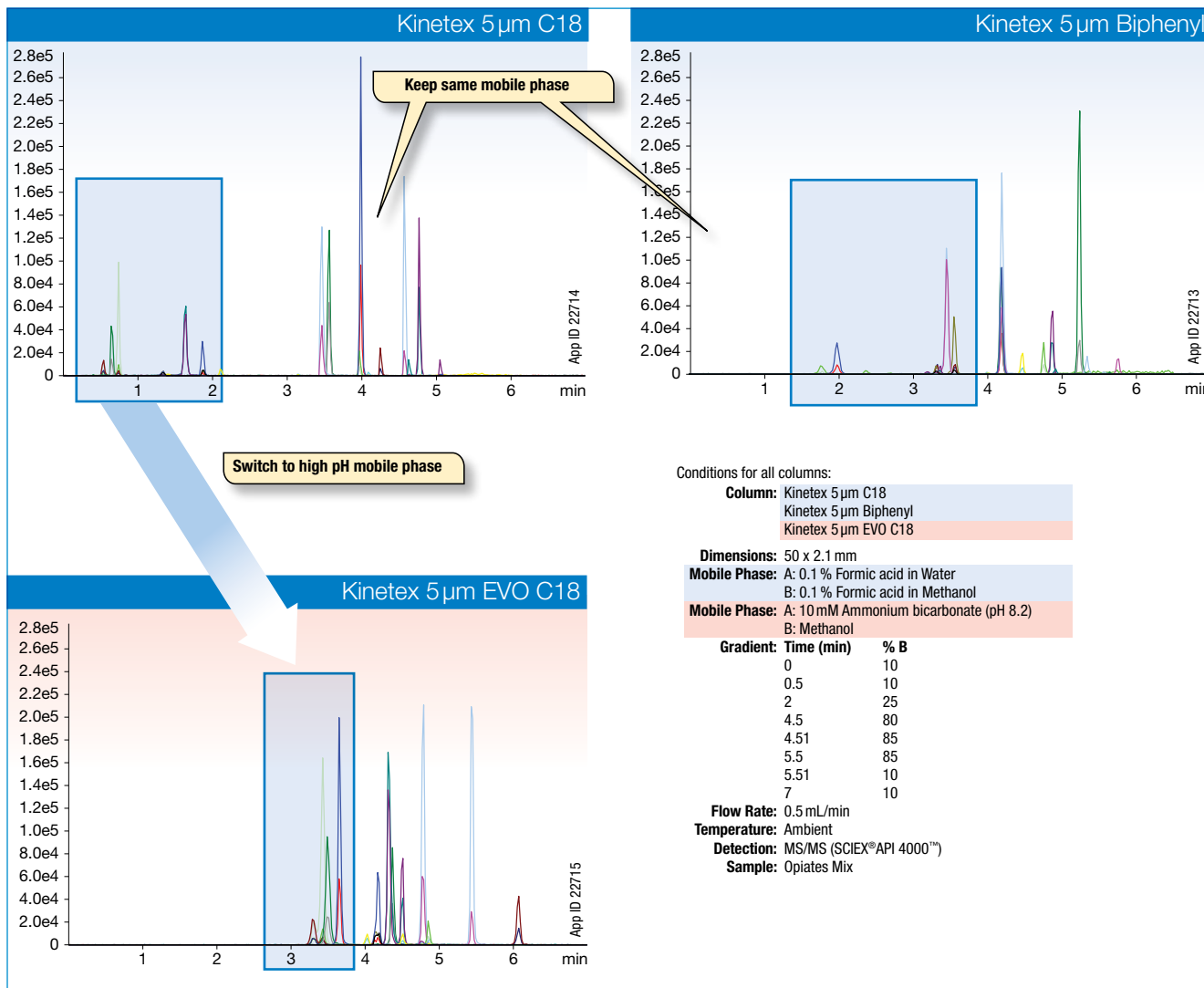
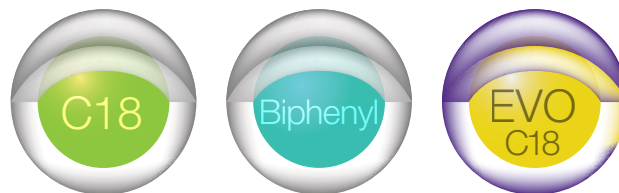
Conventional fully porous and core-shell PFP/F5 columns fail to reach the level of repeatability that you deserve. Inconsistencies in their base silica have led to data inaccuracies that waste your time and money. Kinetex F5 columns were specifically designed to avoid these past problems and provide a high degree of reproducibility.



Comparative separations may not be representative of all applications.

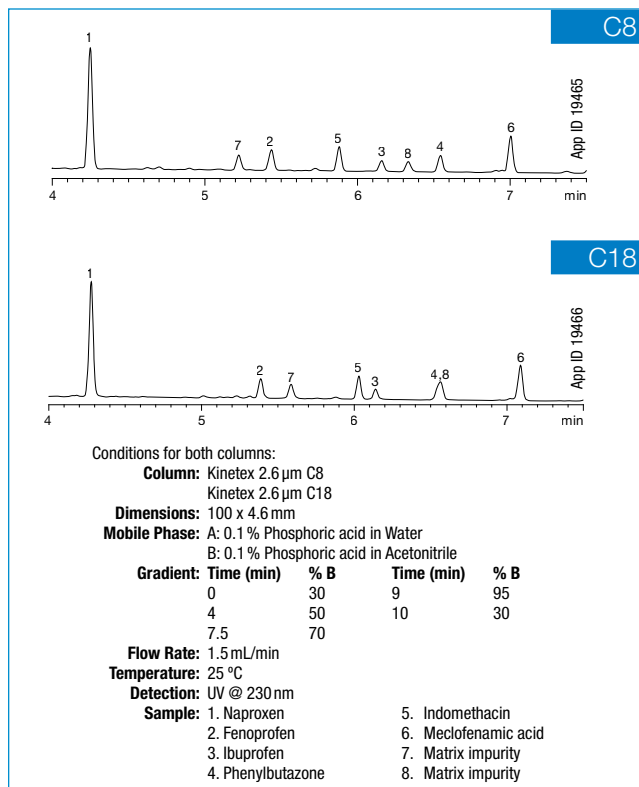
## Selectivities Built for Your Needs

The extensive range of Kinetex stationary phases allows you to get retention enhancement without performance loss. Use the multi-functional Kinetex Biphenyl or pH stable Kinetex EVO C18 to reach the desired solution for your method.

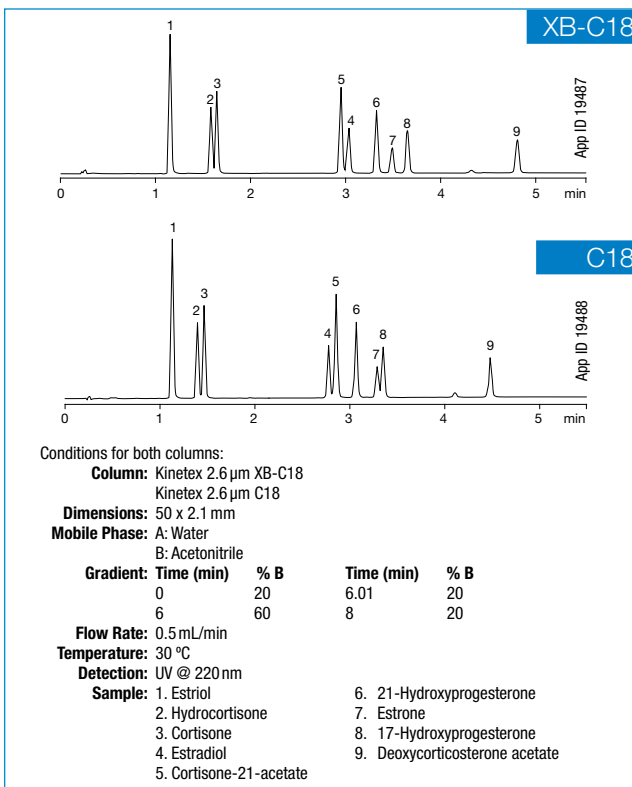




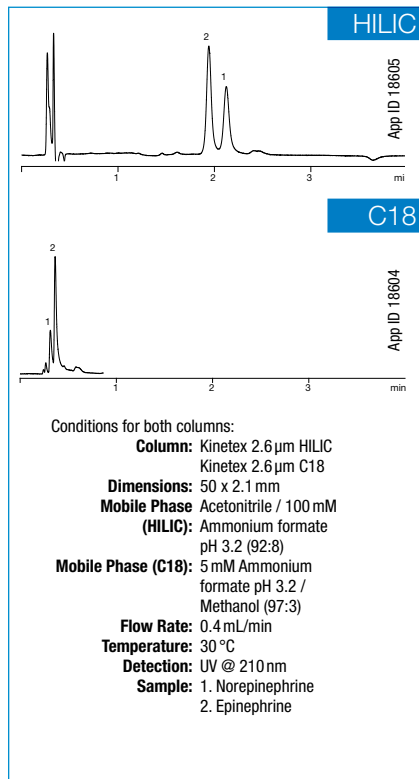
## Veterinary Drugs



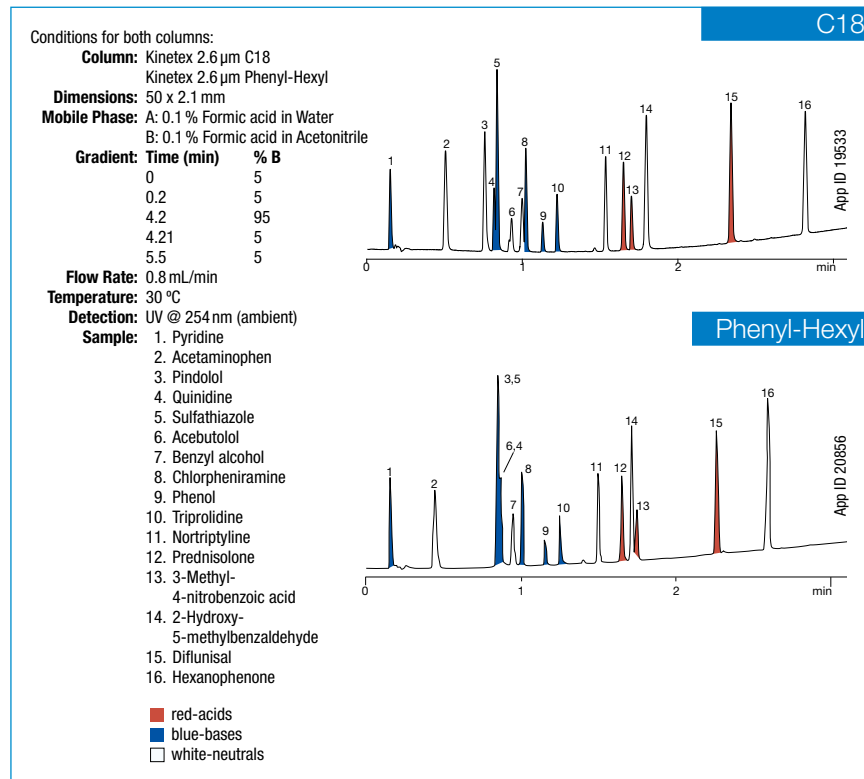
## Steroids



## Norepinephrine and Epinephrine



## Acids, Bases, and Neutrals Mix



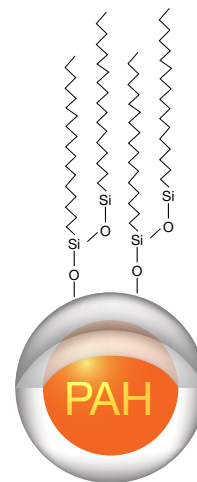
Comparative separations may not be representative of all applications.

## Kinetex PAH

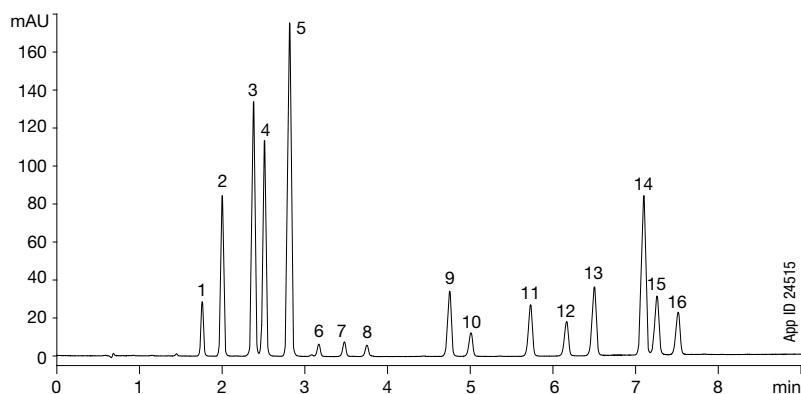
- Expanded resolution with chemical selectivity specifically for PAHs
- Increased throughput and sensitivity with core-shell technology for HPLC/UHPLC

### Designed and QC Tested for PAH Analysis by HPLC/UHPLC

Kinetex PAH columns were specifically built for the analysis of PAHs. Controlled pore size processing and a proprietary polymerically bonded stationary phase were developed for this product to ensure excellent resolution between priority polycyclic aromatic hydrocarbons (PAHs). Combined with core-shell particle technology, incredibly high efficiency and sensitivity at comfortable LC pressures is very achievable.



#### EPA 610 – PAH Analysis



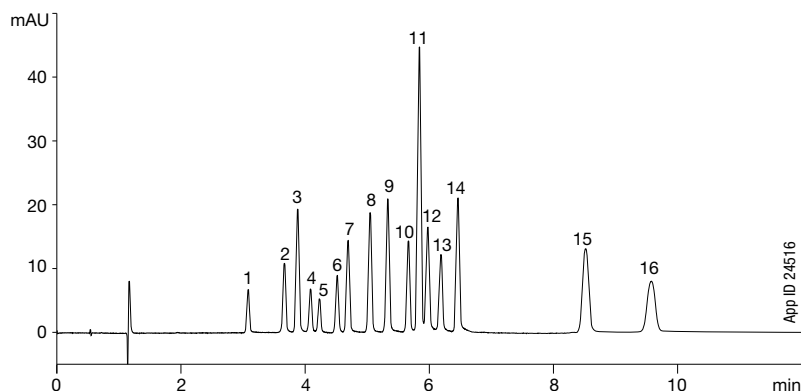
**Column:** Kinetex 3.5  $\mu$ m PAH  
**Dimensions:** 100 x 4.6 mm  
**Part No.:** [00D-4764-E0](#)  
**Mobile Phase:** A: Water  
 B: Acetonitrile  
**Gradient:**

Time (min)	% B
0	50
7	100
8	100
9	50
12	50

  
**Flow Rate:** 1.2 mL/min  
**Backpressure:** 136 Bar  
**Temperature:** 35 °C  
**Detection:** UV @ 292 nm  
**Sample:**

1. Naphthalene	9. Benzo[a]anthracene
2. Acenaphthylene	10. Chrysene
3. Acenaphthene	11. Benzo[b]fluoranthene
4. Fluorene	12. Benzo[k]fluoranthene
5. Phenanthrene	13. Benzo[a]pyrene
6. Anthracene	14. Dibenzo[a,h]anthracene
7. Fluoranthene	15. Benzo[g,h,i]perylene
8. Pyrene	16. Indeno[1,2,3-cd]pyrene

#### EU 15+1 PAH Analysis



**Column:** Kinetex 3.5  $\mu$ m PAH  
**Dimensions:** 100 x 4.6 mm  
**Part No.:** [00D-4764-E0](#)  
**Mobile Phase:** A: Water  
 B: Acetonitrile  
**Gradient:**

Time (min)	% B
0	50
6	100
11.5	100
12	50
14	50

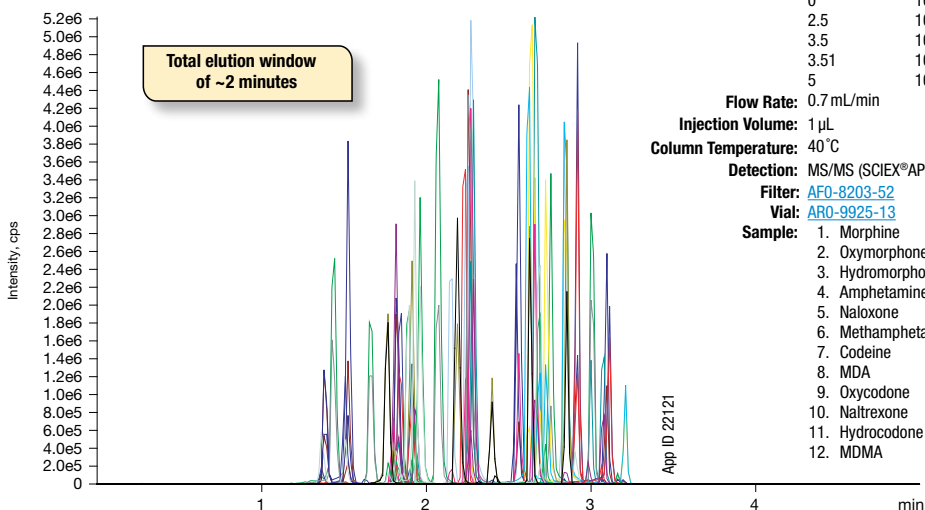
  
**Flow Rate:** 1.5 mL/min  
**Backpressure:** 136 Bar  
**Temperature:** 35 °C  
**Detection:** UV @ 292 nm  
**Sample:**

1. Benzo[c]fluorene	9. Benzo[a]pyrene
2. Cyclopenta[c,d]pyrene	10. Dibenzo[a,i]pyrene
3. Benzo[a,h]anthracene	11. Dibenzo[a,h]anthracene
4. Chrysene	12. Benzo[g,h,i]perylene
5. 5-Methylchrysene	13. Indeno[1,2,3-cd]pyrene
6. Benzo[j]fluoranthene	14. Dibenzo[a,e]pyrene
7. Benzo[b]fluoranthene	15. Dibenzo[a,i]pyrene
8. Benzo[k]fluoranthene	16. Dibenzo[a,h]pyrene

## Applications

### Clinical Research and Toxicology

#### Comprehensive Drug Research Panel



**Column:** Kinetex 2.6µm Biphenyl  
**Dimensions:** 50 x 3.0 mm  
**Part No.:** [00B-4622-Y0](#)  
**Guard Cartridge:** [AJO-9208](#)  
**Guard Holder:** [AJO-9000](#)  
**Mobile Phase:** A: 0.1% Formic acid in Water  
 B: 0.1% Formic acid in Methanol

Gradient	Time (min)	% B
	0	10
	2.5	100
	3.5	100
	3.51	10
	5	10

**Flow Rate:** 0.7 mL/min  
**Injection Volume:** 1 µL  
**Column Temperature:** 40°C  
**Detection:** MS/MS (SCIEX<sup>®</sup> API 5000™)  
**Filter:** [AFO-8203-52](#)  
**Vial:** [ARO-9925-13](#)  
**Sample:**

13. MDEA
14. Norfentanyl
15. Tramadol
16. Benzoylcegonine
17. Meperidine
18. Meprobamate
19. Norbuprenorphine
20. Fentanyl
21. Buprenorphine
22. Flurazepam
23. Carisoprodol
24. PCP
25. Propoxyphene
26. Sufentanil
27. 6-MAM
28. Midazolam
29. Normeperidine
30. EDDP
31. Methadone
32. Lorazepam
33. Clonazepam
34. Norpropoxyphene
35. Oxazepam
36. Hydroxalprazolam
37. Nordiazepam
38. Flunitrazepam
39. Temazepam
40. Alprazolam
41. Diazepam

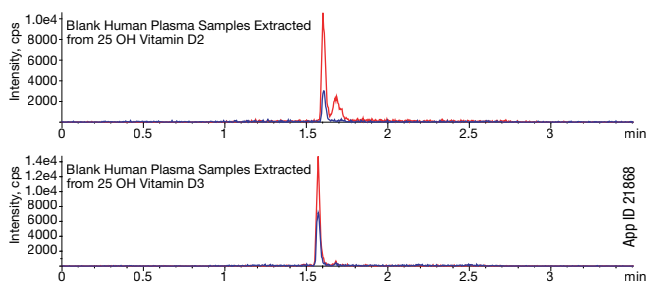
#### Vitamin D

**Column:** Kinetex 2.6µm C18  
**Dimensions:** 30 x 3.0 mm  
**Guard Cartridge:** [AJO-8775](#)  
**Guard Holder:** [AJO-9000](#)  
**Part No.:** [00A-4462-Y0](#)  
**Mobile Phase:** A: 0.1% Formic acid in Water  
 B: 0.1% Formic acid in Methanol

Gradient	Time (min)	% B
	0	60
	0.5	95
	2	95
	2.01	60
	3.5	60

**Flow Rate:** 0.6 mL/min  
**Temperature:** 22°C  
**Detection:** Tandem Mass Spectrometer (MS/MS) (22°C)  
**Detector:** SCIEX API 5000™ System  
**Filter:** [AFO-8203-52](#)  
**Vial:** [ARO-9925-13](#)  
**Sample:**

1. 25-Hydroxy Vitamin D2 (25-OH D2)
2. 25-Hydroxy Vitamin D3-2H3
3. 25-Hydroxy Vitamin D3-d6 (25-OH D3-d6)



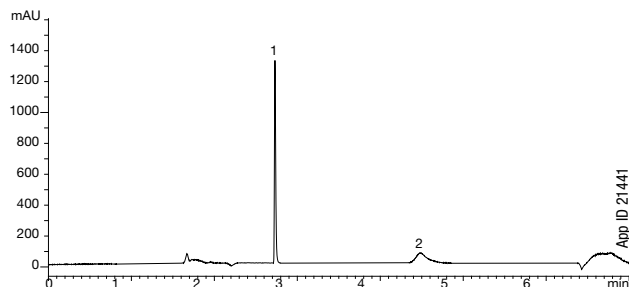
#### Human Plasma Vitamin C

**Column:** Kinetex 5µm XB-C18  
**Dimensions:** 150 x 4.6 mm  
**Guard Cartridge:** [AJO-8768](#)  
**Guard Holder:** [AJO-9000](#)  
**Part No.:** [00F-4605-E0](#)  
**Mobile Phase:** A: 0.1% Formic acid in Water  
 B: Acetonitrile

Gradient	Time (min)	% B
	0	0
	3.5	0
	3.6	100
	5	100
	5.1	0
	7	0

**Flow Rate:** 0.8 mL/min  
**Temperature:** 22°C  
**Detection:** UV @ 245 nm  
**Filter:** [AFO-8103-52](#)  
**Vial:** [ARO-9925-13](#)  
**Sample:**

1. Vitamin C (ascorbic acid)
2. Uric acid



## Applications

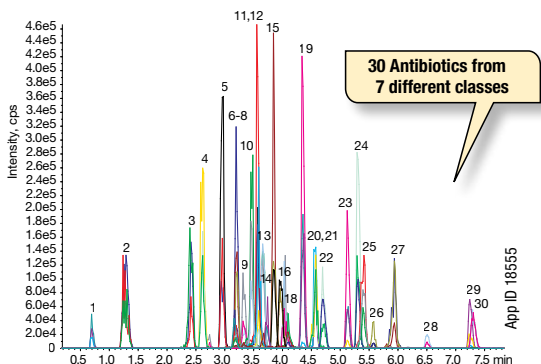
### Food Testing

#### Multi-Class Antibiotics Screening of Meat

**Column:** Kinetex 2.6 µm C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4462-AN](#)  
**Mobile Phase:** A: 0.1 % Formic acid in Water  
 B: 0.1 % Formic acid in Methanol

Gradient	Time (min)	% B	Time (min)	% B
	0	2	7.37	99
	0.3	2	8.27	99
	7.27	80	13	2

**Flow Rate:** 0.5 mL/min  
**Temperature:** 40 °C  
**Detection:** Mass Spectrometer (MS) (300 °C)  
**Detector:** SCIEX<sup>®</sup> API 4000™ System  
**Note:** Analytes spiked at 100 ng/mL  
**Sample:** See full list of analytes at [www.phenomenex.com](http://www.phenomenex.com)



### Azo Dyes

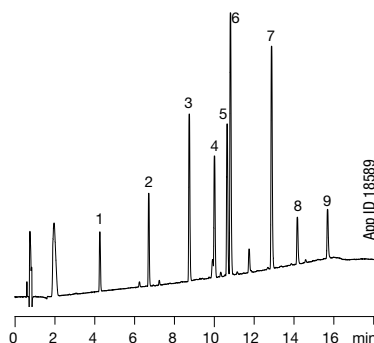
**Column:** Kinetex 2.6 µm C18  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4462-EQ](#)  
**Mobile Phase:** A: 0.1 % Phosphoric acid in Water  
 B: 0.1 % Phosphoric acid in Acetonitrile

Gradient	Time (min)	% B	Time (min)	% B
	0	25	17.01	25
	15	95	20	25
	17	95		

**Flow Rate:** 1.8 mL/min  
**Temperature:** 50 °C  
**Detection:** UV @ 215 nm  
**Backpressure:** 380 bar

**Sample:**

1. Orange II	6. Sudan I
2. Sudan Orange G	7. Sudan II
3. Fast Garnet GBC	8. Sudan III
4. Dimethyl yellow	9. Sudan IV
5. Sudan Red G	



### Multi-Toxin Screen

**Column:** Kinetex 2.6 µm XB-C18 100 Å  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4496-AN](#)  
**Mobile Phase:** A: Water with 5 mM Ammonium acetate and 0.5 % Acetic acid  
 B: Methanol with 5 mM Ammonium acetate and 0.5 % Acetic acid

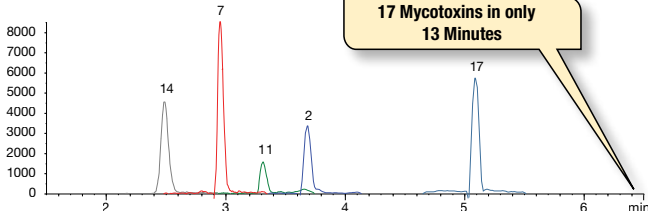
Gradient	Time (min)	% B	Time (min)	% B
	0	2	5.2	98
	2	2	8	98
	5	80		

**Flow Rate:** 0.45 mL/min  
**Temperature:** Ambient (22 °C)  
**Detection:** Tandem Mass Spectrometer (MS/MS) (550 °C)  
**Detector:** SCIEX API 5500™

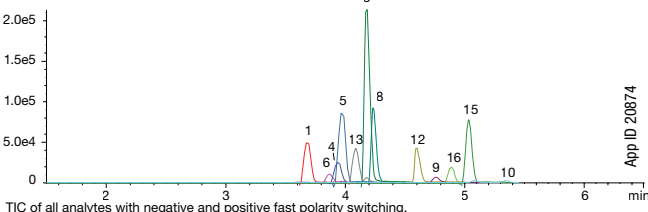
**Sample:**

1. 15-Acetyldeoxynivalenol	7. Deoxynivalenol	13. Monoacetoxyscirpenol
2. 3-Acetyldeoxynivalenol	8. Diacetoxyscirpenol	14. Nivalenol
3. Aflatoxin B1	9. Fumonisin B1	15. Ochratoxin
4. Aflatoxin B2	10. Fumonisin B2	16. T-2 toxin
5. Aflatoxin G1	11. Fusarenon X	17. Zearalenon
6. Aflatoxin G2	12. HT-2 toxin	

#### Negative Polarity



#### Positive Polarity



TIC of all analytes with negative and positive fast polarity switching.

### Pharmaceutical

#### Tricyclic Antidepressants

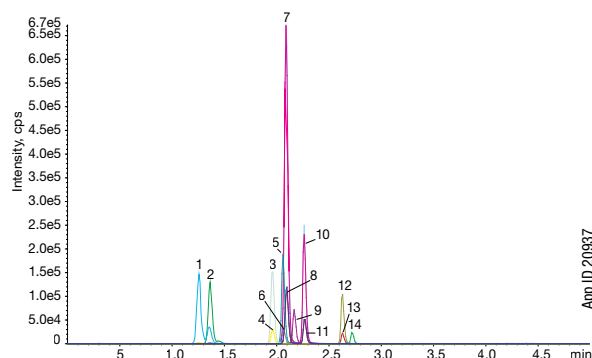
**Column:** Kinetex 2.6 µm C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4462-AN](#)  
**Mobile Phase:** A: 0.1 % Formic acid in Water  
 B: 0.1 % Formic acid in Methanol

Gradient	Time (min)	% B	Time (min)	% B
	0	40	4.01	40
	3.5	80	5	40
	4	80		

**Flow Rate:** 0.4 mL/min  
**Temperature:** 22 °C  
**Detection:** MS/MS  
**Detector:** SCIEX<sup>®</sup> API 4000™ System

**Sample:**

1. Doxepin	8. Nortriptyline
2. DM-Doxepin	9. Amitriptyline
3. Imipramine-D3 (IS)	10. Protriptyline-D3 (IS)
4. Imipramine	11. Protriptyline
5. Desipramine-D3 (IS)	12. Clomipramine-D3 (IS)
6. Desipramine	13. Clomipramine
7. Nortriptyline-D3 (IS)	14. DM-Clomipramine



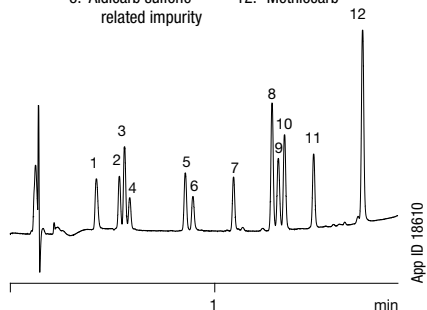
## Applications Environmental

### Carbamate Pesticides: EPA Method 531.1

**Column:** Kinetex 2.6 µm C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4462-AN](#)  
**Guard Cartridge:** [AJ0-8782](#)  
**Guard Holder:** [AJ0-9000](#)  
**Mobile Phase:** A: 0.1 % Phosphoric acid in Water  
 B: 0.1 % Phosphoric acid in Acetonitrile  
**Gradient:** (95:5) A/B to (5:95) A/B over 3 min  
**Flow Rate:** 1.0 mL/min  
**Temperature:** 40 °C  
**Detection:** UV @ 210 nm  
**Filter:** [AF0-8203-52](#)  
**Vial:** [ARO-9925-13](#)

**Sample :**

1. Aldicarb sulfoxide	7. Aldicarb
2. Oxamyl	8. Baygon <sup>®</sup> (Propoxur)
3. Aldicarb sulfone	9. Carbofuran
4. Methomyl	10. Carbaryl
5. 3-OH-Carbofuran	11. 1-Naphthol
6. Aldicarb sulfone-related impurity	12. Methiocarb

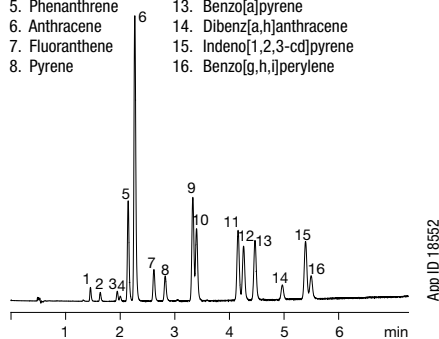


### Polyaromatic Hydrocarbons (PAHs): EPA Method 610

**Column:** Kinetex 2.6 µm C18  
**Dimensions:** 100 x 4.6 mm  
**Part No.:** [00D-4462-E0](#)  
**Guard Cartridge:** [AJ0-8768](#)  
**Guard Holder:** [AJ0-9000](#)  
**Mobile Phase:** A: Water  
 B: Acetonitrile  
**Gradient:** (30:70) A/B to (0:100) A/B over 10 min  
**Flow Rate:** 1.5 mL/min  
**Temperature:** 30 °C  
**Detection:** UV @ 254 nm  
**Filter:** [AF0-8203-52](#)  
**Vial:** [ARO-9925-13](#)

**Sample :**

1. Naphthalene	9. Chrysene
2. Acenaphthylene	10. Benz[a]anthracene
3. Fluorene	11. Benzo[b]fluoranthene
4. Acenaphthene	12. Benzo[k]fluoranthene
5. Phenanthrene	13. Benzo[a]pyrene
6. Anthracene	14. Dibenzo[a,h]anthracene
7. Fluoranthene	15. Indeno[1,2,3-cd]pyrene
8. Pyrene	16. Benzo[g,h,i]perylene



### Triazine Pesticides: EPA Method 536

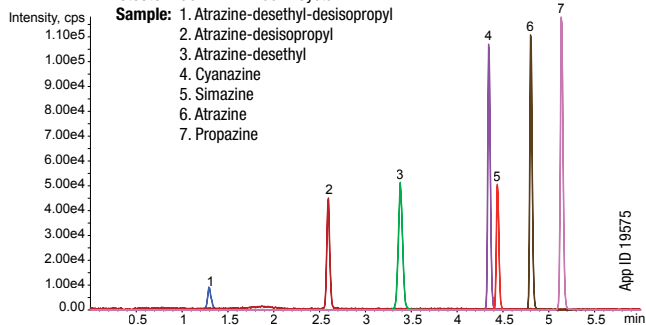
**Column:** Kinetex 2.6 µm XB-C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4496-AN](#)  
**Guard Cartridge:** [AJ0-8782](#)  
**Guard Holder:** [AJ0-9000](#)  
**Mobile Phase:** A: 5 mM Ammonium Acetate  
 B: Methanol  
**Gradient:**

Time (min)	% B
0	5
0.25	40
2	40
3	75
4	75
4.1	5

**Flow Rate:** 0.3 mL/min  
**Temperature:** 25 °C  
**Detection:** MS/MS  
**Filter:** [AF0-8203-52](#)  
**Vial:** [ARO-9925-13](#)  
**Detector:** SCIEX<sup>®</sup> API 4000<sup>®</sup> System

**Sample :**

1. Atrazine-desethyl-desisopropyl
2. Atrazine-desisopropyl
3. Atrazine-desethyl
4. Cyanazine
5. Simazine
6. Atrazine
7. Propazine



### Carbonyl Compounds in Drinking Water

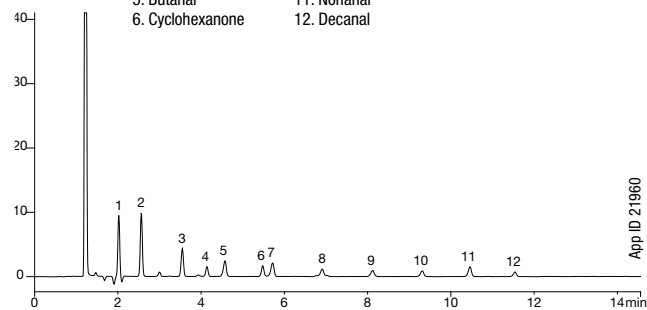
**Column:** Kinetex 5 µm C18  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4601-E0](#)  
**Guard Cartridge:** [AJ0-8768](#)  
**Guard Holder:** [AJ0-9000](#)  
**Mobile Phase:** A: Water  
 B: Acetonitrile  
**Gradient:**

Time (min)	% B
0	50
15	100
20	100

**Flow Rate:** 2 mL/min  
**Temperature:** 30 °C  
**Detection:** UV @ 360 nm (ambient)  
**Filter:** [AF0-8103-52](#)  
**Vial:** [ARO-9925-13](#)

**Sample :**

1. Formaldehyde	7. Pentanal
2. Acetaldehyde	8. Hexanal
3. Propanal	9. Heptanal
4. Crotonaldehyde	10. Octanal
5. Butanal	11. Nonanal
6. Cyclohexanone	12. Decanal





# Kinetex<sup>®</sup> Core-Shell LC Columns

## Material Characteristics

Packing Material	pH Stability	Particle Sizes (µm)	Pore Size (Å)	Effective Surface Area (m <sup>2</sup> /g)	Effective Carbon Load (%)	USP Classification	Pressure Stability (bar)
Polar C18	1.5-8.5*	2.6	100	200	9	L1	1000/600*
PS C18	1.5-8.5*	2.6	100	200	9	L1	1000/600*
EVO C18	1-12	5, 2.6, 1.7	100	200	11	L1	1000/600*
C18	1.5-8.5**	5, 2.6, 1.7, 1.3	100	200	12	L1	1000/600*
XB-C18	1.5-8.5**	5, 3.5, 2.6, 1.7	100	200	10	L1	1000/600*
C8	1.5-8.5**	5, 2.6, 1.7	100	200	8	L7	1000/600*
Biphenyl	1.5-8.5**	5, 2.6, 1.7	100	200	11	L11	1000/600*
Phenyl-Hexyl	1.5-8.5**	5, 2.6, 1.7	100	200	11	L11	1000/600*
F5	1.5-8.5**	5, 2.6, 1.7	100	200	9	L43	1000/600*
HILIC	2.0-7.5	5, 2.6, 1.7	100	200	0	L3	1000/600*
PAH	1.5-8.5*	3.5	100	200	12	L118	1000/600*

\*\*Columns are pH stable from 1.5-10 under isocratic conditions. Columns are pH stable 1.5-8.5 under gradient conditions.

\*2.1 mm ID Kinetex columns are pressure stable up to 1000 bar. 3.0 mm and 4.6 mm ID Kinetex 2.6 µm columns are stable up to 600 bar. When using Kinetex 1.3 µm or 1.7 µm, increased performance can be achieved, however high pressure-capable instrumentation is required.

### Ordering Information

5 µm Minibore Columns (mm)					SecurityGuard <sup>™</sup> ULTRA Cartridges <sup>‡</sup>
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	<a href="#">00A-4633-AN</a>	<a href="#">00B-4633-AN</a>	<a href="#">00D-4633-AN</a>	<a href="#">00F-4633-AN</a>	<a href="#">AJ0-9298</a>
F5	—	<a href="#">00B-4724-AN</a>	<a href="#">00D-4724-AN</a>	<a href="#">00F-4724-AN</a>	<a href="#">AJ0-9322</a>
Biphenyl	<a href="#">00A-4627-AN</a>	<a href="#">00B-4627-AN</a>	<a href="#">00D-4627-AN</a>	—	<a href="#">AJ0-9209</a>
XB-C18	<a href="#">00A-4605-AN</a>	<a href="#">00B-4605-AN</a>	<a href="#">00D-4605-AN</a>	—	<a href="#">AJ0-8782</a>
C18	<a href="#">00A-4601-AN</a>	<a href="#">00B-4601-AN</a>	<a href="#">00D-4601-AN</a>	<a href="#">00F-4601-AN</a>	<a href="#">AJ0-8782</a>
C8	—	<a href="#">00B-4608-AN</a>	<a href="#">00D-4608-AN</a>	—	<a href="#">AJ0-8784</a>
Phenyl-Hexyl	—	<a href="#">00B-4603-AN</a>	—	—	<a href="#">AJ0-8788</a>
HILIC	—	<a href="#">00B-4606-AN</a>	—	—	<a href="#">AJ0-8786</a>

for 2.1 mm ID

5 µm MidBore <sup>™</sup> Columns (mm)					SecurityGuard <sup>™</sup> ULTRA Cartridges <sup>‡</sup>
Phases	30 x 3.0	50 x 3.0	100 x 3.0	150 x 3.0	3/pk
EVO C18	<a href="#">00A-4633-Y0</a>	<a href="#">00B-4633-Y0</a>	<a href="#">00D-4633-Y0</a>	<a href="#">00F-4633-Y0</a>	<a href="#">AJ0-9297</a>
F5	—	—	<a href="#">00D-4724-Y0</a>	<a href="#">00F-4724-Y0</a>	<a href="#">AJ0-9321</a>
Biphenyl	—	<a href="#">00B-4627-Y0</a>	<a href="#">00D-4627-Y0</a>	<a href="#">00F-4627-Y0</a>	<a href="#">AJ0-9208</a>
XB-C18	—	<a href="#">00B-4605-Y0</a>	<a href="#">00D-4605-Y0</a>	<a href="#">00F-4605-Y0</a>	<a href="#">AJ0-8775</a>
C18	<a href="#">00A-4601-Y0</a>	<a href="#">00B-4601-Y0</a>	<a href="#">00D-4601-Y0</a>	<a href="#">00F-4601-Y0</a>	<a href="#">AJ0-8775</a>
C8	—	<a href="#">00B-4608-Y0</a>	<a href="#">00D-4608-Y0</a>	—	<a href="#">AJ0-8777</a>
Phenyl-Hexyl	—	<a href="#">00B-4603-Y0</a>	<a href="#">00D-4603-Y0</a>	—	<a href="#">AJ0-8781</a>

for 3.0 mm ID

5 µm Semi-Preparative Columns (mm)				SecurityGuard <sup>™</sup> SemiPrep Cartridges <sup>***</sup>
Phases	100 x 10	150 x 10	250 x 10	10 x 10 /3pk
EVO C18	—	<a href="#">00F-4633-N0</a>	<a href="#">00G-4633-N0</a>	<a href="#">AJ0-9306</a>
F5	—	—	<a href="#">00G-4724-N0</a>	<a href="#">AJ0-9323</a>
C18	<a href="#">00D-4601-N0</a>	<a href="#">00F-4601-N0</a>	<a href="#">00G-4601-N0</a>	<a href="#">AJ0-9278</a>
Biphenyl	—	<a href="#">00F-4627-N0</a>	<a href="#">00G-4627-N0</a>	<a href="#">AJ0-9280</a>
XB-C18	—	<a href="#">00F-4605-N0</a>	<a href="#">00G-4605-N0</a>	<a href="#">AJ0-9278</a>

for ID: 9-12 mm

5 µm Analytical Columns (mm)					SecurityGuard <sup>™</sup> ULTRA Cartridges <sup>‡</sup>
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
EVO C18	<a href="#">00B-4633-E0</a>	<a href="#">00D-4633-E0</a>	<a href="#">00F-4633-E0</a>	<a href="#">00G-4633-E0</a>	<a href="#">AJ0-9296</a>
F5	<a href="#">00B-4724-E0</a>	<a href="#">00D-4724-E0</a>	<a href="#">00F-4724-E0</a>	<a href="#">00G-4724-E0</a>	<a href="#">AJ0-9320</a>
Biphenyl	<a href="#">00B-4627-E0</a>	<a href="#">00D-4627-E0</a>	<a href="#">00F-4627-E0</a>	<a href="#">00G-4627-E0</a>	<a href="#">AJ0-9207</a>
XB-C18	<a href="#">00B-4605-E0</a>	<a href="#">00D-4605-E0</a>	<a href="#">00F-4605-E0</a>	<a href="#">00G-4605-E0</a>	<a href="#">AJ0-8768</a>
C18	<a href="#">00B-4601-E0</a>	<a href="#">00D-4601-E0</a>	<a href="#">00F-4601-E0</a>	<a href="#">00G-4601-E0</a>	<a href="#">AJ0-8768</a>
C8	<a href="#">00B-4608-E0</a>	<a href="#">00D-4608-E0</a>	<a href="#">00F-4608-E0</a>	<a href="#">00G-4608-E0</a>	<a href="#">AJ0-8770</a>
Phenyl-Hexyl	<a href="#">00B-4603-E0</a>	<a href="#">00D-4603-E0</a>	<a href="#">00F-4603-E0</a>	<a href="#">00G-4603-E0</a>	<a href="#">AJ0-8774</a>
HILIC	—	—	<a href="#">00F-4606-E0</a>	<a href="#">00G-4606-E0</a>	<a href="#">AJ0-8772</a>

for 4.6 mm ID

5 µm Axia <sup>™</sup> Packed Preparative Columns (mm)					SecurityGuard <sup>™</sup> PREP Cartridges*
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	15 x 21.2 /ea
EVO C18	<a href="#">00B-4633-P0-AX</a>	<a href="#">00D-4633-P0-AX</a>	<a href="#">00F-4633-P0-AX</a>	<a href="#">00G-4633-P0-AX</a>	<a href="#">AJ0-9304</a>
F5	—	—	<a href="#">00F-4724-P0-AX</a>	<a href="#">00G-4724-P0-AX</a>	<a href="#">AJ0-9324</a>
Biphenyl	<a href="#">00B-4627-P0-AX</a>	<a href="#">00D-4627-P0-AX</a>	<a href="#">00F-4627-P0-AX</a>	<a href="#">00G-4627-P0-AX</a>	<a href="#">AJ0-9272</a>
XB-C18	<a href="#">00B-4605-P0-AX</a>	<a href="#">00D-4605-P0-AX</a>	<a href="#">00F-4605-P0-AX</a>	<a href="#">00G-4605-P0-AX</a>	<a href="#">AJ0-9145</a>
C18	<a href="#">00B-4601-P0-AX</a>	<a href="#">00D-4601-P0-AX</a>	<a href="#">00F-4601-P0-AX</a>	<a href="#">00G-4601-P0-AX</a>	<a href="#">AJ0-9145</a>
C8	<a href="#">00B-4608-P0-AX</a>	<a href="#">00D-4608-P0-AX</a>	<a href="#">00F-4608-P0-AX</a>	<a href="#">00G-4608-P0-AX</a>	<a href="#">AJ0-9205</a>
Phenyl-Hexyl	<a href="#">00B-4603-P0-AX</a>	<a href="#">00D-4603-P0-AX</a>	<a href="#">00F-4603-P0-AX</a>	<a href="#">00G-4603-P0-AX</a>	<a href="#">AJ0-9147</a>
HILIC	—	<a href="#">00D-4606-P0-AX</a>	<a href="#">00F-4606-P0-AX</a>	<a href="#">00G-4606-P0-AX</a>	<a href="#">AJ0-9277</a>

for ID: 18-29 mm



<sup>‡</sup>SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

<sup>\*\*\*</sup>SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

\*PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)

# Kinetex<sup>®</sup> Core-Shell LC Columns

## Ordering Information (continued)

5 µm Axia Packed Preparative Columns (mm)					SecurityGuard <sup>™</sup> PREP Cartridges**
Phases	50 x 30	100 x 30	150 x 30	250 x 30	15 x 30 /ea
EVO C18	<a href="#">00B-4633-UO-AX</a>	<a href="#">00D-4633-UO-AX</a>	<a href="#">00F-4633-UO-AX</a>	<a href="#">00G-4633-UO-AX</a>	<a href="#">AJ0-9305</a>
F5	<a href="#">00B-4724-UO-AX</a>	<a href="#">00D-4724-UO-AX</a>	<a href="#">00F-4724-UO-AX</a>	—	<a href="#">AJ0-9325</a>
Biphenyl	—	—	<a href="#">00F-4627-UO-AX</a>	<a href="#">00G-4627-UO-AX</a>	<a href="#">AJ0-9273</a>
XB-C18	<a href="#">00B-4605-UO-AX</a>	<a href="#">00D-4605-UO-AX</a>	<a href="#">00F-4605-UO-AX</a>	<a href="#">00G-4605-UO-AX</a>	<a href="#">AJ0-9204</a>
C18	<a href="#">00B-4601-UO-AX</a>	<a href="#">00D-4601-UO-AX</a>	<a href="#">00F-4601-UO-AX</a>	<a href="#">00G-4601-UO-AX</a>	<a href="#">AJ0-9204</a>
C8	<a href="#">00B-4608-UO-AX</a>	<a href="#">00D-4608-UO-AX</a>	<a href="#">00F-4608-UO-AX</a>	<a href="#">00G-4608-UO-AX</a>	<a href="#">AJ0-9217</a>
Phenyl-Hexyl	<a href="#">00B-4603-UO-AX</a>	<a href="#">00D-4603-UO-AX</a>	<a href="#">00F-4603-UO-AX</a>	<a href="#">00G-4603-UO-AX</a>	<a href="#">AJ0-9216</a>
HILIC	—	—	<a href="#">00F-4606-UO-AX</a>	—	—

for ID: 30–49 mm

3.5 µm Minibore and MidBore <sup>™</sup> Columns (mm)					SecurityGuard <sup>™</sup> ULTRA Cartridges <sup>†</sup>	
Phases	50 x 2.1	100 x 2.1	150 x 2.1	100 x 3.0	3/pk	3/pk
PAH	<a href="#">00B-4764-AN</a>	<a href="#">00D-4764-AN</a>	<a href="#">00F-4764-AN</a>	<a href="#">00D-4764-YO</a>	<a href="#">AJ0-9535</a>	<a href="#">AJ0-9534</a>

for 2.1 mm ID for 3.0 mm ID

3.5 µm Analytical Columns (mm)				SecurityGuard <sup>™</sup> ULTRA Cartridges <sup>†</sup>	2.6 µm Microbore Columns (mm)			
Phases	100 x 4.6	150 x 4.6	250 x 4.6	3/pk	Phases	50 x 1.0	100 x 1.0	150 x 1.0
XB-C18	<a href="#">00D-4744-E0</a>	<a href="#">00F-4744-E0</a>	—	<a href="#">AJ0-8768</a>	XB-C18	<a href="#">00B-4496-A0</a>	<a href="#">00D-4496-A0</a>	<a href="#">00F-4496-A0</a>
PAH	<a href="#">00D-4764-E0</a>	<a href="#">00F-4764-E0</a>	<a href="#">00G-4764-E0</a>	<a href="#">AJ0-9533</a>	C18	<a href="#">00B-4462-A0</a>	—	—

for 4.6 mm ID

2.6 µm Micro LC Columns (mm)						
Phases	30 x 0.3	50 x 0.3	100 x 0.3	150 x 0.3	50 x 0.5	150 x 0.5
XB-C18	<a href="#">00A-4496-AC</a>	<a href="#">00B-4496-AC</a>	<a href="#">00D-4496-AC</a>	<a href="#">00F-4496-AC</a>	<a href="#">00B-4496-AF</a>	<a href="#">00F-4496-AF</a>
Biphenyl	—	<a href="#">00B-4622-AC</a>	—	<a href="#">00F-4622-AC</a>	<a href="#">00B-4622-AF</a>	—
C18	<a href="#">00A-4462-AC</a>	<a href="#">00B-4462-AC</a>	—	<a href="#">00F-4462-AC</a>	<a href="#">00B-4462-AF</a>	—
EVO C18	—	<a href="#">00B-4725-AC</a>	—	<a href="#">00F-4725-AC</a>	<a href="#">00B-4725-AF</a>	—
F5	—	<a href="#">00B-4723-AC</a>	<a href="#">00D-4723-AC</a>	<a href="#">00F-4723-AC</a>	<a href="#">00B-4723-AF</a>	—



For information on Micro LC Columns, Traps, and Fittings, see pp. 359–361

2.6 µm MercuryMS <sup>™</sup> LC-MS Cartridges (mm)		
Phases	20 x 2.0	20 x 4.0
Biphenyl	<a href="#">00M-4622-B0-CE</a>	<a href="#">00M-4622-D0-CE</a>

MercuryMS Cartridge Holders		
Part No.	Description	Unit
<a href="#">CH0-7188</a>	Direct-Connect Cartridge Holder, 20 mm	ea
<a href="#">CH0-5845</a>	Standard Cartridge Holder, 20 mm	ea

2.6 µm Minibore Columns (mm)						SecurityGuard <sup>™</sup> ULTRA Cartridges <sup>†</sup>
Phases	30 x 2.1	50 x 2.1	75 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	<a href="#">00A-4725-AN</a>	<a href="#">00B-4725-AN</a>	—	<a href="#">00D-4725-AN</a>	<a href="#">00F-4725-AN</a>	<a href="#">AJ0-9298</a>
PS C18	<a href="#">00A-4780-AN</a>	<a href="#">00B-4780-AN</a>	—	<a href="#">00D-4780-AN</a>	<a href="#">00F-4780-AN</a>	<a href="#">AJ0-8951</a>
Polar C18	<a href="#">00A-4759-AN</a>	<a href="#">00B-4759-AN</a>	—	<a href="#">00D-4759-AN</a>	<a href="#">00F-4759-AN</a>	<a href="#">AJ0-9532</a>
Biphenyl	<a href="#">00A-4622-AN</a>	<a href="#">00B-4622-AN</a>	—	<a href="#">00D-4622-AN</a>	<a href="#">00F-4622-AN</a>	<a href="#">AJ0-9209</a>
XB-C18	<a href="#">00A-4496-AN</a>	<a href="#">00B-4496-AN</a>	<a href="#">00C-4496-AN</a>	<a href="#">00D-4496-AN</a>	<a href="#">00F-4496-AN</a>	<a href="#">AJ0-8782</a>
C18	<a href="#">00A-4462-AN</a>	<a href="#">00B-4462-AN</a>	<a href="#">00C-4462-AN</a>	<a href="#">00D-4462-AN</a>	<a href="#">00F-4462-AN</a>	<a href="#">AJ0-8782</a>
C8	<a href="#">00A-4497-AN</a>	<a href="#">00B-4497-AN</a>	<a href="#">00C-4497-AN</a>	<a href="#">00D-4497-AN</a>	<a href="#">00F-4497-AN</a>	<a href="#">AJ0-8784</a>
HILIC	<a href="#">00A-4461-AN</a>	<a href="#">00B-4461-AN</a>	<a href="#">00C-4461-AN</a>	<a href="#">00D-4461-AN</a>	<a href="#">00F-4461-AN</a>	<a href="#">AJ0-8786</a>
Phenyl-Hexyl	<a href="#">00A-4495-AN</a>	<a href="#">00B-4495-AN</a>	<a href="#">00C-4495-AN</a>	<a href="#">00D-4495-AN</a>	<a href="#">00F-4495-AN</a>	<a href="#">AJ0-8788</a>
F5	<a href="#">00A-4723-AN</a>	<a href="#">00B-4723-AN</a>	—	<a href="#">00D-4723-AN</a>	<a href="#">00F-4723-AN</a>	<a href="#">AJ0-9322</a>

for 2.1 mm ID

2.6 µm MidBore <sup>™</sup> Columns (mm)						SecurityGuard <sup>™</sup> ULTRA Cartridges <sup>†</sup>
Phases	30 x 3.0	50 x 3.0	75 x 3.0	100 x 3.0	150 x 3.0	3/pk
EVO C18	<a href="#">00A-4725-Y0</a>	<a href="#">00B-4725-Y0</a>	—	<a href="#">00D-4725-Y0</a>	<a href="#">00F-4725-Y0</a>	<a href="#">AJ0-9297</a>
PS C18	<a href="#">00A-4780-Y0</a>	<a href="#">00B-4780-Y0</a>	—	<a href="#">00D-4780-Y0</a>	<a href="#">00F-4780-Y0</a>	<a href="#">AJ0-8950</a>
Polar C18	—	<a href="#">00B-4759-Y0</a>	—	<a href="#">00D-4759-Y0</a>	<a href="#">00F-4759-Y0</a>	<a href="#">AJ0-9531</a>
Biphenyl	—	<a href="#">00B-4622-Y0</a>	—	<a href="#">00D-4622-Y0</a>	<a href="#">00F-4622-Y0</a>	<a href="#">AJ0-9208</a>
XB-C18	<a href="#">00A-4496-Y0</a>	<a href="#">00B-4496-Y0</a>	<a href="#">00C-4496-Y0</a>	<a href="#">00D-4496-Y0</a>	<a href="#">00F-4496-Y0</a>	<a href="#">AJ0-8775</a>
C18	<a href="#">00A-4462-Y0</a>	<a href="#">00B-4462-Y0</a>	<a href="#">00C-4462-Y0</a>	<a href="#">00D-4462-Y0</a>	<a href="#">00F-4462-Y0</a>	<a href="#">AJ0-8775</a>
C8	<a href="#">00A-4497-Y0</a>	<a href="#">00B-4497-Y0</a>	<a href="#">00C-4497-Y0</a>	<a href="#">00D-4497-Y0</a>	<a href="#">00F-4497-Y0</a>	<a href="#">AJ0-8777</a>
HILIC	<a href="#">00A-4461-Y0</a>	—	—	<a href="#">00D-4461-Y0</a>	<a href="#">00F-4461-Y0</a>	<a href="#">AJ0-8779</a>
Phenyl-Hexyl	—	<a href="#">00B-4495-Y0</a>	—	<a href="#">00D-4495-Y0</a>	<a href="#">00F-4495-Y0</a>	<a href="#">AJ0-8781</a>
F5	—	<a href="#">00B-4723-Y0</a>	—	<a href="#">00D-4723-Y0</a>	<a href="#">00F-4723-Y0</a>	<a href="#">AJ0-9321</a>

for 3.0 mm ID

<sup>†</sup>SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

<sup>\*\*</sup>PREP SecurityGuard Cartridges require holder, Part No. [AJ0-8277](#)

# Kinetex<sup>®</sup> Core-Shell LC Columns

## Ordering Information (continued)

2.6 µm Analytical Columns (mm)							SecurityGuard <sup>™</sup> ULTRA Cartridges <sup>‡</sup>
Phases	30 x 4.6	50 x 4.6	75 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
EVO C18	<a href="#">00A-4725-E0</a>	<a href="#">00B-4725-E0</a>	—	<a href="#">00D-4725-E0</a>	<a href="#">00F-4725-E0</a>	<a href="#">00G-4725-E0</a>	<a href="#">AJ0-9296</a>
PS C18	<a href="#">00A-4780-E0</a>	<a href="#">00B-4780-E0</a>	—	<a href="#">00D-4780-E0</a>	<a href="#">00F-4780-E0</a>	<a href="#">00G-4780-E0</a>	<a href="#">AJ0-8949</a>
Polar C18	<a href="#">00A-4759-E0</a>	<a href="#">00B-4759-E0</a>	—	<a href="#">00D-4759-E0</a>	<a href="#">00F-4759-E0</a>	—	<a href="#">AJ0-9530</a>
Biphenyl	—	<a href="#">00B-4622-E0</a>	—	<a href="#">00D-4622-E0</a>	<a href="#">00F-4622-E0</a>	—	<a href="#">AJ0-9207</a>
XB-C18	—	<a href="#">00B-4496-E0</a>	<a href="#">00C-4496-E0</a>	<a href="#">00D-4496-E0</a>	<a href="#">00F-4496-E0</a>	—	<a href="#">AJ0-8768</a>
C18	<a href="#">00A-4462-E0</a>	<a href="#">00B-4462-E0</a>	<a href="#">00C-4462-E0</a>	<a href="#">00D-4462-E0</a>	<a href="#">00F-4462-E0</a>	—	<a href="#">AJ0-8768</a>
C8	—	<a href="#">00B-4497-E0</a>	<a href="#">00C-4497-E0</a>	<a href="#">00D-4497-E0</a>	<a href="#">00F-4497-E0</a>	—	<a href="#">AJ0-8770</a>
HILIC	—	<a href="#">00B-4461-E0</a>	<a href="#">00C-4461-E0</a>	<a href="#">00D-4461-E0</a>	<a href="#">00F-4461-E0</a>	—	<a href="#">AJ0-8772</a>
Phenyl-Hexyl	—	<a href="#">00B-4495-E0</a>	<a href="#">00C-4495-E0</a>	<a href="#">00D-4495-E0</a>	<a href="#">00F-4495-E0</a>	—	<a href="#">AJ0-8774</a>
F5	<a href="#">00A-4723-E0</a>	<a href="#">00B-4723-E0</a>	—	<a href="#">00D-4723-E0</a>	<a href="#">00F-4723-E0</a>	—	<a href="#">AJ0-9320</a>

for 4.6 mm ID

1.7 µm Microbore Columns (mm)			
Phases	50 x 1.0	100 x 1.0	150 x 1.0
EVO C18	<a href="#">00B-4726-A0</a>	<a href="#">00D-4726-A0</a>	<a href="#">00F-4726-A0</a>
Biphenyl	<a href="#">00B-4628-A0</a>	<a href="#">00D-4628-A0</a>	—

1.7 µm Minibore Columns (mm)					SecurityGuard ULTRA Cartridges <sup>‡</sup>
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	—	<a href="#">00B-4726-AN</a>	<a href="#">00D-4726-AN</a>	<a href="#">00F-4726-AN</a>	<a href="#">AJ0-9298</a>
Biphenyl	<a href="#">00A-4628-AN</a>	<a href="#">00B-4628-AN</a>	<a href="#">00D-4628-AN</a>	<a href="#">00F-4628-AN</a>	<a href="#">AJ0-9209</a>
XB-C18	<a href="#">00A-4498-AN</a>	<a href="#">00B-4498-AN</a>	<a href="#">00D-4498-AN</a>	<a href="#">00F-4498-AN</a>	<a href="#">AJ0-8782</a>
C18	<a href="#">00A-4475-AN</a>	<a href="#">00B-4475-AN</a>	<a href="#">00D-4475-AN</a>	<a href="#">00F-4475-AN</a>	<a href="#">AJ0-8782</a>
C8	<a href="#">00A-4499-AN</a>	<a href="#">00B-4499-AN</a>	<a href="#">00D-4499-AN</a>	<a href="#">00F-4499-AN</a>	<a href="#">AJ0-8784</a>
HILIC	<a href="#">00A-4474-AN</a>	<a href="#">00B-4474-AN</a>	<a href="#">00D-4474-AN</a>	—	<a href="#">AJ0-8786</a>
Phenyl-Hexyl	—	<a href="#">00B-4500-AN</a>	<a href="#">00D-4500-AN</a>	<a href="#">00F-4500-AN</a>	<a href="#">AJ0-8788</a>
F5	—	<a href="#">00B-4722-AN</a>	<a href="#">00D-4722-AN</a>	<a href="#">00F-4722-AN</a>	<a href="#">AJ0-9322</a>

for 2.1 mm ID



For Column Heater, see p. 416



1.7 µm MidBore <sup>™</sup> Columns (mm)				SecurityGuard ULTRA Cartridges <sup>‡</sup>
Phases	30 x 3.0	50 x 3.0	100 x 3.0	3/pk
XB-C18	<a href="#">00A-4498-Y0</a>	<a href="#">00B-4498-Y0</a>	<a href="#">00D-4498-Y0</a>	<a href="#">AJ0-8775</a>
C18	—	<a href="#">00B-4475-Y0</a>	<a href="#">00D-4475-Y0</a>	<a href="#">AJ0-8775</a>
C8	<a href="#">00A-4499-Y0</a>	<a href="#">00B-4499-Y0</a>	<a href="#">00D-4499-Y0</a>	<a href="#">AJ0-8777</a>
HILIC	—	<a href="#">00B-4474-Y0</a>	—	<a href="#">AJ0-8779</a>
Phenyl	—	—	<a href="#">00D-4500-Y0</a>	<a href="#">AJ0-8781</a>

for 3.0 mm ID

<sup>‡</sup>SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

1.3 µm Minibore Columns (mm)		
Phases	30 x 2.1	50 x 2.1
C18	<a href="#">00A-4515-AN</a>	<a href="#">00B-4515-AN</a>

KINETEX | HPLC / UHPLC

## Core-Shell Performance Enhancement Kit

### Ordering Information

Part No.	Unit
<a href="#">AQ0-8892</a>	ea

## SecurityGuard<sup>™</sup> ULTRA Cartridge System

The SecurityGuard ULTRA cartridge system protects ultra-high performance columns, like Kinetex, from damaging contaminants and microparticulates.

- Extend Kinetex column lifetime
- Simple to use
- Pressure rated to 20000 psi (1378 bar)
- Fits virtually all manufacturers' columns 2.1 to 4.6 mm ID

High Pressure  
Rated Format

## SecurityGuard ULTRA Cartridge Holder

### Ordering Information

Part No.	Description	Unit
<a href="#">AJ0-9000</a>	SecurityGuard ULTRA Cartridge Holder	ea



For Core-Shell Performance Enhancement Kit description, see p. 421

For more information on the SecurityGuard ULTRA Cartridge System, see p. 335

For UHPLC system connections, see SecurityLINK<sup>™</sup> UHPLC fingertight fitting system on pp. 336-337

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP<sup>™</sup> products on pp. 417-418

## UHPLC / HPLC Sure-Lok<sup>™</sup> High Pressure PEEK Male Nut Fittings

### Ordering Information

Part No.	Description	Unit
<a href="#">AQ0-8503</a>	Sure-Lok High Pressure PEEK 1-Pc Nut 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)	10/pk
<a href="#">AQ0-8530</a>	Sure-Lok Fitting Tightening Tool, Aluminum	ea

See p. 420 for more information.



For Ultra-High Performance Stainless Steel Nut and Ferrule Set, see p. 420

# LiChrosorb®

- Quality-packed columns by Phenomenex

LiChrosorb® is a well-established, rugged, irregular silica material, with high surface area (60 Å, 500 m<sup>2</sup>/g).

### Ordering Information

SecurityGuard™ Analytical Cartridges require universal holder Part No.: [KJO-4282](#)

5 µm Columns (mm)				SecurityGuard Cartridges (mm)	
Phases	125 x 4.0	250 x 4.0	150 x 4.6	250 x 4.6	4 x 3.0
					/10pk
RP-8	<a href="#">00E-0233-D0</a>	<a href="#">00G-0233-D0</a>	<a href="#">00F-0233-E0</a>	<a href="#">00G-0233-E0</a>	<a href="#">AJ0-4290</a>

for ID: 3.2-8.0 mm

# LiChrospher®

- Quality-packed by Phenomenex

LiChrospher® (the 4 µm material is also known as Superspher® in Europe) is a spherical alternative to the well-established LiChrosorb irregular material. It offers higher efficiencies than the LiChrosorb material.

### Ordering Information

SecurityGuard™ Analytical Cartridges require universal holder Part No.: [KJO-4282](#)

4 µm (Superspher) Columns (mm)			SecurityGuard Cartridges (mm)	
Phases	125 x 4.0	250 x 4.0	4 x 2.0	4 x 3.0
			/10pk	/10pk
RP-8	<a href="#">00E-3042-D0</a>	<a href="#">00G-3042-D0</a>	<a href="#">AJ0-4289</a>	<a href="#">AJ0-4290</a>
RP-18	<a href="#">00E-3043-D0</a>	<a href="#">00G-3043-D0</a>	<a href="#">AJ0-4286</a>	<a href="#">AJ0-4287</a>

for ID: 2.0-3.0 mm      3.2-8.0 mm

5 µm Columns (mm)					SecurityGuard Cartridges (mm)	
Phases	125 x 4.0	250 x 4.0	150 x 4.6	250 x 4.6	4 x 2.0	4 x 3.0
					/10pk	/10pk
RP-8	<a href="#">00E-3049-D0</a>	<a href="#">00G-3049-D0</a>	<a href="#">00F-3049-E0</a>	<a href="#">00G-3049-E0</a>	<a href="#">AJ0-4289</a>	<a href="#">AJ0-4290</a>
RP-18	<a href="#">00E-3050-D0</a>	<a href="#">00G-3050-D0</a>	<a href="#">00F-3050-E0</a>	<a href="#">00G-3050-E0</a>	<a href="#">AJ0-4286</a>	<a href="#">AJ0-4287</a>
RP-8 endcapped	<a href="#">00E-3051-D0</a>	<a href="#">00G-3051-D0</a>	—	<a href="#">00G-3051-E0</a>	<a href="#">AJ0-4289</a>	<a href="#">AJ0-4290</a>
RP-18 endcapped	<a href="#">00E-3052-D0</a>	<a href="#">00G-3052-D0</a>	<a href="#">00F-3052-E0</a>	<a href="#">00G-3052-E0</a>	<a href="#">AJ0-4286</a>	<a href="#">AJ0-4287</a>
CN	<a href="#">00E-3053-D0</a>	<a href="#">00G-3053-D0</a>	—	<a href="#">00G-3053-E0</a>	<a href="#">AJ0-4304</a>	<a href="#">AJ0-4305</a>
RP-Select B	<a href="#">00E-3156-D0</a>	<a href="#">00G-3156-D0</a>	—	<a href="#">00G-3156-E0</a>	—	—

for ID: 2.0-3.0 mm      3.2-8.0 mm



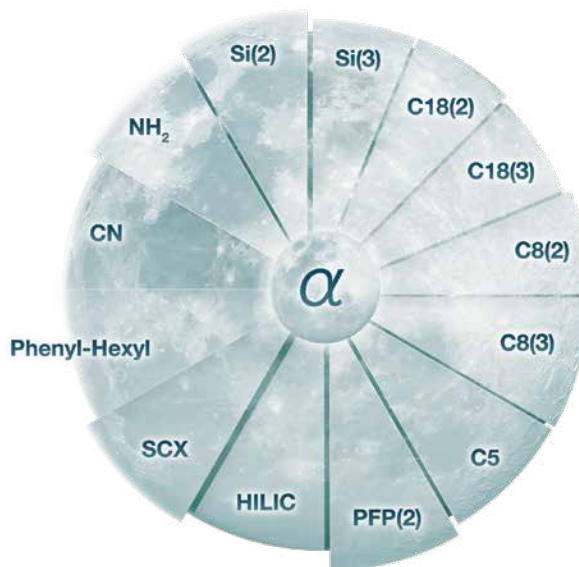
Other column dimensions available upon request.

## Explore Successful Separations

Your success begins with our commitment to provide the essential solutions to HPLC separations in the Luna brand. Some of the highest quality and performance standards are incorporated into Luna products, making them an indispensable platform for all areas of HPLC.

## Explore Resolution with Luna Selectivities

Phase selectivity has the strongest impact on overall chromatographic resolution. Choosing the optimal selectivity can drive your separation to success. Luna phases span through 10 different chemistries, each offering its own unique selectivity.



Luna Bonded Phase Selectivity Chart

Luna Phases	Description	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	pH Stability	Reversed Phase	Normal Phase	HILIC	IEX	USP Column Classification
<b>Silica(2)</b>	Unbonded silica	3, 5, 10, 10-PREP, 15	100	400	—	2.0 - 7.5		☾	☾		L3
<b>Silica(3)</b>	Unbonded silica	10-PREP	100	400	—	2.0 - 7.5		☾	☾		L3
<b>C5</b>	5 Carbon ligand	5, 10	100	440	12.5	1.5 - 9.0*	☾				—
<b>C8(2)</b>	C8 ligand optimized for improved peak shape	3, 5, 10, 10-PREP, 15	100	400	13.5	1.5 - 9.0*	☾				L7
<b>C8(3)</b>	C8 ligand optimized for improved peak shape	10-PREP	100	400	13	1.5 - 9.0*	☾				L7
<b>C18(2)</b>	C18 ligand optimized for improved peak shape	2.5, 3, 5, 10, 10-PREP, 15	100	400	17.5	1.5 - 9.0*	☾				L1
<b>C18(3)</b>	C18 ligand optimized for improved peak shape	10-PREP	100	400	17	1.5 - 9.0*	☾				L1
<b>CN</b>	Versatile CN phase	3, 5, 10	100	400	7.0	1.5 - 7.0	☾	☾			L10
<b>NH<sub>2</sub></b>	Rugged and reproducible NH <sub>2</sub>	3, 5, 10	100	400	9.5	1.5 - 11	☾	☾	☾	☾	L8
<b>Phenyl-Hexyl</b>	Phenyl phase attached to C6 (hexyl) ligand	3, 5, 10, 10-PREP, 15	100	400	17.5	1.5 - 9.0*	☾				L11
<b>SCX</b>	Benzene sulfonic acid	5, 10	100	400	Binding Capacity: 0.15 meq/g	2.0 - 7.0				☾	L9
<b>HILIC</b>	Reproducible, cross-linked diol	3, 5	200	200	5.7	1.5 - 8.0			☾		L20
<b>PFP(2)</b>	Pentafluorophenyl with a C3 (propyl) linkage	3, 5	100	400	11.5	1.5 - 8.0	☾		☾		L43

\* pH range is 1.5 - 9 under gradient conditions. pH range is 1.5 - 10 under isocratic conditions.



### UHPLC

Try out Luna Omega 1.6 µm fully porous UHPLC columns to boost your UHPLC instrumentation performance (see page 290)



Try Gemini for 1.0 - 12.0 pH stability. (see page 234).



Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 417-418



## Luna Silica

### A Backbone and Phase Designed for Long Column Lifetimes

Luna columns' excellent performance is not simply the result of ultra-pure metal-free silica (99.99% purity). Meticulous care is given to the quality control of surface smoothness, pore structure and pore consistency to ensure particles of uniform structure and enhanced mechanical strength. Either bonded or unbonded, Luna silica produces highly advanced HPLC columns:

- Low percentage of "fines" from damaged silica leading to lower backpressures and enhanced column performance and lifetimes
- High column bed stability enhanced by particle shape uniformity

### Incredible Silica Smoothness

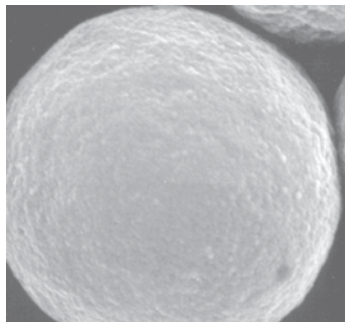
Luna silica is extremely smooth and spherical. For bonded phases, this provides a uniform bonding surface for consistent and even bonded phase coverage. The likelihood of silica particle shearing and breakage during bonding and packing is very low; thus, Luna columns have high efficiencies and long column lifetimes.

- Recommended for preparative and bulk packing into DAC systems, see page 395 for more information

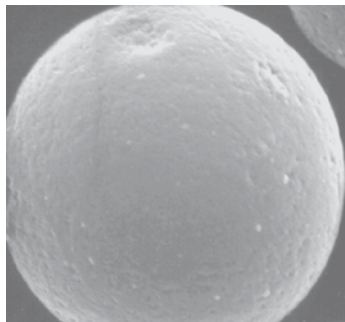
### Long Column Lifetimes and Excellent Performance

Ultra-pure, metal-free silica (99.99% purity) is the backbone of all Luna material. The resulting high quality particles have a surface smoothness, pore structure, and pore consistency to ensure a more uniform particle shape and greater reproducibility.

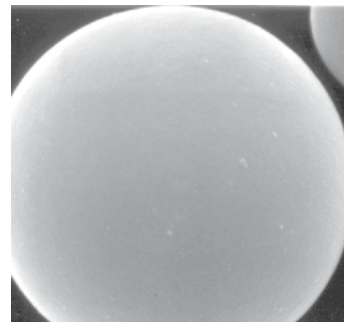
#### Superior Particle Smoothness



Agilent Technologies<sup>®</sup>  
ZORBAX<sup>®</sup> 5 µm SB-C18



Waters<sup>®</sup>  
Symmetry<sup>®</sup> 5 µm C18



Phenomenex  
Luna 5 µm C18

#### Luna Silica(2)

USP: L3

**pH Stability:** 2.0 – 7.5

Particle Size: 3 µm, 5 µm, 10 µm, 10 µm-PREP, and 15 µm

Phase: Unbonded silica

Application: Polar compounds

#### Luna Silica(3)

USP: L3

**pH Stability:** 2.0 – 7.5

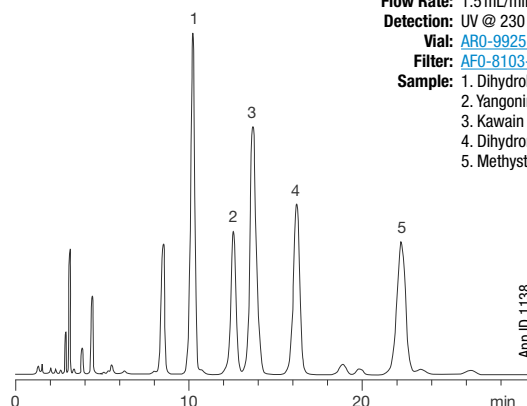
Particle Size: 10 µm-PREP

Phase: Unbonded silica

Application: Small Organic Molecules, Steroids, Nutraceuticals, Fat Soluble Vitamins, Tocopherols

#### Natural Products (Kava Kava)

**Column:** Luna 5 µm Silica(2)  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4274-E0](#)  
**Guard Cartridge:** [AJ0-4348](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** Hexane/Dioxane (85:15)  
**Flow Rate:** 1.5 mL/min  
**Detection:** UV @ 230 nm  
**Vial:** [AR0-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Sample:** 1. Dihydrokavain  
2. Yangonin  
3. Kavain  
4. Dihydromethysticin  
5. Methysticin



App ID 1138



## Luna C18(2), C18(3), C8(2), C8(3), C5

### Your Starting Point for Reversed Phase Methods

The Luna column has found a place as one of the world's top reversed phase columns because it provides a measurable improvement over many HPLC columns for two important chromatographic properties: resolution and peak shape. The high efficiencies and bonded phase surface coverage provide for sharp peaks. The result:

- Free exposed silanols virtually eliminated by complete bonding and endcapping
- Sharp peak shape for good method sensitivity
- pH stable from 1.5 to 10.0 for over 10000 hours

#### Luna C18(2)

USP: L1

LC-MS Certified

**pH Stability:** 1.5-9.0\*

Particle Size: 2.5 µm, 3 µm, 5 µm, 10 µm, 10 µm-*PREP*, and 15 µm

Phase: C18, endcapped

Application: Small molecules

Strength: Wide pH stability provides longer column lifetime and greater method flexibility

#### Luna C18(3)

USP: L1

LC-MS Certified

**pH Stability:** 1.5-9.0\*

Particle Size: 10 µm-*PREP*

Phase: C18, endcapped

Application: Pharmaceuticals, Peptides, Nutraceuticals, Agrochemical, Vitamins, Basic Compounds, General Reversed Phase Applications

Strength: Media made for process and purification methods

#### Luna C8(2)

USP: L7

LC-MS Certified

**pH Stability:** 1.5-9.0\*

Particle Size: 3 µm, 5 µm, 10 µm, 10 µm-*PREP*, and 15 µm

Phase: C8, endcapped

Application: Small molecules when less retention and greater speed is desired

Strength: Lower silanol activity than C18(2) phase plus wide pH stability for longer column life and greater method flexibility

#### Luna C8(3)

USP: L7

LC-MS Certified

**pH Stability:** 1.5-9.0\*

Particle Size: 10 µm-*PREP*

Phase: C8, endcapped

Application: Pharmaceuticals, Peptides, Estrogens, Basic Compounds, General Reversed Phase Applications

Strength: Media made for process and purification methods

#### Luna C5

LC-MS Certified

**pH Stability:** 1.5-9.0\*

Particle Size: 5 µm, 10 µm

Phase: C5, endcapped

Application: Small molecules when less retention and greater speed is desired

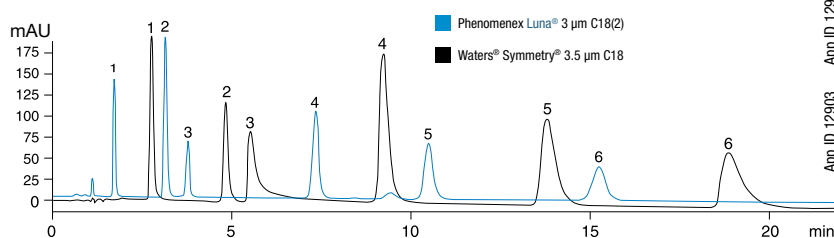
Strength: Greater hydrolytic and pH stability compared to most C4 phases

\* pH range is 1.5-10 under isocratic conditions. pH range is 1.5-9 under gradient conditions.



## Applications

### Polar, Acidic Drugs



App ID 12904  
App ID 12903

Conditions same for both columns:

**Dimensions:** 75 x 4.6 mm

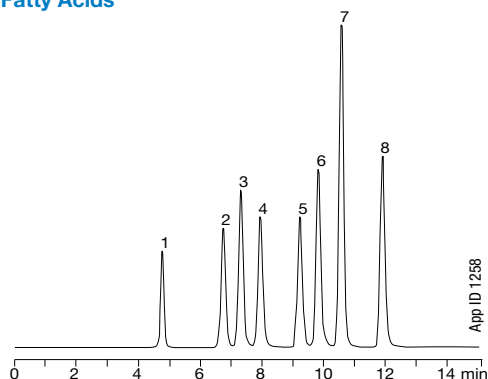
**Mobile Phase:** 20 mM KH<sub>2</sub>PO<sub>4</sub>/Acetonitrile(70:30)

**Flow Rate:** 0.75 mL/min

**Detection:** UV @ 202 nm

**Sample:** 1. Tolmetin  
2. Naproxen  
3. Diflunisal  
4. Fenoprofen  
5. Indomethacin  
6. Ibuprofen

### Fatty Acids



App ID 1258

**Columns:** Luna 5 µm C8(2)  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4249-E0](#)  
**Mobile Phase:** A: Acetonitrile  
B: Water (18 Mohms DI)  
**Gradient:** A/B (70:30) to A/B (90:10) in 10 min,  
A/B (90:10) to A/B (70:30) in 2 min,  
hold for 4 min  
**Flow Rate:** 0.3 mL/min  
**Detection:** Evaporative Light Scattering (ELSD)  
**Temperature:** 22 °C

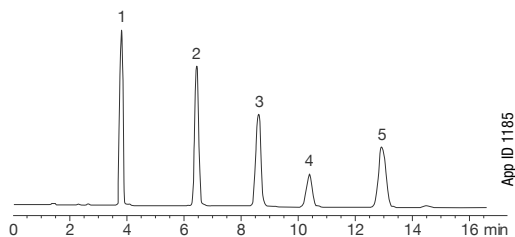
**Sample:** 1. Lauric acid  
2. Myristic acid  
3. Palmitoleic acid  
4. Linoleic acid  
5. Palmitic acid  
6. Oleic acid  
7. Heptadecanoic acid  
8. Stearic acid

The comparative data presented here may not be representative for all applications.

## Luna C18(2), C18(3), C8(2), C8(3), C5 (cont'd)

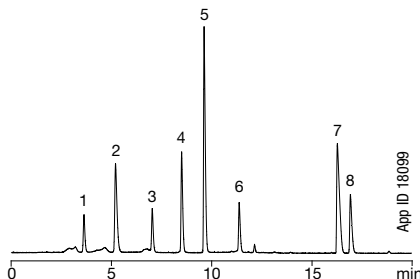
### Steroids

**Column:** Luna 5  $\mu$ m C18(2)  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4252-E0](#)  
**Mobile Phase:** 0.1% H<sub>3</sub>PO<sub>4</sub> / Acetonitrile/Methanol (54:35:11)  
**Flow Rate:** 0.75 mL/min  
**Detection:** UV @ 254 nm  
**Sample:** 1. Hydrocortisone 3. 11- $\alpha$ -Hydroxyprogesterone  
 2. Corticosterone 4. Cortisone Acetate  
 5. 11-Ketoprogesterone



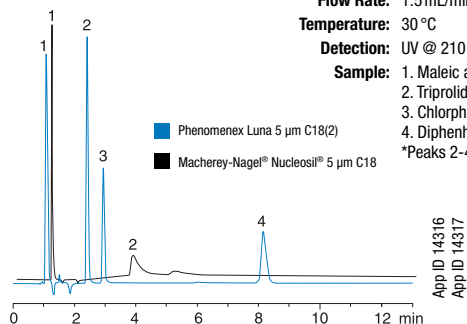
### Narcotics

**Columns:** Luna 5  $\mu$ m C18(2) **Flow Rate:** 1.0 mL/min  
**Dimensions:** 150 x 4.6 mm **Temperature:** 45 °C  
**Part No.:** [00F-4252-E0](#) **Detection:** UV @ 254 nm (ambient)  
**Mobile Phase:** A: 10 mM NH<sub>4</sub>OAc, pH 5.5 **Sample:** 1. Normorphine 5. Codeine  
 B: Acetonitrile 2. Morphine 6. Hydrocodone  
**Gradient:** A/B (95:5) for 3 minutes, then A/B (95:5) to A/B (60:40) in 23 minutes 3. Hydromorphone 7. Cocaine  
 4. Norcodeine 8. Norcocaine



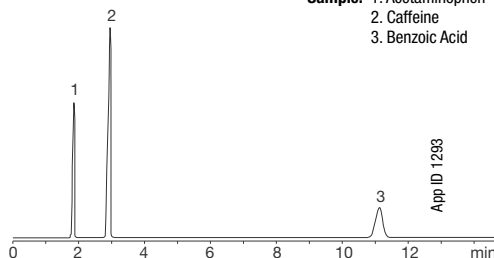
### Basic Compounds

Conditions same for both columns:  
**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** 20 mM Potassium phosphate, pH 2.5 / Acetonitrile (75:25)  
**Flow Rate:** 1.5 mL/min  
**Temperature:** 30 °C  
**Detection:** UV @ 210 nm  
**Sample:** 1. Maleic acid  
 2. Triprolidine\*  
 3. Chlorpheniramine\*  
 4. Diphenhydramine\*  
 \*Peaks 2-4 adsorb on Nucleosil C18



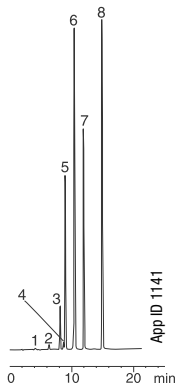
### Acetaminophen, USP Method

**Column:** Luna 5  $\mu$ m C18(2)  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4252-E0](#)  
**Mobile Phase:** Water/Methanol/Acetic Acid (69:28:3)  
**Flow Rate:** 1.5 mL/min  
**Detection:** UV @ 275 nm  
**Sample:** 1. Acetaminophen  
 2. Caffeine  
 3. Benzoic Acid



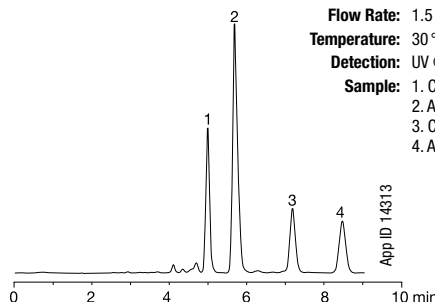
### Pharmaceutical Preservatives

**Column:** Luna 5  $\mu$ m C5  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4043-E0](#)  
**Mobile Phase:** A: 0.5% Acetic acid in water/acetonitrile (80:20)  
 B: 0.5% Acetic acid in water/acetonitrile (20:80)  
**Gradient:** A/B (100:0) to A/B (0:100) in 30 min  
**Flow Rate:** 1 mL/min  
**Temperature:** 25 °C  
**Detection:** UV @ 254 nm  
**Sample:** 1. Propylparaben impurity  
 2. Benzyl alcohol  
 3. Phenol  
 4. Benzoic acid  
 5. Methylparaben  
 6. Benzaldehyde  
 7. Ethylparaben  
 8. Propylparaben



### $\alpha$ - and $\beta$ -acids in Hop Extract

**Column:** Luna 5  $\mu$ m C18(2)  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** [00G-4252-E0](#)  
**Mobile Phase:** Methanol with 0.1% H<sub>3</sub>PO<sub>4</sub> / Water with 0.1% H<sub>3</sub>PO<sub>4</sub> (90:10)  
**Flow Rate:** 1.5 mL/min  
**Temperature:** 30 °C  
**Detection:** UV @ 314 nm  
**Sample:** 1. Cohumulone  
 2. Ad-+humulone  
 3. Colupulone  
 4. Ad-+lupulone



## Luna Phenyl-Hexyl Engineered for Stability

Luna Phenyl-Hexyl columns provide separations not achievable on C18 or C8 columns; such as increased retention for polar, aromatic compounds as well as reversals in analyte elution order. Luna Phenyl-Hexyl columns are a reproducible, extremely stable phenyl phase. Most phenyl phases use a short propyl (3 carbon) linker, which limits phase stability. The Phenyl-Hexyl bonded phase employs a phenyl ring with a hexyl (6 carbon) linker and is densely bonded to Luna silica surface, reducing bonded phase hydrolysis and increasing chemical stability. The result:

- **Highly reproducible and stable phenyl phase**
- **Dual selectivity of both phenyl phase and a short alkyl phase (C5 or C8)**
- **Excellent retention of aromatic and polar, amine compounds**
- **Recommended for US EPA Method 8330B for explosives analysis**
- **1.5 to 10 pH stability for over 10000 hours**

### Luna Phenyl-Hexyl

USP: L11

LC-MS Certified

**pH Stability: 1.5-9.0\***

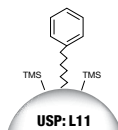
Particle Size: 3 µm, 5 µm, 10 µm, 10 µm-PREP, and 15 µm

Phase: Phenyl with Hexyl (C6) linker, endcapped

Application: Non-polar compounds

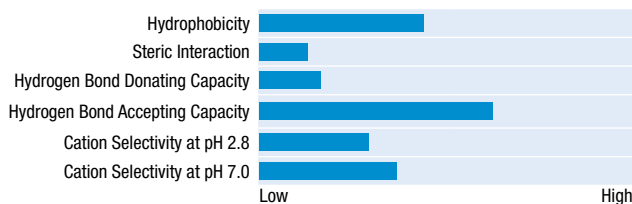
Strength: Aromatic selectivity enhanced by higher hydrophobicity due to hexyl linker

\* pH range is 1.5 - 10 under isocratic conditions.  
pH range is 1.5 - 9 under gradient conditions.



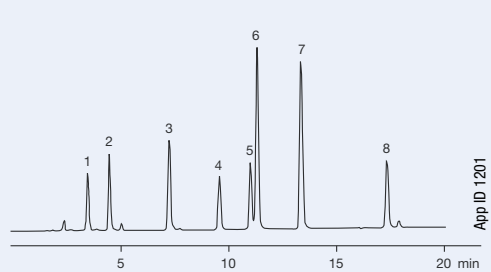
### Luna Phenyl-Hexyl

Our most hydrophobic phenyl column and it will also provide good hydrogen accepting functionality for acidic retention.

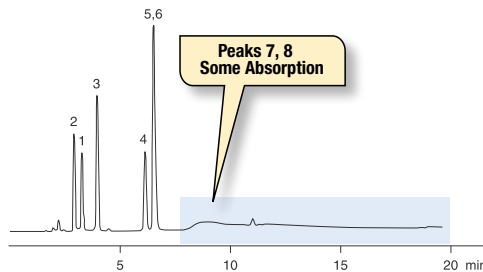


### Chromatographic Comparisons of Phenyl Columns\*\*

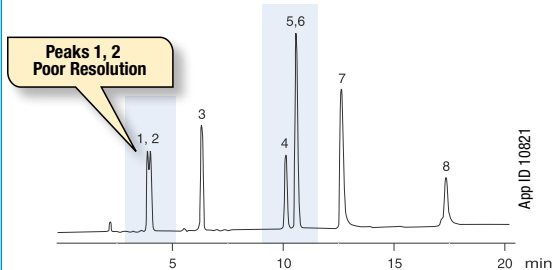
#### Luna 5 µm Phenyl-Hexyl



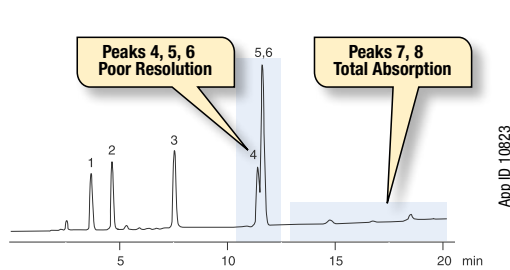
#### Waters® Spherisorb® 5 µm Phenyl



#### Agilent Technologies® ZORBAX® 5 µm SB-Phenyl



#### Agilent Technologies ZORBAX 5 µm Phenyl



### Antibacterials

Conditions for all columns:

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** A: 20 mM KH<sub>2</sub>PO<sub>4</sub>, pH 2.5

B: Acetonitrile

**Gradient:** A/B (80:20) to A/B (75:25) in 5 min to A/B (55:45) in 15 min

**Flow Rate:** 1.0 mL/min

**Detection:** UV @ 254 nm

**Sample:**

1. Carbadox	4. Oxolinic Acid	7. Nalidixic Acid
2. Thiamphenicol	5. Sulfadimethoxine	8. Piromidic Acid
3. Furazolidone	6. Sulfaquinoxaline	

\*\*The comparative data presented here may not be representative for all applications.

## Luna CN (cyano)

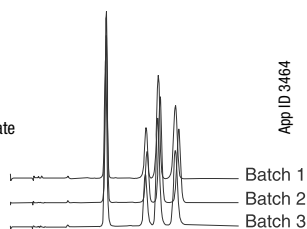
### Proven Reproducibility

For carboxyl, carbonyl, and amine containing compounds, Luna CN columns offer a unique polar selectivity in reversed phase and normal phase modes. Luna CN columns provide sharp peaks and great reproducibility run-to-run, column-to-column and batch-to-batch. State of the art modification of the silica surface ensures improved resistance to bonded phase hydrolysis providing one of the most stable CN phases on the market. The result:

- Excellent polar selectivity
- Improved peak shapes
- One of the most stable CN columns under reversed phase or normal phase conditions
- pH stable from 1.5 to 7.0

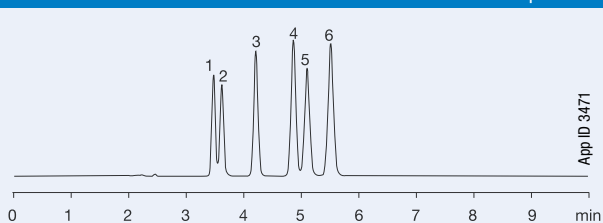
### Batch-to-Batch Reproducibility

**Column:** Luna 5 µm CN  
**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** A: Hexane, B: Methylene chloride/Methanol(80:20), A/B (80:20)  
**Flow Rate:** 2.0 mL/min  
**Detection:** UV @ 254 nm  
**Injection:** 1.0 µL  
**Temperature:** Ambient  
**Sample:** 1. Hydrocortisone  
 2. Prednisone  
 3. Cortisone  
 4. Hydrocortisone Acetate



### Chromatographic Comparisons of CN Columns\*\*

#### Luna 5 µm CN



#### Phthalate Esters

Normal Phase Conditions for all columns:  
**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** A: Hexane, B: Methylene chloride/Methanol (80:20), A/B (99:1)  
**Flow Rate:** 1.0 mL/min  
**Detection:** UV @ 254 nm  
**Temperature:** Ambient  
**Sample:** 1. Di-n-octyl phthalate  
 2. Bis (2-Ethylhexyl) phthalate  
 3. Butylbenzyl phthalate  
 4. Di-n-butyl phthalate  
 5. Diethyl phthalate  
 6. Dimethyl phthalate

## Luna CN

USP: L10

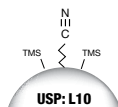
**pH Stability:** 1.5-7.0

**Particle Size:** 3 µm, 5 µm, and 10 µm

**Phase:** Cyano, endcapped

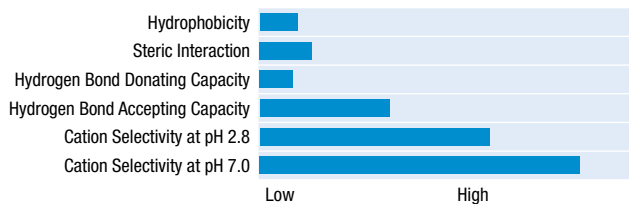
**Application:** Compounds with COOH, CO, NH<sub>2</sub>, NHR<sub>2</sub>, or NR<sub>2</sub>

**Strength:** Improved reproducibility for more consistent results run-to-run, column-to-column, batch-to-batch



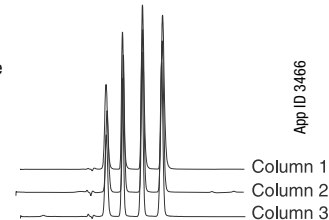
### Luna CN

Nitrile groups bound to the silica surface offer a unique polar selectivity under reversed phase or normal phase conditions.

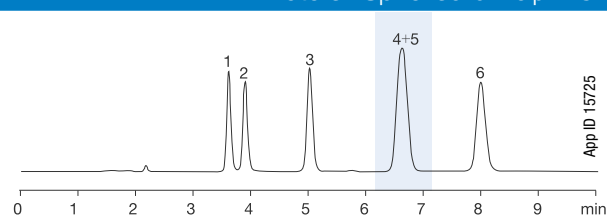


### Column-to-Column Reproducibility

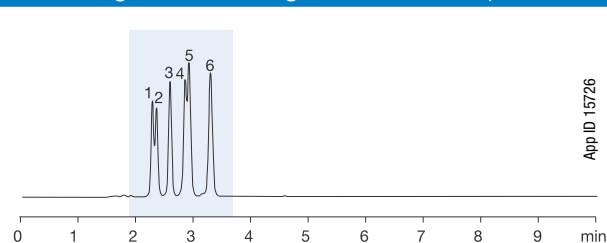
**Column:** Luna 5 µm CN  
**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** A: Hexane, B: Methylene chloride/Methanol(80:20), A/B (95:5)  
**Flow Rate:** 1.0 mL/min  
**Injection:** 5 µL  
**Detection:** UV @ 254 nm  
**Temperature:** Ambient  
**Sample:** 1. Dimethyl phthalate  
 2. Diethyl phthalate  
 3. Dibutyl phthalate  
 4. Dioctyl phthalate



#### Waters<sup>®</sup> Spherisorb<sup>®</sup> 5 µm CN



#### Agilent Technologies<sup>®</sup> ZORBAX<sup>®</sup> 5 µm SB-CN



\*\*The comparative data presented here may not be representative for all applications.



## Luna NH<sub>2</sub> (amino)

### Developed for Ruggedness

Luna NH<sub>2</sub> columns were developed to provide improved amino column lifetime. Column life for most amino columns can be problematic as the amino bonding easily strips off the silica. Luna NH<sub>2</sub> columns, however, show good bonded phase stability under both normal and reversed phase modes and across a pH range of 1.5 to 11.0. Such a broad pH range indicates the bonded phase ruggedness and the density of the bonded phase coverage. The result:

- Long lifetimes and low phase bleed for more reproducible methods
- Excellent retention of simple sugars, complex sugars, sugar alcohols by reversed phase conditions, and hydrogen bonding compounds under normal phase conditions
- pH stable from 1.5 to 11.0
- Stable in 100 % aqueous mobile phases

## Luna NH<sub>2</sub>

USP: L8

**pH Stability:** 1.5-11.0

Particle Size: 3 μm, 5 μm, and 10 μm

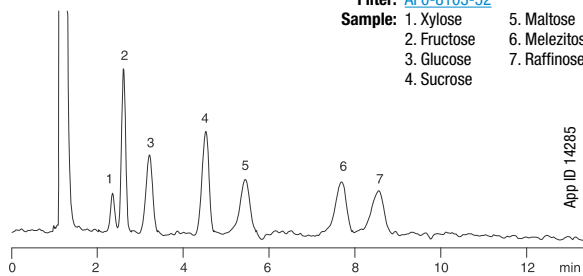
Phase: Amino

Application: Compounds with COOH, CO, NH<sub>2</sub>, NHR<sub>2</sub>, or NR<sub>2</sub>

Strength: Sugars by reversed phase, steroids by normal phase, oligonucleotides by ion exchange

### Simple Sugars

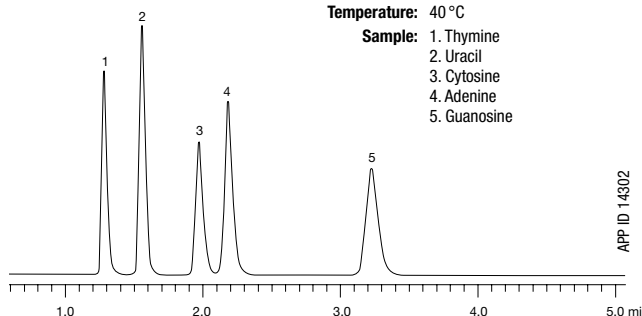
**Column:** Luna 5 μm NH<sub>2</sub>  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** [00G-4378-E0](#)  
**Guard Cartridge:** [AJ0-4302](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** Acetonitrile/Water (80:20)  
**Flow Rate:** 3 mL/min  
**Temperature:** 40 °C  
**Detection:** RI  
**Vial:** [AR0-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Sample:** 1. Xylose 5. Maltose  
 2. Fructose 6. Melezitose  
 3. Glucose 7. Raffinose  
 4. Sucrose



App ID 14285

### Nucleic Acid Bases

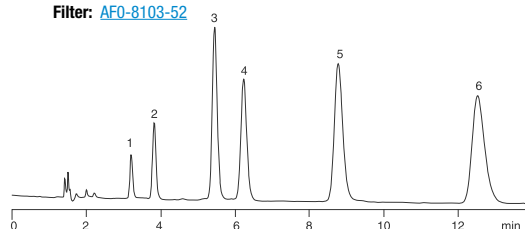
**Column:** Luna 5 μm NH<sub>2</sub>  
**Dimension:** 150 x 4.6 mm  
**Part No.:** [00F-4378-E0](#)  
**Mobile Phase:** Acetonitrile/Water (80:20)  
**Flow Rate:** 1.0 mL/min  
**Detection:** UV @ 254 nm  
**Temperature:** 40 °C  
**Sample:** 1. Thymine  
 2. Uracil  
 3. Cytosine  
 4. Adenine  
 5. Guanosine



APP ID 14302

### Steroids

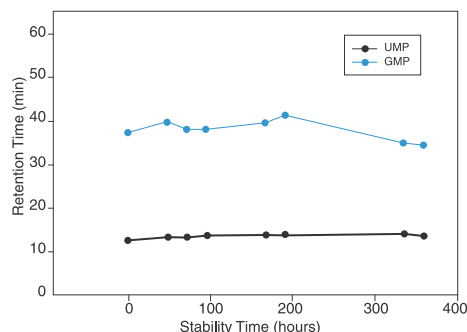
**Column:** Luna 5 μm NH<sub>2</sub>  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** [00G-4378-E0](#)  
**Guard Cartridge:** [AJ0-4302](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** Hexane/Ethanol (85:15)  
**Flow Rate:** 2 mL/min  
**Temperature:** 22 °C  
**Detection:** UV @ 240 nm  
**Vial:** [AR0-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Sample:** 1. 11-Ketoprogesterone  
 2. 11-Hydroxyprogesterone  
 3. Cortisone Acetate  
 4. Prednisolone 21-Acetate  
 5. Cortisone  
 6. Prednisolone



App ID 14299

### Stability in 100% Aqueous Mobile Phase

**Column:** Luna 5 μm NH<sub>2</sub>  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** [00G-4378-E0](#)  
**Guard Cartridge:** [AJ0-4302](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** 20 mM Potassium Phosphate Buffer pH 2.7  
**Flow Rate:** 1.5 mL/min  
**Detector:** UV @ 254 nm  
**Vial:** [AR0-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Temperature:** Ambient  
**Injection:** 2.5 μL  
**Conditions:** Continuously flushed at 1.0 mL/min using 100 % 20 mM Potassium Phosphate Buffer pH 2.7 between injections



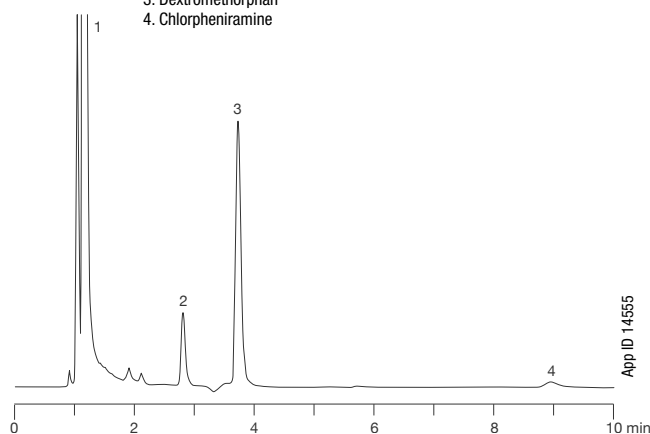
## Luna SCX (strong cation exchange) Develop Robust Methods

Luna SCX columns provide excellent resolution and peak shape of basic, cationic compounds. However, most SCX columns show poor peak shape and bad resolution causing many chromatographers to ignore this important phase for small molecule method development, until now. Luna SCX columns contain a benzene sulfonic acid ligand providing ion-exchange, reversed phase, and aromatic interactions. Such interactions make Luna SCX columns great as a first dimension for 2D LC applications as well as improved resolution for small molecules. The result:

- Resolving power and sharp peak shape to separate complex cationic/basic and nitrogen containing compounds
- 5 and 10  $\mu\text{m}$  columns and bulk media for analytical through preparative separations
- Benzene sulfonic acid ligand provides mixed-mode interaction improving separation for 2D peptide applications

### Childrens Tylenol Cold Syrup

**Column:** Luna 5  $\mu\text{m}$  SCX  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4398-E0](#)  
**Guard Cartridge:** [AJ0-4308](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** 50 mM  $\text{KH}_2\text{PO}_4$ , pH 2.5/Acetonitrile (35:65)  
**Injection Volume:** 1  $\mu\text{L}$   
**Flow Rate:** 1.5 mL/min  
**Detection:** UV @ 210 nm  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Sample Prep:** Dissolve 1 part Childrens Tylenol Cold in 10 parts Methanol  
**Sample:** 1. Acetaminophen  
 2. Pseudoephedrine  
 3. Dextromethorphan  
 4. Chlorpheniramine



**SCX Method Development and pH:** The standard operating pH range for Luna SCX columns is 2.0 to 7.0. Most SCX methods are typically run between pH 2.0 and 5.0 for optimal performance. This ensures that nitrogen-containing analytes, especially those with adjacent conjugated system are protonated. Running in highly acidic (pH < 2.0) or basic (pH > 7.0) mobile phases may cause this phase to undergo degradation, as is common for all silica-based SCX phases.

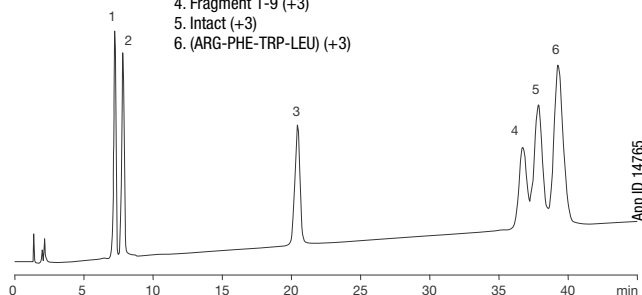
### Luna SCX

USP: L9

**pH Stability:** 2.0-7.0  
**Particle Size:** 5  $\mu\text{m}$  and 10  $\mu\text{m}$   
**Phase:** Benzene Sulfonic Acid, Strong Cation Exchange  
**Application:** Amine and polyamine containing compounds  
**Strength:** Guaranteed to provide sharper peak shape and better resolution compared to traditional SCX columns

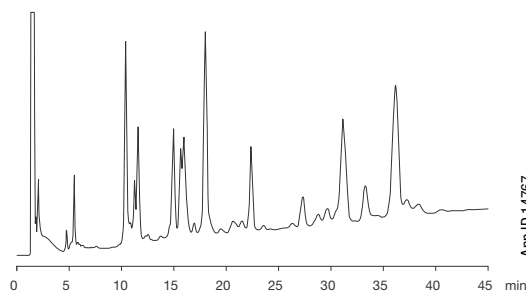
### Peptides

**Column:** Luna 5  $\mu\text{m}$  SCX  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4398-E0](#)  
**Guard Cartridge:** [AJ0-4308](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** A: 20 mM Potassium Phosphate, 25% Acetonitrile, pH 2.5  
 B: 20 mM Potassium Phosphate, 25% Acetonitrile, 400 mM Potassium Chloride, pH 2.5  
**Gradient:** A/B (95:5) to A/B (10:90) in 45 minutes  
**Flow Rate:** 1 mL/min  
**Temperature:** 35  $^{\circ}\text{C}$   
**Detection:** UV @ 215 nm  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Injection Volume:** 2  $\mu\text{L}$  (5  $\mu\text{g}$  on column)  
**Sample:** Peptide Mixture - Substance P  
 1. Fragment 5-11 (+1)  
 2. Fragment 4-11 (+1)  
 3. Fragment 2-11 (+2)  
 4. Fragment 1-9 (+3)  
 5. Intact (+3)  
 6. (ARG-PHE-TRP-LEU) (+3)



### Tryptic Digest of Bovine Cytochrome c

**Column:** Luna 5  $\mu\text{m}$  SCX  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4398-E0](#)  
**Guard Cartridge:** [AJ0-4308](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** A: 20 mM Potassium Phosphate, pH 2.5 / 25% Acetonitrile  
 B: 20 mM Potassium Phosphate, pH 2.5 / 25% Acetonitrile / 350 mM Potassium Chloride  
**Gradient:** 100% A to 100% B in 50 minutes  
**Flow Rate:** 1 mL/min  
**Temperature:** 35  $^{\circ}\text{C}$   
**Detection:** UV @ 215 nm  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Injection Volume:** 50  $\mu\text{L}$  (20  $\mu\text{g}$  on column)  
**Sample:** Bovine Cytochrome c trypsin digest



## Luna HILIC

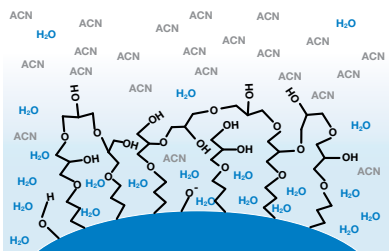
### Increase MS Sensitivity and Retention for Polar Compounds

Luna HILIC columns retain a water-enriched layer on the surface of the silica. This water layer facilitates the transfer of polar compounds onto the stationary phase for increased retention.

Hydrophilic Interaction Liquid Chromatography (HILIC) is a separation mode where the partitioning of polar solutes from the high concentration, water-miscible, organic mobile phase into the hydrophilic surface environment creates separations. Polar solutes exhibit increased retention and elute in the order of increasing hydrophilicity.

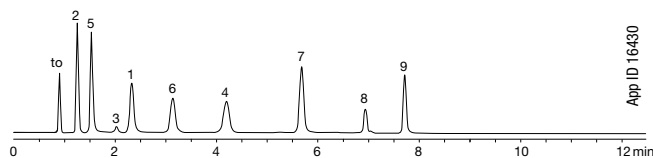
Finally, reproducible, robust HILIC separations!

- Made for retention of polar compounds
- Increase mass spectrometry sensitivity
- Increase laboratory throughput and productivity



### Vitamin Mix on Luna HILIC

Vitamins provide an excellent platform to demonstrate the benefits of HILIC. The effect of increased polar compound retention can be easily seen in this application.

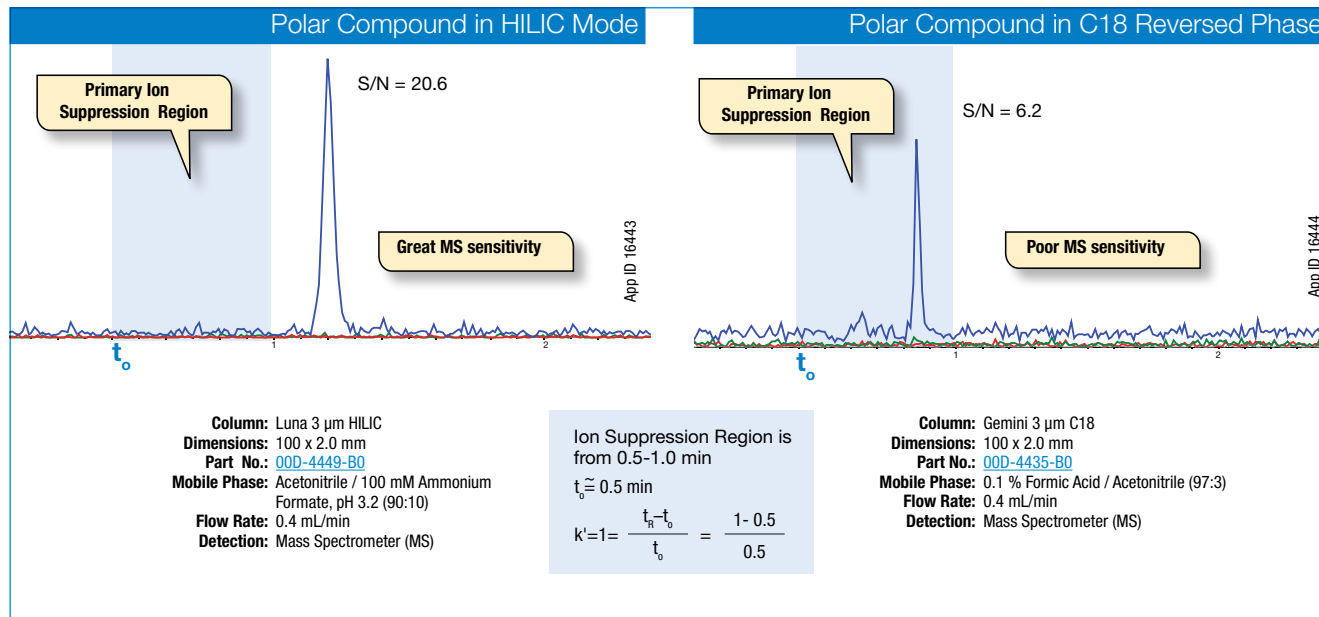


**Column:** Luna 5 µm HILIC  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4450-E0](#)  
**Guard Cartridge:** [AJ0-8329](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** A: Acetonitrile  
 B: Water  
 C: 100 mM Ammonium Acetate, pH 5.8  
**Gradient:** A/B/C (90:5:5) for 2.5 min to A/B/C (50:45:5) in 7.5 min, hold for 2.5 min. Re-equilibrate @ A/B/C (90:5:5) for 7.5 min  
**Flow Rate:** 2.0 mL/min  
**Detection:** UV @ 260 nm  
**Vial:** [AR0-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Sample:** 1. p-Aminobenzoic Acid pK<sub>a</sub> 4.7, H<sup>+</sup> pK<sub>a</sub> 2.7 logP 0.83  
 2. Nicotinamide H<sup>+</sup> pK<sub>a</sub> 3.35 logP -0.37  
 3. Riboflavin pK<sub>a</sub> 10.2 logP -1.46  
 4. Nicotinic Acid pK<sub>a</sub> 4.7, H+pK<sub>a</sub> 3.0 logP 0.36  
 5. Pyridoxine H<sup>+</sup> pK<sub>a</sub> 5.6, pK<sub>a</sub> 8.6 logP -0.77  
 6. Thiamine H<sup>+</sup> pK<sub>a</sub> 5.5 logP -4.6  
 7. Ascorbic Acid pK<sub>a</sub> 4.1, 11.2 logP -1.85  
 8. Cyanocobalamin pK<sub>a</sub> 1.59 logP -0.90  
 9. Folic Acid pK<sub>a</sub> 2.7, 4.1, 8.9 logP -0.02

## Improved Mass Spec Sensitivity

Luna HILIC columns allow low level polar metabolites to be retained on column past the critical ion suppression zone, allowing: Increased MS sensitivity and Higher signal-to-noise ratio (S/N).

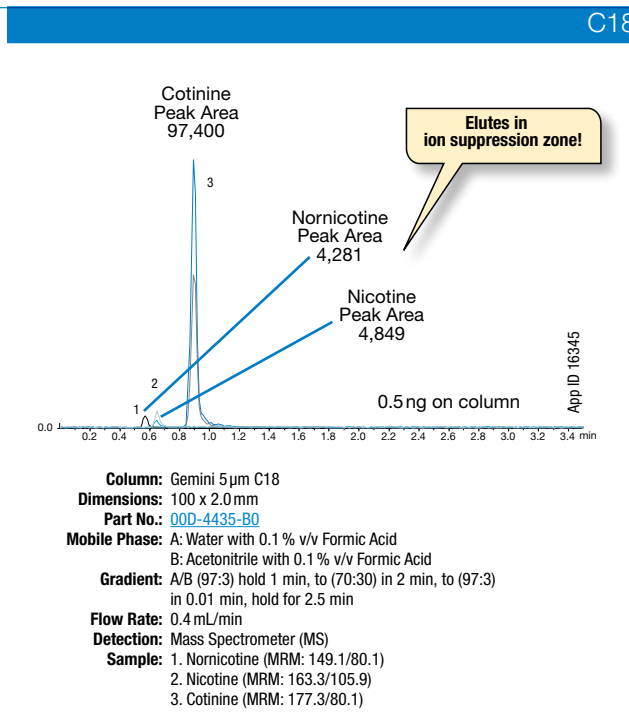
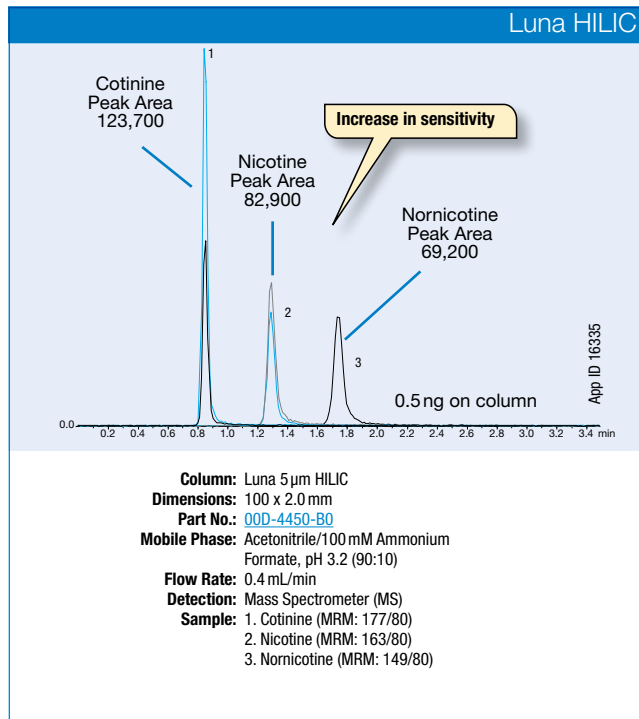
### Bamethan



## Luna HILIC (cont'd) Improved Mass Spec Sensitivity (cont'd)

The increased retention in HILIC allows elution of the analytes outside the suppression region and thus increases detector sensitivity. In addition, the Luna HILIC column also resolves the compounds with the reverse order of that seen in reversed phase LC.

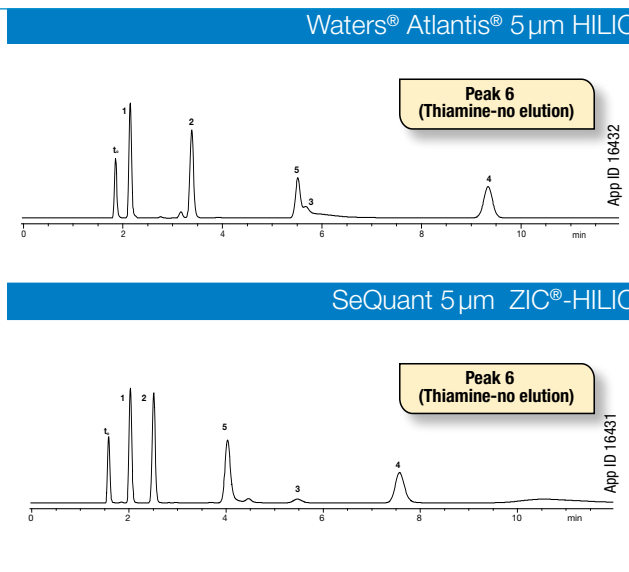
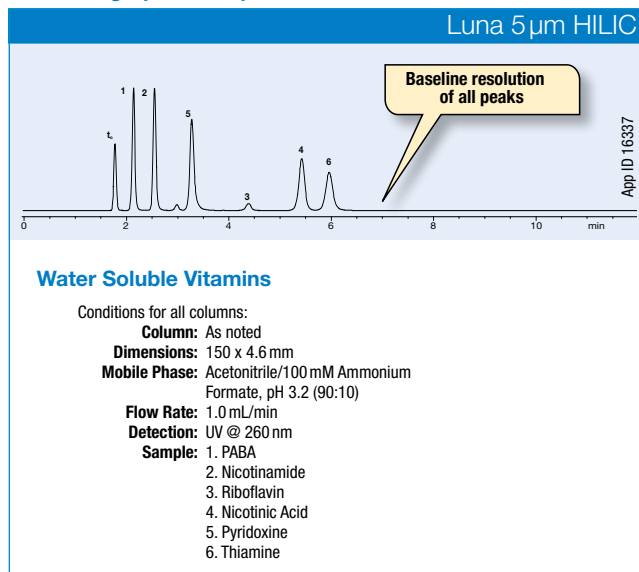
### Nicotine and Metabolites



## Unique HILIC Selectivity

Not all HILIC columns are alike, Luna HILIC columns deliver on the exacting standards you have come to trust from the Luna product line.

### Chromatographic Comparisons of HILIC Columns\*\*



\*\* The comparative data presented here may not be representative for all applications.

## Luna PFP(2)

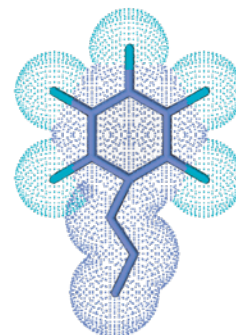
### Powerful Selectivity for Reversed Phase Methods

Luna PFP(2) columns provide remarkable selectivity for highly polar compounds, complex natural products, isomers, and other closely related compounds. This is achieved by using a pentafluorophenyl with a propyl linkage which provides multiple retention mechanisms different to other reversed phase media.

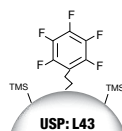
- Achieve excellent selectivity using four mechanisms of solute/stationary phase interactions
- Extremely discerning for halogenated, aromatic and conjugated compounds
- Provides orthogonal selectivity even using traditional reversed phase mobile phase systems

Luna PFP(2) selectivity is achieved through 4 mechanisms of interaction

- Hydrogen Bonding
- Dipole-Dipole Interactions
- Aromatic and  $\pi$ - $\pi$  Interactions
- Hydrophobic

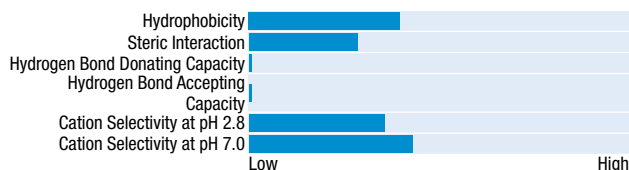


A typical alkyl phase (C18, C8) achieves selectivity through only 1 mechanism of interaction.



### Luna PFP(2)

Pentafluorophenyl groups provide very little hydrogen bonding abilities, but the strongly electronegative fluorine groups will provide good charge based selectivity for cationic compounds, while the rigid bonded phase is a good steric selector.

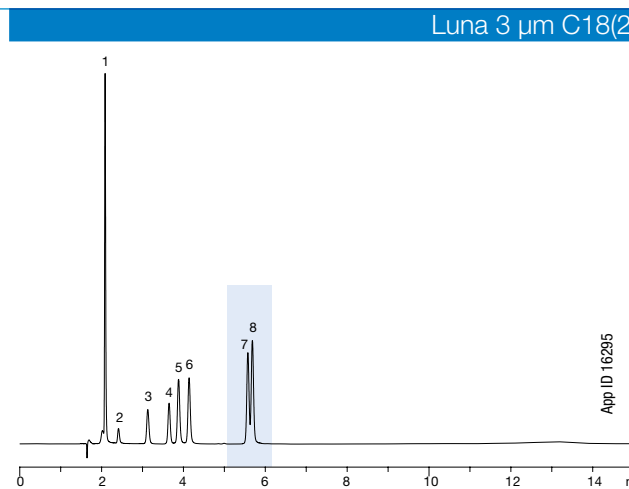
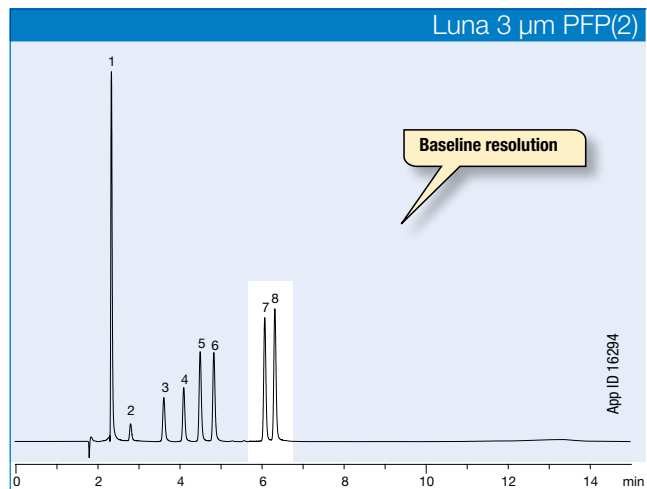


## Aromatic Compounds

Aromatic compounds show different retention characteristics on Luna PFP(2) compared to traditional reversed phase columns. The presence of the aromatic benzene ring in Luna PFP(2) increases the relative attraction between the stationary phase and aromatic analytes, leading to increased retention for these types of compounds. Closely related polyphenolic compounds are readily separated with Luna PFP(2) columns.



### Catechins



**Columns:** Luna 3 µm PFP(2)  
Luna 3 µm C18(2)  
**Part Nos.:** [00F-4447-E0](#)  
[00F-4251-E0](#)

Conditions for all columns:

**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** A: 0.1 % Formic acid in Water  
B: 0.1 % Formic acid in Acetonitrile  
**Gradient:** A/B (80:20) to (55:45) in 10 min  
**Flow Rate:** 1 mL/min  
**Temperature:** 22 °C  
**Detection:** UV @ 280 nm

**Sample:** 1. Gallic acid  
2. Epigallo catechin  
3. Catechin  
4. Epicatechin  
5. Epigallocatechin gallate  
6. Gallo catechin gallate  
7. Epicatechin gallate  
8. Catechin gallate



## Fast LC Solutions

### Ordering Information

2.5 µm High Speed Technology (HST) Columns (mm)					
Phase	30 x 2.0	50 x 2.0	100 x 2.0	50 x 3.0	100 x 3.0
Luna 2.5 µm C18(2)-HST	<a href="#">00A-4446-B0</a>	<a href="#">00B-4446-B0</a>	<a href="#">00D-4446-B0</a>	<a href="#">00B-4446-Y0</a>	<a href="#">00D-4446-Y0</a>



For information about HST Columns, contact your Phenomenex technical consultant or local distributor.

MercuryMS™ LC-MS Cartridges (mm)				Columns (mm)			
3 µm	Phase	10 x 2.0	10 x 4.0	20 x 2.0	20 x 4.0	20 x 2.0	20 x 4.0
Luna	C18(2)	<a href="#">00N-4251-B0-CE</a>	<a href="#">00N-4251-D0-CE</a>	<a href="#">00M-4251-B0-CE</a>	<a href="#">00M-4251-D0-CE</a>	<a href="#">00M-4251-B0</a>	<a href="#">00M-4251-D0</a>
Luna	C8(2)	<a href="#">00N-4248-B0-CE</a>	—	<a href="#">00M-4248-B0-CE</a>	—	<a href="#">00M-4248-B0</a>	—
5 µm	Phase	10 x 2.0	10 x 4.0	20 x 2.0	20 x 4.0		
Luna	C18(2)	<a href="#">00N-4252-B0-CE</a>	<a href="#">00N-4252-D0-CE</a>	<a href="#">00M-4252-B0-CE</a>	<a href="#">00M-4252-D0-CE</a>	—	—
Luna	C8(2)	<a href="#">00N-4249-B0-CE</a>	—	<a href="#">00M-4249-B0-CE</a>	—	—	—

## MercuryMS™ Cartridge Holders

### Ordering Information

#### Direct-Connect Cartridge Holders

Part No.	Description
<a href="#">CHO-7187</a>	10 mm direct-connect holder
<a href="#">CHO-7188</a>	20 mm direct-connect holder



Direct-Connect Holder

#### Standard Cartridge Holders

Part No.	Description
<a href="#">CHO-5846</a>	10 mm standard holder
<a href="#">CHO-5845</a>	20 mm standard holder



Standard Holder



## Micro LC Columns

### Ordering Information



For information on Micro LC Columns, Traps, and Fittings, see pp. 359-361

3 µm and 5 µm Micro LC Columns (mm)								Trap Column	Trap Column
Phases	50 x 0.30	100 x 0.30	150 x 0.30	50 x 0.50	100 x 0.50	150 x 0.50	250 x 0.50	20 x 0.30	20 x 0.50
3 µm C8(2)	<a href="#">00B-4248-AC</a>	—	—	<a href="#">00B-4248-AF</a>	—	—	—	—	—
3 µm C18(2)	<a href="#">00B-4251-AC</a>	<a href="#">00D-4251-AC</a>	<a href="#">00F-4251-AC</a>	<a href="#">00B-4251-AF</a>	<a href="#">00D-4251-AF</a>	<a href="#">00F-4251-AF</a>	—	—	—
3 µm Phenyl-Hexyl	—	<a href="#">00D-4256-AC</a>	—	—	<a href="#">00D-4256-AF</a>	—	—	—	—
3 µm NH <sub>2</sub>	—	—	<a href="#">00F-4377-AC</a>	—	—	—	—	—	—
3 µm HILIC	—	—	—	<a href="#">00B-4449-AF</a>	—	—	—	—	—
5 µm C8(2)	—	—	<a href="#">00F-4249-AC</a>	—	—	—	—	<a href="#">05M-4249-AC</a>	<a href="#">05M-4249-AF</a>
5 µm C18(2)	—	—	<a href="#">00F-4252-AC</a>	—	—	<a href="#">00F-4252-AF</a>	<a href="#">00G-4252-AF</a>	<a href="#">05M-4252-AC</a>	<a href="#">05M-4252-AF</a>
5 µm Phenyl-Hexyl	<a href="#">00B-4257-AC</a>	—	—	<a href="#">00B-4257-AF</a>	—	—	—	—	—

## HPLC Columns

### Ordering Information

\*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

3 µm Microbore and Minibore Columns (mm)							SecurityGuard Cartridges (mm)
Phases	50 x 1.0	150 x 1.0	30 x 2.0	50 x 2.0	100 x 2.0	150 x 2.0	4 x 2.0*
Silica(2)	—	<a href="#">00F-4162-A0</a>	—	<a href="#">00B-4162-B0</a>	<a href="#">00D-4162-B0</a>	<a href="#">00F-4162-B0</a>	<a href="#">AJ0-4347</a>
C8(2)	—	—	<a href="#">00A-4248-B0</a>	<a href="#">00B-4248-B0</a>	<a href="#">00D-4248-B0</a>	<a href="#">00F-4248-B0</a>	<a href="#">AJ0-4289</a>
C18(2)	<a href="#">00B-4251-A0</a>	<a href="#">00F-4251-A0</a>	<a href="#">00A-4251-B0</a>	<a href="#">00B-4251-B0</a>	<a href="#">00D-4251-B0</a>	<a href="#">00F-4251-B0</a>	<a href="#">AJ0-4286</a>
CN	—	—	—	<a href="#">00B-4254-B0</a>	<a href="#">00D-4254-B0</a>	<a href="#">00F-4254-B0</a>	<a href="#">AJ0-4304</a>
Phenyl-Hexyl	—	—	—	<a href="#">00B-4256-B0</a>	<a href="#">00D-4256-B0</a>	<a href="#">00F-4256-B0</a>	<a href="#">AJ0-4350</a>
NH <sub>2</sub>	—	<a href="#">00F-4377-A0</a>	<a href="#">00A-4377-B0</a>	<a href="#">00B-4377-B0</a>	<a href="#">00D-4377-B0</a>	<a href="#">00F-4377-B0</a>	<a href="#">AJ0-4301</a>
HILIC	—	—	—	<a href="#">00B-4449-B0</a>	<a href="#">00D-4449-B0</a>	<a href="#">00F-4449-B0</a>	<a href="#">AJ0-8328</a>
PFP(2)	—	<a href="#">00F-4447-A0</a>	<a href="#">00A-4447-B0</a>	<a href="#">00B-4447-B0</a>	<a href="#">00D-4447-B0</a>	<a href="#">00F-4447-B0</a>	<a href="#">AJ0-8326</a>

for ID: 2.0-3.0 mm

## HPLC Columns (cont'd)

### Ordering Information (continued)

3µm MidBore™ and Analytical Columns (mm)								SecurityGuard™ Cartridges (mm)		
Phases	30 x 3.0	50 x 3.0	150 x 3.0	30 x 4.6	50 x 4.6	75 x 4.6	100 x 4.6	150 x 4.6	4 x 2.0*	4 x 3.0*
									/10pk	/10pk
Silica(2)	—	00B-4162-Y0	00F-4162-Y0	00A-4162-E0	00B-4162-E0	—	00D-4162-E0	00F-4162-E0	AJO-4347	AJO-4348
C8(2)	00A-4248-Y0	00B-4248-Y0	00F-4248-Y0	00A-4248-E0	00B-4248-E0	00C-4248-E0	00D-4248-E0	00F-4248-E0	AJO-4289	AJO-4290
C18(2)	00A-4251-Y0	00B-4251-Y0	00F-4251-Y0	00A-4251-E0	00B-4251-E0	00C-4251-E0	00D-4251-E0	00F-4251-E0	AJO-4286	AJO-4287
CN	—	00B-4254-Y0	00F-4254-Y0	00A-4254-E0	00B-4254-E0	00C-4254-E0	00D-4254-E0	00F-4254-E0	AJO-4304	AJO-4305
Phenyl-Hexyl	—	00B-4256-Y0	00F-4256-Y0	—	00B-4256-E0	00C-4256-E0	00D-4256-E0	00F-4256-E0	AJO-4350	AJO-4351
NH <sub>2</sub>	—	00B-4377-Y0	00F-4377-Y0	—	00B-4377-E0	—	00D-4377-E0	00F-4377-E0	AJO-4301	AJO-4302
HILIC	—	00B-4449-Y0	00F-4449-Y0	—	—	—	00D-4449-E0	00F-4449-E0	AJO-8328	AJO-8329
PPF(2)	—	00B-4447-Y0	00F-4447-Y0	—	00B-4447-E0	—	00D-4447-E0	00F-4447-E0	AJO-8326	AJO-8327

for ID: 2.0-3.0mm 3.2-8.0mm

5µm Microbore and Minibore Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	150 x 1.0	30 x 2.0	50 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0*
						/10pk
Silica(2)	—	00A-4274-B0	00B-4274-B0	00F-4274-B0	00G-4274-B0	AJO-4347
C5	—	00A-4043-B0	00B-4043-B0	00F-4043-B0	—	AJO-4292
C8(2)	—	00A-4249-B0	00B-4249-B0	00F-4249-B0	00G-4249-B0	AJO-4289
C18(2)	00F-4252-A0	00A-4252-B0	00B-4252-B0	00F-4252-B0	00G-4252-B0	AJO-4286
CN	—	—	00B-4255-B0	00F-4255-B0	—	AJO-4304
Phenyl-Hexyl	—	00A-4257-B0	00B-4257-B0	00F-4257-B0	00G-4257-B0	AJO-4350
NH <sub>2</sub>	—	00A-4378-B0	00B-4378-B0	00F-4378-B0	00G-4378-B0	AJO-4301
SCX	—	—	00B-4398-B0	—	—	AJO-4307
PPF(2)	—	00A-4448-B0	00B-4448-B0	00F-4448-B0	—	AJO-8326

for ID: 2.0-3.0mm



5µm MidBore and Analytical Columns (mm)							SecurityGuard™ Cartridges (mm)		
Phases	30 x 3.0	50 x 3.0	150 x 3.0	250 x 3.0	30 x 4.6	50 x 4.6	75 x 4.6	4 x 2.0*	4 x 3.0*
								/10pk	/10pk
Silica(2)	—	—	—	—	—	00B-4274-E0	—	AJO-4347	AJO-4348
C5	—	—	00F-4043-Y0	—	—	00B-4043-E0	—	AJO-4292	AJO-4293
C8(2)	—	00B-4249-Y0	00F-4249-Y0	00G-4249-Y0	00A-4249-E0	00B-4249-E0	00C-4249-E0	AJO-4289	AJO-4290
C18(2)	00A-4252-Y0	00B-4252-Y0	00F-4252-Y0	00G-4252-Y0	00A-4252-E0	00B-4252-E0	00C-4252-E0	AJO-4286	AJO-4287
CN	—	00B-4255-Y0	00F-4255-Y0	00G-4255-Y0	00A-4255-E0	00B-4255-E0	00C-4255-E0	AJO-4304	AJO-4305
Phenyl-Hexyl	—	00B-4257-Y0	00F-4257-Y0	00G-4257-Y0	00A-4257-E0	00B-4257-E0	—	AJO-4350	AJO-4351
NH <sub>2</sub>	—	00B-4378-Y0	00F-4378-Y0	00G-4378-Y0	—	00B-4378-E0	—	AJO-4301	AJO-4302
SCX	—	—	00F-4398-Y0	—	—	00B-4398-E0	—	AJO-4307	AJO-4308
HILIC	—	—	00F-4450-Y0	—	—	—	—	AJO-8328	AJO-8329
PPF(2)	—	—	00F-4448-Y0	—	—	00B-4448-E0	—	AJO-8326	AJO-8327

for ID: 2.0-3.0mm 3.2-8.0mm

5µm Analytical and Semi-Prep Columns (mm)				SecurityGuard™ Cartridges (mm)		
Phases	100 x 4.6	150 x 4.6	250 x 4.6	250 x 10	4 x 3.0*	10 x 10 <sup>‡</sup>
					/10pk	/3pk
Silica(2)	00D-4274-E0	00F-4274-E0	00G-4274-E0	00G-4274-N0	AJO-4348	AJO-7223
C5	00D-4043-E0	00F-4043-E0	00G-4043-E0	00G-4043-N0	AJO-4293	AJO-7372
C8(2)	00D-4249-E0	00F-4249-E0	00G-4249-E0	00G-4249-N0	AJO-4290	AJO-7222
C18(2)	00D-4252-E0	00F-4252-E0	00G-4252-E0	00G-4252-N0	AJO-4287	AJO-7221
CN	00D-4255-E0	00F-4255-E0	00G-4255-E0	00G-4255-N0	AJO-4305	AJO-7313
Phenyl-Hexyl	00D-4257-E0	00F-4257-E0	00G-4257-E0	00G-4257-N0	AJO-4351	AJO-7314
NH <sub>2</sub>	00D-4378-E0	00F-4378-E0	00G-4378-E0	00G-4378-N0	AJO-4302	AJO-7364
SCX	00D-4398-E0	00F-4398-E0	00G-4398-E0	00G-4398-N0	AJO-4308	AJO-7369
HILIC	00D-4450-E0	00F-4450-E0	00G-4450-E0	00G-4450-N0	AJO-8329	AJO-8902
PPF(2)	00D-4448-E0	00F-4448-E0	00G-4448-E0	00G-4448-N0	AJO-8327	AJO-8376

for ID: 3.2-8.0mm 9-16mm



For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

\*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJO-4282](#)  
<sup>‡</sup>SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJO-9281](#)

## Preparative Columns

### Ordering Information (continued)

5 µm Axia™ Packed Preparative Columns (mm)								SecurityGuard™ Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	50 x 30	100 x 30	250 x 30	15 x 21.2**	15 x 30 †
								/ea	/ea
Silica(2)	—	<a href="#">00D-4274-PO-AX</a>	<a href="#">00F-4274-PO-AX</a>	<a href="#">00G-4274-PO-AX</a>	—	—	<a href="#">00G-4274-UO-AX</a>	<a href="#">AJ0-7229</a>	<a href="#">AJ0-8312</a>
C5	—	—	—	<a href="#">00G-4043-PO-AX</a>	—	—	—	—	—
C8(2)	<a href="#">00B-4249-PO-AX</a>	—	<a href="#">00F-4249-PO-AX</a>	<a href="#">00G-4249-PO-AX</a>	—	<a href="#">00D-4249-UO-AX</a>	—	<a href="#">AJ0-7840</a>	<a href="#">AJ0-8302</a>
C18(2)	<a href="#">00B-4252-PO-AX</a>	<a href="#">00D-4252-PO-AX</a>	<a href="#">00F-4252-PO-AX</a>	<a href="#">00G-4252-PO-AX</a>	<a href="#">00B-4252-UO-AX</a>	<a href="#">00D-4252-UO-AX</a>	<a href="#">00G-4252-UO-AX</a>	<a href="#">AJ0-7839</a>	<a href="#">AJ0-8301</a>
CN	—	—	<a href="#">00F-4255-PO-AX</a>	<a href="#">00G-4255-PO-AX</a>	—	<a href="#">00D-4255-UO-AX</a>	<a href="#">00G-4255-UO-AX</a>	<a href="#">AJ0-8220</a>	<a href="#">AJ0-8311</a>
Phenyl-Hexyl	—	—	<a href="#">00F-4257-PO-AX</a>	<a href="#">00G-4257-PO-AX</a>	—	—	<a href="#">00G-4257-UO-AX</a>	<a href="#">AJ0-7841</a>	<a href="#">AJ0-8303</a>
NH <sub>2</sub>	—	—	<a href="#">00F-4378-PO-AX</a>	<a href="#">00G-4378-PO-AX</a>	—	—	—	<a href="#">AJ0-8162</a>	<a href="#">AJ0-8309</a>
PPF(2)	—	<a href="#">00D-4448-PO-AX</a>	<a href="#">00F-4448-PO-AX</a>	<a href="#">00G-4448-PO-AX</a>	—	<a href="#">00D-4448-UO-AX</a>	—	<a href="#">AJ0-8377</a>	<a href="#">AJ0-8378</a>
HILIC	—	<a href="#">00D-4450-PO-AX</a>	<a href="#">00F-4450-PO-AX</a>	<a href="#">00G-4450-PO-AX</a>	—	—	<a href="#">00G-4450-UO-AX</a>	<a href="#">AJ0-8829</a>	<a href="#">AJ0-8830</a>

for ID: 18-29 mm      30-49 mm

10 µm Axia™ Packed Preparative Columns (mm) (continued)						SecurityGuard Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	250 x 21.2	250 x 30	250 x 50	15 x 21.2**	15 x 30 †
						/ea	/ea
Silica(2)	—	—	<a href="#">00G-4091-PO-AX</a>	<a href="#">00G-4091-UO-AX</a>	<a href="#">00G-4091-VO-AX</a>	<a href="#">AJ0-7229</a>	<a href="#">AJ0-8312</a>
C5	—	<a href="#">00D-4092-PO-AX</a>	<a href="#">00G-4092-PO-AX</a>	—	<a href="#">00G-4092-VO-AX</a>	—	—
C8(2)	—	—	<a href="#">00G-4250-PO-AX</a>	<a href="#">00G-4250-UO-AX</a>	<a href="#">00G-4250-VO-AX</a>	<a href="#">AJ0-7840</a>	<a href="#">AJ0-8302</a>
C18(2)	<a href="#">00B-4253-PO-AX</a>	<a href="#">00D-4253-PO-AX</a>	<a href="#">00G-4253-PO-AX</a>	<a href="#">00G-4253-UO-AX</a>	<a href="#">00G-4253-VO-AX</a>	<a href="#">AJ0-7839</a>	<a href="#">AJ0-8301</a>
CN	—	—	<a href="#">00G-4300-PO-AX</a>	—	—	<a href="#">AJ0-8220</a>	<a href="#">AJ0-8311</a>
Phenyl-Hexyl	—	—	<a href="#">00G-4285-PO-AX</a>	<a href="#">00G-4285-UO-AX</a>	—	<a href="#">AJ0-7841</a>	<a href="#">AJ0-8303</a>
NH <sub>2</sub>	—	—	<a href="#">00G-4379-PO-AX</a>	—	<a href="#">00G-4379-VO-AX</a>	<a href="#">AJ0-8162</a>	<a href="#">AJ0-8309</a>
SCX	—	—	<a href="#">00G-4401-PO-AX</a>	—	<a href="#">00G-4401-PO-AX</a>	<a href="#">AJ0-8162</a>	<a href="#">AJ0-8596</a>

for ID: 18-29 mm      30-49 mm

## Pilot Scale Columns

### Ordering Information

10 µm Analytical and Semi-Prep Columns (mm)			SecurityGuard Cartridges (mm)	
Phases	250 x 4.6	250 x 10	4 x 3.0*	10 x 10†
			/10 pk	/3 pk
Silica(2)	<a href="#">00G-4091-E0</a>	<a href="#">00G-4091-N0</a>	<a href="#">AJ0-4348</a>	<a href="#">AJ0-7223</a>
C8(2)	<a href="#">00G-4250-E0</a>	<a href="#">00G-4250-N0</a>	<a href="#">AJ0-4290</a>	<a href="#">AJ0-7222</a>
C18(2)	<a href="#">00G-4253-E0</a>	<a href="#">00G-4253-N0</a>	<a href="#">AJ0-4287</a>	<a href="#">AJ0-7221</a>
CN	<a href="#">00G-4300-E0</a>	—	<a href="#">AJ0-4305</a>	<a href="#">AJ0-7313</a>
Phenyl-Hexyl	<a href="#">00G-4285-E0</a>	<a href="#">00G-4285-N0</a>	<a href="#">AJ0-4351</a>	<a href="#">AJ0-7314</a>
NH <sub>2</sub>	<a href="#">00G-4379-E0</a>	<a href="#">00G-4379-N0</a>	<a href="#">AJ0-4302</a>	<a href="#">AJ0-7364</a>
SCX	<a href="#">00G-4401-E0</a>	<a href="#">00G-4401-N0</a>	<a href="#">AJ0-4308</a>	<a href="#">AJ0-7369</a>

for ID: 3.2-8.0 mm      9-16 mm

10 µm-PREP Columns (mm)		
Phases	250 x 4.6	250 x 10
Silica(3)	<a href="#">00G-4617-E0</a>	<a href="#">00G-4617-N0</a>
C8(3)	<a href="#">00G-4623-E0</a>	<a href="#">00G-4623-N0</a>
C18(3)	<a href="#">00G-4616-E0</a>	<a href="#">00G-4616-N0</a>

15 µm Pilot Scale Columns (mm)	
Phases	250 x 4.6
C18(2)	<a href="#">00G-4273-E0</a>
Phenyl-Hexyl	<a href="#">00G-4286-E0</a>



\*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)  
 †SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)  
 \*\*PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)  
 ††PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8277](#)



See our latest developments in High-throughput Purifications starting on page 384  
 For more dimensions and phases of Axia packed preparative columns, see p. 393  
 For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334  
 For additional Luna 10 µm-PREP Scout/Pilot Scale columns, see p. 399  
 For Bulk Media, see p. 400



Method development column kits and method validation column kits are available. Contact Phenomenex for details.

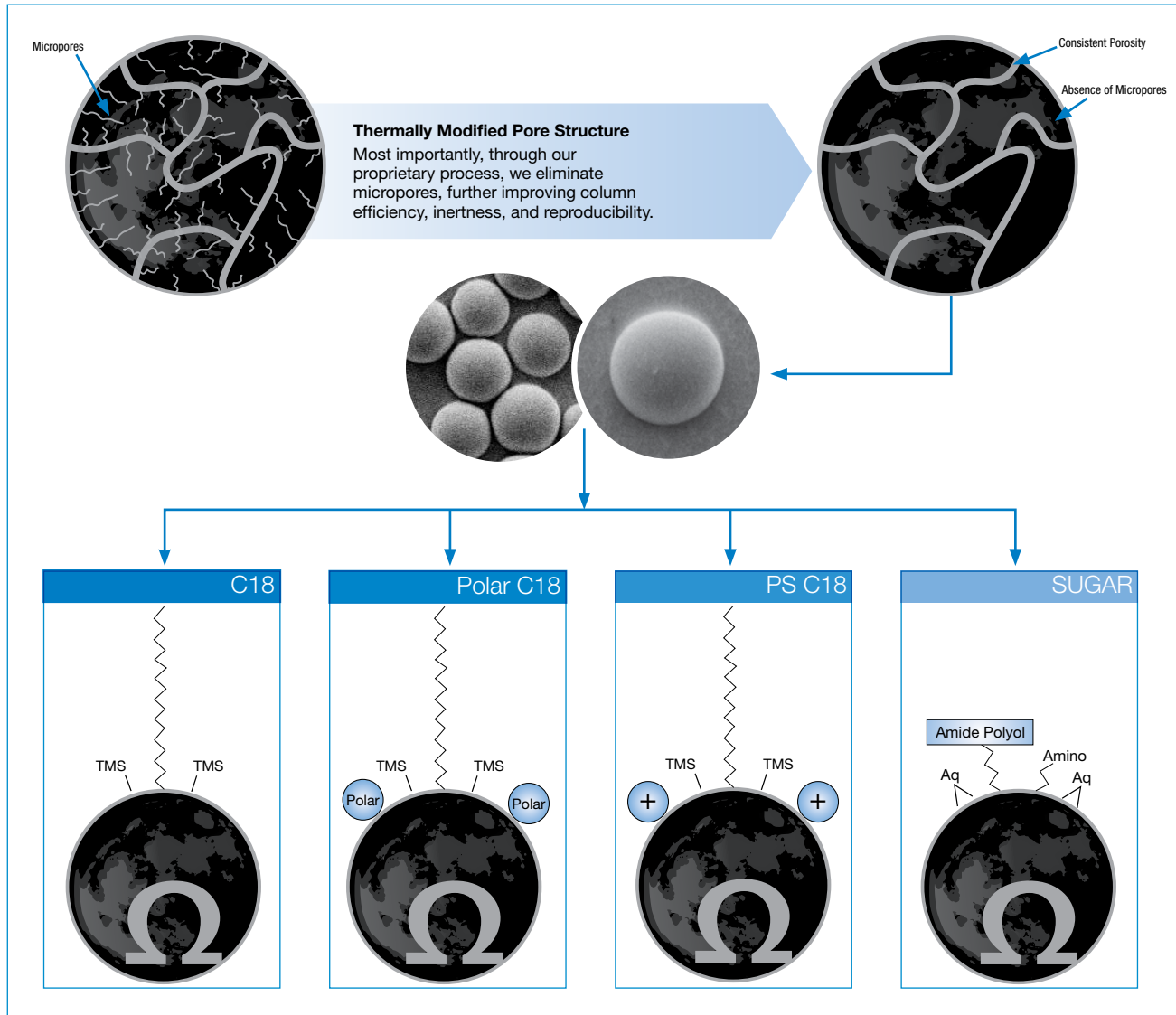


Improve analyte sensitivity and reduce baseline noise with Strata SPE tubes and well plates, see p. 70 for more information

## Luna Omega Silica

The Luna Omega 1.6µm, 3µm, and 5µm particles build upon the Luna legacy with an innovative yet rugged UHPLC and HPLC silica particle architecture. The novel manufacturing process implements a proprietary processing technique to gain greater particle inertness, a stronger particle morphology, and more consistent porosity.

### Thermally Modified Fully Porous Particle Technology

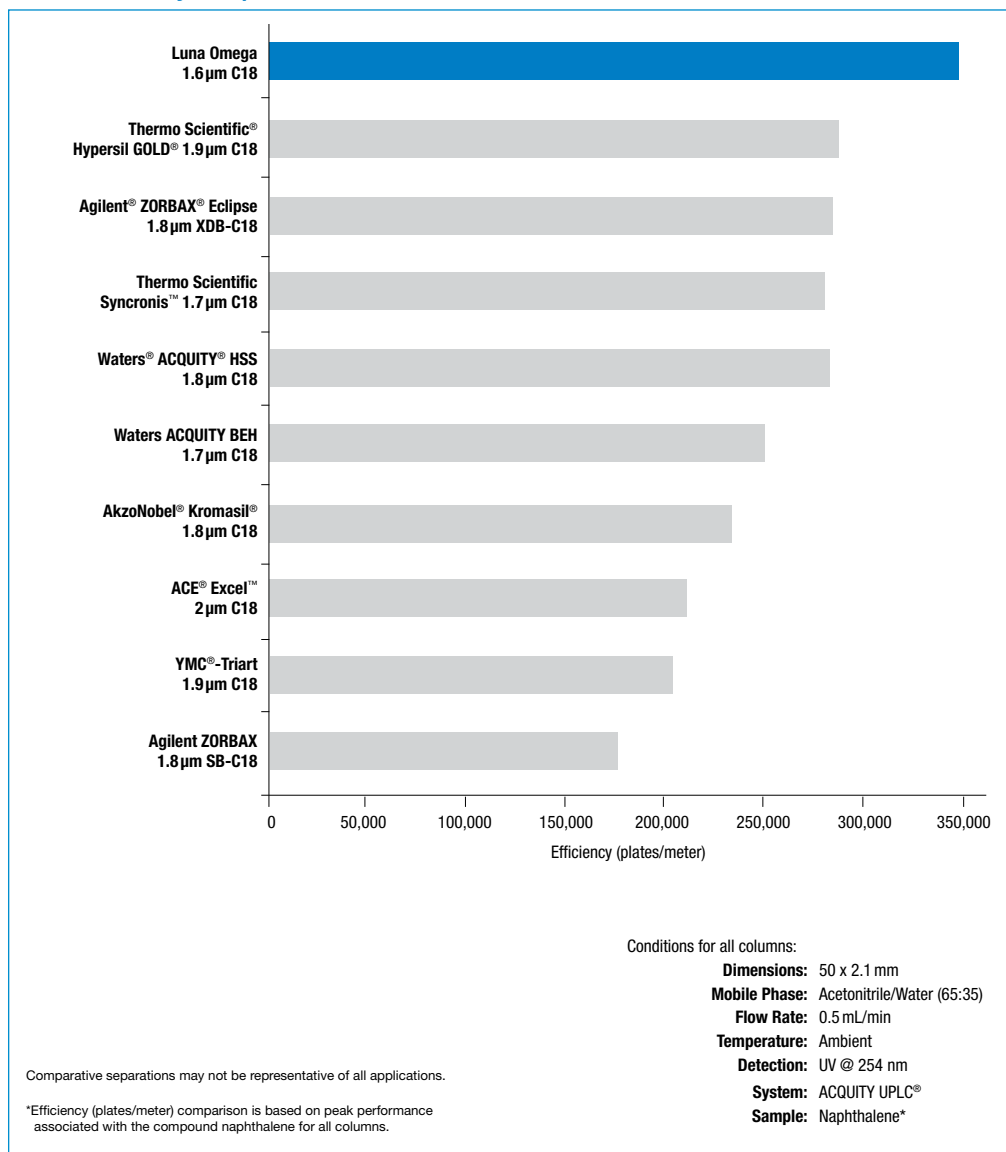


## Astounding Performance

The undeniably high efficiency levels found in each Luna Omega UHPLC column provide you with the potential of huge gains in method performance. While traditional silica and hybrid fully porous

particles claim high performance, when compared to Luna Omega 1.6 $\mu$ m, they drastically fall short and prevent UHPLC scientists from reaching their UHPLC potential

### UHPLC Efficiency Comparison



Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP<sup>™</sup> products on pp. 417-418



## Luna Omega C18

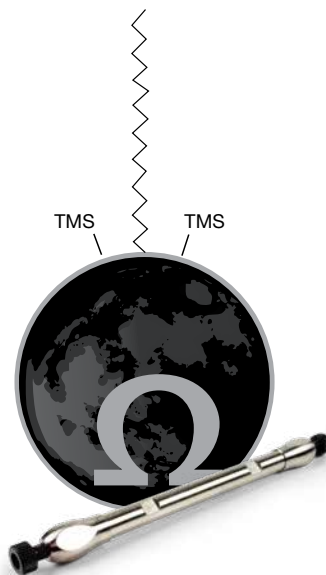
Luna Omega C18 is an excellent first choice for chromatographers who are just starting method development or attempting to improve upon existing chromatographic results with other C18s. With its higher performance potential, excellent retention profile, and greater inertness, the Luna Omega C18 was designed to be the new all-purpose UHPLC to HPLC to PREP LC solution with next level scalable reproducibility for industries all over the world.

### Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
C18	1.6, 3, 5	100	260	11	1.5 - 8.5*	1034/600**	L1

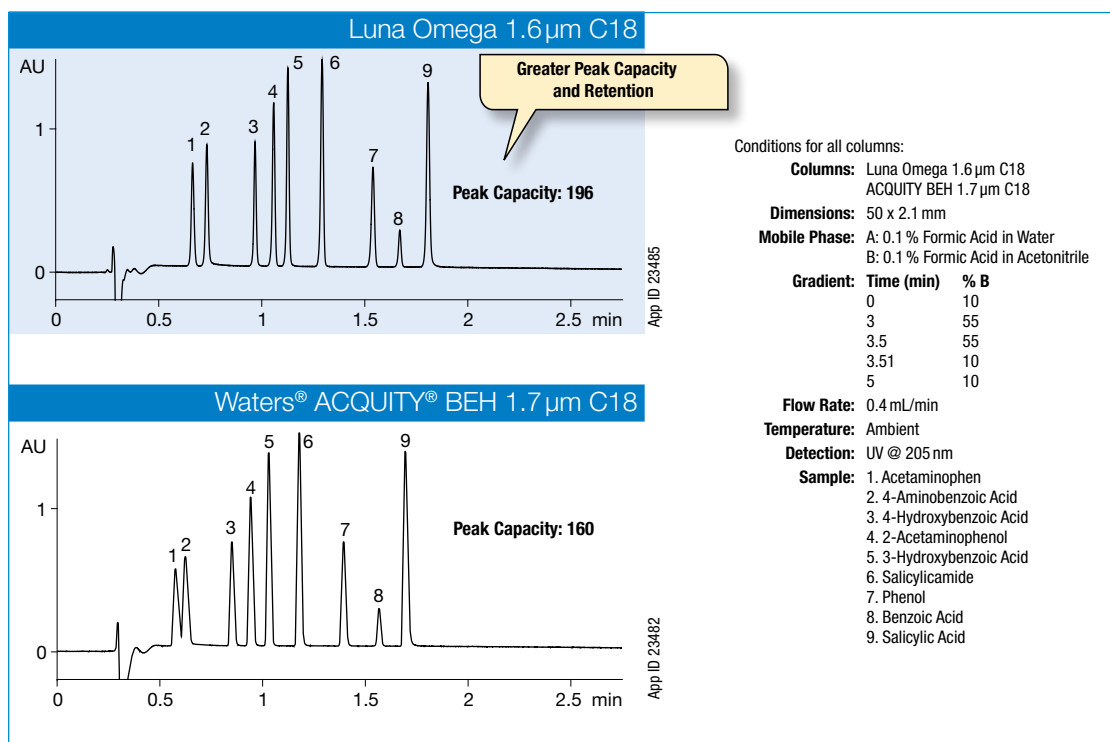
\*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

\*\*1.6 µm Luna Omega columns are pressure stable up to 1034 bar and 3 or 5 µm are stable up to 600 bar.



### Greater Retention and Better Results

Higher efficiency levels in combination with excellent stationary phase coverage and greater particle inertness, translates to improved separation power for you. Now you can utilize the greater retention of Luna Omega C18 to tackle both easy and difficult separations.



Comparative separations may not be representative of all applications.

## Generating the Next Level Of Reliability Through Advanced Process Optimization

Over the past three years, our scientists and engineers with the help of customers and Danaher colleagues, have optimized our processes to provide products that deliver very high levels of performance and newly achievable levels of reliability and reproducibility.

## Reproducible and Scalable

By setting a new standard for reliability, the Luna Omega C18 spans UHPLC and HPLC with a scalable range of high-performance particle sizes that will ensure that your developed methods are easily transferred. From single compound identification to complex impurity profiles, the Luna Omega C18 will serve as a pillar for your lab to count on day in and day out.

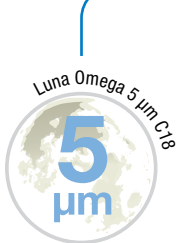


### Batch-to-Batch Reproducibility Study

In this example, we compared three batches of Luna Omega C18 using all three different particle sizes on a complex QC Pharmaceutical representative sample.

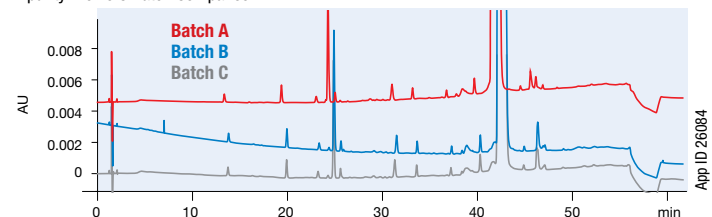
Conditions for all columns:

- Mobile Phase:** A: Water with 0.1 % Formic Acid  
B: Acetonitrile with 0.1 % Formic Acid
- Temperature:** 30 °C
- Detection:** UV @ 254 nm
- Injection Volume:** 5 µL
- Sample:** 5 mg/mL of Chlorhexidine and Related Substances



#### Luna Omega 5 µm C18

Impurity Profile 3 Batch Comparison



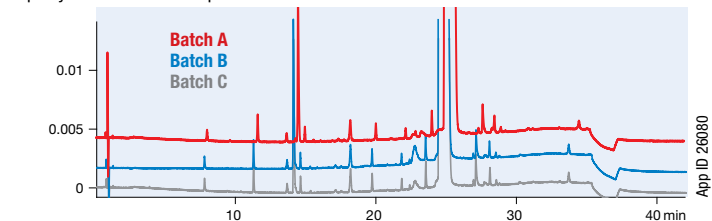
Column: Luna Omega 5 µm C18  
Dimension: 250 x 4.6 mm  
Part No.: [00G-4785-E0](#)

Gradient: Time (min)	% B
0	2
2.5	2
52.5	35
55	35
57.5	2
62.5	2



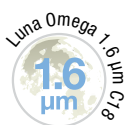
#### Luna Omega 3 µm C18

Impurity Profile 3 Batch Comparison



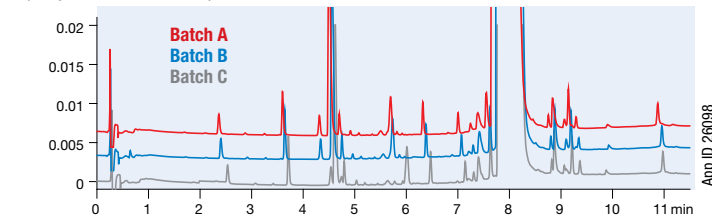
Column: Luna Omega 3 µm C18  
Dimension: 150 x 4.6 mm  
Part No.: [00F-4784-E0](#)

Gradient: Time (min)	% B
0	2
1.5	2
31.5	35
34.5	35
36	2
42	2



#### Luna Omega 1.6 µm C18

Impurity Profile 3 Batch Comparison



Column: Luna Omega 1.6 µm C18  
Dimension: 50 x 2.1 mm  
Part No.: [00B-4742-AN](#)

Gradient: Time (min)	% B
0	2
0.5	2
10.5	35
11.5	35
12	2
14	2

## Luna Omega PS C18

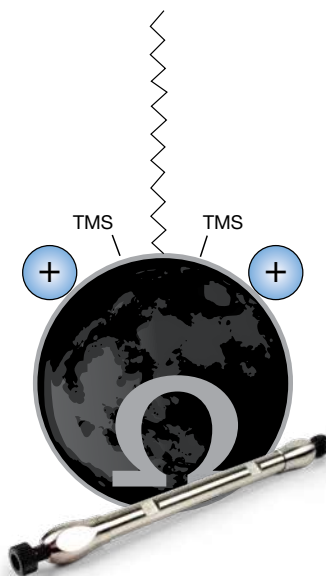
Luna Omega PS C18 is a unique mixed-mode stationary phase that provides incredibly useful polar and non-polar retention. The surface of the PS C18 contains a positive charge which aids in the retention of acidic compounds through ionic interactions, while the C18 ligand promotes general reversed phase retention. This mixed-mode selectivity allows for greater separation between compounds with varying functional groups.

### Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
PS C18	1.6, 3, 5	100	260	9	1.5 - 8.5*	1034/600**	L1

\*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

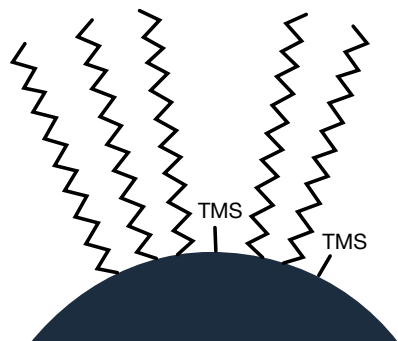
\*\*1.6µm Luna Omega columns are pressure stable up to 1034 bar and 3 or 5µm are stable up to 600 bar.



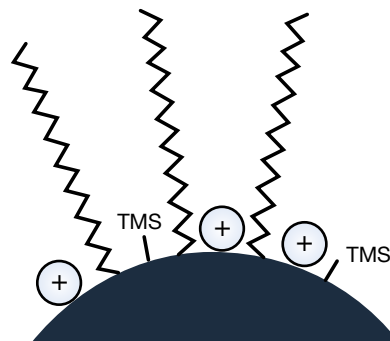
### A C18, But More Positive

Luna Omega PS C18 has been fine-tuned and manufactured by Phenomenex to provide a mixed selectivity that is highly useful for method development involving either combinations of polars and non-polars, or just one single compound class with small changes in functional groups.

Luna Omega C18 silica surface



Luna Omega PS C18 silica surface

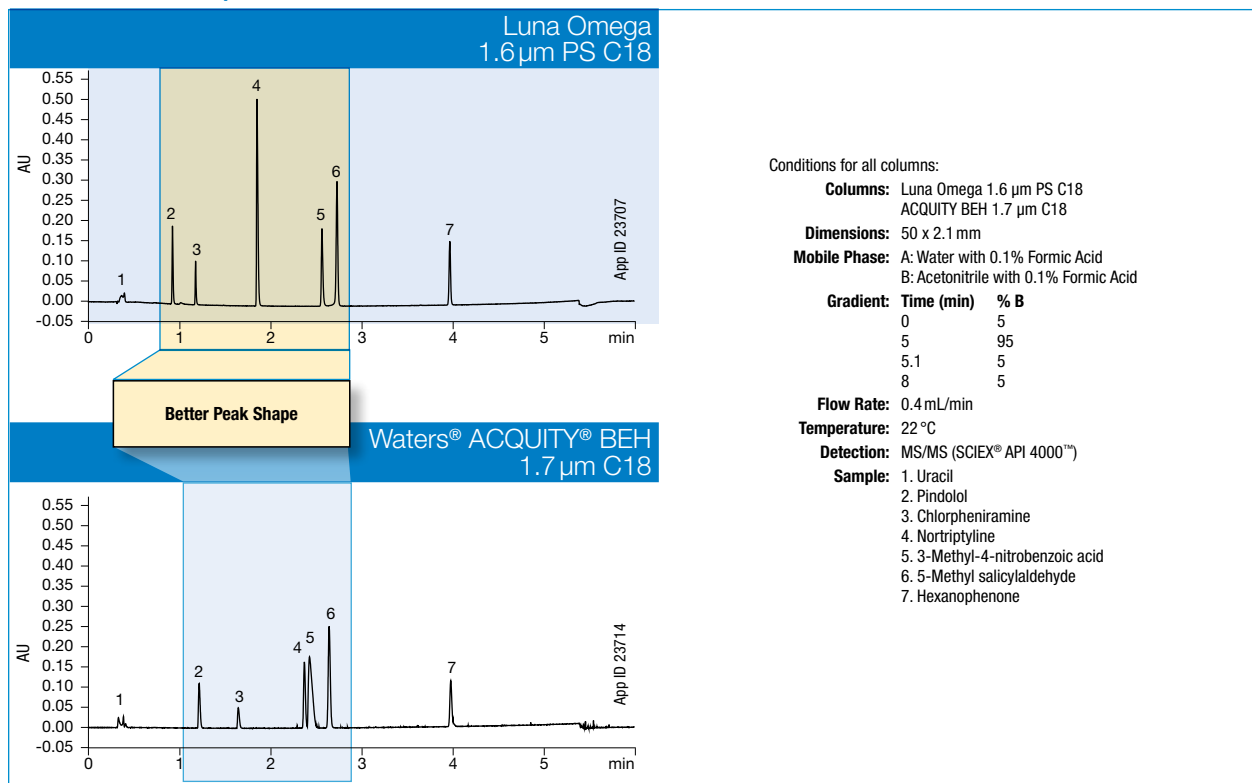


## Luna Omega PS C18 (cont'd)

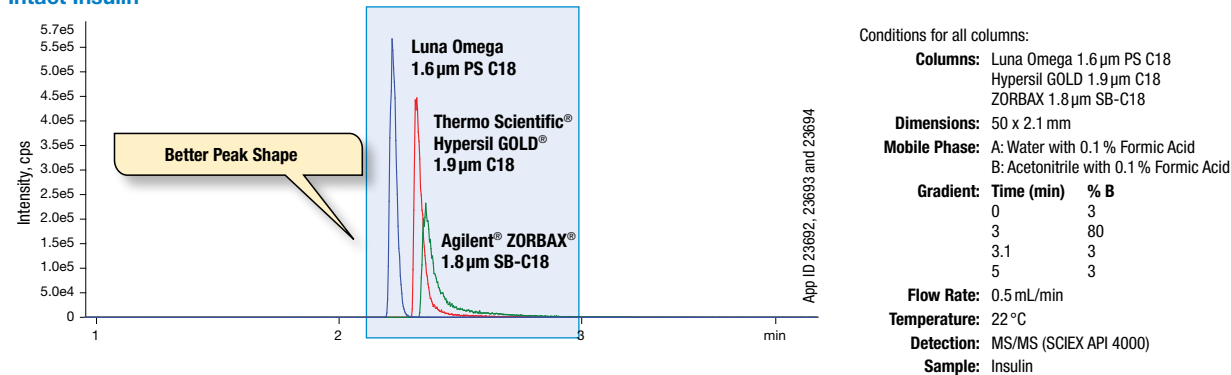
### Better Peak Shape for Bases

While traditional alkyl phases are prone to show tailing for basic compounds because of secondary interactions occurring at the silica surface, the surface of the Luna Omega PS C18 was designed with positive charges that serve to repel strong basic species and consistently display sharp peak shape.

#### Pharmaceutical Compound Mixture



#### Intact Insulin



Comparative separations may not be representative of all applications.

## Luna Omega Polar C18

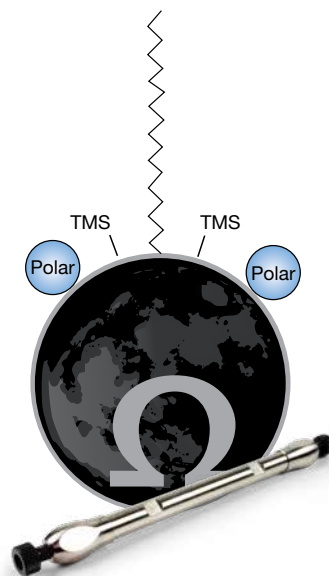
Luna Omega Polar C18 is a novel UHPLC stationary phase capable of providing a unique selectivity within a wide elution window and increased retention for both polar and non-polar analytes. The all-purpose C18 ligand provides hydrophobic interactions while a polar modified particle surface provides enhanced polar retention and also aqueous stability. These attributes make the Luna Omega Polar C18 an excellent choice for balanced retention of polar and hydrophobic compounds as well as to solely enhance retention of highly polar compounds.

### Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
Polar C18	1.6, 3, 5	100	260	9	1.5 - 8.5*	1034/600**	L1

\*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

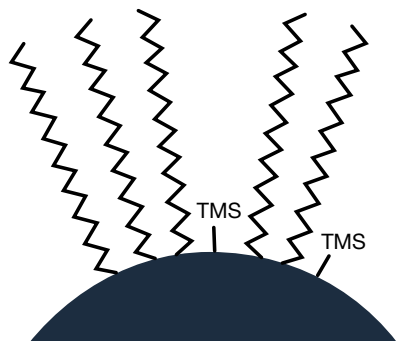
\*\*1.6µm Luna Omega columns are pressure stable up to 1034 bar and 3 or 5µm are stable up to 600 bar.



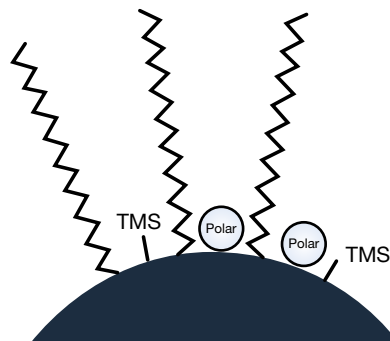
### A C18, But Different

Luna Omega Polar C18 is a uniquely modified C18-based chemistry that has been optimized to improve the performance of polar analyses. This new particle surface chemistry makes the Polar C18 applicable to all industries that utilize UHPLC for mixtures of polar and non-polar compounds.

Luna Omega C18 silica surface



Luna Omega Polar C18 silica surface



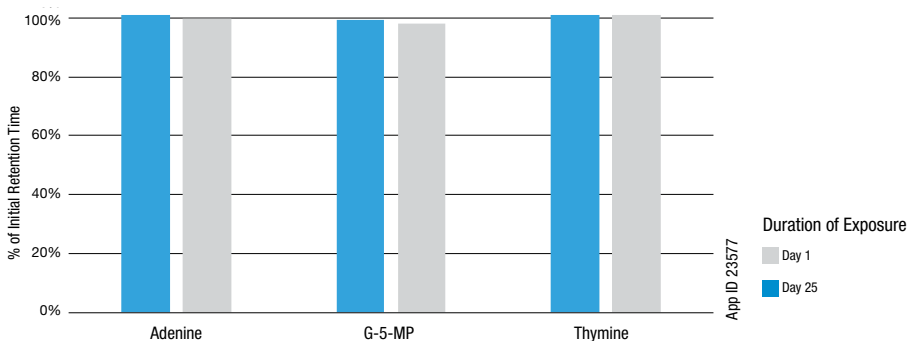


## Luna Omega Polar C18 (cont'd)

### No Stationary Phase Collapse

Traditional C18 phases are known to collapse under 100% aqueous conditions, causing retention loss of compounds and method development headaches. That is why an advanced proprietary bonding technology was used for the Luna Omega Polar C18 in order to ensure aqueous stability. The graph below displays the excellent stability of Polar C18 in 100% aqueous buffer conditions for over 2 weeks.

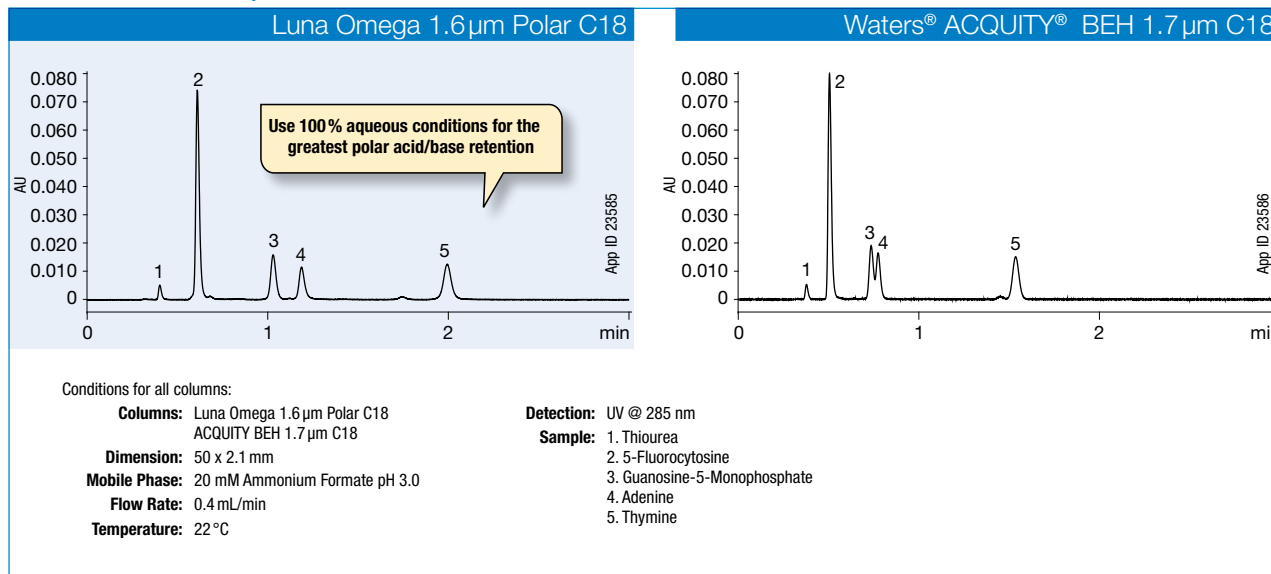
#### Aqueous Stability of Luna Omega Polar C18



Conditions for all columns:

<b>Columns:</b> Luna Omega 1.6 µm Polar C18	<b>Temperature:</b> 22 °C
<b>Dimension:</b> 50 x 2.1 mm	<b>Detection:</b> UV @ 254 nm
<b>Part No.:</b> <a href="#">00B-4748-AN</a>	<b>Sample:</b> 1. Adenine
<b>Mobile Phase:</b> 10 mM Ammonium Formate with 0.1 % Formic Acid	2. Guanosine-5-Monophosphate
<b>Flow Rate:</b> 0.4 mL/min	3. Thymine

#### Nucleosides in 100% Aqueous Conditions



Comparative separations may not be representative of all applications.

## Luna Omega SUGAR

Luna Omega SUGAR breaks ground as it combines the performance benefits of thermally modified fully porous particles with a novel HILIC stationary phase that excels at polar compound retention and selectivity.

- Improved carbohydrate retention and separation with multi-functional selectivity that contains amide/amino stationary phase and polar endcapping
- Enhanced lifetime with highly robust and efficient thermally modified fully porous particle
- QC tested for sugars to ensure reliable quality

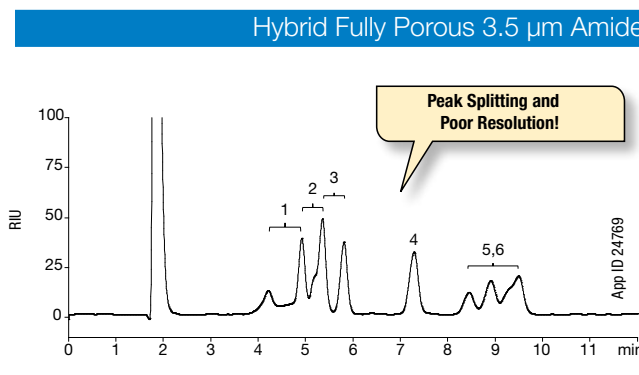
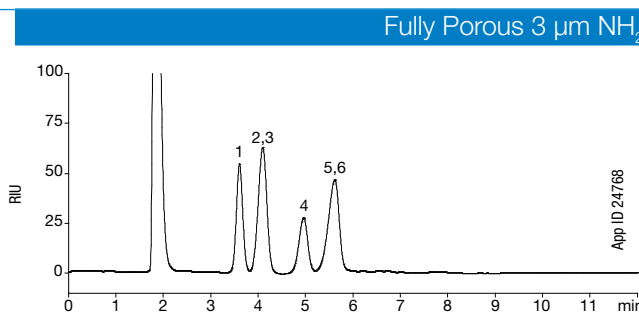
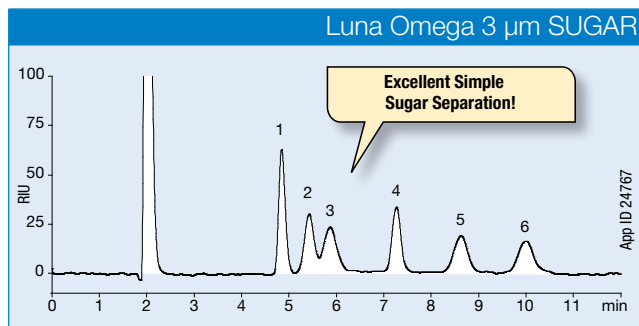
### Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
Luna Omega SUGAR	3	100	260	<2	2.0-7.0	345	L8



## Exceptional Retention and Separation

Luna Omega SUGAR greatly improves upon the retention and separation capabilities of traditional fully porous, core-shell, and hybrid materials, while also allowing for greater peak response! All this while also ensuring that customers do not need to depend on buffers or ion-pair agents to get adequate separation at the cost of losing signal.



Conditions for all columns:

**Columns:** Luna Omega 3 µm SUGAR  
Fully Porous 3 µm NH<sub>2</sub>  
Hybrid Fully Porous 3.5 µm Amide

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** Acetonitrile/Water (75:25)

**Flow Rate:** 1 mL/min

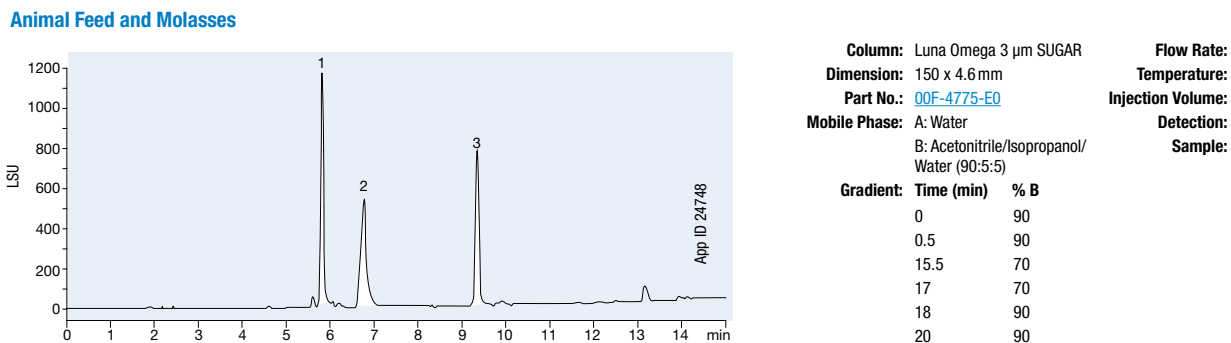
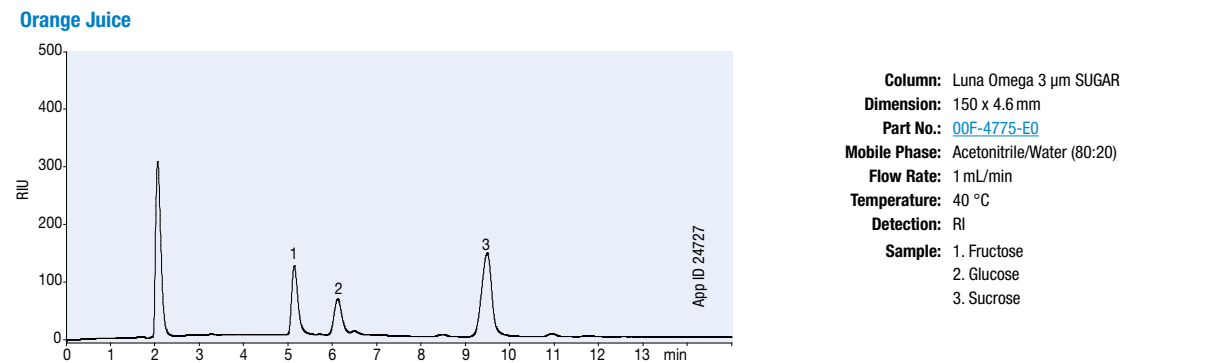
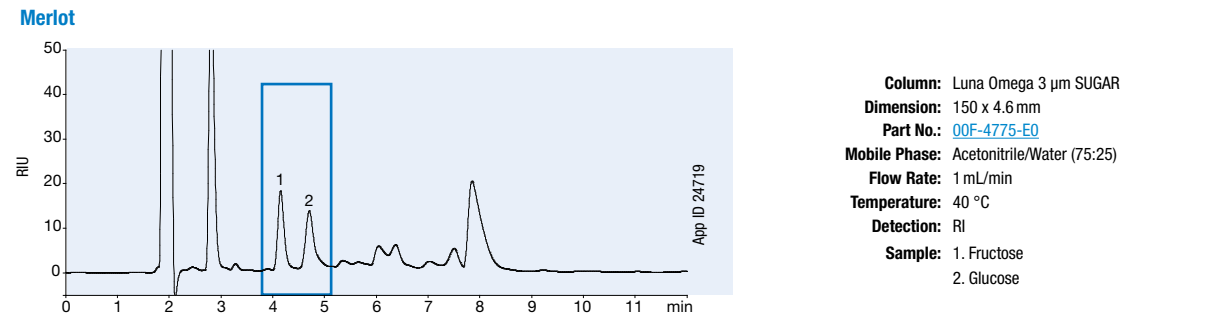
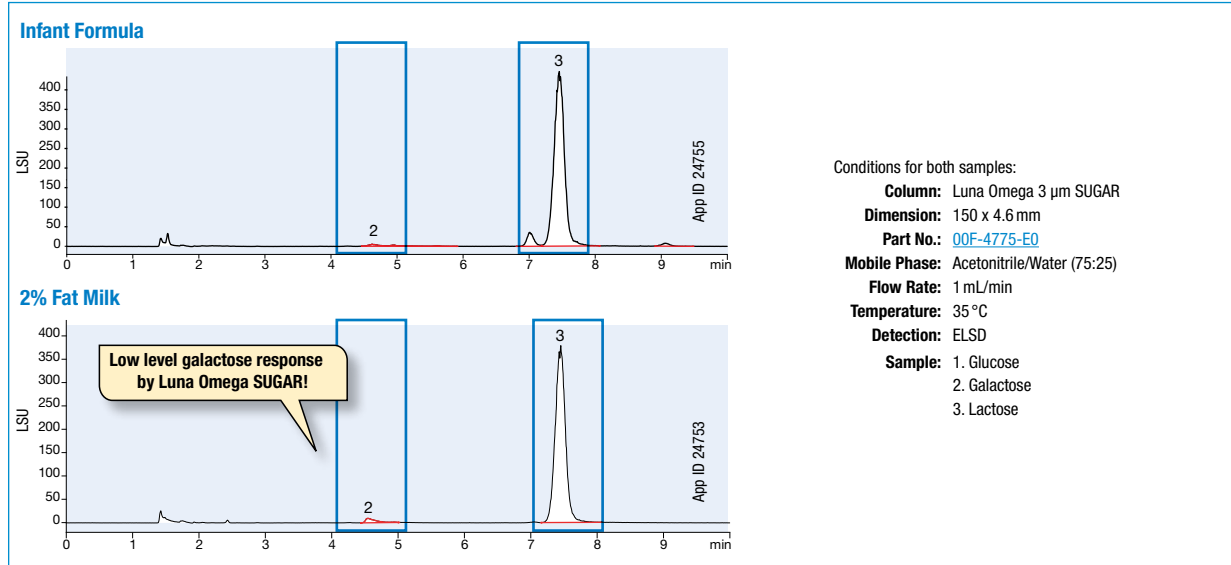
**Temperature:** 25 °C

**Detection:** RI

**Sample:**  
1. Fructose  
2. Glucose  
3. Galactose  
4. Sucrose  
5. Maltose  
6. Lactose

Comparative separations may not be representative of all applications.

## Luna Omega SUGAR (cont'd)



## Ordering Information

1.6 µm Microbore Columns (mm)			
Phases	50 x 1.0	100 x 1.0	150 x 1.0
Polar C18	<a href="#">00B-4748-AO</a>	<a href="#">00D-4748-AO</a>	<a href="#">00F-4748-AO</a>
PS C18	—	<a href="#">00D-4752-AO</a>	—
C18	<a href="#">00B-4742-AO</a>	<a href="#">00D-4742-AO</a>	<a href="#">00F-4742-AO</a>

1.6 µm Minibore Columns (mm)				SecurityGuard™ ULTRA Cartridges†	
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
Polar C18	<a href="#">00A-4748-AN</a>	<a href="#">00B-4748-AN</a>	<a href="#">00D-4748-AN</a>	<a href="#">00F-4748-AN</a>	<a href="#">AJ0-9505</a>
PS C18	<a href="#">00A-4752-AN</a>	<a href="#">00B-4752-AN</a>	<a href="#">00D-4752-AN</a>	<a href="#">00F-4752-AN</a>	<a href="#">AJ0-9508</a>
C18	<a href="#">00A-4742-AN</a>	<a href="#">00B-4742-AN</a>	<a href="#">00D-4742-AN</a>	<a href="#">00F-4742-AN</a>	<a href="#">AJ0-9502</a>

for 2.1 mm ID

3 µm Micro LC Columns (mm)						Trap Column	
Phases	50 x 0.30	100 x 0.30	150 x 0.30	50 x 0.50	100 x 0.50	150 x 0.50	20 x 0.30
Polar C18	<a href="#">00B-4760-AC</a>	<a href="#">00D-4760-AC</a>	<a href="#">00F-4760-AC</a>	<a href="#">00B-4760-AF</a>	<a href="#">00D-4760-AF</a>	<a href="#">00F-4760-AF</a>	—
PS C18	<a href="#">00B-4758-AC</a>	<a href="#">00D-4758-AC</a>	<a href="#">00F-4758-AC</a>	<a href="#">00B-4758-AF</a>	<a href="#">00D-4758-AF</a>	<a href="#">00F-4758-AF</a>	<a href="#">05M-4758-AC</a>

3 µm Minibore Columns (mm)				SecurityGuard Cartridges (mm)	
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	4 x 2.0* /10 pk
Polar C18	<a href="#">00A-4760-AN</a>	<a href="#">00B-4760-AN</a>	<a href="#">00D-4760-AN</a>	<a href="#">00F-4760-AN</a>	<a href="#">AJ0-7600</a>
PS C18	<a href="#">00A-4758-AN</a>	<a href="#">00B-4758-AN</a>	<a href="#">00D-4758-AN</a>	<a href="#">00F-4758-AN</a>	<a href="#">AJ0-7605</a>
C18	—	<a href="#">00B-4784-AN</a>	<a href="#">00D-4784-AN</a>	<a href="#">00F-4784-AN</a>	<a href="#">AJ0-7611</a>
SUGAR	—	<a href="#">00B-4775-AN</a>	<a href="#">00D-4775-AN</a>	<a href="#">00F-4775-AN</a>	<a href="#">AJ0-4496</a>

for ID: 2.0-3.0 mm

3 µm MidBore™ Columns (mm) (cont'd)			SecurityGuard Cartridges (mm)	
Phases	50 x 3.0	100 x 3.0	150 x 3.0	4 x 2.0* /10 pk
Polar C18	<a href="#">00B-4760-YO</a>	<a href="#">00D-4760-YO</a>	<a href="#">00F-4760-YO</a>	<a href="#">AJ0-7600</a>
PS C18	<a href="#">00B-4758-YO</a>	<a href="#">00D-4758-YO</a>	<a href="#">00F-4758-YO</a>	<a href="#">AJ0-7605</a>
C18	<a href="#">00B-4784-YO</a>	<a href="#">00D-4784-YO</a>	<a href="#">00F-4784-YO</a>	<a href="#">AJ0-7611</a>
SUGAR	—	—	<a href="#">00F-4775-YO</a>	<a href="#">AJ0-4496</a>

for ID: 2.0-3.0 mm

3 µm Analytical Columns (mm)				SecurityGuard Cartridges (mm)	
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0* /10 pk
Polar C18	<a href="#">00B-4760-E0</a>	<a href="#">00D-4760-E0</a>	<a href="#">00F-4760-E0</a>	<a href="#">00G-4760-E0</a>	<a href="#">AJ0-7601</a>
PS C18	<a href="#">00B-4758-E0</a>	<a href="#">00D-4758-E0</a>	<a href="#">00F-4758-E0</a>	<a href="#">00G-4758-E0</a>	<a href="#">AJ0-7606</a>
C18	<a href="#">00B-4784-E0</a>	<a href="#">00D-4784-E0</a>	<a href="#">00F-4784-E0</a>	<a href="#">00G-4784-E0</a>	<a href="#">AJ0-7612</a>
SUGAR	—	<a href="#">00D-4775-E0</a>	<a href="#">00F-4775-E0</a>	<a href="#">00G-4775-E0</a>	<a href="#">AJ0-4495</a>

for ID: 3.2-8.0 mm

5 µm Minibore and MidBore™ Columns (mm)						SecurityGuard Cartridges (mm)	
Phases	50 x 2.1	100 x 2.1	150 x 2.1	50 x 3.0	100 x 3.0	150 x 3.0	4 x 2.0* /10 pk
Polar C18	<a href="#">00B-4754-AN</a>	<a href="#">00D-4754-AN</a>	<a href="#">00F-4754-AN</a>	<a href="#">00B-4754-YO</a>	<a href="#">00D-4754-YO</a>	<a href="#">00F-4754-YO</a>	<a href="#">AJ0-7600</a>
PS C18	<a href="#">00B-4753-AN</a>	<a href="#">00D-4753-AN</a>	<a href="#">00F-4753-AN</a>	<a href="#">00B-4753-YO</a>	<a href="#">00D-4753-YO</a>	<a href="#">00F-4753-YO</a>	<a href="#">AJ0-7605</a>

for ID: 2.0 - 3.0 mm

5 µm Analytical Columns (mm)				SecurityGuard Cartridges (mm)	
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0* /10 pk
Polar C18	<a href="#">00B-4754-E0</a>	<a href="#">00D-4754-E0</a>	<a href="#">00F-4754-E0</a>	<a href="#">00G-4754-E0</a>	<a href="#">AJ0-7601</a>
PS C18	<a href="#">00B-4753-E0</a>	<a href="#">00D-4753-E0</a>	<a href="#">00F-4753-E0</a>	<a href="#">00G-4753-E0</a>	<a href="#">AJ0-7606</a>
C18	<a href="#">00B-4785-E0</a>	<a href="#">00D-4785-E0</a>	<a href="#">00F-4785-E0</a>	<a href="#">00G-4785-E0</a>	<a href="#">AJ0-7612</a>

for ID: 3.2-8.0 mm

5 µm Semi-Preparative Columns (mm)		SecurityGuard Cartridges (mm)	
Phases	250 x 10	10 x 10** /3 pk	
Polar C18	<a href="#">00G-4754-NO</a>	<a href="#">AJ0-9519</a>	
PS C18	<a href="#">00G-4753-NO</a>	<a href="#">AJ0-9520</a>	

for ID: 9-16 mm

5 µm Axia™ Packed Preparative Columns (mm)				SecurityGuard Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	15 x 21.2** /ea
Polar C18	<a href="#">00B-4754-P0-AX</a>	<a href="#">00D-4754-P0-AX</a>	<a href="#">00F-4754-P0-AX</a>	<a href="#">00G-4754-P0-AX</a>	<a href="#">AJ0-7603</a>
PS C18	<a href="#">00B-4753-P0-AX</a>	<a href="#">00D-4753-P0-AX</a>	<a href="#">00F-4753-P0-AX</a>	<a href="#">00G-4753-P0-AX</a>	<a href="#">AJ0-7608</a>
C18	—	—	—	<a href="#">00G-4785-P0-AX</a>	—

for ID: 18-29 mm

5 µm Axia™ Packed Preparative Columns (mm) (cont'd)				SecurityGuard Cartridges (mm)	
Phases	100 x 30	150 x 30	250 x 30	250 x 50	15 x 30.0* /ea
Polar C18	<a href="#">00D-4754-U0-AX</a>	<a href="#">00F-4754-U0-AX</a>	<a href="#">00G-4754-U0-AX</a>	<a href="#">00G-4754-V0-AX</a>	<a href="#">AJ0-7604</a>
PS C18	<a href="#">00D-4753-U0-AX</a>	<a href="#">00F-4753-U0-AX</a>	<a href="#">00G-4753-U0-AX</a>	<a href="#">00G-4753-V0-AX</a>	<a href="#">AJ0-7609</a>

for ID: 30-49 mm



For 5 µm Luna Omega Micro LC Columns, Traps, and Fittings, see p. 361

† SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

\* SecurityGuard Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

\*\*\*SemiPREP SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

\*\*PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)

◆PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8277](#)

## Coated and Immobilized Polysaccharide Chiral Phases that offer Broad Enantioselectivity

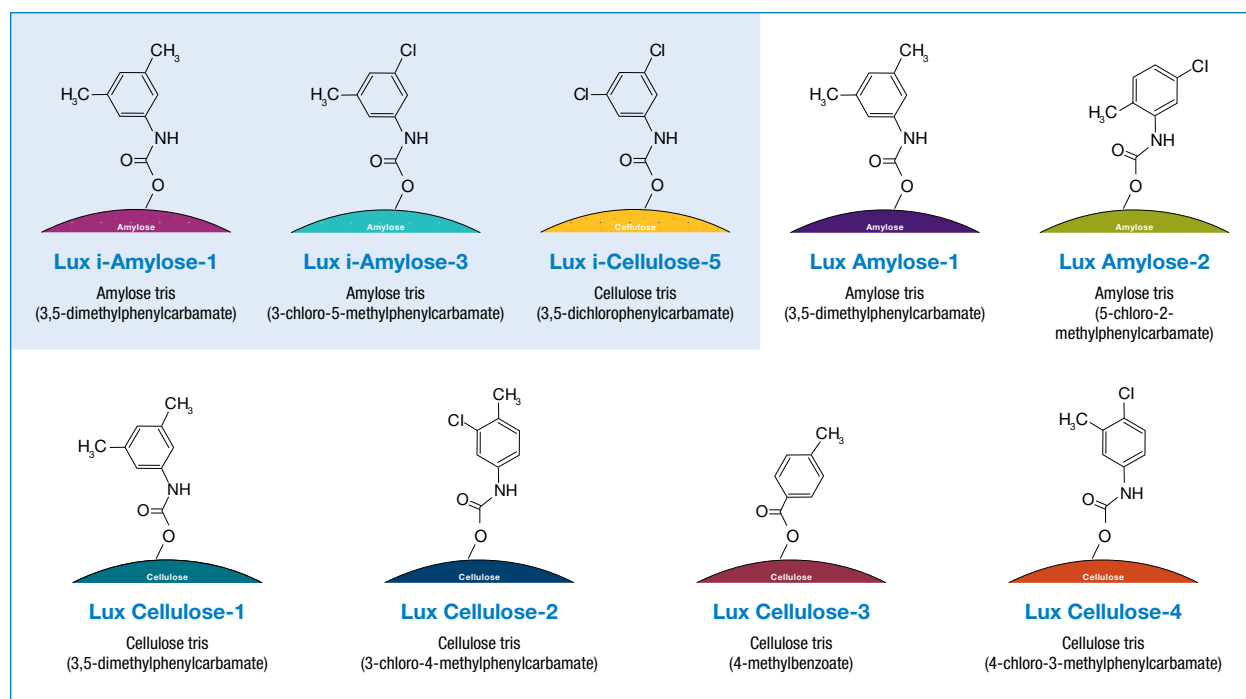
Lux coated and immobilized chiral columns are guaranteed to perform similar to or better than the equivalent DAICEL Chiral Technologies column of matching polysaccharide backbone and chiral selector at considerable cost savings. Lux phases can also provide alternative selectivity to other chiral selectors when separation is not achieved or when higher resolution is required.

### Technical Specifications

Particle Size	3, 5, 10 <sup>1</sup> , 20 <sup>1</sup> μm
pH Stability	2-9
Stability	Normal phase, polar organic, SFC, and reversed phase conditions
Maximum Pressure	300 bar
Temperature Range	0-50 °C
Shipping Solvent	n-Hexane/2-propanol (9:1, v/v)
Switching Solvent	Methanol/Ethanol (9:1, v/v)

<sup>1</sup>Please inquire for availability

### Resolve Over 92% of Your Enantiomers with Our Nine Coated and Immobilized Phases!



### Easily upgrade from your existing chiral columns to Lux LC/SFC columns!

If you are using one of the DAICEL <sup>®</sup> columns below:	Guaranteed alternative:	Phase description:
CHIRALPAK <sup>®</sup> IA <sup>®</sup>	<b>Lux i-Amylose-1</b>	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK IG <sup>®</sup> and IG-3	<b>Lux i-Amylose-3</b>	Amylose tris(3-chloro-5-methylphenylcarbamate)
CHIRALPAK IC <sup>®</sup> and IC-3	<b>Lux i-Cellulose-5</b>	Cellulose tris(3,5-dichlorophenylcarbamate)
CHIRALPAK AD <sup>®</sup> , AD-H <sup>®</sup> , AD-3, AD-RH <sup>®</sup> , and AD-3R	<b>Lux Amylose-1</b>	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK AY <sup>®</sup> , AY-H <sup>®</sup> , AY-3, AY-RH, and AY-3R	<b>Lux Amylose-2</b>	Amylose tris(5-chloro-2-methylphenylcarbamate)
CHIRALCEL <sup>®</sup> OD <sup>®</sup> , OD-H <sup>®</sup> , OD-3, OD-RH <sup>®</sup> , and OD-3R	<b>Lux Cellulose-1</b>	Cellulose tris(3,5-dimethylphenylcarbamate)
CHIRALCEL OZ, OZ-H <sup>®</sup> , OZ-3, OZ-RH, and OZ-3R	<b>Lux Cellulose-2</b>	Cellulose tris(3-chloro-4-methylphenylcarbamate)
CHIRALCEL OJ <sup>®</sup> , OJ-H <sup>®</sup> , OJ-3, OJ-RH <sup>®</sup> , and OJ-3R	<b>Lux Cellulose-3</b>	Cellulose tris(4-methylbenzoate)
CHIRALCEL OX-H, OX-3, OX-RH, and OX-3R	<b>Lux Cellulose-4</b>	Cellulose tris(4-chloro-3-methylphenylcarbamate)

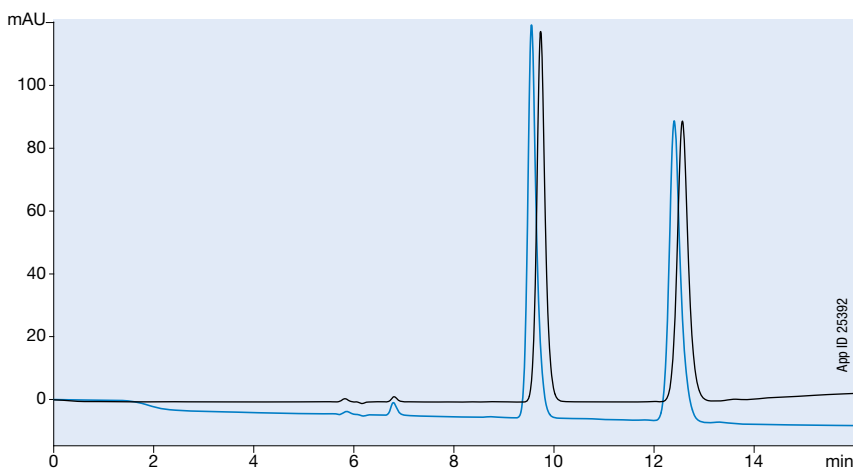


## Lux Immobilized Chiral Selectors

The immobilization and bonding technology used within the Lux i-Amylose-3 promotes column stability in strong organic solvents, which affords you the ability to expand your chiral separation success with more solvent systems and separation modes. Below is an example of stable retention time, separation, and peak shape

after exposure to strong solvents for both 5 and 3 μm particle sizes. The exposure to aggressive solvents DCM and THF did not affect the excellent performance of these Lux i-Amylose-3 columns. In addition, bonding technology that promotes robust reproducibility.

### Strong Solvent Stability and Robustness



\*Aggressive solvent stability was tested by flushing columns with DCM followed by THF before rerunning in mobile phase.

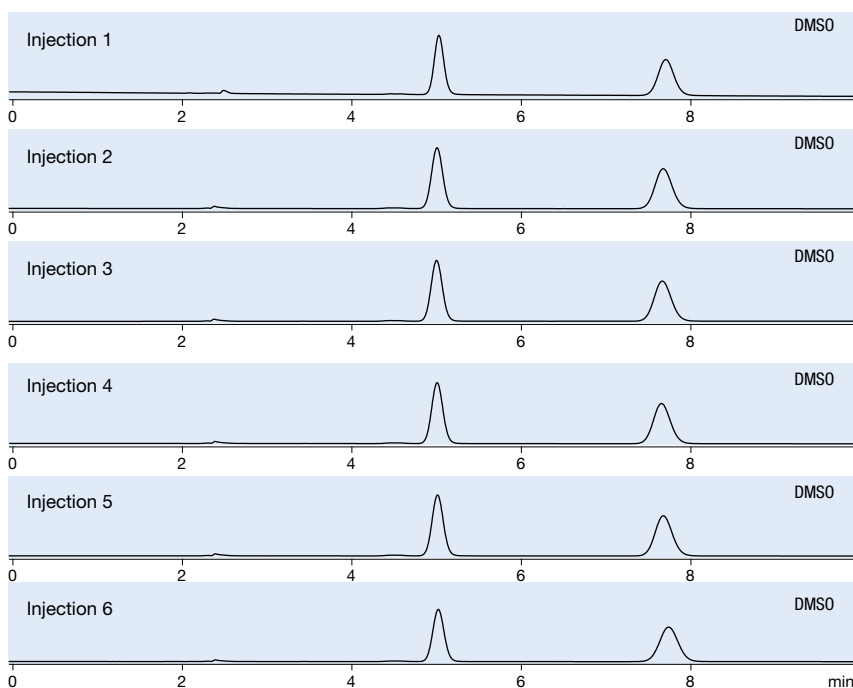
Conditions for all separations:  
**Columns:** Lux 5 μm i-Amylose-3  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** [00G-4779-E0](#)  
**Mobile Phase:** Hexane/Isopropanol with 0.1% Diethylamine (80/20)  
**Flow Rate:** 0.5 mL/min  
**Injection Volume:** 10 μL (2 mg/mL)  
**Detection:** UV @ 220 nm  
**Sample:** 1. Trans-Stilbene Oxide  
 2. Trans-Stilbene Oxide

■ Before Exposure to Strong Solvents (DCM & THF)\*  
 ■ After Exposure



### Load Samples in Desired Strong Solvents

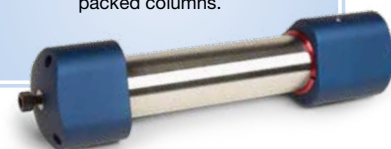
With the strong solvent stability of the Lux immobilized phases (i-Amylose-3, i-Cellulose-5 and i-Amylose-1) comes the ability to keep samples diluted in the strong organic solvents that are needed for sample solubility or are directly from a reaction mixture.



Conditions for all separations:  
**Column:** Lux 5 μm i-Cellulose-5  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** [00G-4756-E0](#)  
**Mobile Phase:** Methanol/DEA (100:0.1)  
**Flow Rate:** 1.5 mL/min  
**Detection:** UV @ 280 nm  
**Temperature:** 27 °C  
**Sample:** Laudanosine  
**Dilution Solvent:** Dimethyl Sulfoxide (DMSO)

### Solve compound solubility issues

by loading in strong organic solvents for preparative purifications on extremely robust Lux i-Amylose-3, i-Cellulose-5 and i-Amylose-1 AXIA™ packed columns.



## Lux Chiral Stationary Phases

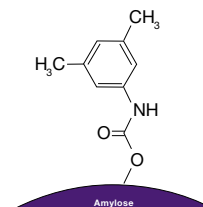
The Lux line of coated and immobilized cellulose-based and amylose-based chiral stationary phases includes nine complementary selectivities.



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

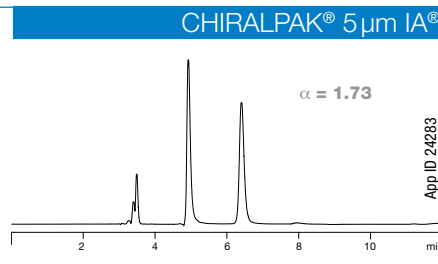
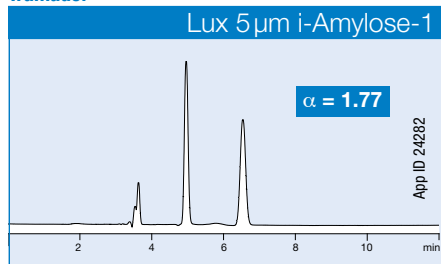
### Lux i-Amylose-1: Immobilized 3,5-Dimethyl Phenylcarbamate Selector

Known to have broad enantio-recognition, this incredibly popular Amylose tris (3,5-dimethylphenylcarbamate) chiral selector provides polar, electrostatic, hydrophobic, van der Waals, and other retention mechanisms.



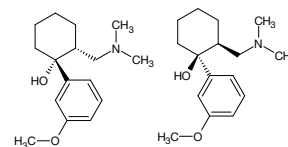
Amylose tris(3,5-dimethylphenylcarbamate)

#### Tramadol



Conditions for both columns:

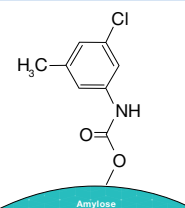
- Dimensions:** 250 x 4.6 mm
- Mobile Phase:** 0.1% DEA in Hexane / 0.1% DEA in IPA (90:10)
- Flow Rate:** 1 mL/min
- Detection:** UV @ 270 nm
- Temperature:** Ambient



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

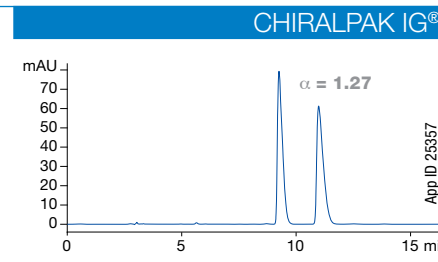
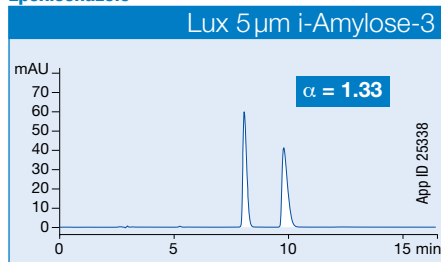
### Lux i-Amylose-3: Immobilized 3-Chloro, 5-Methyl Phenylcarbamate Selector

Lux immobilized chiral stationary phases provide complementary but distinct enantioselectivity for a wide range of chirality. In addition, the immobilization process allows for the use of a wide range of mobile phases and strong solvents, making the Lux immobilized phases an ideal set of chiral phases to start screening with.



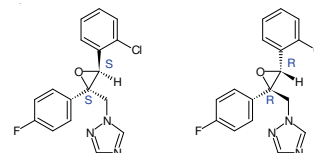
Amylose tris(3-chloro-5-methylphenylcarbamate)

#### Epoxiconazole



Conditions for both columns:

- Dimensions:** 250 x 4.6 mm
- Mobile Phase:** Water with 5 mM Ammonium Acetate + 0.05% Formic Acid/Acetonitrile (35:65)
- Flow Rate:** 1.0 mL/min
- Injection Volume:** 10 μL (2 mg/mL)
- Detection:** UV @ 254 nm
- Temperature:** Ambient



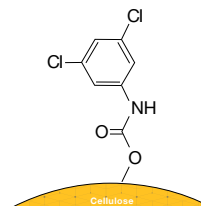
Columns used for comparison were manufactured by DAICEL Corporation. Phenomenex is in no way affiliated with DAICEL Corporation. Comparative separations may not be representative of all applications.



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

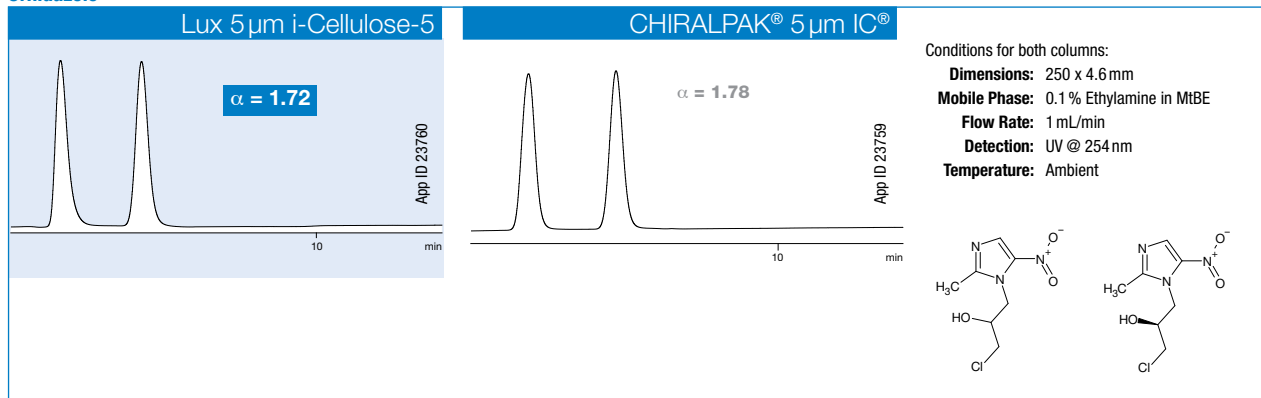
## Lux i-Cellulose-5: Immobilized 3,5-Dichloro Phenylcarbamate Selector

The dichlorophenyl-moiety part of the i-Cellulose-5 selector creates a novel chiral selectivity by way of having two strong electron accepting atoms that draw the electron cloud of the phenyl ring outward.



Cellulose tris(3,5-dichlorophenylcarbamate)

### Omidazole



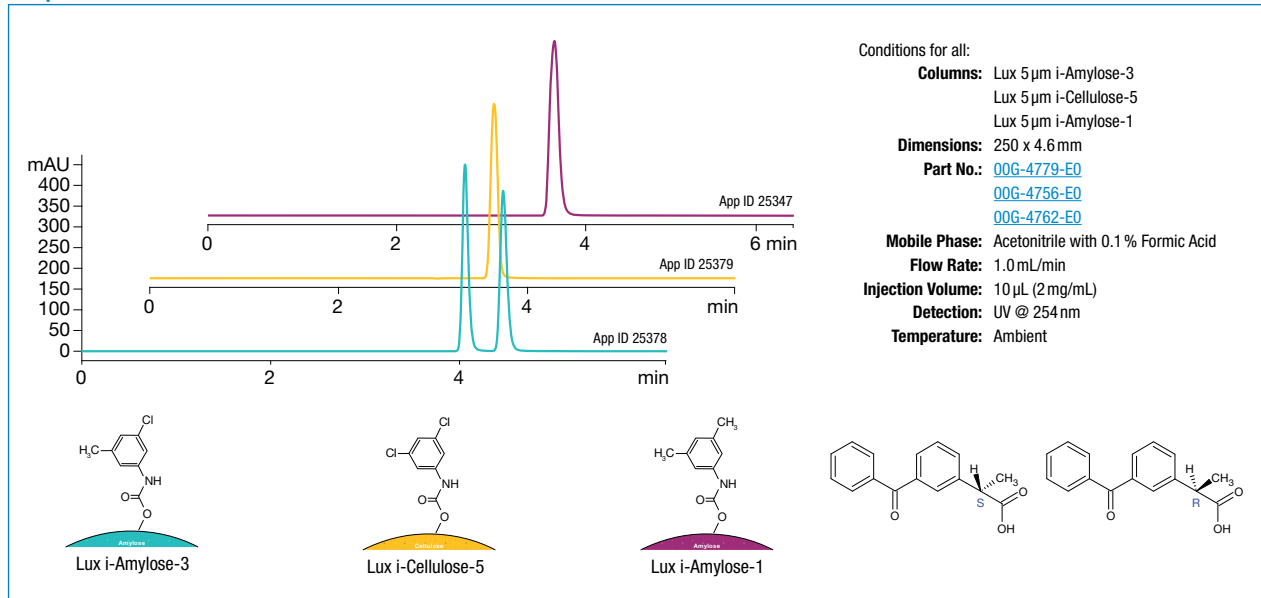
Columns used for comparison were manufactured by DAICEL Corporation. Phenomenex is in no way affiliated with DAICEL Corporation. Comparative separations may not be representative of all applications.



## Immobilized Selectivity Comparison

Lux immobilized chiral columns offer a wide and complementary range of enantioselectivity for chiral separation projects under normal phase, reversed phase, polar ionic, or SFC separation modes. Below is an example of chiral screening using i-Amylose-3, i-Cellulose-5, and i-Amylose-1 under polar ionic conditions.

### Ketoprofen

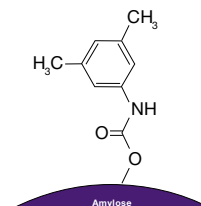




Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

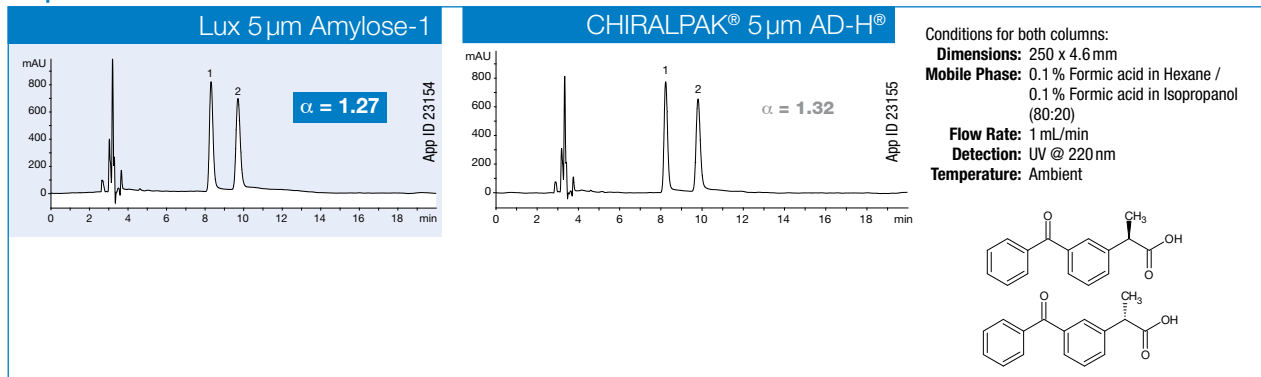
## Lux Amylose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector

This universally trusted amylose phenylcarbamate derivative is absolutely essential to any chiral screen. Lux Amylose-1 is a guaranteed alternative to CHIRALPAK<sup>®</sup> AD<sup>®</sup>. Expect equivalent or better performance when using this Lux phase.



Amylose tris(3,5-dimethylphenylcarbamate)

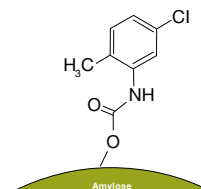
### Ketoprofen



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

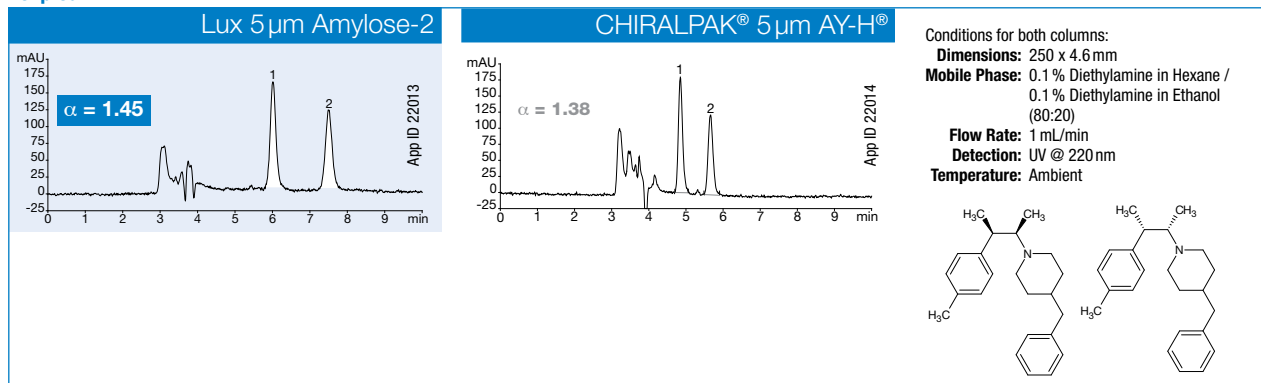
## Lux Amylose-2: Coated 5-Chloro, 2-Methyl Phenylcarbamate Selector

This first-to-market chlorinated amylose phenylcarbamate derivative offers complex chiral recognition components that greatly increase the chances of achieving chiral resolution.



Amylose tris(5-chloro-2-methylphenylcarbamate)

### Ifenprodil



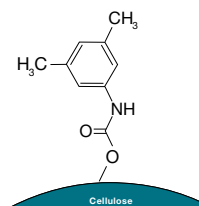
Comparative separations may not be representative of all applications.



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

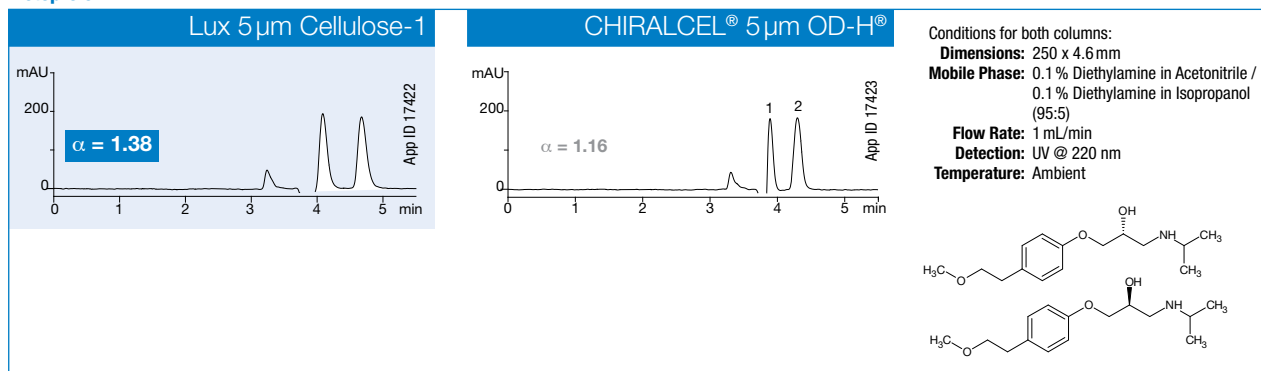
## Lux Cellulose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector

This universally trusted cellulose phenylcarbamate derivative is absolutely essential to any chiral screen. Guaranteed alternative to CHIRALCEL<sup>®</sup> OD-H<sup>®</sup>. Expect equivalent or better performance.



Cellulose tris(3,5-dimethylphenylcarbamate)

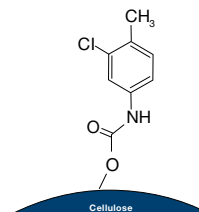
### Metoprolol



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

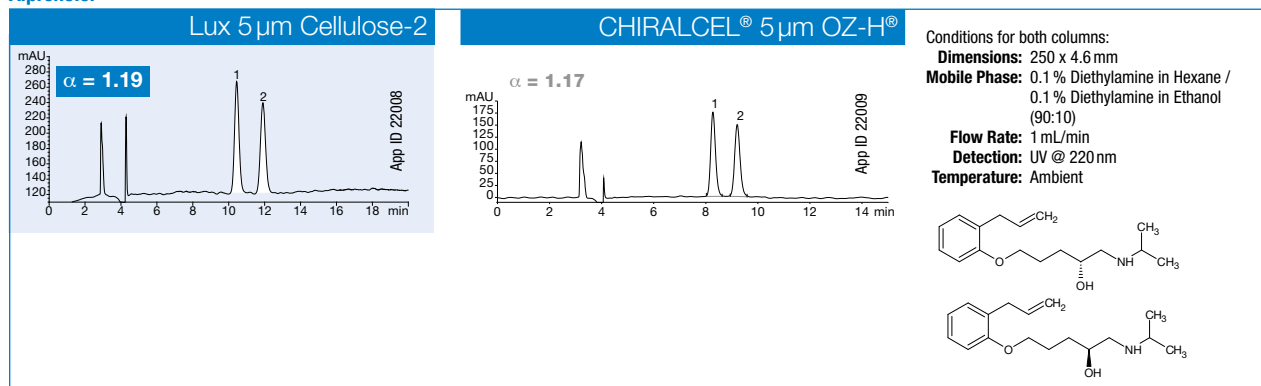
## Lux Cellulose-2: Coated 3-Chloro, 4-Methyl Phenylcarbamate Selector

This first-to-market halogenated cellulose phenylcarbamate derivative offers unique chiral recognition abilities that complement the rest of the Lux family of columns.



Cellulose tris(3-chloro-4-methylphenylcarbamate)

### Alprenolol



Comparative separations may not be representative of all applications.

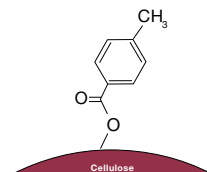




Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

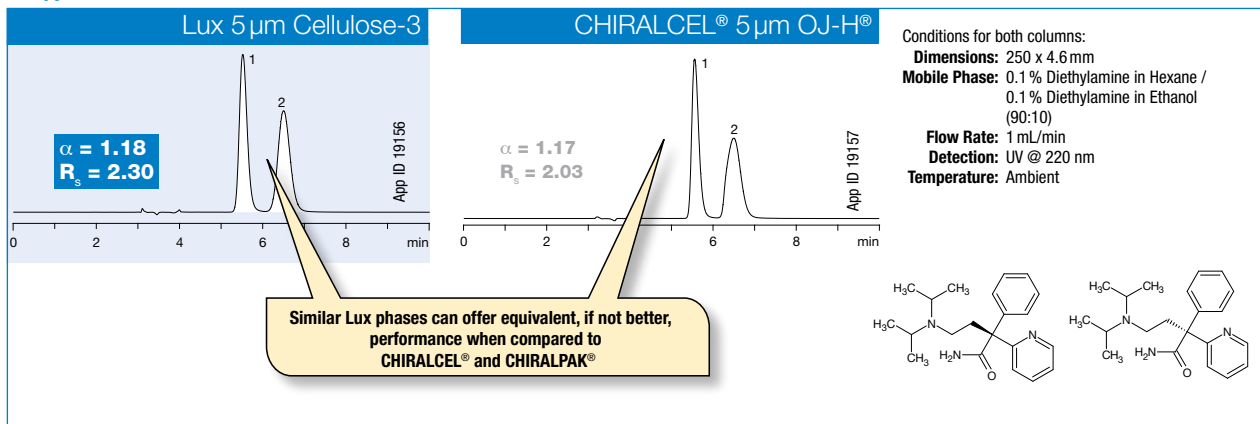
## Lux Cellulose-3: Coated 4-Methyl Phenylacetate Selector

This cellulose methylbenzoate derivative offers distinct and complementary chiral recognition abilities.



Cellulose tris(4-methylbenzoate)

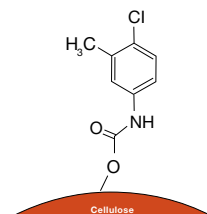
### Disopyramide



Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

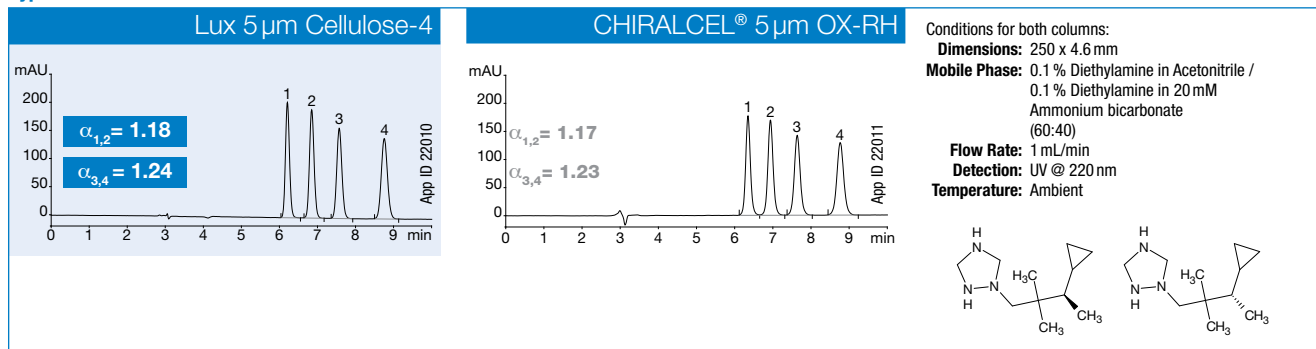
## Lux Cellulose-4: Coated 4-Chloro, 3-Methyl Phenylcarbamate Selector

This chlorinated cellulose phenylcarbamate derivative offers unique chiral recognition abilities.



Cellulose tris(4-chloro-3-methylphenylcarbamate)

### Cyproconazole

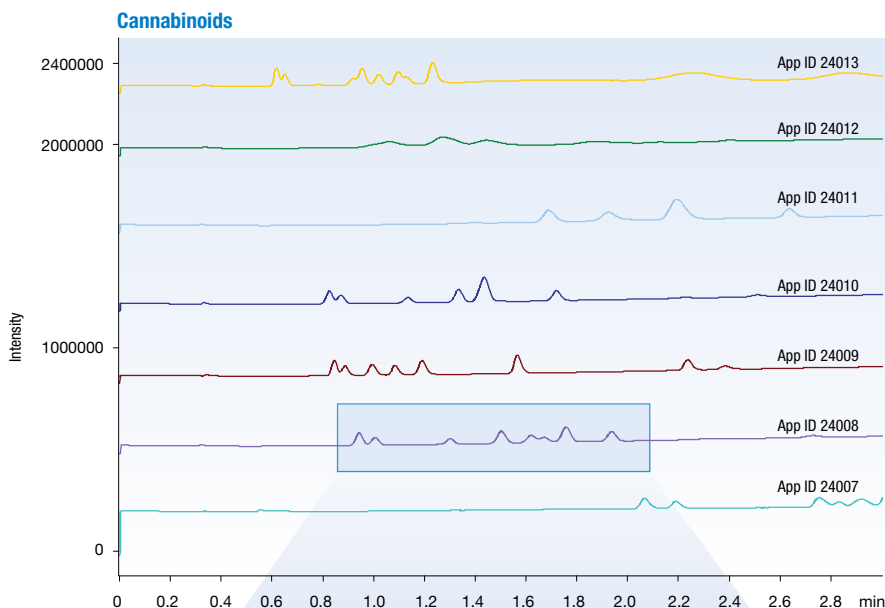


Comparative separations may not be representative of all applications.

## Achiral SFC Success with Chiral Columns!

While the incredible range of interaction mechanisms (polar, electrostatic, hydrophobic, van der Waals, and others) present in each Lux material are fundamental for ensuring baseline separation of chiral compounds, these same interaction mechanisms can also be used as an excellent screening tool for achiral work. Here we

present an achiral screening of natural cannabinoids using 7 Lux selectivities under one SFC mobile phase. The initial resolution and separation provided by the Lux Cellulose-2 was then further optimized to provide even greater resolution.



Conditions for all columns:

**Columns:** Lux 3 µm i-Cellulose-5  
 Lux 3 µm Amylose-2  
 Lux 3 µm Amylose-1  
 Lux 3 µm Cellulose-4  
 Lux 3 µm Cellulose-3  
 Lux 3 µm Cellulose-2  
 Lux 3 µm Cellulose-1

**Dimensions:** 150 x 3.0 mm

**Mobile Phase:** A: Carbon Dioxide  
 B: Methanol

Gradient:	Time (min)	% B
	0	5
	2.5	25
	3	25

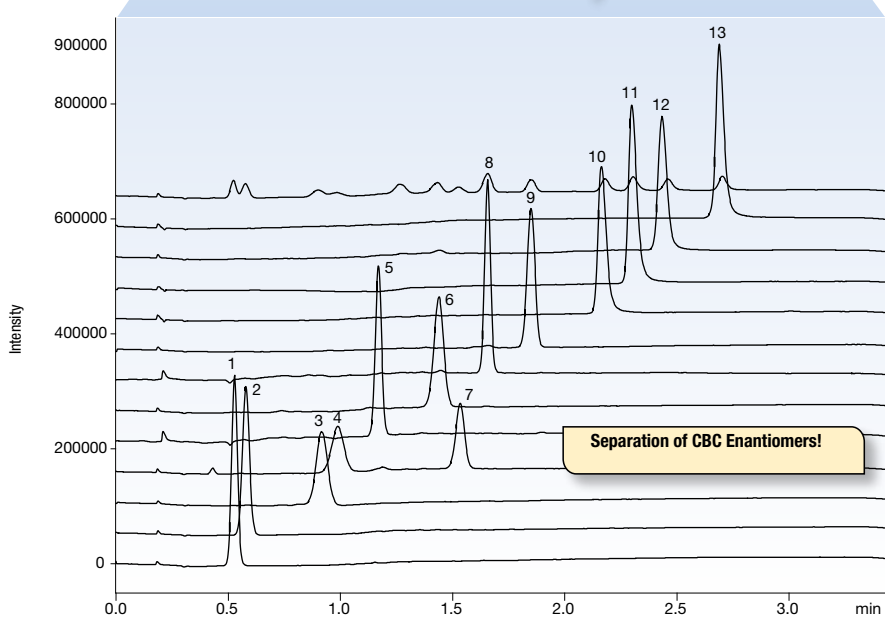
**Flow Rate:** 3 mL/min

**Detection:** UV @ 220 nm

**Temperature:** 40 °C

**Sample:** Cannabinoid mix of 8

Expanded and optimized method separates achiral and chiral species!



**Column:** Lux 3 µm Cellulose-2

**Dimensions:** 150 x 3.0 mm

**Part No.:** [00F-4456-Y0](#)

**Mobile Phase:** A: Carbon Dioxide  
 B: Methanol

Gradient:	Time (min)	% B
	0	4
	3	25
	3.5	25

**Flow Rate:** 5 mL/min

**Detection:** UV @ 220 nm

**Temperature:** 40 °C

**Sample:** Cannabinoid mix of 12

- |                       |           |
|-----------------------|-----------|
| 1. CBDV               | 8. THCV   |
| 2. CBN                | 9. CBG    |
| 3. Delta-8-THC        | 10. CBDA  |
| 4. CBC (Enantiomer 1) | 11. CBDVA |
| 5. CBD                | 12. THCA  |
| 6. Delta-9-THC        | 13. CBGA  |
| 7. CBC (Enantiomer 2) |           |



App ID 24342

## Axia™ Chiral Columns Out Perform Other Prep Columns

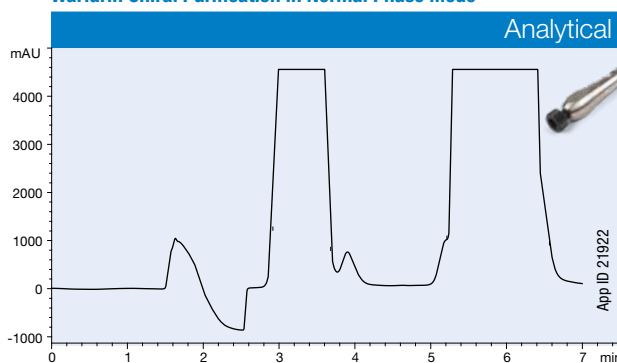
Axia specialized preparative hardware shows higher performance than traditionally packed standard hardware preparative columns. This revolutionary packing technology paired with Lux polysaccharide-based chiral stationary phases provide purification results like no other chiral column can provide.

To better understand how much Axia technology improves column performance over traditionally slurry packed preparative columns we scaled-up a 5 μm Lux Cellulose-1 chiral media analytical column and packed the same media into two different 150 x 21.2 mm ID

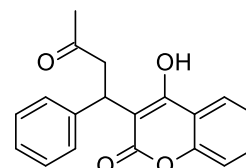
columns. One column was packed using Axia technology and the other prep column was packed using the traditional slurry packing process.

The Axia packing technology had a substantial increase in column efficiency resulting in increased resolution over traditionally packed preparative columns. With increased resolution you are able to increase your sample load enabling you to purify more target compound(s) per purification run. This equates to better throughput and economics.

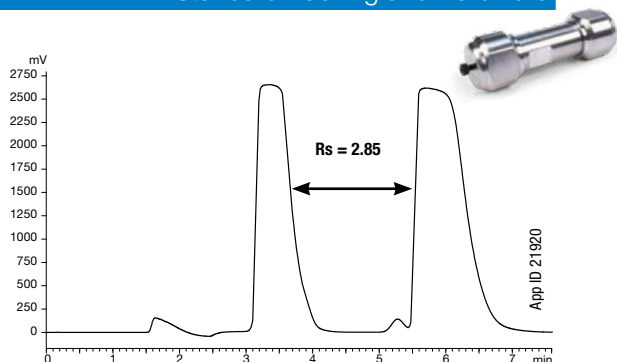
### Warfarin Chiral Purification in Normal Phase Mode



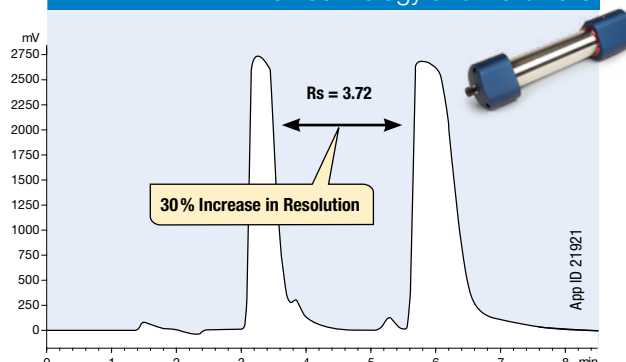
**Column:** Lux 5 μm Cellulose-1  
**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** Hexane/Ethanol (75:25)  
**Flow Rate:** 1 mL/min  
**Temperature:** Ambient  
**Inj. Volume:** 100 μL



### Standard Packing and Hardware



### Axia Technology and Hardware



Conditions for both columns:  
**Media:** Lux 5 μm Cellulose-1  
**Dimensions:** 150 x 21.2 mm  
**Mobile Phase:** Hexane / Ethanol (75:25)

**Flow Rate:** 20 mL/min  
**Temperature:** Ambient  
**Inj. Volume:** 2 mL

42% Increase in Efficiency

Column (mm)	Analytical 150 x 4.6	Standard 150 x 21.2	Axia 150 x 21.2
Mass Loaded (mg)	2	40	40
Resolution*	1.5	2.85	3.72
Plates (N)	117	535	760

\* Resolution calculated with peak width at baseline and center retention time due to the overloaded peaks being off-scale

“We have used Phenomenex Axia prep-HPLC columns for several years and they consistently provide excellent separation and reproducibility for a variety of different compounds.”

Jeremy R. Wolf  
 ABC Laboratories, USA

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

# LUX<sup>®</sup> Chiral LC & SFC Columns

## Ordering Information

3µm Minibore, MidBore™, and Analytical Columns (mm)										SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	150 x 2.0	50 x 3.0	100 x 3.0	150 x 3.0	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 2.0*	4 x 3.0*
										/10pk	/10pk
i-Amylose-3	<a href="#">00B-4778-BO</a>	<a href="#">00F-4778-BO</a>	<a href="#">00B-4778-YO</a>	—	—	<a href="#">00B-4778-EO</a>	<a href="#">00D-4778-EO</a>	<a href="#">00F-4778-EO</a>	<a href="#">00G-4778-EO</a>	<a href="#">AJ0-8651</a>	<a href="#">AJ0-8650</a>
i-Cellulose-5	<a href="#">00B-4755-BO</a>	<a href="#">00F-4755-BO</a>	<a href="#">00B-4755-YO</a>	<a href="#">00D-4755-YO</a>	<a href="#">00F-4755-YO</a>	<a href="#">00B-4755-EO</a>	<a href="#">00D-4755-EO</a>	<a href="#">00F-4755-EO</a>	<a href="#">00G-4755-EO</a>	<a href="#">AJ0-8631</a>	<a href="#">AJ0-8632</a>
Cellulose-1	<a href="#">00B-4458-BO</a>	<a href="#">00F-4458-BO</a>	<a href="#">00B-4458-YO</a>	<a href="#">00D-4458-YO</a>	<a href="#">00F-4458-YO</a>	<a href="#">00B-4458-EO</a>	<a href="#">00D-4458-EO</a>	<a href="#">00F-4458-EO</a>	<a href="#">00G-4458-EO</a>	<a href="#">AJ0-8402</a>	<a href="#">AJ0-8403</a>
Cellulose-2	<a href="#">00B-4456-BO</a>	<a href="#">00F-4456-BO</a>	<a href="#">00B-4456-YO</a>	<a href="#">00D-4456-YO</a>	<a href="#">00F-4456-YO</a>	<a href="#">00B-4456-EO</a>	<a href="#">00D-4456-EO</a>	<a href="#">00F-4456-EO</a>	<a href="#">00G-4456-EO</a>	<a href="#">AJ0-8398</a>	<a href="#">AJ0-8366</a>
Cellulose-3	<a href="#">00B-4492-BO</a>	<a href="#">00F-4492-BO</a>	<a href="#">00B-4492-YO</a>	<a href="#">00D-4492-YO</a>	<a href="#">00F-4492-YO</a>	<a href="#">00B-4492-EO</a>	<a href="#">00D-4492-EO</a>	<a href="#">00F-4492-EO</a>	<a href="#">00G-4492-EO</a>	<a href="#">AJ0-8621</a>	<a href="#">AJ0-8622</a>
Cellulose-4	<a href="#">00B-4490-BO</a>	<a href="#">00F-4490-BO</a>	<a href="#">00B-4490-YO</a>	<a href="#">00D-4490-YO</a>	<a href="#">00F-4490-YO</a>	<a href="#">00B-4490-EO</a>	<a href="#">00D-4490-EO</a>	<a href="#">00F-4490-EO</a>	<a href="#">00G-4490-EO</a>	<a href="#">AJ0-8626</a>	<a href="#">AJ0-8627</a>
Amylose-1	<a href="#">00B-4729-BO</a>	<a href="#">00F-4729-BO</a>	<a href="#">00B-4729-YO</a>	<a href="#">00D-4729-YO</a>	<a href="#">00F-4729-YO</a>	<a href="#">00B-4729-EO</a>	<a href="#">00D-4729-EO</a>	<a href="#">00F-4729-EO</a>	<a href="#">00G-4729-EO</a>	<a href="#">AJ0-9337</a>	<a href="#">AJ0-9336</a>
Amylose-2	<a href="#">00B-4471-BO</a>	<a href="#">00F-4471-BO</a>	<a href="#">00B-4471-YO</a>	<a href="#">00D-4471-YO</a>	<a href="#">00F-4471-YO</a>	<a href="#">00B-4471-EO</a>	<a href="#">00D-4471-EO</a>	<a href="#">00F-4471-EO</a>	<a href="#">00G-4471-EO</a>	<a href="#">AJ0-8471</a>	<a href="#">AJ0-8470</a>

for ID: 2.0–3.0 mm 3.2–8.0 mm

5µm Minibore and Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 2.0*	4 x 3.0*
						/10pk	/10pk
i-Amylose-1	<a href="#">00B-4762-BO</a>	<a href="#">00B-4762-EO</a>	<a href="#">00D-4762-EO</a>	<a href="#">00F-4762-EO</a>	<a href="#">00G-4762-EO</a>	<a href="#">AJ0-8640</a>	<a href="#">AJ0-8641</a>
i-Amylose-3	—	<a href="#">00B-4779-EO</a>	<a href="#">00D-4779-EO</a>	<a href="#">00F-4779-EO</a>	<a href="#">00G-4779-EO</a>	<a href="#">AJ0-8651</a>	<a href="#">AJ0-8650</a>
i-Cellulose-5	—	<a href="#">00B-4756-EO</a>	<a href="#">00D-4756-EO</a>	<a href="#">00F-4756-EO</a>	<a href="#">00G-4756-EO</a>	<a href="#">AJ0-8631</a>	<a href="#">AJ0-8632</a>
Cellulose-1	—	<a href="#">00B-4459-EO</a>	<a href="#">00D-4459-EO</a>	<a href="#">00F-4459-EO</a>	<a href="#">00G-4459-EO</a>	<a href="#">AJ0-8402</a>	<a href="#">AJ0-8403</a>
Cellulose-2	<a href="#">00B-4457-BO</a>	<a href="#">00B-4457-EO</a>	<a href="#">00D-4457-EO</a>	<a href="#">00F-4457-EO</a>	<a href="#">00G-4457-EO</a>	<a href="#">AJ0-8398</a>	<a href="#">AJ0-8366</a>
Cellulose-3	—	<a href="#">00B-4493-EO</a>	<a href="#">00D-4493-EO</a>	<a href="#">00F-4493-EO</a>	<a href="#">00G-4493-EO</a>	<a href="#">AJ0-8621</a>	<a href="#">AJ0-8622</a>
Cellulose-4	—	—	<a href="#">00D-4491-EO</a>	<a href="#">00F-4491-EO</a>	<a href="#">00G-4491-EO</a>	<a href="#">AJ0-8626</a>	<a href="#">AJ0-8627</a>
Amylose-1	<a href="#">00B-4732-BO</a>	—	<a href="#">00D-4732-EO</a>	<a href="#">00F-4732-EO</a>	<a href="#">00G-4732-EO</a>	<a href="#">AJ0-9337</a>	<a href="#">AJ0-9336</a>
Amylose-2	—	<a href="#">00B-4472-EO</a>	<a href="#">00D-4472-EO</a>	<a href="#">00F-4472-EO</a>	<a href="#">00G-4472-EO</a>	<a href="#">AJ0-8471</a>	<a href="#">AJ0-8470</a>

for ID: 2.0–3.0 mm 3.2–8.0 mm

5µm Semi-Prep Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	150 x 10.0	250 x 10.0	10 x 10.0 <sup>†</sup>
			/3pk
i-Amylose-1	—	<a href="#">00G-4762-NO</a>	<a href="#">AJ0-8642</a>
i-Amylose-3	—	<a href="#">00G-4779-NO</a>	<a href="#">AJ0-8652</a>
i-Cellulose-5	—	<a href="#">00G-4756-NO</a>	<a href="#">AJ0-8633</a>
Cellulose-1 <sup>†</sup>	<a href="#">00F-4459-NO</a>	<a href="#">00G-4459-NO</a>	<a href="#">AJ0-8404</a>
Cellulose-2 <sup>†</sup>	—	<a href="#">00G-4457-NO</a>	<a href="#">AJ0-8399</a>
Cellulose-3	—	<a href="#">00G-4493-NO</a>	<a href="#">AJ0-8623</a>
Cellulose-4	—	<a href="#">00G-4491-NO</a>	<a href="#">AJ0-8628</a>
Amylose-1	—	<a href="#">00G-4732-NO</a>	<a href="#">AJ0-9344</a>
Amylose-2	<a href="#">00F-4472-NO</a>	<a href="#">00G-4472-NO</a>	<a href="#">AJ0-8472</a>

for ID: 9–16 mm

<sup>†</sup>Inquire for Lux 10µm Cellulose-1 and Cellulose-2 columns.

5µm Axia™ Packed Preparative Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	150 x 21.2	250 x 21.2	250 x 30	250 x 50	15 x 21.2**	15 x 30.0*
					/ea	/ea
i-Amylose-1	<a href="#">00F-4762-PO-AX</a>	<a href="#">00G-4762-PO-AX</a>	<a href="#">00G-4762-UO-AX</a>	<a href="#">00G-4762-VO-AX</a>	<a href="#">AJ0-8643</a>	<a href="#">AJ0-8644</a>
i-Amylose-3	<a href="#">00F-4779-PO-AX</a>	<a href="#">00G-4779-PO-AX</a>	<a href="#">00G-4779-UO-AX</a>	<a href="#">00G-4779-VO-AX</a>	<a href="#">AJ0-8653</a>	<a href="#">AJ0-8654</a>
i-Cellulose-5	<a href="#">00F-4756-PO-AX</a>	<a href="#">00G-4756-PO-AX</a>	<a href="#">00G-4756-UO-AX</a>	<a href="#">00G-4756-VO-AX</a>	<a href="#">AJ0-8634</a>	<a href="#">AJ0-8635</a>
Cellulose-1 <sup>†</sup>	<a href="#">00F-4459-PO-AX</a>	<a href="#">00G-4459-PO-AX</a>	<a href="#">00G-4459-UO-AX</a>	<a href="#">00G-4459-VO-AX</a>	<a href="#">AJ0-8405</a>	<a href="#">AJ0-8406</a>
Cellulose-2 <sup>†</sup>	<a href="#">00F-4457-PO-AX</a>	<a href="#">00G-4457-PO-AX</a>	<a href="#">00G-4457-UO-AX</a>	<a href="#">00G-4457-VO-AX</a>	<a href="#">AJ0-8400</a>	<a href="#">AJ0-8401</a>
Cellulose-3	<a href="#">00F-4493-PO-AX</a>	<a href="#">00G-4493-PO-AX</a>	<a href="#">00G-4493-UO-AX</a>	<a href="#">00G-4493-VO-AX</a>	<a href="#">AJ0-8624</a>	<a href="#">AJ0-8625</a>
Cellulose-4	<a href="#">00F-4491-PO-AX</a>	<a href="#">00G-4491-PO-AX</a>	<a href="#">00G-4491-UO-AX</a>	<a href="#">00G-4491-VO-AX</a>	<a href="#">AJ0-8629</a>	<a href="#">AJ0-8630</a>
Amylose-1	<a href="#">00F-4732-PO-AX</a>	<a href="#">00G-4732-PO-AX</a>	<a href="#">00G-4732-UO-AX</a>	<a href="#">00G-4732-VO-AX</a>	<a href="#">AJ0-9338</a>	<a href="#">AJ0-9339</a>
Amylose-2	—	<a href="#">00G-4472-PO-AX</a>	<a href="#">00G-4472-UO-AX</a>	—	<a href="#">AJ0-8473</a>	<a href="#">AJ0-8474</a>

for ID: 18–29 mm 30–49 mm

## Column Performance Check Standard

Part No.	Description	Unit
<a href="#">AL0-8412</a>	Chiral Test Mix No. 5 (Lux)	ea



Lux Chiral Method Screening Kits are available. Please contact your Phenomenex representative for more information.

Bulk Media		
Phases	100 g	1 kg
<b>10 µm</b>		
Cellulose-1	<a href="#">04G-4501</a>	<a href="#">04K-4501</a>
Cellulose-2	<a href="#">04G-4502</a>	<a href="#">04K-4502</a>
Cellulose-3	<a href="#">04G-4624</a>	<a href="#">04K-4624</a>
Cellulose-4	<a href="#">04G-4625</a>	<a href="#">04K-4625</a>



\*SecurityGuard Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

†SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJ0-9281](#)

\*\*HPLC PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)  
SFC PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8617](#)

\*HPLC PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8277](#)  
SFC PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8618](#)

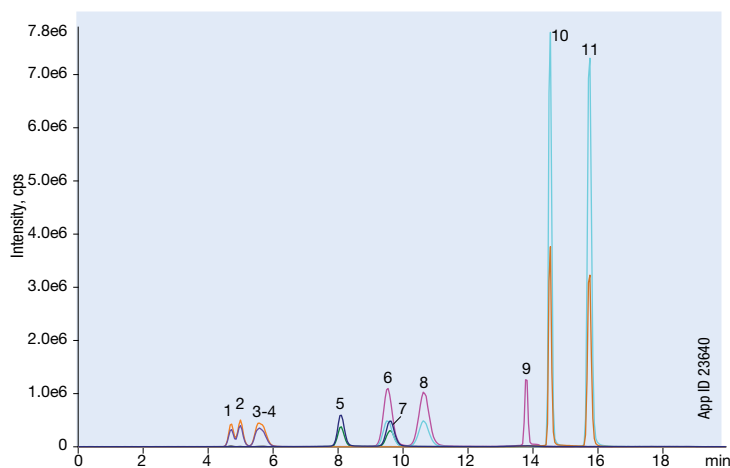


## Rapid and Accurate Chiral Separation of Methamphetamine and Amphetamine Enantiomers from Urine

Lux 3 µm AMP is a unique LC media that is specifically developed and tested for the chiral analysis of amphetamine and substituted amphetamines, including methamphetamine. Once presence of amphetamine or methamphetamine has been determined, enantiomeric confirmation can then easily be achieved.

### Not Affected by Common Interferences

Another excellent benefit of the Lux 3 µm AMP is that its separation of amphetamine and methamphetamine enantiomers isn't affected by common therapeutics and ingredients such as those seen below. In addition, the separation power of the Lux AMP column can also help with resolution between enantiomers of substituted amphetamines.



**Column:** Lux 3 µm AMP  
**Dimension:** 150 x 3.0 mm  
**Part No.:** [00F-4751-Y0](#)  
**Mobile Phase:** A: 5 mM Ammonium Bicarbonate, adjusted to pH 11 with Ammonium Hydroxide  
 B: Methanol

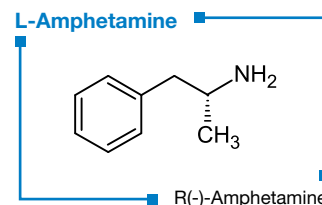
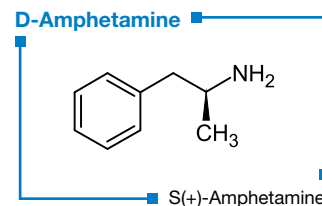
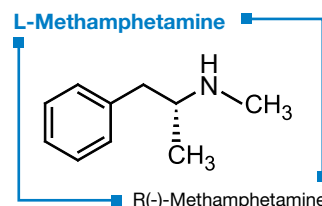
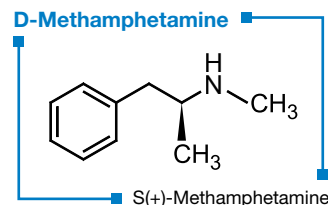
Gradient:	Time (min)	% B
	0	60
	10	60
	11	95
	16	95
	16.3	60

**Flow Rate:** 0.42 mL/min  
**Temperature:** Ambient  
**Detection:** MS/MS (SCIEX<sup>®</sup> 4500 QTRAP<sup>®</sup>)

- 1S,2R(+)-Ephedrine
2. R,R(-)-Pseudoephedrine
3. S,S(+)-Pseudoephedrine
4. 1R,2S(-)-Ephedrine
5. R(-)-Amphetamine
6. R(-)-Methamphetamine
7. S(+)-Amphetamine
8. S(+)-Methamphetamine
9. Phentermine
10. R(-)-MDMA
11. S(+)-MDMA

**Compounds included in this interference study but not illustrated chromatographically:**

- acetaminophen
- aspirin
- (±)-chlorpheniramine
- caffeine
- diphenhydramine
- dextromethorphan
- ibuprofen
- (±)-MDA
- (±)-MDEA
- phenylephrine
- norephedrine



### 1-Minute β-Glucuronidase Removal

Within 1 minute, with no necessary method development, your samples will be ready for analysis.

Learn more at:  
[www.phenomenex.com/beta-gone](http://www.phenomenex.com/beta-gone)  
 or visit p. 56

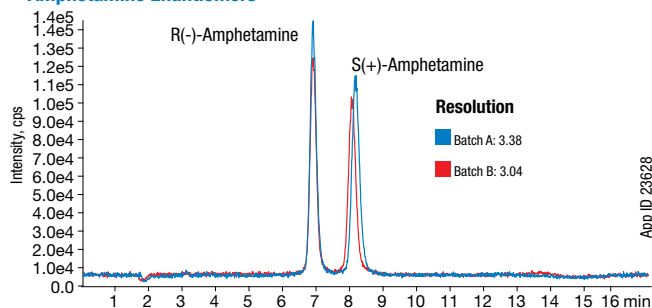




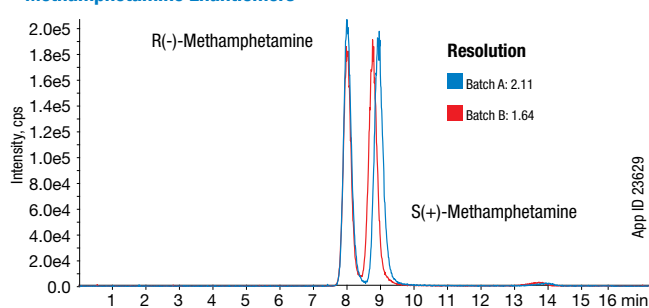
## Exceptional Reliability

Lux 3  $\mu$ m AMP media and columns are designed to be consistent and incredibly accurate tools for amphetamine and methamphetamine analysis. Each batch is specifically tested by LC-MS for the analysis of amphetamine and methamphetamine, and columns are quality tested to ensure dependability and reproducibility.

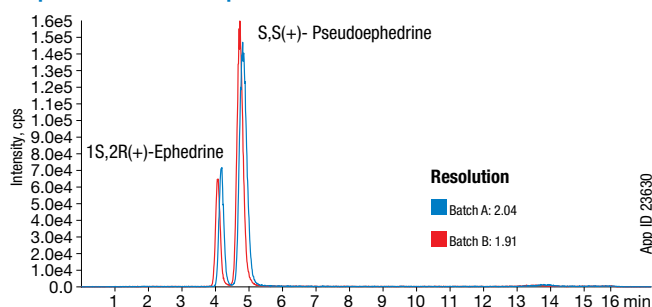
### Amphetamine Enantiomers



### Methamphetamine Enantiomers



### Ephedrine and Pseudoephedrine



**Column:** Lux 3  $\mu$ m AMP  
**Dimension:** 150 x 3.0 mm  
**Part No.:** 00F-4751-Y0  
**Mobile Phase:** A: 5 mM Ammonium Bicarbonate, adjusted to pH 11 with Ammonium Hydroxide  
 B: Methanol  
**Gradient:**

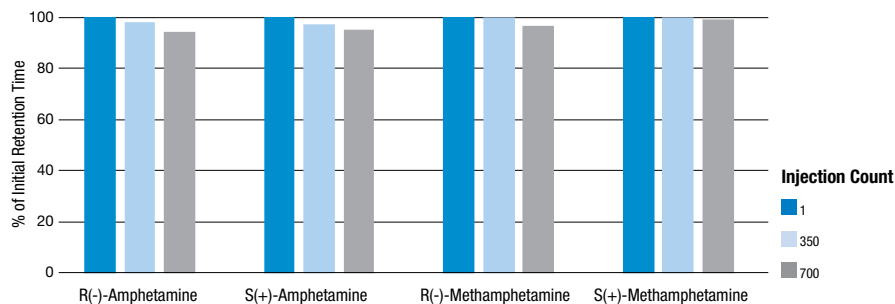
Time (min)	% B
0	60
10	60
11	95
13	95
13.1	60

**Flow Rate:** 0.42 mL/min  
**Temperature:** 22 °C  
**Sample:**

- Ephedrine
- Pseudoephedrine
- R(-)-Amphetamine
- S(+)-Amphetamine
- R(-)-Methamphetamine
- S(+)-Methamphetamine



## Excellent Lifetime



### Ordering Information

Phase	3 $\mu$ m Analytical Columns (mm)		SecurityGuard <sup>™</sup> Cartridges (mm)	
	150 x 3.0	150 x 4.6	4 x 2.0*	4 x 3.0*
AMP	00F-4751-Y0	00F-4751-E0	10/pk AJ0-8475	10/pk AJ0-8476
			for ID: 2.0 - 3.0 mm	3.2 - 8.0 mm

\*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282

## Finish First with Monolithic Silica HPLC Columns

Onyx is a silica monolithic HPLC column designed for high speed analysis. The monolithic nature allows for "dilute-and-shoot" applications saving scientists valuable sample preparation time.

- Reduce run times by more than 50 %
- "Dilute-and-Shoot" dirty biological samples
- Analytical, capillary, and semi-prep dimensions

### Material Characteristics

Packing Material	Macropore Size (µm)	Mesopore Size (Å)	Pore Volume (mL/g)	Surface Area (m <sup>2</sup> /g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m <sup>2</sup> )	End Capping
Onyx C8	2	130	1.0	300	11	3.8	Yes
Onyx C18	2	130	1.0	300	18	3.6	Yes
Onyx C18*	1.5	130	1.0	300	18	3.6	Yes
Onyx HD-C18	1	130	1.0	300	18	3.6	Yes

Maximum Pressure: 200 Bar; pH Range: 2.0-7.5

\*50 x 2.0 mm ID only; enhanced 1.5 µm macropore size for higher efficiencies

## High Resolution Monolithic Columns— Onyx HD-C18

- 50% higher performance compared to our standard Onyx columns
- Backpressure 2 times lower than particle packed columns
- 30% longer column lifetime compared to some particle packed columns

## Monolithic Technology vs. Particle-Based Technology

### Onyx

- **Monolithic porous silica rod**
- **Significantly shorter run times**  
Cut methods by more than half
- **Low backpressures**  
Less stress on system and column
- **High flow rates**  
Due to high porosity
- **No inlet bed settling**  
Increased reliability, reproducibility, and lifetime



### Particle-Based Columns

- **Individual silica particles**
- **High flow resistance**  
Limits ability to shorten run times
- **Increased backpressure**  
Limits life of pumps, seals, and column
- **Reduced throughput**  
Long run times
- **Bed splitting possible**  
Shortens column life & lessens reproducibility



## 10 mm ID Onyx Semi-Prep Column

- Flow rates from 5 – 35 mL/min
- Loading capacities approaching what is typically observed on 21.2mm ID columns for some samples
- Pore structure rapidly disrupts DMSO injection slug resulting in better mixing & improved binding of analyte to sorbent
- Long lifetimes when analyzing “dirty” samples due to monolithic nature

## Excellent Reproducibility

Several parameters, such as peak asymmetry and retention factors, were used to test the reproducibility of Onyx silica monolithic columns and ensure that every batch meets the quality control standards of chromatographers worldwide.



Refer to technical note, [TN-1025](#), for more information pertaining to Onyx reproducibility. Call your Phenomenex representative.

### Ordering Information

Part No.	Description	Size (mm)
<b>Capillary Columns</b>		
<a href="#">CHO-7646</a>	Onyx Monolithic C18	150 x 0.1
<b>Analytical Columns</b>		
<a href="#">CHO-8373</a>	Onyx Monolithic C18	50 x 2.0
<a href="#">CHO-8464</a>	Onyx Monolithic C18	25 x 3.0
<a href="#">CHO-8158</a>	Onyx Monolithic C18	100 x 3.0
<a href="#">CHO-7643</a>	Onyx Monolithic C18	100 x 4.6
<a href="#">CHO-7644</a>	Onyx Monolithic C18	50 x 4.6
<a href="#">CHO-7645</a>	Onyx Monolithic C18	25 x 4.6
<a href="#">CHO-8611</a>	Onyx Monolithic HD-C18	100 x 4.6
<a href="#">CHO-7647</a>	Onyx Monolithic C8	100 x 4.6
<b>SemiPrep Columns</b>		
<a href="#">CHO-7878</a>	Onyx Monolithic C18	100 x 10.0
<b>Guard Cartridge System</b>		
<a href="#">KJO-8465</a>	Onyx Monolithic C18 Guard Cartridge Kit (3/pk cartridges + holder)	5 x 3.0
<a href="#">CHO-8466</a>	Onyx Monolithic C18 Guard Cartridges (3/pk)	5 x 3.0
<a href="#">CHO-7649</a>	Onyx Monolithic C18 Guard Cartridges (3/pk)	5 x 4.6
<a href="#">KJO-7652</a>	Onyx Monolithic C18 Guard Cartridge Kit (3/pk cartridges + holder + wrench)	10 x 4.6
<a href="#">CHO-7650</a>	Onyx Monolithic C18 Guard Cartridges (3/pk)	10 x 4.6
<b>Column Coupler</b>		
<a href="#">AQQ-7654</a>	Onyx Column Coupler, 0.020 in. ID	



For Onyx Reversed Phase Column  
Check Standard, see p. 424



Product based on monolithic technology under  
license from Merck KGaA, Darmstadt, Germany

## Organic Size Exclusion/Gel Permeation for Polymer Analysis

- 5 and 10  $\mu\text{m}$  particle sizes
- Narrow bore (4.6 mm ID) solvent-saver to preparative columns available
- Alternative to Agilent® (Polymer Labs) PLgel™, Waters® Styragel® and Ultrastaygel™, and other columns (see p. 320)
- Highly cross-linked for mechanical and chemical stability
- Temperature stable to 140°C

Phenogel is available in seven different pore sizes, ranging from 50 Å to 10<sup>6</sup> Å†, and a linear bed configuration. Pore size distribution and pore volume are closely controlled parameters in the manufacturing process accounting for the high resolution, tight linear calibration curves, and excellent column-to-column reproducibility.

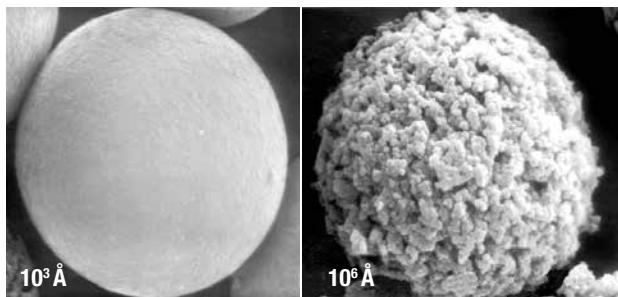
### Sample Elution

Each standard dimension Phenogel column (300 x 7.8 mm) has an internal volume of 15 mL that is distributed as follows:

- 3 mL is occupied by the solid portions of the gel particles (20% of total column volume)
- 6 mL is the pore volume of the packing material (40% of total column volume)
- 6 mL is the interstitial volume or volume between the gel particles (40% of total column volume)

Thus, about 6 mL of solvent must elute through each column before even the largest molecules can emerge, while the smallest molecules emerge with the total column volume of 12 mL. This constant distribution of volume makes it possible to predict the amount of solvent and time necessary to complete any analysis.

### SEM Photos of Phenogel Polymer Beads



### Technical Specifications

Material:	SDVB
Particle Size:	5, 10 $\mu\text{m}$
Porosities:	50 Å to 10 <sup>6</sup> Å†, and mixed beds
Maximum Pressure:	1500 psi
Maximum Temperature:	140°C
Minimum Efficiency*:	5 $\mu\text{m}$ : 45,000 p/m** 10 $\mu\text{m}$ : 35,000 p/m**
Typical Flow Rates:	4.6 mm ID: 0.35 mL/min 7.8 mm ID: 1.0 mL/min 21.2 mm ID: 7.0 mL/min

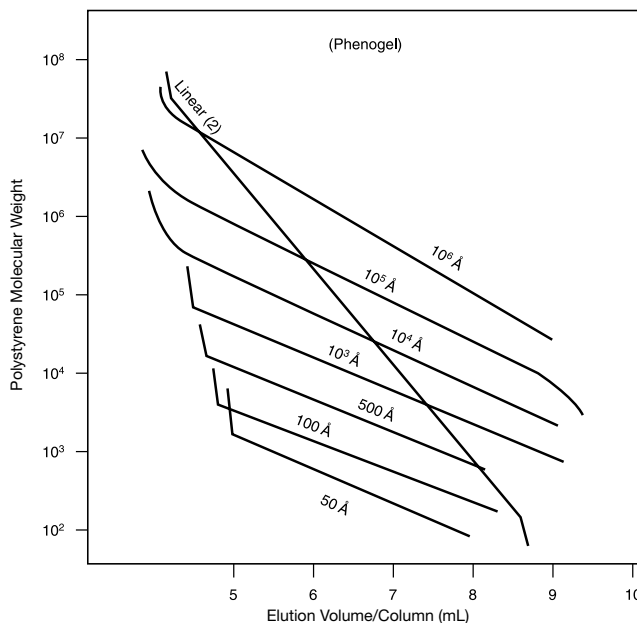
\* Tested in THF \*\* For 300 x 7.8 mm ID columns

† See note on p. 444 regarding pore sizes and exclusion limits

### Column Selection by Molecular Weight

Sample Type	Molecular Weight	Phenogel Column
Small Organics	100 - 3 K	50 Å
	500 - 6 K	100 Å
	1 K - 15 K	500 Å
Resins	1 K - 75 K	10 <sup>3</sup> Å
	5 K - 500 K	10 <sup>4</sup> Å
	10 K - 1,000 K	10 <sup>5</sup> Å
High MW Polymers	60 K - 10,000 K	10 <sup>6</sup> Å
	100 - 10,000 K	Linear(2)

### Column Molecular Weight Calibration Curves



## Solvent and Temperature Compatibility

- Phenogel columns are packed in tetrahydrofuran (THF)
- Columns can also be shipped in solvents such as DMF and chloroform to help minimize equilibration time

## Solvent Compatibility Table

Mobile Phase Solvent	Phenogel Pore Size (Å)							Linear & Mixed	Suggested Operating Temp.
	50	100	500	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>		
Acetone	Y	Y	Y	Y				Y	
Benzene	Y	Y	Y	Y	Y	Y	Y	Y	Y
Carbon Tetrachloride	Y	Y	Y	Y	Y	Y	Y	Y	Y
Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	Y
30% HFIP/Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	Y
Diethyl Ether	Y	Y	Y	Y	Y	Y	Y	Y	Y
Dimethylacetamide (DMAC)	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Dimethylformamide (DMF)	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Dioxane	Y	Y	Y	Y	Y	Y	Y	Y	Y
DMSO	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Ethyl Acetate	Y	Y	Y	Y	Y	Y	Y	Y	Y
Hexafluoroisopropanol (HFIP)	Y	Y	Y	Y	Y	Y	Y	Y	Y
Hexane	Y	Y	Y	Y	Y	Y	Y	Y	Y
M-Cresol	Y*	Y	Y	Y	Y	Y	Y	Y	100 °C
Methyl Ethyl Ketone	Y	Y	Y	Y	Y	Y	Y	Y	Y
Methylene Chloride	Y	Y	Y	Y	Y	Y	Y	Y	Y
O-Chlorophenol	Y*	Y	Y	Y	Y	Y	Y	Y	100 °C
O-Dichlorobenzene	Y*	Y	Y	Y	Y	Y	Y	Y	135 °C
Quinolin	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Tetrahydrofuran	Y	Y	Y	Y	Y	Y	Y	Y	Y
Toluene	Y	Y	Y	Y	Y	Y	Y	Y	Y
Trichlorobenzene	Y*	Y	Y	Y	Y	Y	Y	Y	135 °C
Water	N	N	N	N	N	N	N	N	
Xylene	Y	Y	Y	Y	Y	Y	Y	Y	Y

\*Not recommended on 5 μm 50 Å columns.

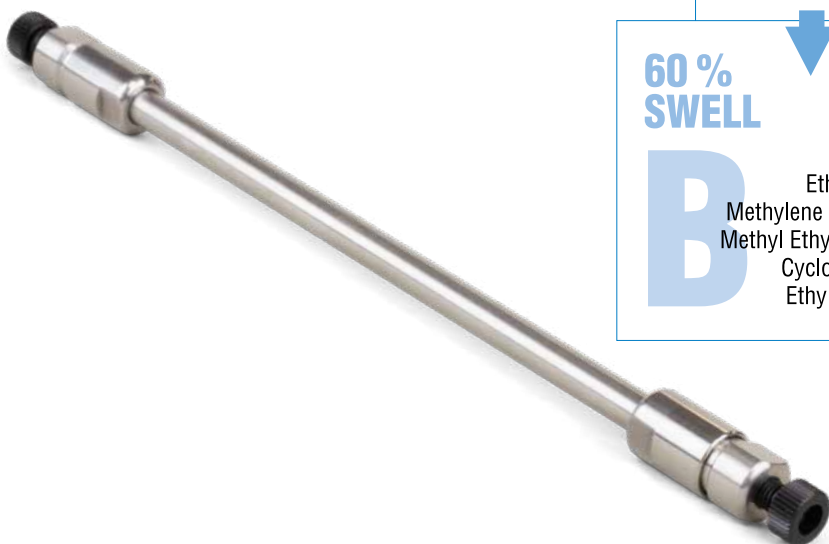
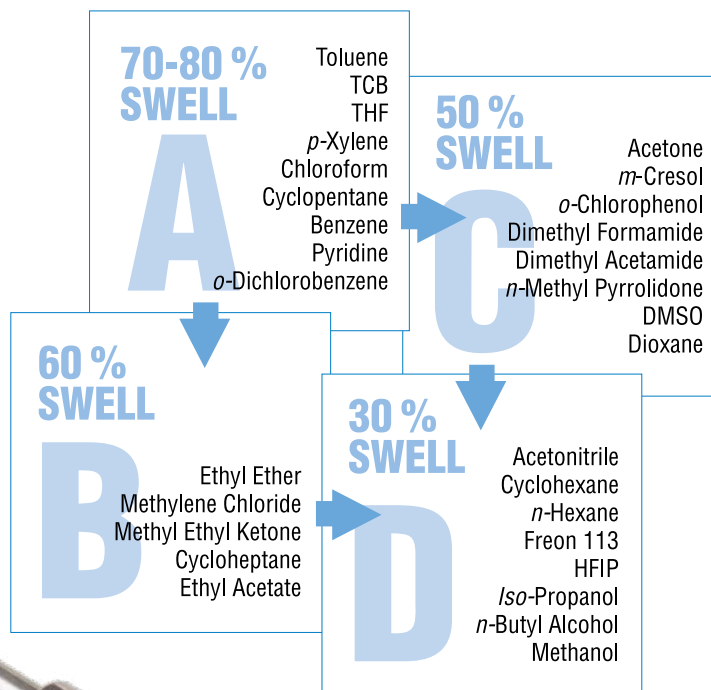
N = Not Compatible  
Y = Compatible

## Solvent Switching Considerations

Although Phenogel columns are rugged and can withstand strong solvent changes, care should be exercised when switching from high-swell solvents (A) to low-swell solvents (B, C, and D). Improper solvent switches can result in a void. Best results are attained when an intermediate-swell solvent is used and column lifetime is improved. Contact Phenomenex regarding solvents not listed below.

Column life can be maximized by dedicating certain columns to certain solvents. This will also minimize solvent switches. If care is not taken, a void may occur.

- Reduce flow rate to 0.2 mL/min
- Backpressure must NEVER exceed 1500 psi
- Always check solvent miscibility in a beaker or follow the solvent miscibility table on page 442 before proceeding with ANY solvent switch.
- Compare the swell characteristics of solvent 1 (old solvent) to solvent 2 (new solvent) and use the following guidelines:
  - If solvent 1 and solvent 2 belong to the same swell category (see table below), check the solvent miscibility and proceed with the switch.
  - If solvent 1 and solvent 2 belong to successive swell categories as indicated by the arrows in the table below, check the miscibility and proceed with the switch.
  - If solvent 1 and solvent 2 DO NOT belong to the same OR successive swell categories, switch to an intermediate solvent FIRST, as indicated by the arrows in the table.



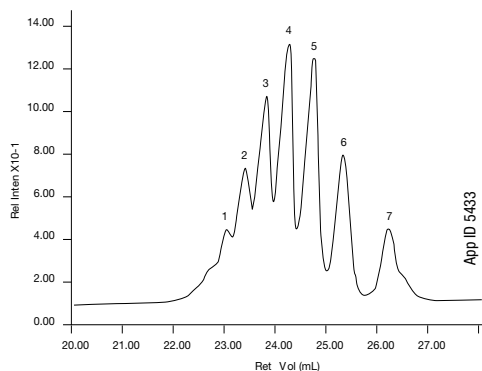


## Pharmaceutical Excipients Analysis

Gel permeation chromatography using Phenogel columns is an excellent method for measuring the molecular weight distribution and lot-to-lot consistency of fillers and dispersants.

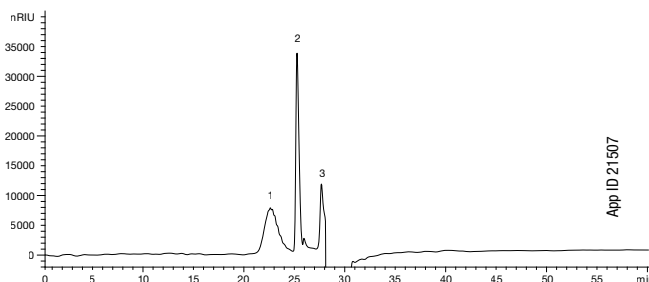
### Polyethylene Glycol 330

**Column:** Phenogel 5  $\mu\text{m}$  50 Å, 100 Å, 500 Å  
**Dimensions:** 300 x 7.8 mm  
**Guard Cartridge:** [AJ0-9292](#)  
**Guard Holder:** [KJ0-4282](#)  
**Solvent:** THF  
**Flow Rate:** 1.0 mL/min  
**Detection:** Differential Refractometer  
**Injection Volume:** 100  $\mu\text{L}$  0.25% w/v  
**Temperature:** Ambient  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-1102-52](#)  
**Sample:** 1. dp7 546 MW    5. dp3 194 MW  
           2. dp6 458 MW    6. dp2 106 MW  
           3. dp5 370 MW    7. dp1 62 MW  
           4. dp4 282 MW



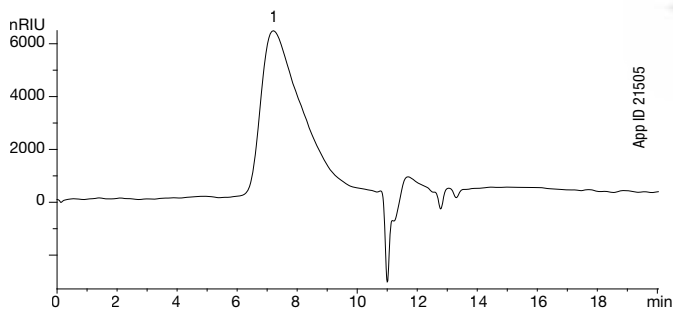
### Polyethylene Glycol 106

**Column:** Phenogel 5  $\mu\text{m}$  50 Å, 100 Å, 500 Å  
**Dimensions:** 300 x 7.8 mm  
**Guard Cartridge:** [AJ0-9292](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** THF  
**Flow Rate:** 1 mL/min  
**Detection:** Refractive Index (RI)  
**Temperature:** 40 °C  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-1102-52](#)  
**Sample:** 1. PEG 106  
           2. API peak A (unknown)  
           3. API peak B (unknown)



### Polyvinylpyrrolidone

**Column:** Phenogel 5  $\mu\text{m}$  Linear(2) x2  
**Dimensions:** 300 x 7.8 mm  
**Part No:** [00H-3259-K0](#)  
**Guard Cartridge:** [AJ0-9292](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** 10 mM Lithium bromide in DMF  
**Flow Rate:** 2 mL/min  
**Detection:** Refractive Index (RI)  
**Column Temp:** 40 °C  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-1102-52](#)  
**Sample:** 1. Polyvinylpyrrolidone (PVP)

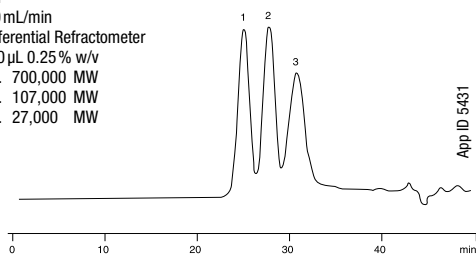


## 50 Å - 10<sup>6</sup> Å Columns

- High resolution at low cost
- Customize your analysis by coupling different pore-size columns
- Wide range of solvent compatibility

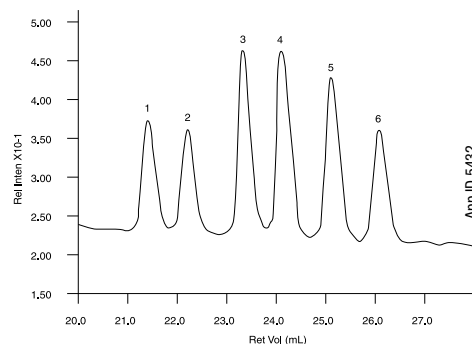
### Polymethyl Methacrylates (Wide MW Range)

**Column:** Phenogel 5 μm 10<sup>5</sup> Å, 10<sup>4</sup> Å, 10<sup>3</sup> Å, 500 Å  
**Dimensions:** 300 x 7.8 mm  
**Solvent:** THF  
**Flow Rate:** 1.0 mL/min  
**Detection:** Differential Refractometer  
**Injection Volume:** 100 μL 0.25% w/v  
**Sample:** 1. 700,000 MW  
 2. 107,000 MW  
 3. 27,000 MW



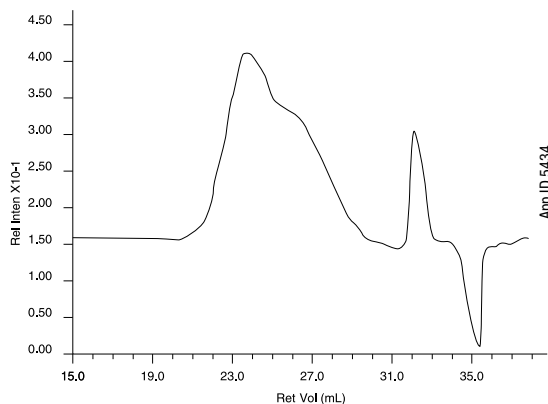
### Closely Related Hydrocarbons

**Column:** Phenogel 5 μm 50 Å, 100 Å, 500 Å  
**Dimensions:** 300 x 7.8 mm  
**Solvent:** THF  
**Flow Rate:** 1.0 mL/min  
**Detection:** Differential Refractometer  
**Injection Volume:** 100 μL 0.25% w/v  
**Temperature:** Ambient  
**Sample:** 1. C40 562 MW 4. C20 282 MW  
 2. C32 450 MW 5. C16 226 MW  
 3. C24 338 MW 6. C13 184 MW



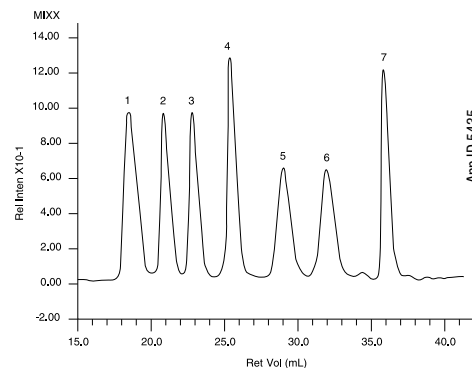
### Polyethylene Oxide (PEO)

**Column:** Phenogel 10 μm 10<sup>5</sup>, 10<sup>4</sup>, 10<sup>3</sup> Å  
**Dimensions:** 300 x 7.8 mm  
**Mobile Phase:** DMF (0.1 M LiBr)  
**Flow Rate:** 1.0 mL/min  
**Detection:** Differential Refractometer  
**Injection Volume:** 100 μL 0.125% w/v  
**Temperature:** 50 °C  
**Sample:** 400,000 MW



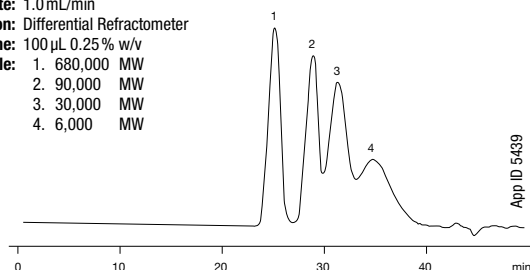
### Polystyrenes (Wide MW Range)

**Column:** Phenogel 10 μm 10<sup>5</sup>, 10<sup>4</sup>, 10<sup>3</sup> Å  
**Dimensions:** 300 x 7.8 mm  
**Mobile Phase:** THF  
**Flow Rate:** 1.0 mL/min  
**Detection:** Differential Refractometer  
**Injection Volume:** 100 μL 0.125% w/v  
**Temperature:** Ambient  
**Sample:** 1. 1,560,000 MW 5. 6,100 MW  
 2. 260,000 MW 6. 845 MW  
 3. 94,000 MW 7. 146 MW  
 4. 30,000 MW



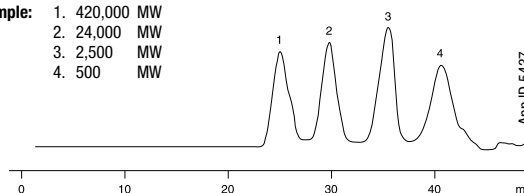
### Poly-(α-Methyl Styrene) (Wide MW Range)

**Column:** Phenogel 5 μm 10<sup>5</sup>, 10<sup>4</sup>, 10<sup>3</sup>, 500 Å  
**Dimensions:** 300 x 7.8 mm  
**Solvent:** THF  
**Flow Rate:** 1.0 mL/min  
**Detection:** Differential Refractometer  
**Injection Volume:** 100 μL 0.25% w/v  
**Sample:** 1. 680,000 MW  
 2. 90,000 MW  
 3. 30,000 MW  
 4. 6,000 MW



### Polybutadienes (Wide MW Range)

**Column:** Phenogel 5 μm 10<sup>5</sup>, 10<sup>4</sup>, 10<sup>3</sup>, 500 Å  
**Dimensions:** 300 x 7.8 mm  
**Solvent:** THF  
**Flow Rate:** 1.0 mL/min  
**Detection:** Differential Refractometer  
**Injection Volume:** 100 μL 0.25% w/v  
**Sample:** 1. 420,000 MW  
 2. 24,000 MW  
 3. 2,500 MW  
 4. 500 MW



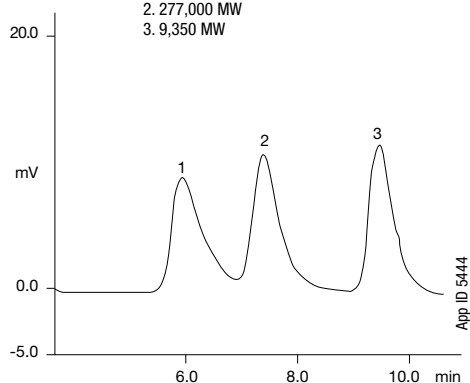
# Phenogel™ Organic GPC/SEC Columns

## Linear Columns

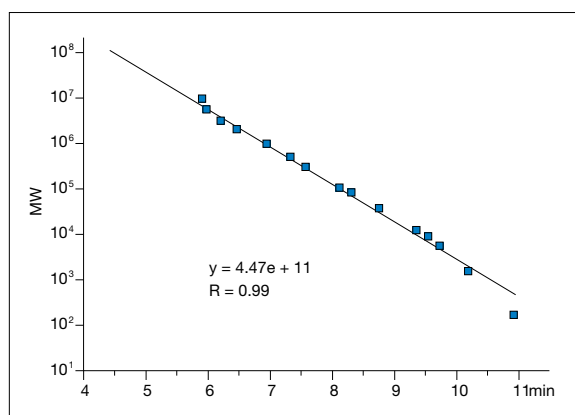
- Linear calibration to 10 million daltons
- Long column lifetime
- Excellent mechanical stability
- Excellent for analyzing a wide range of molecular weights

### Mixed Polystyrene Standard

**Column:** Phenogel 5 µm Linear(2)  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** [00H-3259-K0](#)  
**Guard Cartridge:** [AJ0-9292](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** THF  
**Flow Rate:** 1.0 mL/min  
**Detection:** RI  
**Injection Volume:** 50 µL  
**Temperature:** 35 °C  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-1102-52](#)  
**Sample:** Polystyrene standards injected  
1. 2,860,000 MW  
2. 277,000 MW  
3. 9,350 MW



Calibration Curve: Linear (2) - Phenogel 5 µm 300 x 7.8 mm



## Narrow Bore Columns

### An Improved Dimension in GPC Analysis

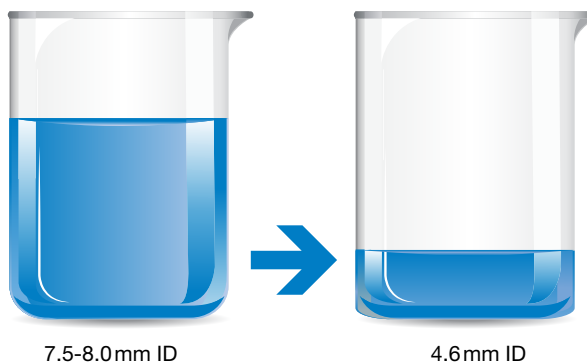
- Decrease solvent consumption
- Retain same elution profile
- Reduce solvent disposal costs

Phenogel-NB (Narrow Bore) columns are optimized to reduce solvent consumption. The Phenogel-NB columns have a 4.6 mm column ID and run at 0.35 mL/min, reducing solvent consumption and disposal costs up to 65 %!

#### Loading

With narrow bore GPC/SEC columns, the volume in which the sample elutes is significantly decreased, thus increasing the effective concentration of the sample. In GPC, this leads to overloading effects and proportionally lower sample loadings must be used.

## Cut Waste!



DISCOVER HOW MUCH YOU WILL SAVE when switching to Phenogel Narrow Bore columns!

Try our NEW solvent savings calculator web tool at

[www.phenomenex.com/GPCSavings](http://www.phenomenex.com/GPCSavings)

# Phenogel™ Organic GPC/SEC Columns

## Ordering Information

5 µm Analytical Columns (mm)		Shipping Solvent			Guards	SecurityGuard™ Cartridges (mm)
		THF	Chloroform	DMF		
		300 x 7.8	300 x 7.8	300 x 7.8	50 x 7.8	4 x 3.0*
<b>Pore Size</b>	<b>MW Range</b>				ea	/3pk
50 Å	100-3 K	<a href="#">00H-0441-KO</a>	—	<a href="#">00H-0441-KO-DF</a>	<a href="#">03B-2088-KO</a>	<a href="#">AJ0-9292</a>
100 Å	500-6 K	<a href="#">00H-0442-KO</a>	—	—	<a href="#">03B-2088-KO</a>	<a href="#">AJ0-9292</a>
500 Å	1 K-15 K	<a href="#">00H-0443-KO</a>	—	—	<a href="#">03B-2088-KO</a>	<a href="#">AJ0-9292</a>
10 <sup>3</sup> Å	1 K-75 K	<a href="#">00H-0444-KO</a>	—	<a href="#">00H-0444-KO-DF</a>	<a href="#">03B-2088-KO</a>	<a href="#">AJ0-9292</a>
10 <sup>4</sup> Å	5 K-500 K	<a href="#">00H-0445-KO</a>	<a href="#">00H-0445-KO-CL</a>	—	<a href="#">03B-2088-KO</a>	<a href="#">AJ0-9292</a>
10 <sup>5</sup> Å	10 K-1,000 K	<a href="#">00H-0446-KO</a>	—	<a href="#">00H-0446-KO-DF</a>	<a href="#">03B-2088-KO</a>	<a href="#">AJ0-9292</a>
10 <sup>6</sup> Å	60 K-10,000 K	<a href="#">00H-0447-KO</a>	—	—	<a href="#">03B-2088-KO</a>	<a href="#">AJ0-9292</a>
		300 x 7.8	300 x 7.8	300 x 7.8	50 x 7.8	4 x 3.0*
<b>Mixed Beds</b>					ea	/3pk
Linear(2)	100-10,000 K	<a href="#">00H-3259-KO</a>	<a href="#">00H-3259-KO-CL</a>	<a href="#">00H-3259-KO-DF</a>	<a href="#">03B-2088-KO</a>	<a href="#">AJ0-9292</a>

for 3.2–8.0 mm ID

5 µm Narrow Bore (NB) Columns (mm)		Guards		SecurityGuard Cartridges (mm)
		300 x 4.6	30 x 4.6	4 x 3.0*
<b>Pore Size</b>	<b>MW Range</b>		ea	/3pk
50 Å	100-3 K	<a href="#">00H-0441-E0</a>	<a href="#">03A-2088-E0</a>	<a href="#">AJ0-9292</a>
100 Å	500-6 K	<a href="#">00H-0442-E0</a>	<a href="#">03A-2088-E0</a>	<a href="#">AJ0-9292</a>
500 Å	1 K-15 K	<a href="#">00H-0443-E0</a>	<a href="#">03A-2088-E0</a>	<a href="#">AJ0-9292</a>
10 <sup>3</sup> Å	1 K-75 K	<a href="#">00H-0444-E0</a>	<a href="#">03A-2088-E0</a>	<a href="#">AJ0-9292</a>
10 <sup>4</sup> Å	5 K-500 K	<a href="#">00H-0445-E0</a>	<a href="#">03A-2088-E0</a>	<a href="#">AJ0-9292</a>
10 <sup>5</sup> Å	10 K-1,000 K	<a href="#">00H-0446-E0</a>	<a href="#">03A-2088-E0</a>	<a href="#">AJ0-9292</a>
10 <sup>6</sup> Å	60 K-10,000 K	<a href="#">00H-0447-E0</a>	<a href="#">03A-2088-E0</a>	<a href="#">AJ0-9292</a>
		300 x 4.6	30 x 4.6	4 x 3.0*
<b>Mixed Beds</b>				
Linear(2)	100-10,000 K	<a href="#">00H-3259-E0</a>	<a href="#">03A-2088-E0</a>	<a href="#">AJ0-9292</a>

for 3.2–8.0 mm ID

10 µm Analytical Columns (mm)		Guards		SecurityGuard Cartridges (mm)
		300 x 7.8	50 x 7.8	4 x 3.0*
<b>Pore Size</b>	<b>MW Range</b>		ea	/3pk
50 Å	100-3 K	<a href="#">00H-0641-KO</a>	<a href="#">03B-2090-KO</a>	<a href="#">AJ0-9292</a>
100 Å	500-6 K	<a href="#">00H-0642-KO</a>	<a href="#">03B-2090-KO</a>	<a href="#">AJ0-9292</a>
500 Å	1 K-15 K	<a href="#">00H-0643-KO</a>	<a href="#">03B-2090-KO</a>	<a href="#">AJ0-9292</a>
10 <sup>3</sup> Å	1 K-75 K	<a href="#">00H-0644-KO</a>	<a href="#">03B-2090-KO</a>	<a href="#">AJ0-9292</a>
10 <sup>4</sup> Å	5 K-500 K	<a href="#">00H-0645-KO</a>	<a href="#">03B-2090-KO</a>	<a href="#">AJ0-9292</a>
10 <sup>5</sup> Å	10 K-1,000 K	<a href="#">00H-0646-KO</a>	<a href="#">03B-2090-KO</a>	<a href="#">AJ0-9292</a>
10 <sup>6</sup> Å	60 K-10,000 K	<a href="#">00H-0647-KO</a>	<a href="#">03B-2090-KO</a>	<a href="#">AJ0-9292</a>
		300 x 7.8	50 x 7.8	4 x 3.0*
<b>Mixed Beds</b>				
Linear(2)	100-10,000 K	<a href="#">00H-3260-KO</a>	<a href="#">03B-2090-KO</a>	<a href="#">AJ0-9292</a>

for 3.2–8.0 mm ID

5 µm Preparative Columns (mm)		Guards	
		300 x 21.2	50 x 21.2
<b>Pore Size</b>	<b>MW Range</b>		ea
100 Å	500-6 K	<a href="#">00H-0442-PO</a>	<a href="#">03B-0642-PO</a>

10 µm Preparative Columns (mm)		Guards	
		300 x 21.2	50 x 21.2
<b>Pore Size</b>	<b>MW Range</b>		ea
100 Å	500-6 K	<a href="#">00H-0642-PO</a>	<a href="#">03B-0642-PO</a>

### Guard Cartridge Holder

Part No.	Description
<a href="#">KJO-4282</a>	Reusable Holder (SecurityGuard Kit)

### Column Union

Part No.	Description	Unit
<a href="#">AQO-8507</a>	Zero Dead Union, SS, with 10-32 fittings	ea

Note: Additional union ([AQO-8507](#)) may be necessary for SecurityGuard to fit in column oven with less than 30 cm length capacity.

## Phenogel Columns are a Recommended Alternative to:

Manufacturer	Columns
Agilent® (Polymer Labs)	PLgel™
Jordi Labs	Jordi Resolve™ RP DVB Column Jordi Resolve DVB 13µ GPC Columns Jordi Resolve DVB GPC Column
Polymer Standards Service (PSS)	SDV® GRAM PolarSil PFG POLEFIN®
Shodex®	GPC K-800 Series GPC KF-800 Series GPC KD-800 Series GPC KF-200 Series
Tosoh Bioscience®	TSKgel® Hxl TSKgel Hhr
Waters®	Styragel® Ultrastryragel™ HSPgel™

\*SecurityGuard Analytical Cartridges require holder, Part No.: [KJO-4282](#)



For Column Heater, see p. 416



SecurityGuard cartridges for Non-Aqueous Polymer GPC columns are not compatible with HFIP solvent.



## Reversed Phase Polymer HPLC Columns

- Excellent alternative to other polystyrene divinylbenzene (PSDVB) columns
- High chemical strength and stability
- pH stable from 0-14
- No bonded phase = zero phase bleed
- Great long-lived solution for separating quaternary amines

PolymerX RP-1 is a porous (100 Å) polystyrene divinylbenzene media which has hydrophobic retention similar to a C18-bonded silica. Because the media is a polymer instead of silica, it is tolerant to pH extremes (0-14) and a good solution for high pH applications where silica-based media fail. PolymerX also delivers good lifetime for analytes like quaternary amines which strongly interact with bonded silica particles.

### Material Characteristics

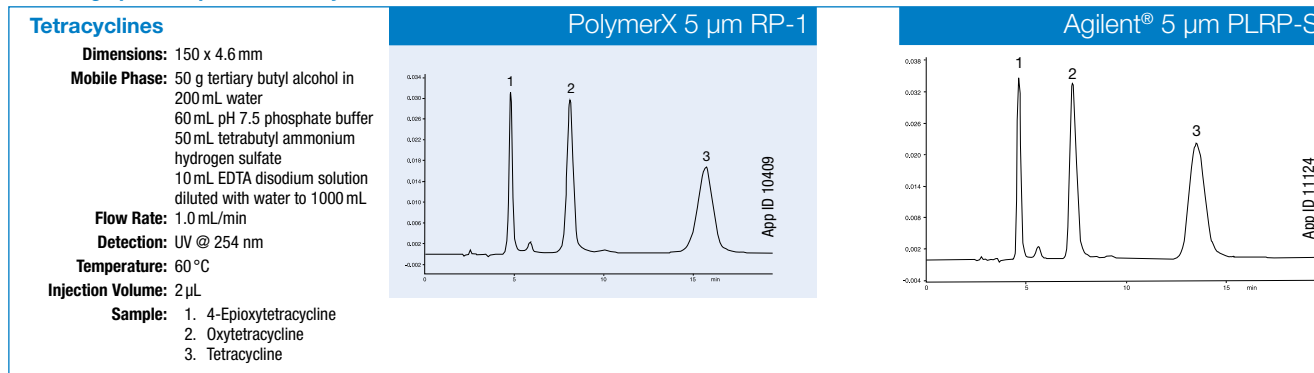
Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	pH Stability
RP-1 (PSDVB)	Spherical 3, 5, 7, 10	100	0 - 14

### Typical Results and Operating Parameters of RP Silica and Polymer Columns

Parameter	C18 silica	RP-polymer
Acidic silanols	present	absent
pH stability	2-9	0-14
Recovery*	~50-80 %	>95 %
Capacity*	1 mg	10-25 mg
Pressure limit	3500 psi	2500 psi
Temperature limit	60 °C	80 °C
Column lifetime		longer

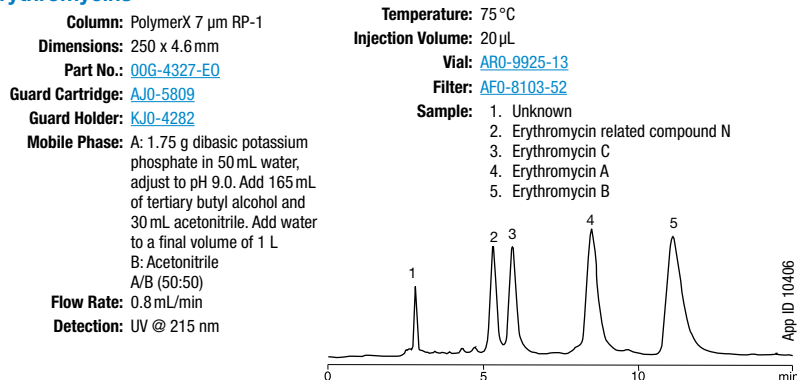
\*pertains to dimethyltritylated (DMT) synthetic oligomer purification on a 150 x 4.1 mm column

### Chromatographic Comparison\*\* of Polymer Columns



\*\*Comparative separations may not be representative of all applications.

### Erythromycins



### Ordering Information

	PolymerX RP-1 Columns (mm)					
	150 x 4.1	150 x 4.6	250 x 4.1	250 x 4.6	250 x 10.0	250 x 21.2
3 µm	<a href="#">00F-4338-Z0</a>	—	—	—	—	—
5 µm	<a href="#">00F-4326-Z0</a>	<a href="#">00F-4326-E0</a>	<a href="#">00G-4326-Z0</a>	<a href="#">00G-4326-E0</a>	—	—
7 µm	—	—	—	<a href="#">00G-4327-E0</a>	—	—
10 µm	—	—	<a href="#">00G-4328-Z0</a>	<a href="#">00G-4328-E0</a>	<a href="#">00G-4328-N0</a>	<a href="#">00G-4328-P0</a>

RP-1 SecurityGuard™ Cartridges (mm)		
4 x 3.0*	10 x 10†	15 x 21.2**
/10pk	/3pk	/ea
<a href="#">AJ0-5809</a>	<a href="#">AJ0-7368</a>	<a href="#">AJ0-8358</a>
for ID: 3.2-8.0 mm	9-16 mm	18-29 mm



Bulk media available upon request.



For PolymerX Column Performance Check Standards, see p. 424

\*SecurityGuard Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

†SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

\*\*Prep SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)



## Aqueous GFC Columns for the Separation of Polymers, Proteins and Peptides

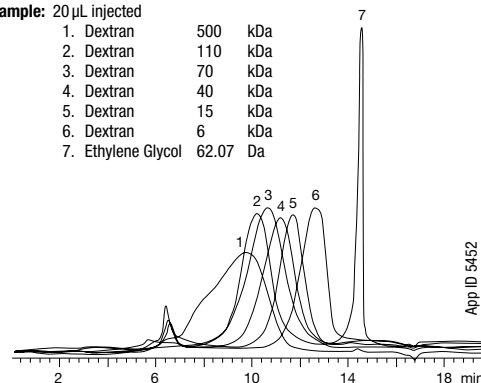
- Highly hydrophilic synthetic polymer phase
- Suitable for water-soluble polymers
- Very low nonspecific interaction with the separation matrix
- Extremely cost-effective
- High efficiencies
- Good mechanical strength

The PolySep material undergoes rigorous quality control tests, from the initial stages of testing of the starting monomers to the final product. There are at least 25 steps of quality assurance during the entire procedure. The packed column then undergoes at least five additional tests, including a batch test for the manufactured materials. Each column is then tested for column efficiency and peak symmetry and ships with a QC chromatogram. This ensures long-lasting columns with very high efficiencies.

### Dextran

Column: PolySep-GFC-P4000  
 Dimensions: 300 x 7.8 mm  
 Part No.: CHO-9229  
 Mobile Phase: Water  
 Flow Rate: 0.8 mL/min  
 Detection: RI  
 Sample: 20 µL injected

1. Dextran	500	kDa
2. Dextran	110	kDa
3. Dextran	70	kDa
4. Dextran	40	kDa
5. Dextran	15	kDa
6. Dextran	6	kDa
7. Ethylene Glycol	62.07	Da



App ID 5452

### PolySep-GFC-P Technical Data and Specifications

Phase:	1000	2000	3000	4000	5000	6000	Linear
Exclusion Limits in Daltons:							
PEG	2 x 10 <sup>5</sup>	9 x 10 <sup>5</sup>	5 x 10 <sup>4</sup>	2 x 10 <sup>5</sup>	2 x 10 <sup>6</sup>	1 x 10 <sup>7</sup>	1 x 10 <sup>7</sup>
Pullulans	3.5 x 10 <sup>5</sup>	1 x 10 <sup>4</sup>	1 x 10 <sup>5</sup>	3.5 x 10 <sup>5</sup>	4 x 10 <sup>6</sup>	2 x 10 <sup>7</sup>	2 x 10 <sup>7</sup>
Separation Range (Da)	20 - 3K	100 - 10K	250 - 75K	3K - 400K	50K - 2M	100K - 15M	1K - 10M
Typical Efficiency Plates/meter	22,000	50,000	32,000	32,000	32,000	32,000	32,000
Maximum Organic Modifier:							
Methanol	20%	95%	70%	70%	70%	70%	70%
Acetonitrile	20%	70%	70%	70%	70%	70%	70%
pH Range	3.0 to 12.0						
Maximum Flow Rate	Depends on backpressure, do not exceed 1000 psi						
Column Hardware	Stainless steel or PEEK (Biocompatible hardware available upon request)						
Temperature	4 to 60 °C						
Maximum Salt	Maximum allowed 0.5 M with a flow rate not to exceed 0.5 mL/min						
Storage	For overnight, pump water at 0.2 mL/min, for longer storage use 0.05% NaNO <sub>3</sub> in water or 10% methanol in water						
General	A guard column is recommended to improve column life						

### Ordering Information

PolySep-GFC-P Columns (mm)		
	Analytical	Guards
Phases	300 x 7.8	35 x 7.8
1000	CHO-9226	CHO-9225
2000	CHO-9227	CHO-9225
3000	CHO-9228	CHO-9225
4000	CHO-9229	CHO-9225
5000	CHO-9230	CHO-9225
6000	CHO-9231	CHO-9225
Linear	CHO-9232	CHO-9225

### Aqueous SEC 2 Column Check Standard

(For PolySep GFC-P and other aqueous-soluble analysis columns)

Part No.: AL0-3043

Unit quantity: 2 mL  
 Contains: Ethylene Glycol  
 Diluent: Water

#### Test Conditions

Mobile Phase: Water  
 Flow Rate: 0.8 mL/min  
 Injection Volume: 15 µL  
 Detection: RI



For additional GFC Columns, see pp. 355-358



For HPLC Column Heater (25-90 °C), see p. 416

## Guaranteed Alternative to Inertsil®

- Highly reproducible
- Long column life
- Mimics performance of GL Sciences, Inc. Inertsil®

### Ordering Information

3 µm ODS-3 Columns (mm)							SecurityGuard™ Cartridges (mm)	
Phases	100 x 2.0	150 x 2.0	100 x 4.0	30 x 4.6	100 x 4.6	150 x 4.6	4 x 2.0*	4 x 3.0*
							/10pk	/10pk
ODS-3 100 Å	<a href="#">00D-4222-B0</a>	<a href="#">00F-4222-B0</a>	<a href="#">00D-4222-D0</a>	<a href="#">00A-4222-E0</a>	<a href="#">00D-4222-E0</a>	<a href="#">00F-4222-E0</a>	<a href="#">AJ0-4286</a>	<a href="#">AJ0-4287</a>
							for ID: 2.0-3.0 mm	3.2-8.0 mm

3 µm and 5 µm ODS-3V Columns (mm)		
Phases	Part No.	Size (mm)
3 µm ODS-3V	<a href="#">00D-4243-E0</a>	100 x 4.6
3 µm ODS-3V	<a href="#">00F-4243-E0</a>	150 x 4.6
5 µm ODS-3V	<a href="#">00F-4241-E0</a>	150 x 4.6
5 µm ODS-3V	<a href="#">00G-4241-E0</a>	250 x 4.6

5 µm Minibore Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0*	
				/10pk	
ODS-2 150 Å	—	<a href="#">00F-3300-B0</a>	—	<a href="#">AJ0-4286</a>	
ODS-3 100 Å	<a href="#">00B-4097-B0</a>	<a href="#">00F-4097-B0</a>	<a href="#">00G-4097-B0</a>	<a href="#">AJ0-4286</a>	
				for ID: 2.0-3.0 mm	

5 µm MidBore™ Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	150 x 3.0	250 x 3.0	150 x 3.2	250 x 3.2	4 x 2.0*	4 x 3.0*
					/10pk	/10pk
C8 150 Å	—	<a href="#">00G-3301-Y0</a>	—	—	<a href="#">AJ0-4289</a>	<a href="#">AJ0-4290</a>
ODS-2 150 Å	—	—	<a href="#">00F-3300-R0</a>	<a href="#">00G-3300-R0</a>	<a href="#">AJ0-4286</a>	<a href="#">AJ0-4287</a>
ODS-3 100 Å	<a href="#">00F-4097-Y0</a>	<a href="#">00G-4097-Y0</a>	<a href="#">00F-4097-R0</a>	<a href="#">00G-4097-R0</a>	<a href="#">AJ0-4286</a>	<a href="#">AJ0-4287</a>
					for ID: 2.0-3.0 mm	3.2-8.0 mm

5 µm and 10 µm Analytical Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
						/10pk
5 µm C8 150 Å	<a href="#">00A-3301-E0</a>	<a href="#">00B-3301-E0</a>	<a href="#">00D-3301-E0</a>	<a href="#">00F-3301-E0</a>	<a href="#">00G-3301-E0</a>	<a href="#">AJ0-4290</a>
5 µm ODS-2 150 Å	<a href="#">00A-3300-E0</a>	—	<a href="#">00D-3300-E0</a>	<a href="#">00F-3300-E0</a>	<a href="#">00G-3300-E0</a>	<a href="#">AJ0-4287</a>
5 µm Silica 100 Å	—	—	—	—	<a href="#">00G-4098-E0</a>	<a href="#">AJ0-4348</a>
5 µm ODS-3 100 Å	<a href="#">00A-4097-E0</a>	<a href="#">00B-4097-E0</a>	<a href="#">00D-4097-E0</a>	<a href="#">00F-4097-E0</a>	<a href="#">00G-4097-E0</a>	<a href="#">AJ0-4287</a>
5 µm Phenyl-3 (PH-3) 100 Å	—	—	—	<a href="#">00F-4298-E0</a>	<a href="#">00G-4298-E0</a>	<a href="#">AJ0-4351</a>
10 µm Silica-3 100 Å	—	—	—	—	<a href="#">00G-4245-E0</a>	<a href="#">AJ0-4348</a>
10 µm ODS-3 100 Å	—	—	—	—	<a href="#">00G-4244-E0</a>	<a href="#">AJ0-4287</a>
						for ID: 3.2-8.0 mm

5 µm and 10 µm SemiPreparative Columns (mm)		SecurityGuard™ Cartridges (mm)	
Phases	250 x 10	10 x 10*	
		/3pk	
5 µm ODS-3 100 Å	<a href="#">00G-4097-N0</a>	<a href="#">AJ0-7221</a>	
10 µm ODS-3 100 Å	<a href="#">00G-4244-N0</a>	<a href="#">AJ0-7221</a>	
		for ID: 9-16 mm	

\*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)  
 †SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJ0-9281](#)

For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334

## Carbohydrate and Organic Acid Analysis

- Excellent resolution and column-to-column reproducibility
- Easy, accurate quantitation from sharper peak shapes
- Longer column lifetimes and faster run time capability from lower backpressures
- Baseline separation of critical sample components due to higher efficiencies

Rezex HPLC columns achieve reproducible, accurate separations based on multiple modes of interaction. Available in 4% and 8% cross-linked sulfonated styrene-divinylbenzene (SDVB) and multiple ionic forms (calcium, sodium, hydrogen, potassium, lead, and silver) for a wide range of selectivities. USP L17, L19, L22, L34, and L58 packings available.

### Use Rezex for carbohydrate, oligosaccharide, and organic acid separations:

- Drug formulation and excipient analysis
- Food and beverage quality control testing
- Fermentation reaction monitoring and recovery testing for biofuels



Recommended alternative to Bio-Rad® Aminex®, Supelco® SUPELCOGEL™, and Waters® Sugar-Pak™ (see p. 329)

### Find the Column For Your Application

Phases Available	Description	Applications	Additional Notes
<b>RCM-Monosaccharide</b> (L19 packing)*	8% cross-linked resin <b>CALCIUM</b> ionic form	Monosaccharides and sugar alcohols from sweeteners and corn and cane sugars; Class separation of di-, tri-, and tetra-	– Our most commonly used column type – Easy regeneration with calcium nitrate solutions
<b>RHM-Monosaccharide</b> (L17 packing)*	8% cross-linked resin <b>HYDROGEN</b> ionic form	Monosaccharides in combination with organic acids, fatty acids, alcohols, ketones, neutral compounds, or inorganic salts	– Versatile column, generally run with a mobile phase of deionized water
<b>RAM-Carbohydrate</b>	8% cross-linked resin <b>SILVER</b> ionic form	Selectivity complementary to other Rezex column types	
<b>RSO-Oligosaccharide</b>	4% cross-linked resin <b>SILVER</b> ionic form	High resolution of oligosaccharides up to 18 degrees of polymerization (Dp)	– Guard column is recommended to protect the ionic integrity of the matrix
<b>RNO-Oligosaccharide</b>	4% cross-linked resin <b>SODIUM</b> ionic form	High resolution of oligosaccharides	
<b>RPM-Monosaccharide</b> (L34 packing)*	8% cross-linked resin <b>LEAD</b> ionic form	Monosaccharides and sugar alcohol analysis. Cellobiose, glucose, xylose, arabinose, mannose and other cellulose products	
<b>RNM-Carbohydrate</b> (L58 packing)*	8% cross-linked resin <b>SODIUM</b> ionic form	For matrices which contain high concentration of inorganic sodium, i.e. molasses	– Easily regenerated to the original ionic strength
<b>ROA-Organic Acid</b> (L22 packing)*	8% cross-linked resin <b>HYDROGEN</b> ionic form	Organic acids alone or in combination with carbohydrates, alcohols, fatty acids, or neutral compounds; Amino sugars; Ethanol, acetic acid, glycerol, and standard alcohol mixtures	– Selectivity can be altered by changing the pH as well as the type of dilute mineral acid used as the mobile phase
<b>RFQ-Fast Acid</b>	8% cross-linked resin <b>HYDROGEN</b> ionic form	Rapid screening of fruit quality; Ethanol, acetic acid, glycerol, and standard alcohol mixtures	– Analytes are routinely chromatographed under 5 minutes
<b>RKP-Potassium</b>	8% cross-linked resin <b>POTASSIUM</b> ionic form	Analysis of glyphosate	
<b>RCU-USP Sugar Alcohols</b> (L19 packing)*	8% cross-linked resin <b>CALCIUM</b> ionic form	For sugar analysis according to the USP procedures	– Sorbitol and mannitol can be resolved using simple isocratic conditions

\* United States Pharmacopeia (USP)



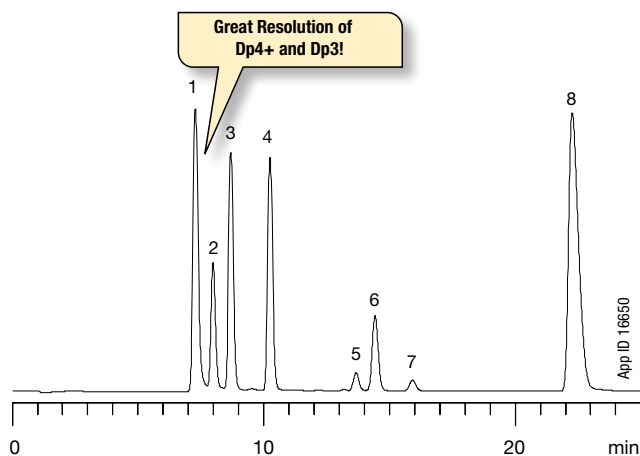


## Bioethanol Fermentation Monitoring

- Easy quantitation of ethanol fermentation broth components
- Monitor starches, sugars, organic acids, and ethanol in one run
- Reliable lactic acid and acetic acid monitoring
- Increase throughput by reducing run times 50% with 150 mm column length

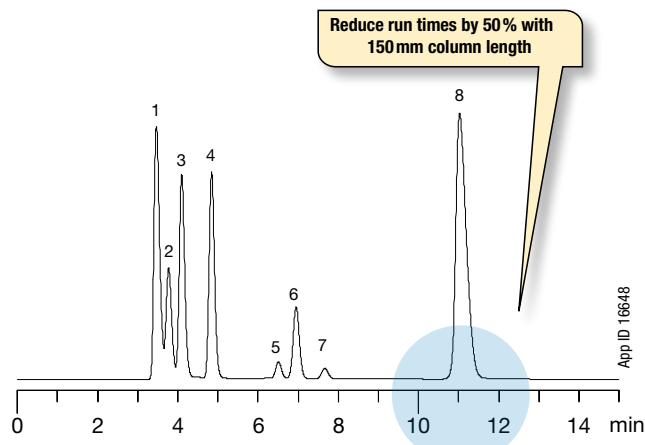
Monitoring the key reaction components throughout the fermentation process is crucial for maximizing ethanol recovery. Rezex ROA is uniquely suited for the separation and analysis of simple and complex sugars, organic acids, and ethanol within a fermentation broth sample. With results easily obtained through an isocratic run, Rezex ROA is instrumental in helping you to accurately determine what critical steps need to be taken to ensure the maximum yield is achieved during your fermentation run.

Rezex ROA has the ability to achieve excellent baseline separation between Dp3 and Dp4+, which have proven to be a challenge within the bioethanol industry. It is this great baseline separation that affords scientists the opportunity to utilize a shorter column dimension. By using the 150 x 7.8 mm Rezex ROA column, you are able to decrease the run time by 50% when compared to the average run time on a 300 x 7.8 mm column.



**Column:** Rezex ROA-Organic Acid  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** [00H-0138-K0](#)  
**Guard Cartridge:** [AJ0-4490](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** 0.005 N Sulfuric Acid  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI @ 40 °C  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Temperature:** 60 °C  
**System:** Shimadzu® Prominence® LC-20A System  
**Sample:**

1. Dp4+	5. Lactic Acid
2. Dp3	6. Glycerol
3. Maltose	7. Acetic Acid
4. Glucose	8. Ethanol



**Column:** Rezex ROA-Organic Acid  
**Dimensions:** 150 x 7.8 mm  
**Part No.:** [00F-0138-K0](#)  
**Guard Cartridge:** [AJ0-4490](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** 0.005 N Sulfuric Acid  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI @ 40 °C  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Temperature:** 60 °C  
**System:** Shimadzu Prominence LC-20A System  
**Sample:**

1. Dp4+	5. Lactic Acid
2. Dp3	6. Glycerol
3. Maltose	7. Acetic Acid
4. Glucose	8. Ethanol

**Shorten GC Fuel Quality Testing**  
 Zebtron ZB-Bioethanol GC column can shorten your quality test down to 5 minutes! (See pp. 122-123).

**Extend Column Lifetime**  
 Protect the Rezex column from the intrusion of the metal ions by using Phenex™ Syringe Filters and SecurityGuard™. The filters and SecurityGuard guard cartridge system work by trapping metal ions, such as calcium, magnesium, and iron, which can damage the column and cause it to lose or change separation efficiency. (See pp. 8 and 330).

# Rezex™ Organic Acid and Carbohydrate Columns

## Rezex™ vs. Bio-Rad® Aminex®

Phenomenex guarantees satisfaction when using Rezex HPLC columns. As illustrated below, Rezex offers advantages that enhance chromatographic results, increase throughput, and simplify quantitation.

### Easier, Accurate Quantitation

Due to improved peak shape

#### Saccharides

Conditions for both columns:

**Column:** Rezex RCM-Monosaccharide  
Aminex HPX-87C

**Dimensions:** 300 x 7.8 mm

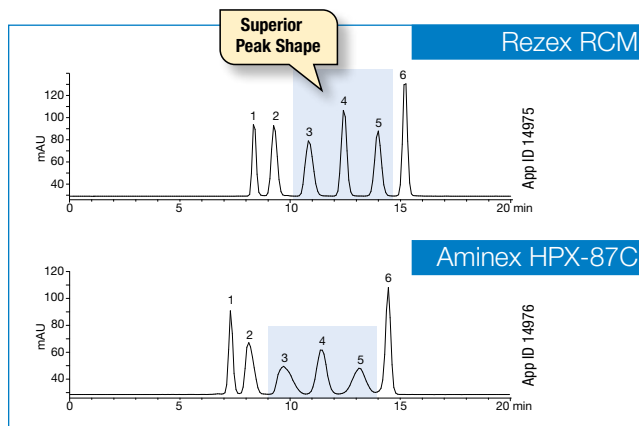
**Mobile Phase:** Water

**Flow Rate:** 0.6 mL/min

**Detection:** ELSD

**Temperature:** 80 °C

**Sample:** 1. Melezitose      4. Mannose  
2. Maltose            5. Fructose  
3. Glucose            6. Ribitol



Comparative separations may not be representative of all applications.

### Baseline Separation of Critical Sample Components

Due to improved resolution

#### Sugars

Conditions for both columns:

**Column:** Rezex RCM-Monosaccharide  
Aminex HPX-87C

**Dimensions:** 300 x 7.8 mm

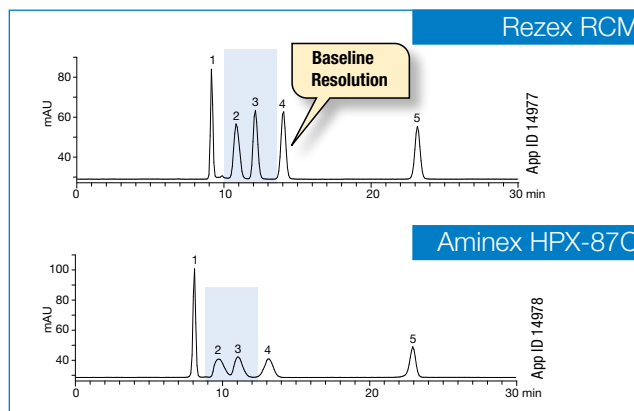
**Mobile Phase:** Water

**Flow Rate:** 0.6 mL/min

**Detection:** ELSD

**Temperature:** 80 °C

**Sample:** 1. Sucrose            4. Fructose  
2. Glucose            5. Sorbitol  
3. Galactose



## Applications

### Food Softeners

**Column:** Rezex RCM-Monosaccharide

**Dimensions:** 300 x 7.8 mm

**Part No.:** [0QH-0130-K0](#)

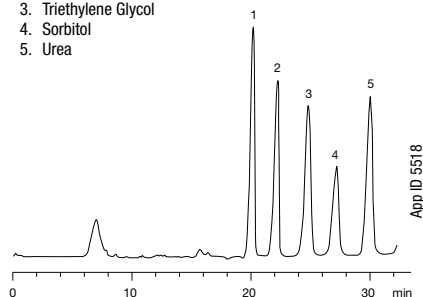
**Mobile Phase:** Water

**Flow Rate:** 0.5 mL/min

**Detection:** RI

**Temperature:** 60 °C

**Sample:** 1. Glycerol  
2. Methoxypolyethylene Glycol  
3. Triethylene Glycol  
4. Sorbitol  
5. Urea



### Amino Sugars

**Column:** Rezex ROA-Organic Acid

**Dimensions:** 300 x 7.8 mm

**Part No.:** [0QH-0138-K0](#)

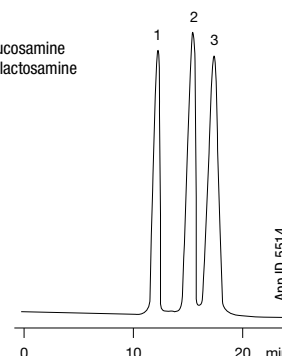
**Mobile Phase:** 1% Phosphoric Acid

**Flow Rate:** 0.6 mL/min

**Detection:** RI

**Temperature:** Ambient

**Sample:** 1. Glucose  
2. N-Acetylglucosamine  
3. N-Acetylgalactosamine

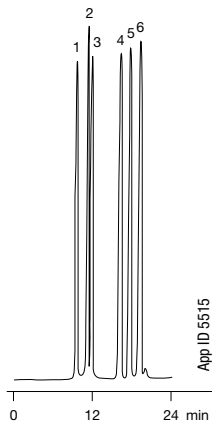




# Rezex™ Organic Acid and Carbohydrate Columns

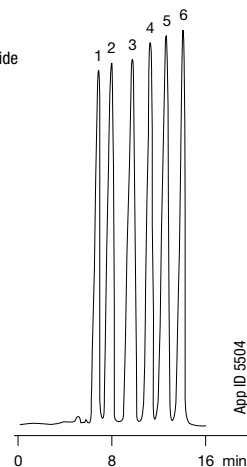
## Organic Acids

**Column:** Rezex ROA-Organic Acid  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** [00H-0138-KO](#)  
**Guard Cartridge:** [AJ0-4490](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** 0.005 N Sulfuric Acid  
**Flow Rate:** 0.5 mL/min  
**Detection:** UV @ 210 nm  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Temperature:** 55 °C  
**Sample:** 1. Oxalic  
 2. Citric  
 3. Tartaric  
 4. Succinic  
 5. Formic  
 6. Acetic



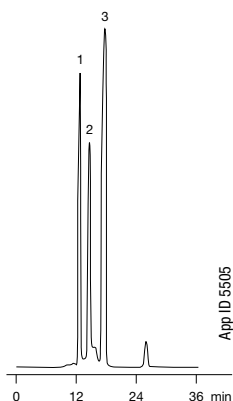
## Saccharides

**Column:** Rezex RCM-Monosaccharide  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** [00H-0130-KO](#)  
**Guard Cartridge:** [AJ0-4493](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Temperature:** 85 °C  
**Sample:** 1. Melezitose  
 2. Maltose  
 3. Glucose  
 4. Mannose  
 5. Fructose  
 6. Ribitol



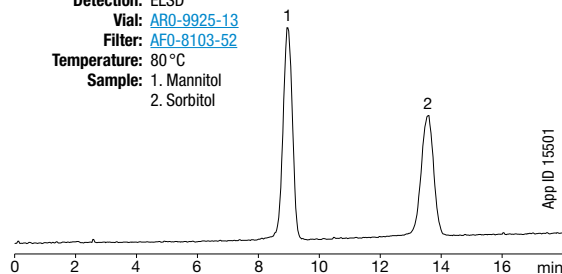
## Apple Juice

**Column:** Rezex RCM-Monosaccharide  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** [00H-0130-KO](#)  
**Guard Cartridge:** [AJ0-4493](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Temperature:** 75 °C  
**Sample:** 1. Sucrose  
 2. Glucose  
 3. Fructose



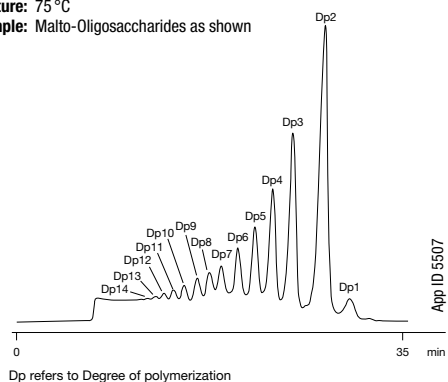
## Mannitol and Sorbitol

**Column:** Rezex RPM-Monosaccharide  
**Dimensions:** 100 x 7.8 mm  
**Part No.:** [00D-0135-KO](#)  
**Guard Cartridge:** [AJ0-4492](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** ELSD  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Temperature:** 80 °C  
**Sample:** 1. Mannitol  
 2. Sorbitol



## Oligosaccharides

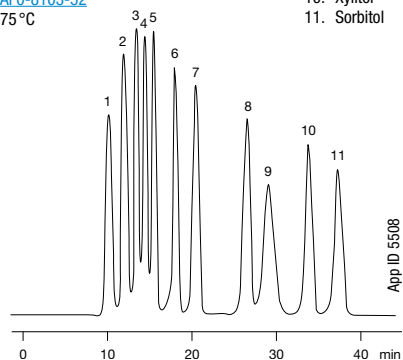
**Column:** Rezex RSO-Oligosaccharide  
**Dimensions:** 200 x 10 mm  
**Part No.:** [00P-0133-NO](#)  
**Mobile Phase:** Water  
**Flow Rate:** 0.3 mL/min  
**Detection:** RI  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Temperature:** 75 °C  
**Sample:** Malto-Oligosaccharides as shown



## Saccharides

**Column:** Rezex RPM-Monosaccharide  
**Dimensions:** 300 x 7.8 mm  
**Part No.:** [00H-0135-KO](#)  
**Guard Cartridge:** [AJ0-4492](#)  
**Guard Holder:** [KJ0-4282](#)  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min  
**Detection:** RI  
**Vial:** [ARO-9925-13](#)  
**Filter:** [AF0-8103-52](#)  
**Temperature:** 75 °C

**Sample:** 1. Stachyose  
 2. Maltose  
 3. Glucose  
 4. Xylose  
 5. Galactose  
 6. Fructose  
 7. Meso-Erythritol  
 8. Mannitol  
 9. Salicin  
 10. Xylitol  
 11. Sorbitol




# Rezex™ Organic Acid and Carbohydrate Columns

## Specifications and Operating Recommendations


	RCM-Monosaccharide	RSO-Oligosaccharide	RNO-Oligosaccharide	RNM-Carbohydrate	RAM-Carbohydrate
Part Number	<a href="#">00H-0130-K0</a>	<a href="#">00P-0133-N0</a>	<a href="#">00P-0137-N0</a>	<a href="#">00H-0136-K0</a>	<a href="#">00H-0131-K0</a>
Ionic Form	Calcium	Silver	Sodium	Sodium	Silver
Standard Dimensions	300 x 7.8 mm	200 x 10 mm	200 x 10 mm	300 x 7.8 mm	300 x 7.8 mm
Matrix	Sulfonated Styrene Divinyl Benzene				
Cross Linking	8%	4%	4%	8%	8%
Particle Size	8 µm	12 µm	12 µm	8 µm	8 µm
Min. Efficiency (p/m) based on last peak	35,000	N/A	N/A	30,000	35,000
Typical Pressure (psi @ Testing Flow Rate)	260	115	130	170	285
Max. Pressure (psi @ Max Flow Rate)	1,000	300	300	1,000	1,000
Max. Flow Rate (mL/min)	1.0 (see pressure)	0.3	0.3	1.0	1.0
Max. Temperature (°C)	85	85	85	85	85
Typical Mobile Phase	Water	Water	Water	Water	Water
pH Range	Neutral	Neutral	Neutral	Neutral	Neutral
Guard Column Part No.	<a href="#">03B-0130-K0</a>	<a href="#">03R-0133-N0</a>	<a href="#">03R-0137-N0</a>	<a href="#">03B-0136-K0</a>	<a href="#">03B-0131-K0</a>

### Cleaning, Regeneration and Storage

Organic Modifiers (Max)	5% Methanol, IPA, EtOH				
Inorganic Modifiers	5% CaSO <sub>4</sub> , Ca(NO <sub>3</sub> ) <sub>2</sub> , CaCl <sub>2</sub>	5% Silver Nitrate	5% Sodium Salts	5% Sodium Salts	2% Silver Nitrate
Avoid 	Acids, Bases, Non-Calcium Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Non-Silver Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Non-Sodium Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Non-Sodium Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Non-Silver Salts/ Metal Ions, >30% Acetonitrile
Cleaning Solvent	100% Water	100% Water	100% Water	100% Water	100% Water
Flow Rate (mL/min)	0.4	0.1	0.1	0.4	0.4
Temperature (°C)	85	85	85	85	85
Duration (hrs)	12	12	12	12	12
Regeneration Solvent	0.1 M Ca(NO <sub>3</sub> ) <sub>2</sub>	0.1 M AgNO <sub>3</sub>	0.1 M NaNO <sub>3</sub>	0.1 M NaNO <sub>3</sub>	0.1 M AgNO <sub>3</sub>
Flow Rate (mL/min)	0.2	0.1	0.2	0.2	0.2
Duration (hrs)	4-16	4-16	4-16	4-16	4-16
Ship/Storage Solvent	Water	Water	Water	Water	Water

	RPM-Monosaccharide	RHM-Monosaccharide	ROA-Organic Acid	RFQ-Fast Acid	RCU-Sugar Alcohols
Part Number	<a href="#">00H-0135-K0</a>	<a href="#">00H-0132-K0</a>	<a href="#">00H-0138-K0</a>	<a href="#">00D-0223-K0</a>	<a href="#">00G-0130-D0</a>
Ionic Form	Lead	Hydrogen	Hydrogen	Hydrogen	Calcium
Standard Dimensions	300 x 7.8 mm	300 x 7.8 mm	300 x 7.8 mm	100 x 7.8 mm	250 x 4.0 mm
Matrix	Sulfonated Styrene Divinyl Benzene				
Cross Linking	8%	8%	8%	8%	8%
Particle Size	8 µm	8 µm	8 µm	8 µm	8 µm
Min. Efficiency (p/m) based on last peak	35,000	35,000	50,000 (Acetic Acid)	30,000	12,000
Typical Pressure (psi @ Testing Flow Rate)	190	275	580	365	90
Max. Pressure (psi @ Max Flow Rate)	1,000	1,000	1,000	1,000	1,000
Max. Flow Rate (mL/min)	1.0	1.0	1.0	1.0	0.5
Max. Temperature (°C)	85	85	85	85	85
Typical Mobile Phase	Water	Water	0.005 N H <sub>2</sub> SO <sub>4</sub>	0.005 N H <sub>2</sub> SO <sub>4</sub>	Water
pH Range	Neutral	1-8	1-8	1-8	Neutral
Guard Column Part No.	<a href="#">03B-0135-K0</a>	<a href="#">03B-0132-K0</a>	<a href="#">03B-0138-K0</a>	<a href="#">03B-0223-K0</a>	<a href="#">03A-0130-D0</a>

### Cleaning, Regeneration and Storage

Organic Modifiers (Max)	5% Methanol, IPA, EtOH				
Inorganic Modifiers	5% Lead Nitrate	5% HNO <sub>3</sub> , H <sub>3</sub> PO <sub>4</sub>	5% HNO <sub>3</sub> , H <sub>3</sub> PO <sub>4</sub>	5% HNO <sub>3</sub> , H <sub>3</sub> PO <sub>4</sub>	5% CaSO <sub>4</sub> , Ca(NO <sub>3</sub> ) <sub>2</sub> , CaCl <sub>2</sub>
Avoid 	Acids, Bases, Non-Lead Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Salts/ Metal Ions, >30% Acetonitrile	Acids, Bases, Salts, Metal Ions, pH > 3, >30% Acetonitrile	Acids, Bases, Salts, Metal Ions, pH > 3, >30% Acetonitrile	Acids, Bases, Non-Calcium Salts, or Metal Ions, >30% Acetonitrile
Cleaning Solvent	100% Water	100% Water	100% Water	100% Water	100% Water
Flow Rate (mL/min)	0.4	0.4	0.4	0.4	0.1
Temperature (°C)	85	85	85	85	85
Duration (hrs)	12	12	12	12	12
Regeneration Solvent	0.1 M Pb(NO <sub>3</sub> ) <sub>2</sub>	0.025 M H <sub>2</sub> SO <sub>4</sub>	0.025 M H <sub>2</sub> SO <sub>4</sub>	0.025 M H <sub>2</sub> SO <sub>4</sub>	0.1 M Ca(NO <sub>3</sub> ) <sub>2</sub>
Flow Rate (mL/min)	0.2	0.2	0.2	0.2	0.1
Duration (hrs)	4-16	4-16	4-16	4-16	4-16
Ship/Storage Solvent	Water	Water	0.005 N H <sub>2</sub> SO <sub>4</sub>	0.005 N H <sub>2</sub> SO <sub>4</sub>	Water

# Rezex™ Organic Acid and Carbohydrate Columns

## Retention Times for Some Carbohydrates and Sugar Alcohols

Counter Ion	Analyte	RAM Ag <sup>+</sup>	RCM Ca <sup>+2</sup>	RNM Na <sup>-</sup>	RHM H <sup>-</sup>	RPM Pb <sup>+2</sup>
	Adonitol (Ribitol)	11.54	14.93	11.10	11.11	20.15
	D-Altrose	11.95	12.71	11.45	10.21	15.82
	D-(-)-Arabinose	13.01	13.56	12.65	11.24	16.47
	D-(+)-Cellobiose	8.86	8.60	8.49	8.02	11.00
	D-(+)-Digitoxose	11.90	13.82	11.39	12.59	15.32
	Dulcitol	11.64	21.61	11.10	10.71	33.25
	Meso-Erythritol	12.31	15.49	11.78	12.14	19.82
	D-(-)-Fructose	12.05	13.65	11.76	10.31	17.71
	L-(-)-Fucose	12.75	13.19	12.30	11.65	16.19
	D-(+)-Galactose	11.87	11.73	11.47	10.19	14.94
	Gentiobiose	8.70	8.40	8.40	7.87	10.53
	D-(+)-Glucose	11.04	10.37	10.71	9.62	12.92
	Inositol	12.59	13.35	12.14	9.98	18.87
	Isomaltose	9.11	8.74	8.76	8.02	11.28
	Lactose	9.27	9.03	8.78	8.32	11.89
	Lactulose	9.75	10.32	9.23	8.57	13.95
	D- Lyxose	12.41	14.06	11.98	10.68	16.66
	D- Maltose	9.16	8.81	8.75	8.18	11.59
	Maltotriose	8.27	8.10	7.94	7.51	11.02
	Maltulose	9.25	9.47	8.82	8.27	12.40
	D- Mannitol	11.36	17.82	10.80	10.59	24.90
	D-(+)-Mannose	12.04	12.04	11.54	10.16	16.39
	Melibiose	9.26	9.04	8.82	8.14	11.97
	D-(+)-Melezitose	8.00	7.93	7.66	7.54*	9.94
	D-(+)-Raffinose	8.10	8.16	7.76	7.88*	10.28
	L-(+)-Rhamnose	11.50	12.18	11.00	10.90	14.47
	D-(-)-Ribose	14.59	23.38	14.34	11.42	33.48
	Salicin	18.51	18.58	17.36	14.98	26.81
	D-Sorbitol	11.91	22.45	11.39	10.83	35.97
	Stachyose	7.60	7.59	7.30	7.27	9.72
	Sucrose	9.03	8.71	8.65	9.24*	11.00
	Trehalose	8.91	8.72	8.49	8.32	11.01
	Xylitol	12.69	22.01	12.16	11.78	32.38
	D-(+)-Xylose	12.06	11.62	11.68	10.24	13.84

\* Partial hydrolysis results.

### Conditions:

**Dimensions:** 300 x 7.8 mm  
**Mobile Phase:** Water (degassed)  
**Flow Rate:** 0.6 mL/min  
**Temperature:** 80 °C  
**Detection:** RI @ 40 °C

## Column Cross Reference Chart

Phenomenex Rezex™	Bio-Rad Aminex®	Supelco® SUPELCOGEL™	Waters® Sugar-Pak™	Transgenomic® CARBOSep™	Sepax® Carbomix®
RCM-Monosaccharide	HPX-87C <a href="#">125-0095</a>	SUPELCOGEL Ca	Sugar-Pak 1	CARBOSep CHO-820	Carbomix Ca
RHM-Monosaccharide	HPX-87H <a href="#">125-0140</a>	SUPELCOGEL C-610H & H	N/A	ICSep ION-300	Carbomix H
RPM-Monosaccharide	HPX-87P <a href="#">125-0098</a>	SUPELCOGEL Pb	N/A	CARBOSep COREGEL-87P	Carbomix Pb
RNM-Carbohydrate	HPX-87N <a href="#">125-0143</a>	N/A	N/A	N/A	Carbomix Na
RSO-Oligosaccharide	HPX-42A <a href="#">125-0097</a>	SUPELCOGEL Ag1 & Ag2	N/A	N/A	N/A
ROA-Organic Acid	HPX-87H <a href="#">125-0140</a>	SUPELCOGEL C-610H & H	N/A	N/A	N/A
RFQ-Fast Acid	Fast Acid <a href="#">125-0100</a>	N/A	N/A	N/A	N/A
RKP-Potassium	HPX-87K <a href="#">125-0142</a>	SUPELCOGEL K	N/A	CARBOSep COREGEL-87K	Carbomix K
RCU-USP Sugar Alcohols	Sugar Alcohols <a href="#">125-0094</a>	N/A	N/A	N/A	N/A
RNO-Oligosaccharide	N/A	N/A	N/A	CARBOSep COREGEL-87N	N/A

## Ordering Information

Columns					Guards		SecurityGuard™ Cartridges (mm)
Description	Part No.	Cross Linkage	Ionic Form	Size (mm)	Part No.	Size (mm)	4 x 3.0* /10pk
RCM-Monosaccharide	<a href="#">00F-0130-KO</a>	8%	Calcium	150 x 7.8	<a href="#">03B-0130-KO</a>	50 x 7.8	<a href="#">AJ0-4493</a>
RCM-Monosaccharide	<a href="#">00H-0130-KO</a>	8%	Calcium	300 x 7.8	<a href="#">03B-0130-KO</a>	50 x 7.8	<a href="#">AJ0-4493</a>
RHM-Monosaccharide	<a href="#">00H-0132-KO</a>	8%	Hydrogen	300 x 7.8	<a href="#">03B-0132-KO</a>	50 x 7.8	<a href="#">AJ0-4490</a>
RAM-Carbohydrate	<a href="#">00H-0131-KO</a>	8%	Silver	300 x 7.8	—	—	<a href="#">AJ0-4491</a>
RSO-Oligosaccharide	<a href="#">00P-0133-NO</a>	4%	Silver	200 x 10.0	<a href="#">03R-0133-NO</a>	60 x 10.0	—
RNO-Oligosaccharide	<a href="#">00P-0137-NO</a>	4%	Sodium	200 x 10.0	<a href="#">03R-0137-NO</a>	60 x 10.0	—
RPM-Monosaccharide	<a href="#">00H-0135-KO</a>	8%	Lead	300 x 7.8	<a href="#">03B-0135-KO</a>	50 x 7.8	<a href="#">AJ0-4492</a>
RPM-Monosaccharide	<a href="#">00D-0135-KO</a>	8%	Lead	100 x 7.8	<a href="#">03B-0135-KO</a>	50 x 7.8	<a href="#">AJ0-4492</a>
RNM-Carbohydrate	<a href="#">00H-0136-KO</a>	8%	Sodium	300 x 7.8	<a href="#">03B-0136-KO</a>	50 x 7.8	—
ROA-Organic Acid	<a href="#">00F-0138-EO</a>	8%	Hydrogen	150 x 4.6	—	—	<a href="#">AJ0-4490</a>
ROA-Organic Acid	<a href="#">00G-0138-EO</a>	8%	Hydrogen	250 x 4.6	—	—	<a href="#">AJ0-4490</a>
ROA-Organic Acid	<a href="#">00F-0138-KO</a>	8%	Hydrogen	150 x 7.8	<a href="#">03B-0138-KO</a>	50 x 7.8	<a href="#">AJ0-4490</a>
ROA-Organic Acid	<a href="#">00H-0138-KO</a>	8%	Hydrogen	300 x 7.8	<a href="#">03B-0138-KO</a>	50 x 7.8	<a href="#">AJ0-4490</a>
RKP-Potassium	<a href="#">00H-3252-KO</a>	8%	Potassium	300 x 7.8	—	—	—
RFQ-Fast Acid	<a href="#">00D-0223-KO</a>	8%	Hydrogen	100 x 7.8	<a href="#">03B-0223-KO</a>	50 x 7.8	<a href="#">AJ0-4490</a>
RCU-USP Sugar Alcohols	<a href="#">00G-0130-DO</a>	8%	Calcium	250 x 4.0	<a href="#">03A-0130-DO</a>	30 x 4.0	<a href="#">AJ0-4493</a>

for ID: 3.2-8.0 mm

\*SecurityGuard Analytical Cartridges require universal holder Part No.: [KJ0-4282](#)



For Column Heater, see p. 416



For our full line of Column Performance Check Standards, see pp. 424-425

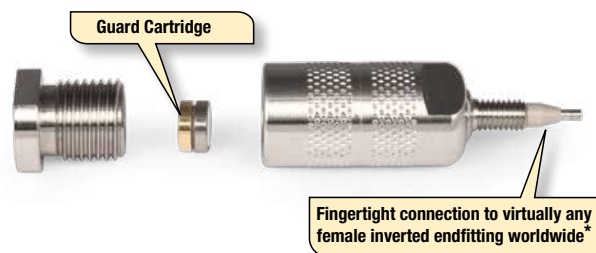
# SecurityGuard™ Standard HPLC and SFC Column Protection

U.S. Patent No. 6, 162, 362

## Column Protection for UHPLC, HPLC, SFC to PREP Your Results and Your Column are Too Important Not to Protect

- Protect HPLC and UHPLC columns and extend lifetime
- Virtually no change in chromatography
- Available in analytical, semi-prep, and preparative sizes
- Simple to use

Did you know a common cause of high backpressure, split peaks, broad peaks, baseline noise, baseline drift and loss of resolution is contaminants? The fact is all mobile phases contain some chemical contaminants or microparticulates, from the sample, solvent, or wear on the polymeric seals of the pump or injector. These contaminants can clog frits, irreversibly bind to columns, degrade performance, and even damage the flow cell. An easy solution, SecurityGuard™ is a universal column protection system designed to effectively (and inexpensively), protect your valuable columns, from the damaging effects of chemical contaminants, without altering your chromatographic results.



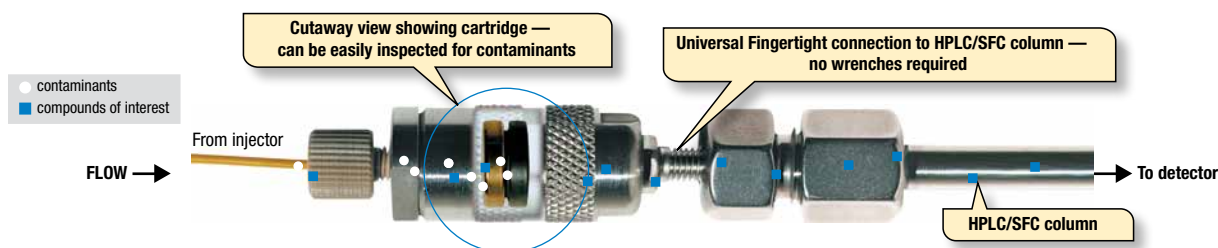
See SecurityGuard Standard in action video:  
[www.phenomenex.com/SecurityGuardInstallation](http://www.phenomenex.com/SecurityGuardInstallation)

### A Universal Guard Cartridge System

#### How SecurityGuard Standard Works\*

The SecurityGuard Standard analytical cartridge holder (patented) directly finger-tightens into virtually any manufacturer's non core-shell and  $\geq 3 \mu\text{m}$  particle columns. Contaminants are retained by

an inexpensive, 4 mm, disposable cartridge instead of fouling your expensive analytical column.



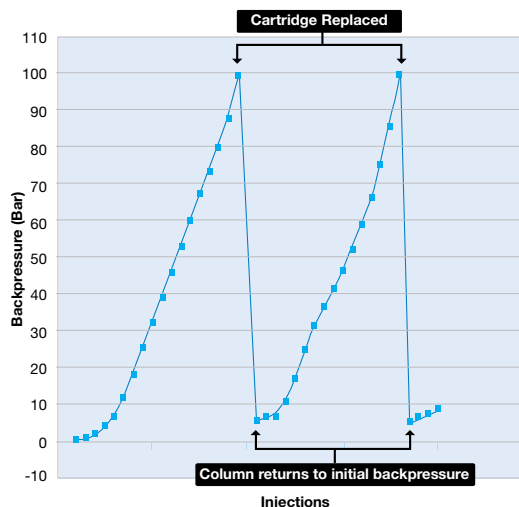
### Increases HPLC Column Lifetime, Guaranteed!

Simply replace SecurityGuard cartridges instead of your expensive HPLC/SFC columns. In this graph, once the expired SecurityGuard Standard cartridge was replaced, the pressure immediately dropped and the column performance was restored allowing for extended column use.



The SecurityGuard Standard holder and cartridges are pressure rated to 5000 psi (345 bar).

For all core-shell and / or  $< 3 \mu\text{m}$  particle columns, and all applications at higher pressures, use SecurityGuard ULTRA, see p.335. For available Semi-Preparative and PREP sizes, see pp. 332-334. For preparative SFC applications, use holder AJ0-8617 for 15 x 21.2 mm cartridges or AJ0-8618 for 15 x 30 mm cartridges. For Kinetex and Aeris Core-Shell SecurityGuard SemiPrep and PREP cartridges, see p. 334.



\*Feature applies to traditional analytical-sized guard system only, and does not apply to SemiPrep or PREP guard cartridges.

Accelerated lifetime test using endogenous biomolecule matrix on a reversed phase C18 column, 5  $\mu\text{m}$ , 50 x 4.6 mm with SecurityGuard Standard C18 cartridges. Backpressure values represent additional backpressure contributed by SecurityGuard.



# SecurityGuard™ Standard HPLC and SFC Column Protection

U.S. Patent No. 6, 162, 362

## “See Your Dirt” Feature

The “see your dirt” feature lets you know exactly when it’s time to replace your cartridge.

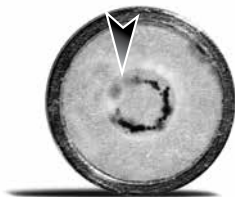
Visually inspect the surface of the cartridge’s packing material any time, without disturbing the packing bed. Now you can easily monitor visual contaminant build-up, and change your guard cartridge before it’s too late!

If your contaminants are colorless, replace the cartridge as often as needed to maintain chromatographic performance.



### CLEAN

If it looks clean, the cartridge may be reinserted for further use.



### DIRTY

If either discoloration or particle build-up is observed, it’s time to replace the cartridge.

*“The SecurityGuard is easy to use and cartridge replacement is simple.”*

*F. Shakir, Sheffield Pharmaceuticals*

*“We didn’t see any change in retention time or difference in the peaks. The SecurityGuard has increased the life of the column.”*

*B. Dietz, ADM*

The opinions stated herein are solely those of the individual and not necessarily those of any company or organization.

## Analytical HPLC/SFC Holder Kit and Replacement Accessories

For 2.0 and 3.0 mm ID cartridges, use with 2.0 to 8.0 mm ID columns

### Ordering Information

#### Analytical Kit

Part No.	Description
<a href="#">KJO-4282</a>	SecurityGuard Standard Kit* (includes holder)

#### Replacement Parts and Accessories

Part No.	Description	Unit
<a href="#">AJ0-4283</a>	PEEK Ferrules	3/pk
<a href="#">AJ0-4285</a>	Stacking Rings	2/pk
<a href="#">AQ0-1389</a>	PEEK Fingertight Fittings	10/pk
<a href="#">AJ0-4284</a>	SecurityGuard Wrenches	2/pk

## UHPLC / HPLC / SFC / PREP Guard Finder

Having a difficult time finding the best column protection device for your specific UHPLC, HPLC, SFC or Prep column?

- Guard Finder matches over 57,000 column part numbers
- Interactive selection tool finds the appropriate column guard in seconds
- Quickly find column protection for any column from any of the top column manufacturers
- Search by brand, part number, technique, or column phase

Try it today at:

[www.phenomenex.com/GuardIT](http://www.phenomenex.com/GuardIT)

### \*Kit KJO-4282 Includes:





# SecurityGuard<sup>PREP</sup><sup>TM</sup> HPLC/SFC Column Protection

## Semi-Preparative HPLC/SFC Holder

For 10.0 mm ID cartridges, use with 9 to 16 mm ID columns

### Ordering Information

#### SecurityGuard SemiPrep Guard Cartridge Holder

Part No.	Description	Unit
<a href="#">AJ0-9281</a>	Holder for 10.0 mm ID cartridges	ea

#### Accessories

Part No.	Description	Unit
----------	-------------	------

#### Nut and Ferrule

<a href="#">AQ0-3018</a>	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea
--------------------------	--------------------------------------------------------------------------	----

#### Sure-Lok<sup>TM</sup> Fingertight Fittings

<a href="#">AQ0-1388</a>	PEEK Sure-Lok Male Nut	ea
<a href="#">AQ0-1389</a>	PEEK Sure-Lok Male Nut	10/pk

#### Sure-Lok<sup>TM</sup> Couplers

<a href="#">AQ0-1392</a>	PEEK Sure-Lok Coupler	ea
<a href="#">AQ0-1393</a>	PEEK Sure-Lok Coupler	10/pk

#### Column Sealing Plugs

<a href="#">AQ0-0217</a>	Column Sealing Plug, 10-32 Thread size	10/pk
--------------------------	----------------------------------------	-------

#### SemiPrep Guard Holder Wrench

<a href="#">AQ0-8904</a>	Wrench, Open End, 1/2 x 9/16 in.	ea
--------------------------	----------------------------------	----



For Semi-Preparative and Preparative Cartridges, see pp. 333-334

## Preparative HPLC/SFC Holder (Two Sizes)

For 21.2 mm ID cartridges, use with 18 to 29 mm ID columns

### Ordering Information

#### SecurityGuard Prep Guard Cartridge Holders

Part No.	Description	Unit
<a href="#">AJ0-8223</a>	HPLC Holder Kit for 21.2 mm ID cartridges, includes column coupler	ea
<a href="#">AJ0-8617</a>	SFC Holder Kit for 21.2 mm ID cartridges, includes column coupler	ea

For 30.0 mm ID cartridges, use with 30 to 49 mm ID columns

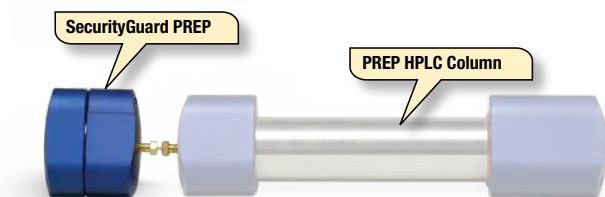
### Ordering Information

#### SecurityGuard Prep Guard Cartridge Holder

Part No.	Description	Unit
<a href="#">AJ0-8277</a>	HPLC Holder Kit for 30.0 mm ID cartridges, includes column coupler	ea
<a href="#">AJ0-8618</a>	SFC Holder Kit for 30.0 mm ID cartridges, includes column coupler	ea

#### Replacement Parts and Accessories

Part No.	Description	Unit
<a href="#">AQ0-8376</a>	PREP Coupler, SS Tube, Nuts, and Ferrules, 10-32 Threads, 1/16 in. OD x 0.030 in. ID	ea
<a href="#">AQ0-8222</a>	PREP Replacement O-Rings, Kalrez <sup>®</sup> For 15 x 21.2 mm SG HPLC Holder, Size 2-021	2/pk
<a href="#">AQ0-8318</a>	PREP Replacement O-Rings, Kalrez <sup>®</sup> For 15 x 30 mm SG HPLC Holder, Size 2-025	2/pk
<a href="#">AQ0-8500</a>	PREP Replacement O-Rings, Teflon <sup>®</sup> For 15 x 21.2 mm SG SFC Holder, Size 2-021	2/pk
<a href="#">AQ0-8501</a>	PREP Replacement O-Rings, Teflon <sup>®</sup> For 15 x 30 mm SG SFC Holder, Size 2-025	2/pk
<a href="#">AT0-0465</a>	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 10 cm length	5/pk
<a href="#">AT0-0466</a>	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 20 cm length	5/pk
<a href="#">AQ0-8903</a>	Wrench, Open End, 1/4 x 9/16 in.	ea

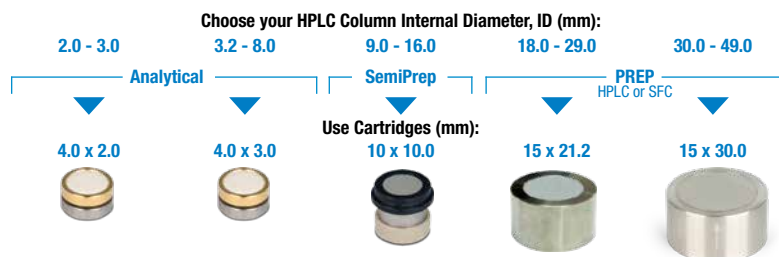


Holders		Cartridges
PREP	SFC	
21.2 mm ID HPLC Holder	21.2 mm ID SFC Holder	Cartridge (15 x 21.2 mm ID)
30 mm ID HPLC Holder	30 mm ID SFC Holder	Cartridge (15 x 30.0 mm ID)
O-Rings		Coupler
Kalrez O-Rings	Teflon O-Rings	PREP Coupler

## Cartridges and Holders

Step 1: Choose column ID

Step 2: Match column phase



### Ordering Information

Material	Description	pH Stability	2.0 - 3.0	3.2 - 8.0	9.0 - 16.0	18.0 - 29.0	30.0 - 49.0
<b>Cartridges for General Purpose/Pharmaceutical</b>			/10pk	/10pk	/3pk	ea	ea
C18	(ODS, Octadecyl)	1.5 - 10	<a href="#">AJ0-4286</a>	<a href="#">AJ0-4287</a>	<a href="#">AJ0-7221</a>	<a href="#">AJ0-7839</a>	<a href="#">AJ0-8301</a>
C12	(Dodecyl)	1.5 - 10	<a href="#">AJ0-6073</a>	<a href="#">AJ0-6074</a>	<a href="#">AJ0-7275</a>	<a href="#">AJ0-7842</a>	<a href="#">AJ0-8304</a>
C8	(MOS, Octyl)	1.5 - 10	<a href="#">AJ0-4289</a>	<a href="#">AJ0-4290</a>	<a href="#">AJ0-7222</a>	<a href="#">AJ0-7840</a>	<a href="#">AJ0-8302</a>
C5	(Pentyl)	1.5 - 10	<a href="#">AJ0-4292</a>	<a href="#">AJ0-4293</a>	<a href="#">AJ0-7372</a>	—	—
C1	(TMS)	2 - 9	—	<a href="#">AJ0-4299</a>	—	—	—
Silica	—	—	<a href="#">AJ0-4347</a>	<a href="#">AJ0-4348</a>	<a href="#">AJ0-7223</a>	<a href="#">AJ0-7229</a>	<a href="#">AJ0-8312</a>
HILIC	(HILIC)	1.5 - 8	<a href="#">AJ0-8328</a>	<a href="#">AJ0-8329</a>	<a href="#">AJ0-8902</a>	—	—
NH <sub>2</sub>	(Amino, Aminopropyl)	1.5 - 11	<a href="#">AJ0-4301</a>	<a href="#">AJ0-4302</a>	<a href="#">AJ0-7364</a>	<a href="#">AJ0-8162</a>	<a href="#">AJ0-8309</a>
CN	(Cyano, Cyanopropyl)	2 - 7.5	<a href="#">AJ0-4304</a>	<a href="#">AJ0-4305</a>	<a href="#">AJ0-7313</a>	<a href="#">AJ0-8220</a>	<a href="#">AJ0-8311</a>
Phenyl	(Phenylhexyl)	1.5 - 10	<a href="#">AJ0-4350</a>	<a href="#">AJ0-4351</a>	<a href="#">AJ0-7314</a>	<a href="#">AJ0-7841</a>	<a href="#">AJ0-8303</a>
PPFP(2)	(Pentafluorophenyl)	1.5 - 8	<a href="#">AJ0-8326</a>	<a href="#">AJ0-8327</a>	<a href="#">AJ0-8376</a>	<a href="#">AJ0-8377</a>	<a href="#">AJ0-8378</a>
SCX	(SA, Strong Cation Exchanger)	2.5 - 7.5	<a href="#">AJ0-4307</a>	<a href="#">AJ0-4308</a>	—	—	<a href="#">AJ0-8596</a>
SAX	(SB, Strong Anion Exchanger)	2.5 - 7.5	—	<a href="#">AJ0-4311</a>	—	—	—
RP-1	(Reversed Phase - Polymer)	0 - 14	—	<a href="#">AJ0-5809</a>	<a href="#">AJ0-7368</a>	<a href="#">AJ0-8358</a>	—
Polar-RP	(Ether-linked Phenyl)	1.5 - 7	<a href="#">AJ0-6075</a>	<a href="#">AJ0-6076</a>	<a href="#">AJ0-7276</a>	<a href="#">AJ0-7845</a>	—
Fusion-RP	(C18 Polar Embedded)	1.5 - 10	<a href="#">AJ0-7556</a>	<a href="#">AJ0-7557</a>	<a href="#">AJ0-7558</a>	<a href="#">AJ0-7844</a>	—
AQ C18	(Polar Endcapped C18)	1.5 - 7.5	<a href="#">AJ0-7510</a>	<a href="#">AJ0-7511</a>	<a href="#">AJ0-7512</a>	<a href="#">AJ0-7843</a>	<a href="#">AJ0-8305</a>
Gemini® NX-C18	(C18 Twin-NX™ Technology)	1 - 12	<a href="#">AJ0-8367</a>	<a href="#">AJ0-8368</a>	<a href="#">AJ0-8369</a>	<a href="#">AJ0-8370</a>	<a href="#">AJ0-8371</a>
Gemini C18	(C18 Twin™ Technology)	1 - 12	<a href="#">AJ0-7596</a>	<a href="#">AJ0-7597</a>	<a href="#">AJ0-7598</a>	<a href="#">AJ0-7846</a>	<a href="#">AJ0-8308</a>
Gemini C6-Phenyl	(C6-Phenyl Twin Technology)	1 - 12	<a href="#">AJ0-7914</a>	<a href="#">AJ0-7915</a>	<a href="#">AJ0-9156</a>	<a href="#">AJ0-9157</a>	<a href="#">AJ0-9158</a>
Luna® Omega Polar C18	(Polar Functional C18)	1.5 - 10	<a href="#">AJ0-7600</a>	<a href="#">AJ0-7601</a>	<a href="#">AJ0-9519</a>	<a href="#">AJ0-7603</a>	<a href="#">AJ0-7604</a>
Luna Omega PS C18	(Mixed-Mode C18)	1.5 - 10	<a href="#">AJ0-7605</a>	<a href="#">AJ0-7606</a>	<a href="#">AJ0-9520</a>	<a href="#">AJ0-7608</a>	<a href="#">AJ0-7609</a>
<b>Cartridges for Chiral</b>			/10pk	/10pk	/3pk	ea	ea
<i>For use with chiral columns, such as Lux® Cellulose-1, -2, -3, -4, i-Cellulose-5, i-Amylose-1, -3, &amp; Amylose-1, -2 (Phenomenex); CHIRALCEL® OD-H®, OJ-H® &amp; CHIRALPAK® AD®-H, IA®, IC®, IG® (DAICEL Corporation)</i>							
Lux i-Amylose-1	Amylose tris (3, 5-dimethylphenylcarbamate)	2 - 9	—	<a href="#">AJ0-8641</a>	<a href="#">AJ0-8642</a>	<a href="#">AJ0-8643</a>	<a href="#">AJ0-8644</a>
Lux i-Amylose-3	Amylose tris (3-chloro-5-methylphenylcarbamate)	2 - 9	<a href="#">AJ0-8651</a>	<a href="#">AJ0-8650</a>	<a href="#">AJ0-8652</a>	<a href="#">AJ0-8653</a>	<a href="#">AJ0-8654</a>
Lux i-Cellulose-5	Cellulose tris (3, 5-dichlorophenylcarbamate)	2 - 9	<a href="#">AJ0-8631</a>	<a href="#">AJ0-8632</a>	<a href="#">AJ0-8633</a>	<a href="#">AJ0-8634</a>	—
Lux Cellulose-1	Cellulose tris (3, 5-dimethylphenylcarbamate)	2 - 9	<a href="#">AJ0-8402</a>	<a href="#">AJ0-8403</a>	<a href="#">AJ0-8404</a>	<a href="#">AJ0-8405</a>	<a href="#">AJ0-8406</a>
Lux Cellulose-2	Cellulose tris (3-chloro-4-methylphenylcarbamate)	2 - 9	<a href="#">AJ0-8398</a>	<a href="#">AJ0-8366</a>	<a href="#">AJ0-8399</a>	<a href="#">AJ0-8400</a>	—
Lux Cellulose-3	Cellulose tris (4-methylbenzoate)	2 - 9	<a href="#">AJ0-8621</a>	<a href="#">AJ0-8622</a>	<a href="#">AJ0-8623</a>	<a href="#">AJ0-8624</a>	<a href="#">AJ0-8625</a>
Lux Cellulose-4	Cellulose tris (4-chloro-3-methylphenylcarbamate)	2 - 9	<a href="#">AJ0-8626</a>	<a href="#">AJ0-8627</a>	<a href="#">AJ0-8628</a>	<a href="#">AJ0-8629</a>	<a href="#">AJ0-8630</a>
Lux Amylose-1	Amylose tris (3, 5-dimethylphenylcarbamate)	2 - 9	<a href="#">AJ0-9337</a>	<a href="#">AJ0-9336</a>	<a href="#">AJ0-9344</a>	<a href="#">AJ0-9338</a>	<a href="#">AJ0-9339</a>
Lux Amylose-2	Amylose tris (5-chloro-2-methylphenylcarbamate)	2 - 9	<a href="#">AJ0-8471</a>	<a href="#">AJ0-8470</a>	<a href="#">AJ0-8472</a>	<a href="#">AJ0-8473</a>	—
Lux AMP	—	1 - 11.5	<a href="#">AJ0-8475</a>	<a href="#">AJ0-8476</a>	—	—	—
<b>HPLC Guard Cartridge Holders (one-time purchase only)</b>			/kit	/holder	/kit	/kit	/kit
Reusable Holder			<a href="#">KJ0-4282</a>	<a href="#">AJ0-9281</a>	<a href="#">AJ0-8223</a>	<a href="#">AJ0-8277</a>	
<b>SFC Guard Cartridge Holders</b>			/kit	/holder	/kit	/kit	
Reusable Holder			<a href="#">KJ0-4282</a>	<a href="#">AJ0-9281</a>	<a href="#">AJ0-8617</a>	<a href="#">AJ0-8618</a>	

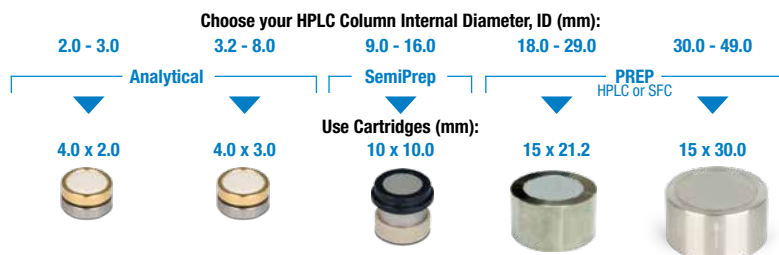
\*For all core-shell and/or < 3µm particle columns use 2.1 to 4.6mm ID SecurityGuard ULTRA Holder and Cartridges, see page 335

Continued on next page

## Cartridges and Holders (cont'd)

Step 1: Choose column ID

Step 2: Match column phase



### Ordering Information (continued)

Material	Description	pH Stability					
<b>Cartridges for Core-Shell Media</b>			—	—	/3pk	ea	ea
<i>For core-shell media columns, such as Kinetex® and Aeris™ (Phenomenex).</i>							
EVO C18	(ODS, Octadecyl)	1 - 12	*	*	AJO-9306	AJO-9304	AJO-9305
C18	(ODS, Octadecyl)	1.5 - 8.5	*	*	AJO-9278	AJO-9145	AJO-9204
C8	(MOS, Octyl)	1.5 - 8.5	*	*	—	AJO-9205	—
PFP	(Pentafluorophenyl)	1.5 - 8.5	*	*	—	AJO-9146	—
F5	(Pentafluorophenylpropyl)	1.5 - 8.5	*	*	AJO-9323	AJO-9324	—
Phenyl-Hexyl	(Phenylhexyl)	1.5 - 9	*	*	—	AJO-9147	AJO-9216
Biphenyl	(Biphenyl)	1.5 - 8.5	*	*	AJO-9280	AJO-9272	—
HILIC	(HILIC)	2 - 7.5	*	*	—	AJO-9277	—
C18-Peptide	(ODS, Octadecyl)	1.5 - 9	*	*	AJO-9317	AJO-9318	—
<b>Cartridges for Protein and Polypeptide Reversed Phase</b>			/10pk	/10pk	/3pk	ea	ea
<i>For use with silica columns for separation of proteins &amp; peptides, such as Jupiter® (Phenomenex) and other widepore or 300 Å brands.</i>							
Widepore C18	(ODS, Octadecyl)	1.5 - 10	AJO-4320	AJO-4321	AJO-7224	AJO-7230	AJO-8313
Widepore C5	(Pentyl)	1.5 - 10	AJO-4326	AJO-4327	AJO-7371	—	—
Widepore C4	(Butyl)	1.5 - 10	AJO-4329	AJO-4330	AJO-7225	AJO-7231	AJO-8314
<i>For use with columns like Biozen™ (Phenomenex).</i>							
Peptide PS-C18 3µm	(Positive Functional C18)	1.5 - 8.5	AJO-7605	AJO-7606	—	—	—
Ion-Exchange	(Weak Cation Exchanger)	2 - 12	AJO-9401	AJO-9400	—	—	—
<b>Cartridges for Synthetic DNA / RNA Analysis</b>			/10pk	/10pk	/3pk	ea	ea
<i>For use with columns like Clarity® (Phenomenex).</i>							
Oligo-RP™	(C18 Twin Technology)	1 - 12	AJO-8134	AJO-8135	AJO-8136	AJO-8210	—
Oligo-XT	(ODS, Octadecyl)	1 - 12	*	*	AJO-9516	AJO-9517	AJO-9518
<b>Cartridges for Silica GFC (Gel Filtration Chromatography)</b>			—	/10pk	—	ea	—
<i>(Aqueous SEC) For use with silica GFC columns, such as Yarra™ and BioSep™ (Phenomenex); ZORBAX® GF-Series (Agilent); Bio-Sil® (Bio-Rad®).</i>							
GFC-2000	—	2 - 7.5	—	AJO-4487	—	AJO-8588	—
GFC-3000	—	2 - 7.5	—	AJO-4488	—	AJO-8589	—
GFC-4000	—	2 - 7.5	—	AJO-4489	—	AJO-8590	—
<b>Cartridges for Polymer GPC (Gel Permeation Chromatography)</b>			—	/3pk	—	—	—
<i>(Organic GPC) For use with polymer GPC columns, such as Phenogel™ (Phenomenex); PLgel™ (Agilent®); SDV® (PSS); Styragel® (Waters®); GPC Series (Shodex®); TSKgel® (Tosoh Bioscience®)</i>							
GPC***	—	0 - 14	—	AJO-9292	—	—	—
<b>Cartridges for Carbohydrate/Organic Acid</b>			—	/10pk	—	—	—
<i>For organic acid and carbohydrate analysis, such as Rezex™ (Phenomenex); Aminex® (Bio-Rad); Sugar-Pak™ (Waters).</i>							
Carbo-H <sup>+</sup>	—	1 - 8	—	AJO-4490	—	—	—
Carbo-Ag <sup>+</sup>	—	Neutral	—	AJO-4491	—	—	—
Carbo-Pb <sup>2+</sup>	—	Neutral	—	AJO-4492	—	—	—
Carbo-Ca <sup>2+</sup>	—	Neutral	—	AJO-4493	—	—	—
<b>HPLC Guard Cartridge Holders (one-time purchase only)</b>			/kit	/holder	/kit	/kit	/kit
Reusable Holder	—	—	KJO-4282	AJO-9281	AJO-8223	AJO-8277	—
<b>SFC Guard Cartridge Holders</b>			/kit	/holder	/kit	/kit	/kit
Reusable Holder	—	—	KJO-4282	AJO-9281	AJO-8617	AJO-8618	—

\*For all core-shell and/or < 3µm particle columns use 2.1 to 4.6mm ID SecurityGuard ULTRA Holder and Cartridges, see page 335

\*\*For use with saccharide and oligosaccharide columns in Ag<sup>+</sup> form.

\*\*\*Not compatible with HFIP solvent.

## UHPLC Column Protection

- Extends HPLC, core-shell, and < 3 μm particle column lifetime
- Virtually no change in chromatography
- Pressure rated to 20000 psi (1378 bar)
- Simple to use

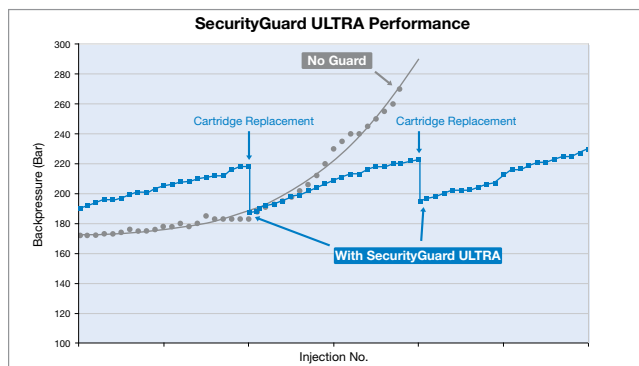
### Universal Fit

Use SecurityGuard ULTRA with virtually all UHPLC columns 2.1 to 4.6mm ID. The extremely low dead volume of this unique product minimizes sample peak dispersion. It will efficiently remove microparticulates and chemical contaminants from the flow stream without contributing to system backpressure or dead volume (<0.3 μL).

### Increases Column Lifetime, Guaranteed!

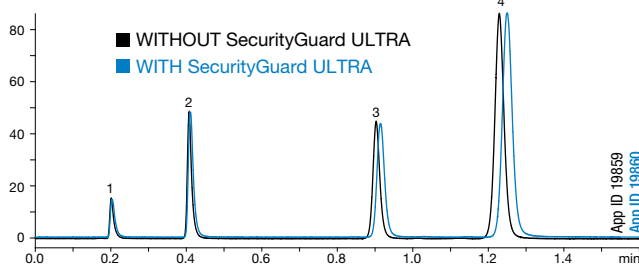
When contaminants and particulates build up at the head of your column or on the guard cartridge, system backpressures can increase dramatically. By simply replacing the SecurityGuard ULTRA cartridge, instead of your column, you are able to regain normal operating conditions and reclaim original column performance.

### Accelerated lifetime test using endogenous biological matrix on Kinetex 2.6 μm C18 50 x 4.6 mm ID column



### Protects with No Loss of Column Performance!

SecurityGuard ULTRA's unique design minimizes sample peak dispersion to maintain column performance without altering your chromatography results.



Conditions for both columns:

Column: Kinetex 1.7 μm XB-C18  
Dimensions: 50 x 2.1 mm  
Guard Cartridge: SecurityGuard ULTRA C18 (ODS) 2.1 mm ID  
Part No.: [AJ0-8768](#)  
Mobile Phase: Acetonitrile / Water (50:50)  
Flow Rate: 0.5 mL/min

Detection: UV @ 254 nm  
Sample: 1. Uracil  
2. Acetophenone  
3. Toluene  
4. Naphthalene

See SecurityGuard ULTRA in action:  
[www.phenomenex.com/SecurityGuardULTRA](http://www.phenomenex.com/SecurityGuardULTRA)

2012 R&D 100  
Award Recipient



## SecurityGuard ULTRA Cartridges

### Ordering Information

Material	Description	pH Stability	Column ID (mm)		
			2.1	3.0	4.6
<b>Cartridges for General Purpose/ Pharmaceutical</b>					
			/3pk	/3pk	/3pk
EVO C18	(ODS, Octadecyl)	1.0 – 12.0	<a href="#">AJ0-9298</a>	<a href="#">AJ0-9297</a>	<a href="#">AJ0-9296</a>
C18	(ODS, Octadecyl)	1.5 – 8.5*	<a href="#">AJ0-8782</a>	<a href="#">AJ0-8775</a>	<a href="#">AJ0-8768</a>
C8	(MOS, Octyl)	1.5 – 8.5*	<a href="#">AJ0-8784</a>	<a href="#">AJ0-8777</a>	<a href="#">AJ0-8770</a>
PFP	(Pentafluorophenyl)	1.5 – 8.5*	<a href="#">AJ0-8787</a>	<a href="#">AJ0-8780</a>	<a href="#">AJ0-8773</a>
F5	(Pentafluorophenyl)	1.5 – 8.5*	<a href="#">AJ0-9322</a>	<a href="#">AJ0-9321</a>	<a href="#">AJ0-9320</a>
Biphenyl	(Biphenyl)	1.5 – 8.5*	<a href="#">AJ0-9209</a>	<a href="#">AJ0-9208</a>	<a href="#">AJ0-9207</a>
Phenyl	(Phenylhexyl)	1.5 – 8.5*	<a href="#">AJ0-8788</a>	<a href="#">AJ0-8781</a>	<a href="#">AJ0-8774</a>
HILIC	(HILIC)	2.0 – 7.5	<a href="#">AJ0-8786</a>	<a href="#">AJ0-8779</a>	<a href="#">AJ0-8772</a>
Polar C18	(Polar Functional C18)	1.5 – 8.5*	<a href="#">AJ0-9532</a>	<a href="#">AJ0-9531</a>	<a href="#">AJ0-9530</a>

### Cartridges for General Purpose/Pharmaceutical (Fully Porous Columns)

For fully porous columns like Luna® Omega (Phenomenex)

C18	(ODS, Octadecyl)	1.5 – 8.5*	<a href="#">AJ0-9502</a>	<a href="#">AJ0-9501</a>	<a href="#">AJ0-9500</a>
Polar C18	(Polar Functional C18)	1.5 – 8.5*	<a href="#">AJ0-9505</a>	—	—
PS C18	(Positive Functional C18)	1.5 – 8.5*	<a href="#">AJ0-9508</a>	—	—

### Cartridges for Protein and Peptide Reversed Phase

For use with columns like Aeria™ (Phenomenex)

Widepore C18	(ODS, Octadecyl)	1.5 – 8.5*	<a href="#">AJ0-8783</a>	—	<a href="#">AJ0-8769</a>
Widepore C8	(MOS, Octyl)	1.5 – 8.5*	<a href="#">AJ0-8785</a>	—	<a href="#">AJ0-8771</a>
Widepore C4	(Butyl)	1.5 – 8.5*	<a href="#">AJ0-8899</a>	—	<a href="#">AJ0-8901</a>
Peptide C18	(ODS, Octadecyl)	1.5 – 8.5*	<a href="#">AJ0-8948</a>	—	<a href="#">AJ0-8946</a>

For use with columns like Biozen™ (Phenomenex)

Glycan	(Amide Polyol)	2.0 – 7.5	<a href="#">AJ0-9800</a>	—	—
Peptide PS-C18 1.6 μm (Positive Functional C18)		1.5 – 8.5*	<a href="#">AJ0-9803</a>	—	—
Peptide XB-C18	(ODS, Octadecyl)	1.5 – 9.0**	<a href="#">AJ0-9806</a>	—	<a href="#">AJ0-9808</a>
WidePore C4	(Butyl)	1.5 – 9.0**	<a href="#">AJ0-9816</a>	—	<a href="#">AJ0-9818</a>
Intact XB-C18	(MOS, Octyl)	1.5 – 9.0**	<a href="#">AJ0-9812</a>	—	<a href="#">AJ0-9814</a>
Oligo	(ODS, Octadecyl)	1.0 – 12.0	<a href="#">AJ0-9820</a>	—	<a href="#">AJ0-9822</a>
dSEC-2 1.8 μm	(Diol)	2.5 – 7.5	—	—	<a href="#">AJ0-9851</a>
dSEC-2 3 μm	(Diol)	2.5 – 7.5	—	—	<a href="#">AJ0-9850</a>
SEC-2	(Diol)	1.5 – 8.5	—	—	<a href="#">AJ0-9850</a>
SEC-3	(Diol)	1.5 – 8.5	—	—	<a href="#">AJ0-9851</a>

### Cartridges for Synthetic DNA / RNA Analysis

For use with columns like Clarity® (Phenomenex)

Oligo-MS C18	(ODS, Octadecyl)	1.5 – 8.5*	<a href="#">AJ0-9068</a>	—	—
Oligo-XT	(ODS, Octadecyl)	1.0 – 12.0	<a href="#">AJ0-9515</a>	—	<a href="#">AJ0-9514</a>

### Cartridges for Silica GFC (Gel Filtration Chromatography)

(Aqueous SEC) For use with silica GFC columns such as Yarra™ (Phenomenex)

X150	—	1.5 – 8.5	—	—	<a href="#">AJ0-9512</a>
X300	—	1.5 – 8.5	—	—	<a href="#">AJ0-9513</a>

\*pH stable 1.5–8.5 under gradient conditions. pH stable 1.5–10 under isocratic conditions.  
\*\*pH range is 1.5–9 under gradient conditions. pH range is 1.5–10 under isocratic conditions.  
[AJ0-9000](#) is the universal holder designed for use with 2.1 mm, 3.0 mm and 4.6 mm ID cartridges.



Holder



Holder with cartridge, assembled

## SecurityGuard ULTRA Cartridge Holder

### Ordering Information

Part No.	Description	Unit
<a href="#">AJ0-9000</a>	SecurityGuard ULTRA Cartridge Holder	ea

Initial SecurityGuard ULTRA installation and cartridge replacement requires 3 wrenches, which must be purchased separately: one 3/8 in. wrench ([AQ0-8959](#); fits Kinetex, Aeria, and Oligo-MS column end-fittings), and two 5/16 in. wrenches ([AQ0-8903](#); fits ULTRA cartridge and holder). See p. 427



## SecurityLINK UHPLC Connections in a Click

The SecurityLINK UHPLC fingertight fitting system simplifies your system and column connections and provides consistent performance with torque limiting technology that prevents column damaging overtightening.

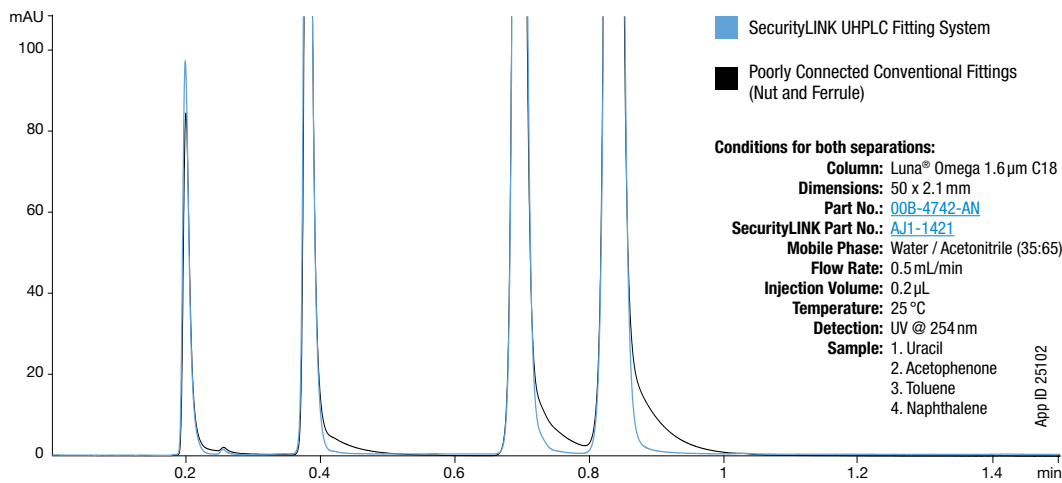
### SecurityLINK UHPLC Fittings

- No tools required for quick and easy installation
- Fitting self-adjusts at column inlet to ensure zero dead-volume for better chromatographic results
- Torque limiting technology prevents system and column port damage
- UHPLC and HPLC compatibility: pressure rated to 19000 psi (1310 bar)



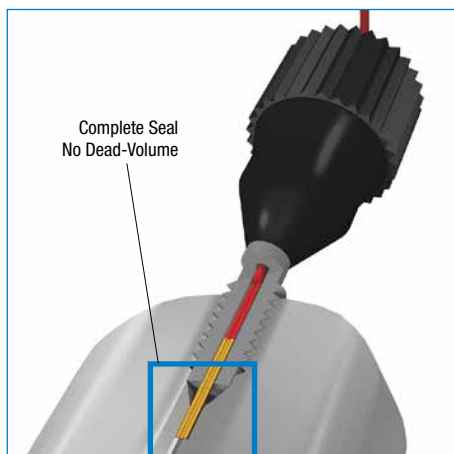
### SecurityLINK vs. Poorly Connected Conventional Fittings

Poorly connected fittings are often the causes of carryover, band broadening, and peak tailing. SecurityLINK offers zero dead-volume connections every time.



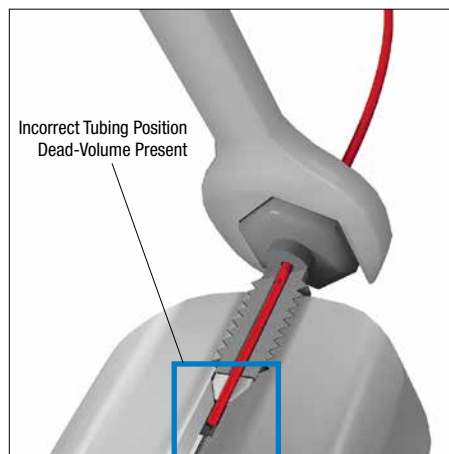
SECURITYLINK | UHPLC

SecurityLINK UHPLC Fitting System



VS.

Poorly Connected Conventional Fittings (Nut and Ferrule)





## Installation Instructions

1. Insert SecurityLINK UHPLC fitting into column port



2. Fingertighten until first "CLICK" feedback is received. Connection Complete!



## Ordering Information

### PEEKsil™



#### PEEKsil Double-Sided 10-32 Fittings for 1/16 in. Ports

Part No.	ID (µm)	Length (mm)
<a href="#">AJ1-2111</a>	25	100
<a href="#">AJ1-2121</a>	25	150
<a href="#">AJ1-2141</a>	25	250
<a href="#">AJ1-2151</a>	25	300
<a href="#">AJ1-2171</a>	25	500
<a href="#">AJ1-2191</a>	25	750
<a href="#">AJ1-21A1</a>	25	1000
<a href="#">AJ1-2211</a>	50	100
<a href="#">AJ1-2221</a>	50	150
<a href="#">AJ1-2231</a>	50	200
<a href="#">AJ1-2241</a>	50	250
<a href="#">AJ1-2251</a>	50	300
<a href="#">AJ1-2271</a>	50	500
<a href="#">AJ1-2291</a>	50	750
<a href="#">AJ1-22A1</a>	50	1000
<a href="#">AJ1-2321</a>	75	150
<a href="#">AJ1-2341</a>	75	250
<a href="#">AJ1-2371</a>	75	500
<a href="#">AJ1-23A1</a>	75	1000
<a href="#">AJ1-2411</a>	100	100
<a href="#">AJ1-2421</a>	100	150
<a href="#">AJ1-2441</a>	100	250
<a href="#">AJ1-2471</a>	100	500
<a href="#">AJ1-24A1</a>	100	1000

### PEEKsil



#### PEEKsil Single-Sided Fittings 1/32 in. OD PEEKsil Tubing with One 10-32 Fitting for 1/16 in. Ports, and One Side with No Fitting

Part No.	ID (µm)	Length (mm)
<a href="#">AJ1-21B1</a>	25	1500
<a href="#">AJ1-2224</a>	50	150
<a href="#">AJ1-2274</a>	50	500
<a href="#">AJ1-2294</a>	50	750
<a href="#">AJ1-22A4</a>	50	1000

SecurityLINK tubing material includes a sleeve that provides: ID, length and part number information.

The "CLICK" Feedback indicates the SecurityLINK Connection is Secure! This Prevents Overtightening & Saves Your Column.

### PEEK-Lined Stainless Steel



#### PEEK-Lined Stainless Steel Double-Sided 10-32 Fittings for 1/16 in. Ports

Part No.	ID (µm)	Length (mm)
<a href="#">AJ1-3121</a>	25	150
<a href="#">AJ1-3141</a>	25	250
<a href="#">AJ1-3161</a>	25	350
<a href="#">AJ1-3171</a>	25	500
<a href="#">AJ1-3181</a>	25	600
<a href="#">AJ1-3221</a>	50	150
<a href="#">AJ1-3241</a>	50	250
<a href="#">AJ1-3261</a>	50	350
<a href="#">AJ1-3271</a>	50	500
<a href="#">AJ1-3281</a>	50	600
<a href="#">AJ1-3321</a>	75	150
<a href="#">AJ1-3341</a>	75	250
<a href="#">AJ1-3361</a>	75	350
<a href="#">AJ1-3371</a>	75	500
<a href="#">AJ1-3381</a>	75	600
<a href="#">AJ1-3421</a>	100	150
<a href="#">AJ1-3441</a>	100	250
<a href="#">AJ1-3461</a>	100	350
<a href="#">AJ1-3471</a>	100	500
<a href="#">AJ1-3481</a>	100	600

### Stainless Steel



#### Stainless Steel Double-Sided 10-32 Fittings for 1/16 in. Ports

Part No.	ID (µm)	Length (mm)
<a href="#">AJ1-14A1</a>	100	1000
<a href="#">AJ1-1411</a>	100	100
<a href="#">AJ1-1414</a>	100	100
<a href="#">AJ1-1421</a>	100	150
<a href="#">AJ1-1441</a>	100	250
<a href="#">AJ1-1461</a>	100	350
<a href="#">AJ1-1471</a>	100	500
<a href="#">AJ1-1481</a>	100	600
<a href="#">AJ1-15A1</a>	125	1000
<a href="#">AJ1-1521</a>	125	150
<a href="#">AJ1-1541</a>	125	250
<a href="#">AJ1-1561</a>	125	350
<a href="#">AJ1-1571</a>	125	500
<a href="#">AJ1-1581</a>	125	600
<a href="#">AJ1-1611</a>	254	100
<a href="#">AJ1-1621</a>	254	150
<a href="#">AJ1-1641</a>	254	250
<a href="#">AJ1-1661</a>	254	350
<a href="#">AJ1-1671</a>	254	500
<a href="#">AJ1-1681</a>	254	600

## Phenomenex Column/Tubing ID Recommendation Chart

	Nano	Microbore	Analytical			Semi-Prep		
Column ID	0.05-0.1 mm (50 µm - 100 µm)	0.3-0.5 mm (300 µm - 500 µm)	1 mm	2.1 mm	3 mm	4.6 mm	7.8 mm	9.0-16.0 mm
Tubing ID	25 µm	50 µm	50 µm - 75 µm	100 µm	100 µm	100 µm	120 µm	254 µm

By Showa Denko K.K.

- High efficiency polymer columns
- Wide application range



## Guide for Shodex Column Selection

Solubility	Molecular Weight	Separation Mode	Column	Page
Sample	Water-insoluble	over 2000	SEC — GPC KF-803-805	338
		under 2000	SEC — GPC KF-802	338
	Water-soluble	over 2000	RPC — RSpak DE-413, 413L, DM-614	340
			SEC — OHpak SB-803-806HQ, SUGAR KS-803-804, PROTEIN KW-802.5-804	339
		IEC — IEC QA-825, DEAE-825, SP-825, CM-825	340	
		HIC — HIC PH-814	340	
		under 2000	SEC — SB-802-802.5HQ, SUGAR KS-801, 803-804	339
			LEC — SUGAR SC1011, SP0810	340
			IEX — RSpak KC-811, SUGAR SH1011, SUGAR SH1821	339, 340
			IC — IC SI-90 4E, SI-50 4E, IC I-524A, YK-421	340
RPC — RSpak DE-613, 413	340			
NPC — SUGAR SZ5532	340			

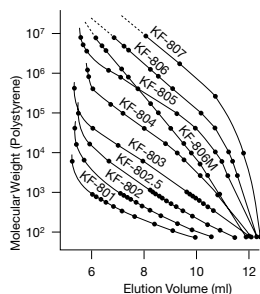
## Organic GPC Columns

Shodex has a wide variety of columns for GPC (or SEC) using organic solvents. The columns are packed with porous S-DVB gels specially developed for GPC use.

Series Name	In-column Solvent	Applications
GPC KF-800 series	THF (tetrahydrofuran)	General purpose GPC

### Calibration Curves for GPC KF-800 Series

Column: Shodex GPC KF-800 series  
Dimensions: 8 x 300 mm



App ID 10766

### Ordering Information

#### Standard Columns

#### Column Type / Part No.

THF	ID x Length (mm)	Plate Number	Exclusion Limit
GPC KF-802	8 x 300	>16,000	5 x 10 <sup>3</sup>
GPC KF-803	8 x 300	>16,000	7 x 10 <sup>4</sup>
GPC KF-804	8 x 300	>16,000	4 x 10 <sup>5</sup>
GPC KF-805	8 x 300	>10,000	4 x 10 <sup>6</sup>

NOTE: Exclusion Limits in parentheses, ( ), are estimated values.

Note: 803, 804, and 805 are available packed in HFIP.

By Showa Denko K.K.

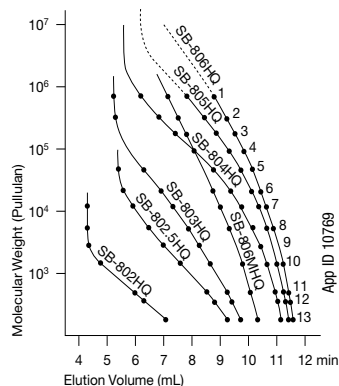
## GFC (Aqueous GPC) Columns

Shodex has a wide variety of columns for GFC. Three types of GFC columns packed with different gel materials are available.

Series Name	Packing Material	Applications
OHpak SB-800HQ	PHM gel	Used for general purpose GFC of water-soluble polymers, proteins and enzymes
SUGAR KS-800	Sulfonated PS gel	Mono, di, tri, oligo and polysaccharides, starches and celluloses
PROTEIN KW-800	Porous silica gel	GFC of proteins, glycoproteins and peptides

### Calibration Curves for OHpak SB-800HQ Series

Column: Shodex OHpak SB-800HQ  
 Dimensions: 8 x 300 mm  
 Eluent: Water  
 Sample: 1. P-800  
 2. P-400  
 3. P-200  
 4. P-100  
 5. P-50  
 6. P-20  
 7. P-10  
 8. P-5  
 9. P-3  
 10. P-1  
 11. Maltotriose  
 12. Maltose  
 13. Glucose



### Ordering Information

#### Aqueous GPC Columns

Column Type/ Part No.	ID x Length (mm)	Plate Number	Exclusion Limit
OHpak SB-802HQ	8 x 300	>10,000	4 x 10 <sup>3</sup>
OHpak SB-802.5HQ	8 x 300	>15,000	1 x 10 <sup>4</sup>
OHpak SB-803HQ	8 x 300	>15,000	1 x 10 <sup>5</sup>
OHpak SB-804HQ	8 x 300	>15,000	1 x 10 <sup>6</sup>
OHpak SB-805HQ	8 x 300	>10,000	4 x 10 <sup>6</sup>
OHpak SB-806HQ	8 x 300	>10,000	(2 x 10 <sup>7</sup> )
OHpak SB-806MHQ	8 x 300	>10,000	(2 x 10 <sup>7</sup> )
SUGAR KS-801 (Na <sup>+</sup> )	8 x 300	>15,000	1 x 10 <sup>3</sup>
SUGAR KS-803 (Na <sup>+</sup> )	8 x 300	>15,000	5 x 10 <sup>4</sup>
SUGAR KS-804 (Na <sup>+</sup> )	8 x 300	>15,000	4 x 10 <sup>5</sup>
PROTEIN KW-802.5	8 x 300	>20,000	5 x 10 <sup>4</sup>
PROTEIN KW-803	8 x 300	>20,000	1.5 x 10 <sup>5</sup>
PROTEIN KW-804	8 x 300	>10,000	6 x 10 <sup>5</sup>

Note: Exclusion Limits in parentheses, ( ), are estimated values.

## Calibration Standards

### Ordering Information

#### Calibration Standards

Standard Type/Part No.	Material	Content	MW Range	Applications
STANDARD P-82	Pullulan	0.2 g x 8 grades	5,000 - 800,000	GFC (aqueous GPC)

## Columns for Organic Acids

KC-811 enables an effective organic acids separation using a mixed mode of IEX, SEC and P&A. Organic acids also can be separated by RPC using RSpak DE-613.

### Ordering Information

#### RSpak

Column Type/ Part No.	ID x Length (mm)	Plate Number	Packing Material	Counter Ion
RSpak KC-811	8 x 300	>17,000	S-DVB gel	H <sup>+</sup>

\*Note: RSpak KC-811 was formerly known as Ionpak KC-811.

By Showa Denko K.K.

## Ion Chromatography Columns

- Great alternative to Dionex® IonPac® AS4, AS4A, and AS14 columns
- High efficiency, general purpose IC column

Shodex offers an innovative IC column for the suppressor method that improves both the separation speed and resolution of anions in most matrices. With high theoretical plates (>5000/m for Sulfate), the column easily and efficiently separates organic and inorganic anions such as EPA Method 300 analytes, acetate, formate, methacrylate and oxalate. High loading and exceptional resistance to loading combine with features such as improved separation of the fluoride peak from the water dip.

### Ordering Information

#### IC Columns

Column Type/ Part No.	ID x Length (mm)	Plate Number	Packing Material	Functional Group	Applications
IC SI-90 4E	4.0 x 250	>5,000 (S04)	PVA	Quaternary ammonium	Inorganic anions and organic acids
IC SI-90 G	4.6 x 10	(Guard)	—	—	(General purpose)
IC SI-50 4E*	4.0 x 250	>14,000	PVA	Quaternary ammonium	Inorganic anions and organic acids
IC I-524A	4.6 x 100	>2,000	PHM gel	Quaternary ammonium	Inorganic anions
IC YK-421	4.6 x 125	>2,500	Hydrophilic Polymer	Carboxyl Coated Silica	Simultaneous separation of monovalent and divalent cations
IC YS-50 (CHO-8194)	4.6 x 125	≥5,500	PVA	Carboxyl	Suppressor and non-suppressor methods
IC YS-G (CHO-8195)	4.6 x 10	(Guard)	—	—	—

\*Use IC SI-90G guard.

## Columns for Proteins and Nucleic Acids

### Ion-Exchange Columns

IEC series columns are suited for the analysis of proteins and nucleic acids.

### Ordering Information

#### IEC Series Columns

Column Type/Part No.	ID x Length (mm)	Plate Number	Packing Material	Functional Group
IEC QA-825	8 x 75	>2,000	PHM gel	Quaternary ammonium (strong anion)
IEC DEAE-825	8 x 75	>2,000	PHM gel	Diethylaminoethyl (weak anion)
IEC SP-825	8 x 75	>2,000	PHM gel	Sulfopropyl (strong cation)
IEC CM-825	8 x 75	>2,000	PHM gel	Carboxymethyl (weak cation)

#### Other Columns

Column Type/Part No.	ID x Length (mm)	Plate Number	Packing Material	Functional Group	Separation Mode	Applications
HIC PH-814	8 x 75	>2,000	PHM gel	Phenyl	HIC	Proteins

## Columns for Sugar Analysis

### Ordering Information

#### Sugar Columns

Column Type/ Part No.	ID x Length (mm)	Plate Number	Exclusion Limit	Packing Material	Counter Ion	Separation Mode
SUGAR SH1011	8 x 300	>15,000	1,000	S-DVB gel	H <sup>+</sup>	SEC + IEX
SUGAR SH1821	8 x 300	>15,000	10,000	S-DVB gel	H <sup>+</sup>	SEC + IEX
SUGAR SC1011	8 x 300	>12,000	1,000	S-DVB gel	Ca <sup>2+</sup>	SEC + IEC
SUGAR SP0810	8 x 300	>10,000	1,000	S-DVB gel	Pb <sup>2+</sup>	SEC + LEC
SUGAR SC1211	6 x 250	>5,000		S-DVB gel	Ca <sup>2+</sup>	P&A + LEC
SUGAR SZ5532	6 x 150	>5,000		S-DVB gel	Zn <sup>2+</sup>	P&A + LEC
SUGAR KS-801	8 x 300	>15,000	1,000	S-DVB gel	Na <sup>+</sup>	SEC + LEC



For improved carbohydrate retention and separation under HILIC conditions, see Luna Omega SUGAR p. 298

## Polymer-Based Reversed Phase Columns

### RSpak

### Applications

DE	Suited for wide applications because its characteristics are similar to those of ODS columns.
DM	Suited for analysis of amino acids and polypeptides.

### Ordering Information

#### RSpak Columns

Column Type/Part No.	Plate Number	ID x Length (mm)
RSpak DE-613	>7,000	6.0 x 150
RSpak DE-413	>11,000	4.6 x 150
RSpak DE-413L	>17,000	4.6 x 250
RSpak DE-G (DE-613P)	(guard column)	4.6 x 10
RSpak DM-614	>4,000	6.0 x 150

# SphereClone™ Guaranteed Replacement to Spherisorb®

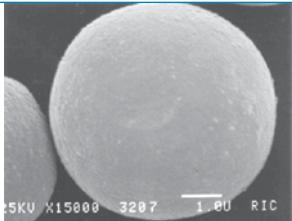
## Guaranteed Replacement to Spherisorb®

- Highly reproducible
- Long column life
- Mimics performance of Waters® Spherisorb®
- Economically priced

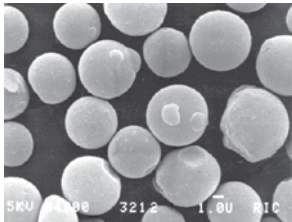
Phenomenex SphereClone columns have been developed to provide chromatographic behavior that mimics that of Waters Spherisorb columns. For comparative applications, please contact your local Phenomenex representative.

### SphereClone™

SEM of Base Silica



Surface  
15,000x Magnification



Physical Mass Distribution and Shape  
4,000x Magnification

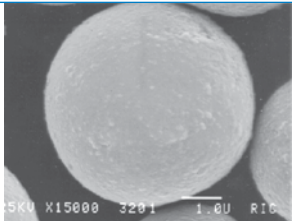
## VS.

### Material Characteristics

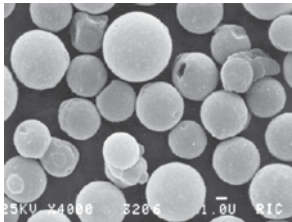
SphereClone™		Spherisorb®†	
3, 5, 10 µm	Particle Size	3, 5, 10 µm	
80 Å	Pore Size	80 Å	
200 m²/g	Surface Area	200 m²/g	
Carbon Load			
—	Silica	—	
6%	C6	6%	
6%	C8	6%	
7%	ODS(1)	6.2%	
12%	ODS(2)	12%	
2%	NH₂	2%	

### Spherisorb®†

SEM of Base Silica



Surface  
15,000x Magnification



Physical Mass Distribution and Shape  
4,000x Magnification

### Ordering Information

3 µm Columns (mm)			SecurityGuard™ Cartridges (mm)	
Phases	50 x 4.6	100 x 4.6	150 x 4.6	4 x 3.0
C8	—	<a href="#">00D-4133-E0</a>	—	<a href="#">AJ0-4290</a>
ODS(1)	—	<a href="#">00D-4134-E0</a>	<a href="#">00F-4134-E0</a>	<a href="#">AJ0-4287</a>
ODS(2)	<a href="#">00B-4135-E0</a>	<a href="#">00D-4135-E0</a>	<a href="#">00F-4135-E0</a>	<a href="#">AJ0-4287</a>
NH₂	—	—	<a href="#">00F-4137-E0</a>	<a href="#">AJ0-4302</a>

for ID: 3.2-8.0 mm

5 µm Columns (mm)			SecurityGuard™ Cartridges (mm)	
Phases	150 x 4.6	250 x 4.6	4 x 3.0	
Silica	<a href="#">00F-4139-E0</a>	<a href="#">00G-4139-E0</a>	<a href="#">AJ0-4348</a>	
C6	<a href="#">00F-4141-E0</a>	<a href="#">00G-4141-E0</a>	—	
C8	<a href="#">00F-4142-E0</a>	<a href="#">00G-4142-E0</a>	<a href="#">AJ0-4290</a>	
ODS(1)	<a href="#">00F-4143-E0</a>	<a href="#">00G-4143-E0</a>	<a href="#">AJ0-4287</a>	
ODS(2)	<a href="#">00F-4144-E0</a>	<a href="#">00G-4144-E0</a>	<a href="#">AJ0-4287</a>	
NH₂	<a href="#">00F-4147-E0</a>	<a href="#">00G-4147-E0</a>	<a href="#">AJ0-4302</a>	
SAX	<a href="#">00F-4149-E0</a>	<a href="#">00G-4149-E0</a>	<a href="#">AJ0-4311</a>	

for ID: 3.2-8.0 mm

10 µm Columns (mm)			SecurityGuard™ Cartridges (mm)	
Phases	250 x 4.6		4 x 3.0	
ODS(2)	<a href="#">00G-4156-E0</a>		<a href="#">AJ0-4287</a>	
SAX	<a href="#">00G-4160-E0</a>		<a href="#">AJ0-4311</a>	

for ID: 3.2-8.0 mm



For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334

SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

\*Comparative separations may not be representative of all applications.  
\*Spherisorb columns used for comparison studies were purchased from manufacturer.



# Star-Ion™ A300

## Suppressed Mode Anion Analysis for EPA Method 300

- Excellent separation of inorganic anions and some common organic anions
- High resolution and peak symmetry
- An alternative to Dionex® IonPac® AS4A

### Material Specifications

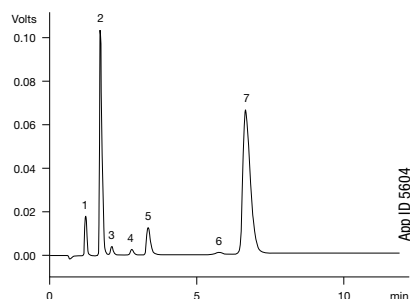
Material Type	PSDVB with quaternary amine functionality
Mode of IC	Suppressed (optimized)
Max. Temperature	45 °C
Max. Pressure	1000 psi without guard column 1200 psi with guard column
Solvent Limitations	No organic solvents are recommended for use with STAR-ION



### EPA Method 300

**Column:** STAR-ION A300  
**Dimensions:** 100 x 4.6 mm  
**Part No.:** [00D-4090-E0-BV](#)  
**Eluent:** 1.7 mM NaHCO<sub>3</sub> / 1.8 mM Na<sub>2</sub>CO<sub>3</sub>  
**Flow Rate:** 2.0 mL/min  
**Detection:** Suppressed Conductivity  
**Injection Volume:** 20 µL  
**Sample:**

1. Fluoride	2 mg/L
2. Chloride	20 mg/L
3. Nitrite	2 mg/L
4. Bromide	2 mg/L
5. Nitrate	10 mg/L
6. Phosphate	2 mg/L
7. Sulfate	60 mg/L



### Ordering Information

#### Suppressed Mode Anion Analysis for EPA Method 300

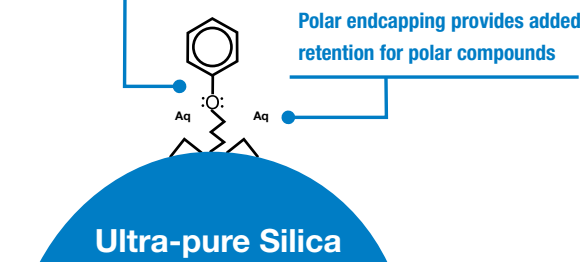
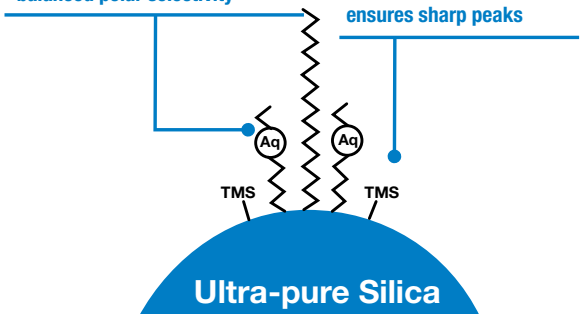
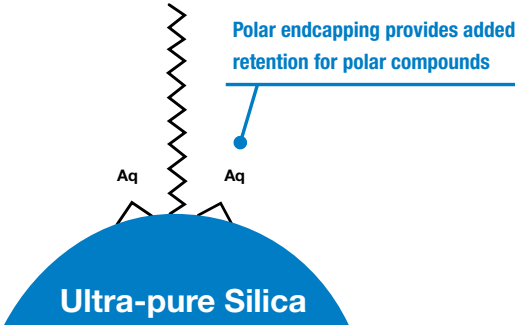
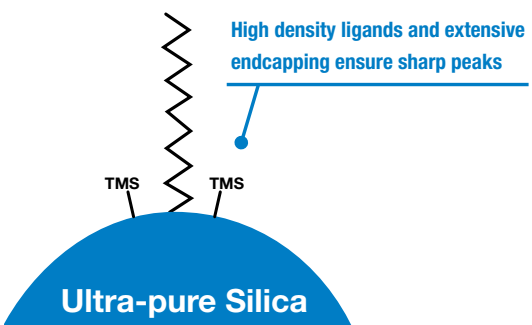
Part No.	Description	Dimensions (mm)	Unit
<a href="#">00D-4090-E0-BV</a>	STAR-ION A300 Anion column (PEEK)	100 x 4.6	ea
<a href="#">AL0-3420</a>	STAR-ION A300 Test Mix		ea
<a href="#">AQO-3351</a>	PEEK ¼ in. - 28 to 10-32 Adapter to connect STAR-ION A300 analytical column to Dionex IC systems (use 2 fittings, one for each end of column)		ea
<a href="#">AQO-1388</a>	PEEK long-nut fitting		ea
<a href="#">ATO-1107</a>	PEEK capillary tubing ¼ in. OD x 0.010 in. D x 5 ft. L		ea
<a href="#">ATO-1110</a>	Polymer tubing cutter		ea



For HPLC Column Heater (25-90°C), see p. 416

## Full Range Selectivity for Reversed Phase Separation

Many different mechanisms of retention are utilized within reversed phase chromatography in order to retain and separate target analytes. Whether your compounds are hydrophobic or polar, Synergi columns provide you with a full range of selectivity, ensuring separation of extremely challenging and complex mixtures.

<p><b>Synergi Polar-RP</b> <b>Phenyl Ether-Linked</b> For polar and aromatic mixtures</p> <p>Ether linkage increases aromaticity of the phenyl group and also provides <math>\pi-\pi</math> interactions with conjugated compounds</p> <p>Polar endcapping provides added retention for polar compounds</p>  <p>Ultra-pure Silica</p>	<p><b>Synergi Fusion-RP</b> <b>C18 Polar Embedded</b> Balanced non-polar and polar performance</p> <p>Embedded polar group complements C18 ligand with balanced polar selectivity</p> <p>TMS endcapping ensures sharp peaks</p>  <p>Ultra-pure Silica</p>
<p><b>Synergi Hydro-RP</b> <b>C18 Polar Endcapped</b> Strong non-polar and polar retention</p> <p>Polar endcapping provides added retention for polar compounds</p>  <p>Ultra-pure Silica</p>	<p><b>Synergi Max-RP</b> <b>C12 TMS Endcapped</b> Excellent for basic compounds at neutral pH</p> <p>High density ligands and extensive endcapping ensure sharp peaks</p>  <p>Ultra-pure Silica</p>

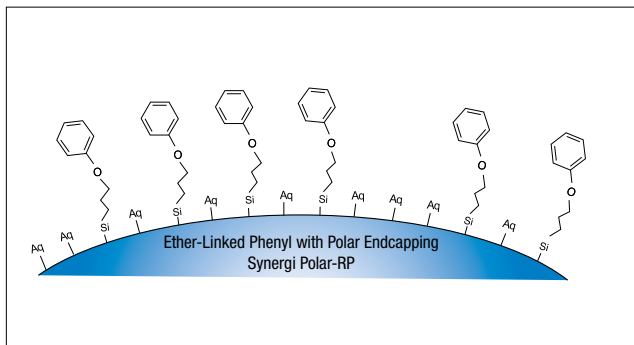


### Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m <sup>2</sup> /g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m <sup>2</sup> )	End Capping
Synergi Max-RP	Spher. 2.5	100	—	400	17	—	TMS
Synergi Hydro-RP	Spher. 2.5	100	—	400	19	—	Hydrophilic
Synergi Polar-RP	Spher. 2.5	100	—	400	11	—	Hydrophilic
Synergi Fusion-RP	Spher. 2.5	100	—	400	12	—	TMS
Synergi Max-RP	Spher. 4, 10	80	1.05	475	17	3.21	TMS
Synergi Hydro-RP	Spher. 4, 10	80	1.05	475	19	2.45	Hydrophilic
Synergi Polar-RP	Spher. 4, 10	80	1.05	475	11	3.15	Hydrophilic
Synergi Fusion-RP	Spher. 4, 10	80	1.05	475	12	N/A	TMS

## Synergi Polar-RP

### An Ether-linked Phenyl Column with Polar Endcapping



#### Synergi Polar-RP

USP: L11

**pH Stability:** 1.5 – 7.0

**Particle Size:** 2.5 µm, 4 µm, and 10 µm

**Phase:** Ether-linked phenyl with polar endcapping

**Application:** For extreme retention of polar and aromatic compounds

**Strength:** Improved peak shape for acidic and basic analytes and aromatic selectivity with methanol containing mobile phases

#### Sample Challenge:

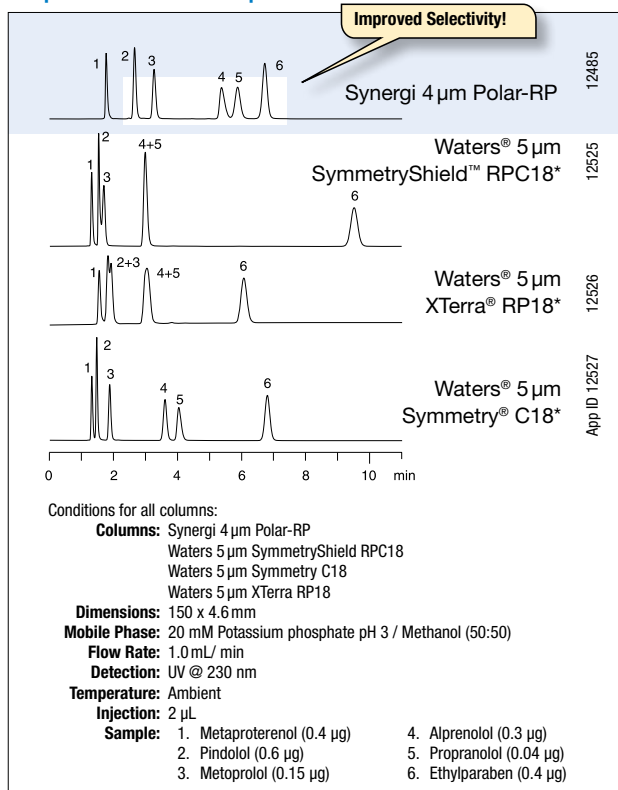
You need greater separation between polar and aromatic compounds with only slight differences chemically or structurally.

#### Selectivity Solution:

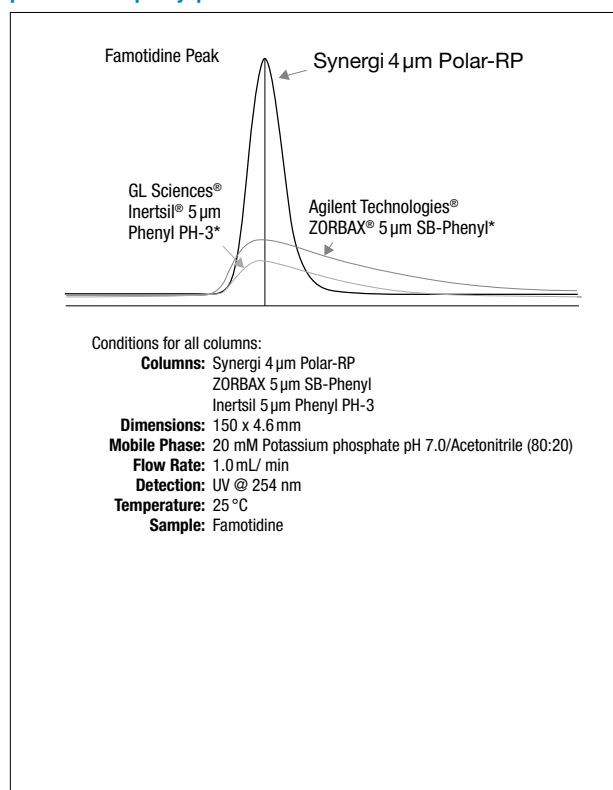
The slightest variations in polarity and aromaticity are exploited by Synergi Polar-RP in order to achieve the greatest separation between polar and/or aromatic compounds.



#### Increased resolution of polar compounds with Synergi Polar-RP compared to traditional C18 phases



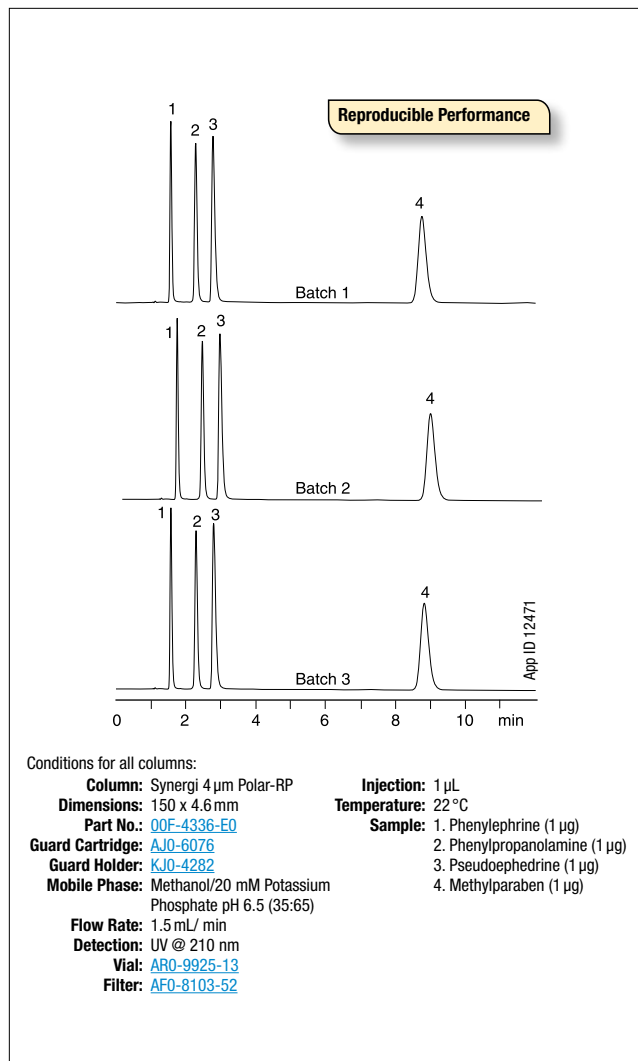
#### Improve peak symmetry of polar compounds with Synergi Polar-RP compared to other phenyl phases



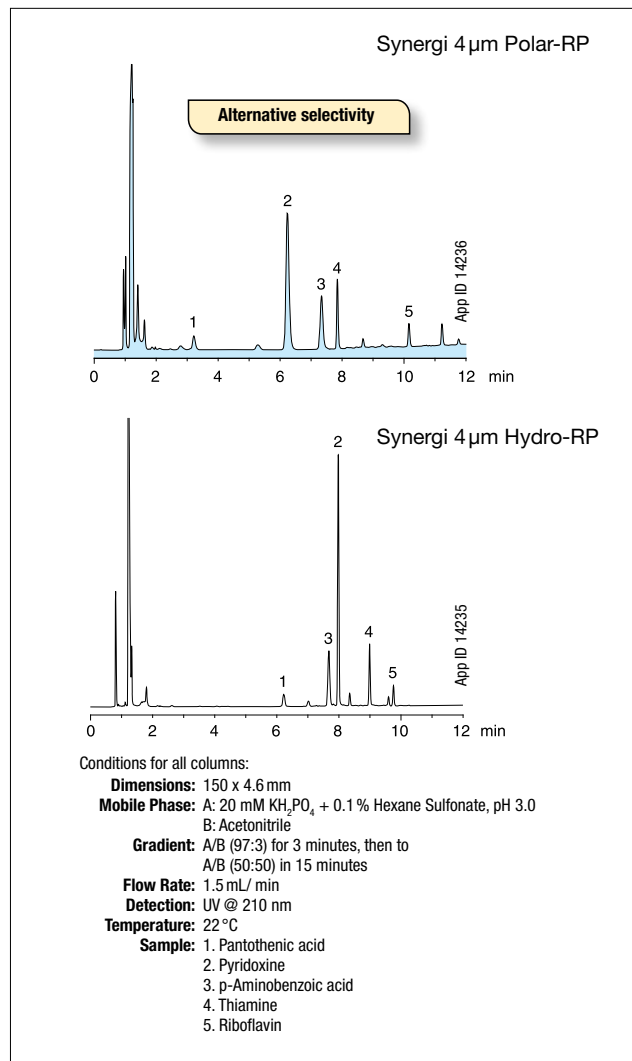
\*See p. 349 for disclaimer information. Comparative separations may not be representative of all applications.

## Synergi Polar-RP (cont'd)

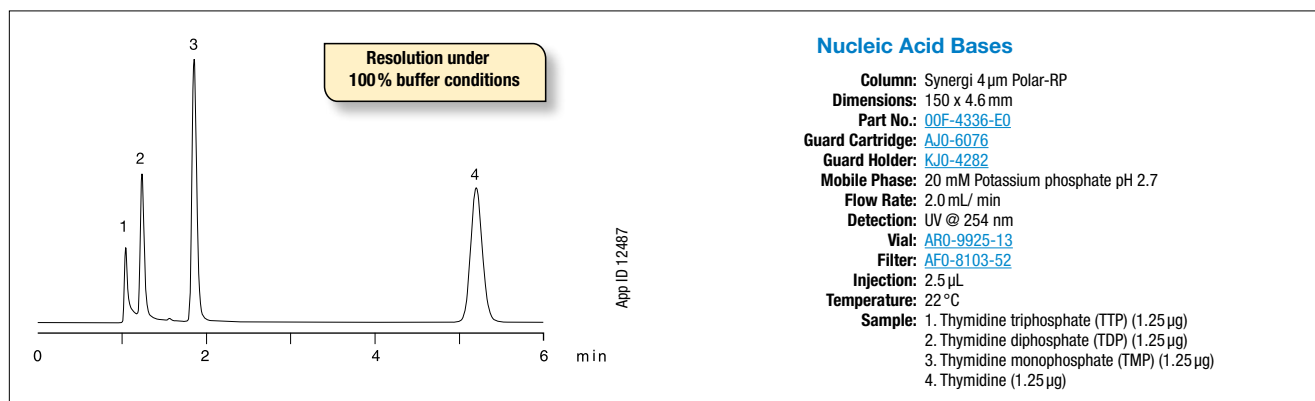
Synergi Polar-RP is highly reproducible



The selectivity of Synergi Polar-RP can provide differences in peak elution order for confirmation or better separation

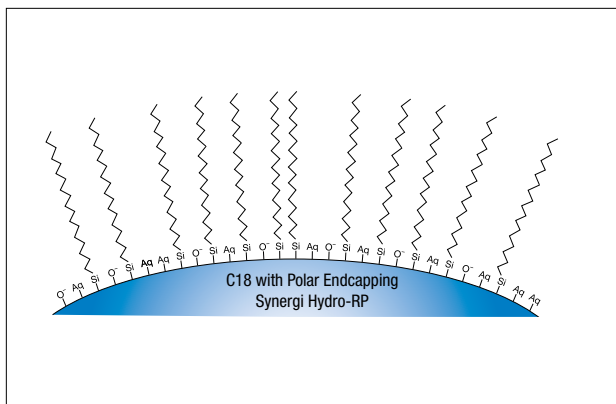


100% buffer mobile phase stability allows for separation of extremely polar compounds, like nucleic acid bases, on Synergi Polar-RP



## Synergi Hydro-RP

### A Polar Endcapped C18 Column



#### Synergi Hydro-RP

USP: L1

<b>pH Stability:</b>	1.5 – 7.5
<b>Particle Size:</b>	2.5 µm, 4 µm, and 10 µm
<b>Phase:</b>	C18 with polar endcapping
<b>Application:</b>	For extreme retention of non-polar and extremely polar alkyl compounds
<b>Strength:</b>	Resolution of highly polar compounds under 100% buffer mobile phase conditions

#### Sample Challenge:

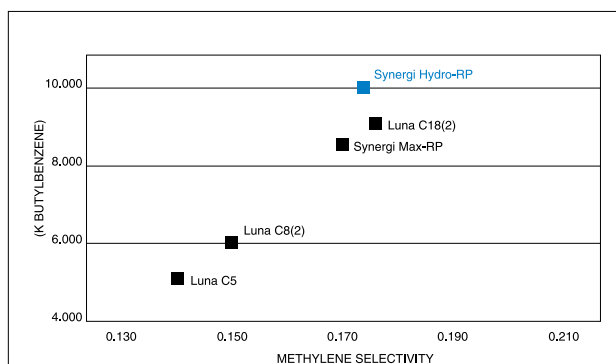
Your sample contains multiple analytes with only slight variations in hydrophobicity.

#### Selectivity Solution:

The extreme hydrophobic selectivity offered by Synergi Hydro-RP is needed to amplify the small differences in selectivity and get greater separation.



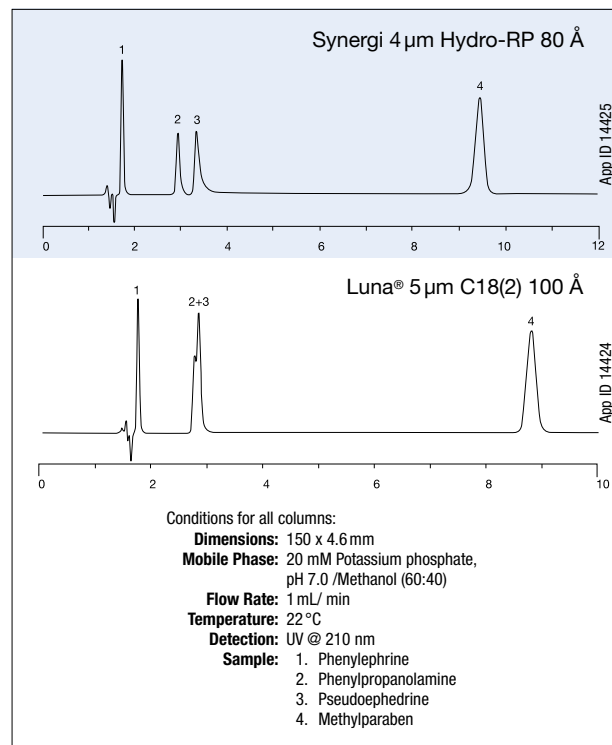
#### Extreme hydrophobic retention relative to other hydrophobic selectivity phases



Conditions for all columns:  
**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** Acetonitrile/20 mM Potassium phosphate pH 7.0 (65:35)  
**Flow Rate:** 1.5 mL/min  
**Temperature:** Ambient  
**Sample:** 1. Butylbenzene  
 2. Amylbenzene

The chart was obtained by plotting hydrophobic retention (k for butylbenzene vs. methylene selectivity (log k for amylbenzene vs the number of methyl groups) under the stated conditions. A column with high hydrophobicity will better resolve two analytes which subtly differ in their overall hydrophobicity than a column with lower hydrophobic selectivity.

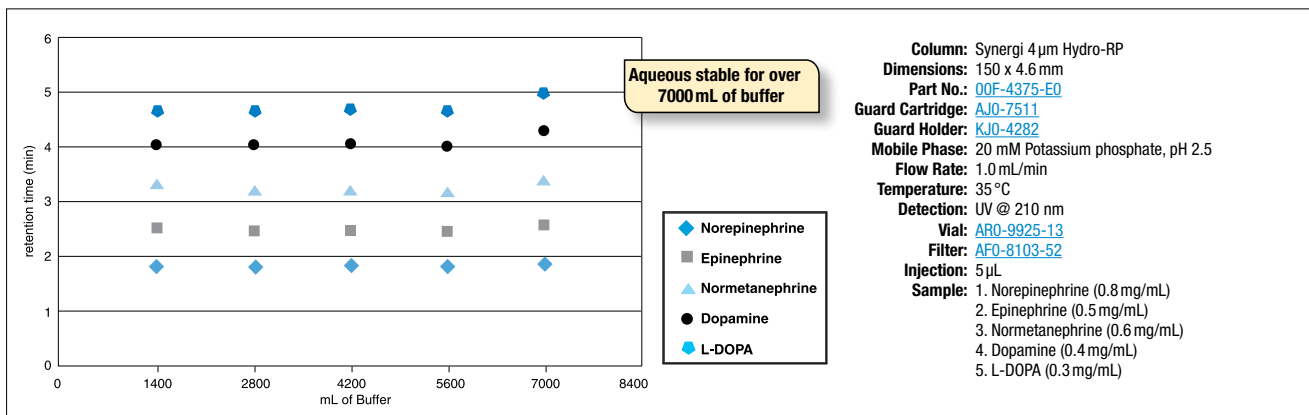
#### Additional polar selectivity provides separation where traditional C18 columns cannot



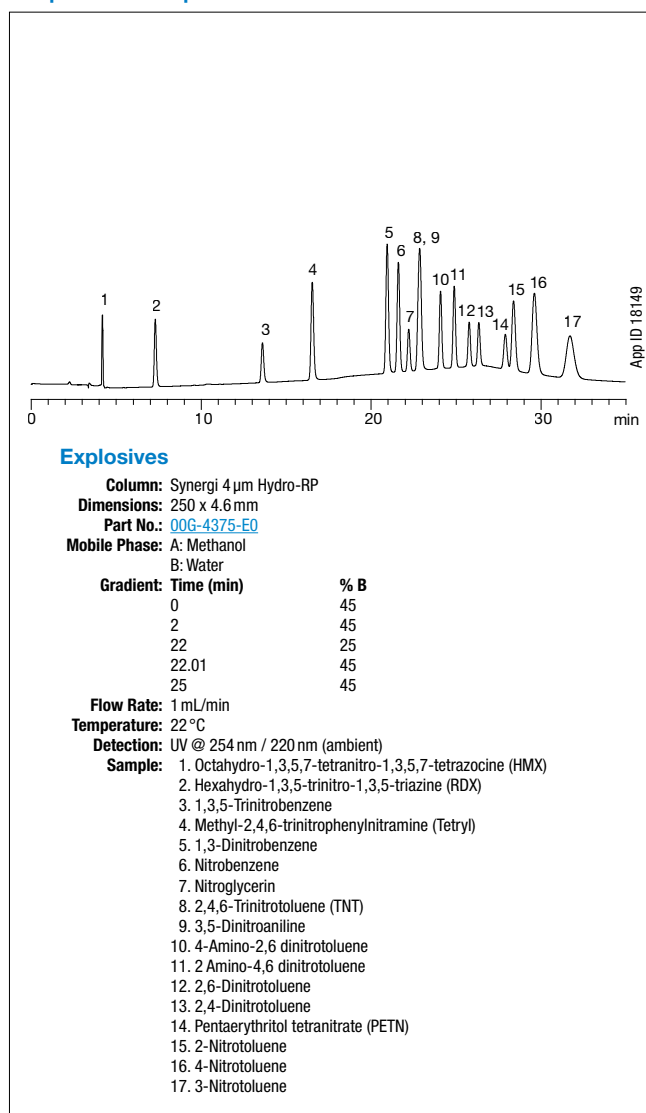
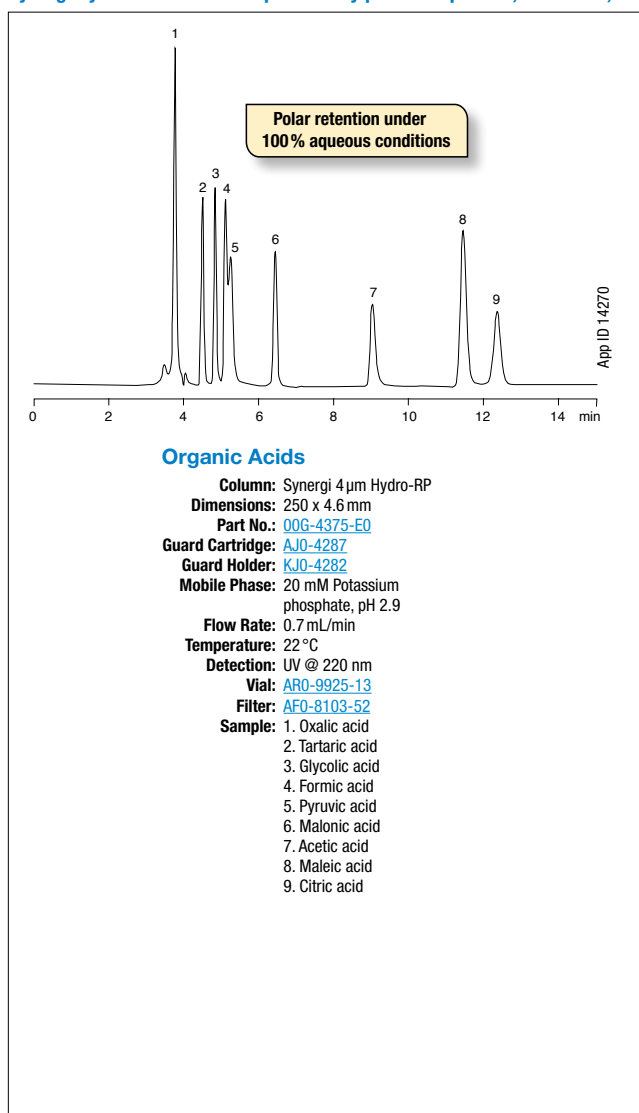


## Synergi Hydro-RP (cont'd)

Synergi Hydro-RP is stable in 100% aqueous mobile phase, providing improved retention of extremely polar compounds

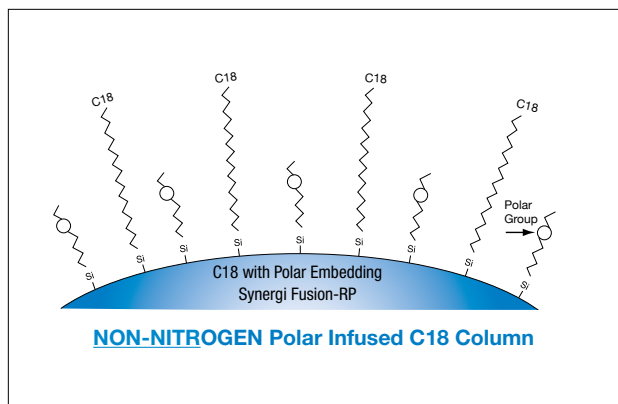


Synergi Hydro-RP is able to separate very polar compounds, as well as, mixtures of polars and non-polars



## Synergi Fusion-RP

### A Polar Embedded C18 Column



#### Synergi Fusion-RP

USP: L1

LC-MS  
Certified

**pH Stability:** 1.5 – 9.0\*\*

**Particle Size:** 2.5 µm, 4 µm, and 10 µm

**Phase:** Polar embedded C18

**Application:** For a balanced retention of polar, basic compounds and moderate retention of hydrophobics over a broad pH range

**Strength:** Analysis of polar, basic compounds with little or no MS phase bleed

\*\* pH range is 1.5 - 10.0 under isocratic conditions.  
pH range is 1.5 - 9 under gradient conditions.

#### Sample Challenge:

You need greater separation of compounds that exhibit moderately polar and hydrophobic characteristics.

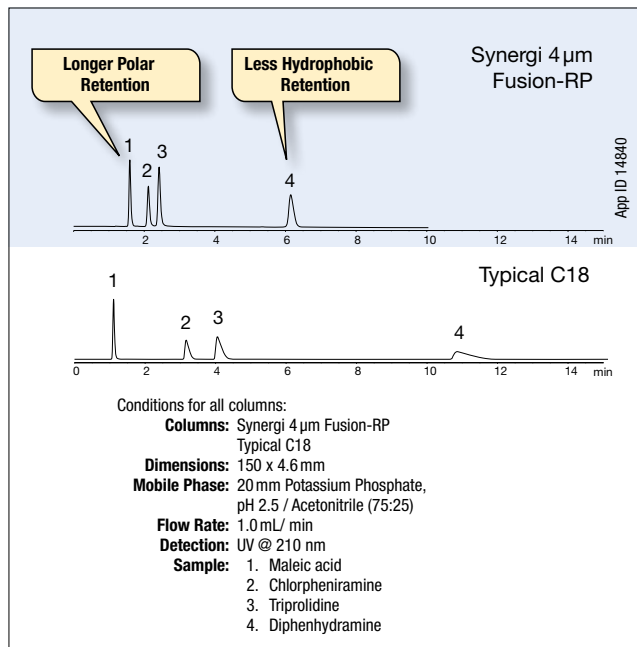
#### Selectivity Solution:

Offering a balanced combination of hydrophobic and polar selectivity, Synergi Fusion-RP will allow you to separate compounds exhibiting polar and hydrophobic characteristics.

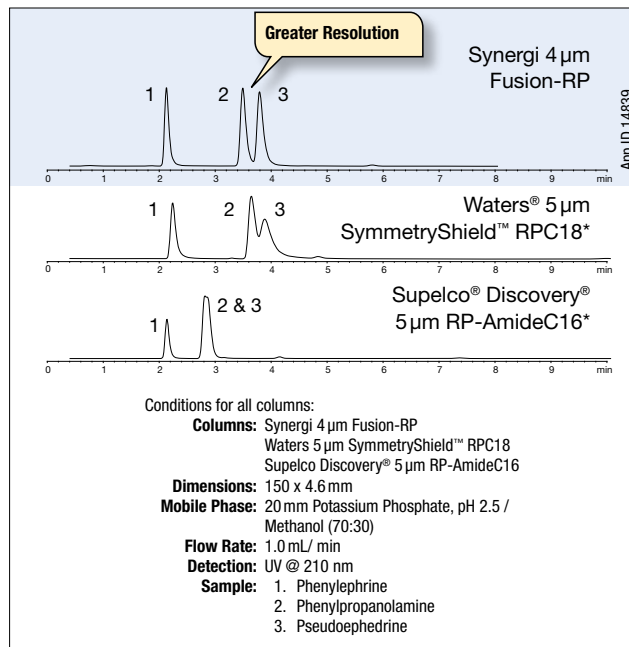


## Balanced Polar and Hydrophobic Retention Allows for Superior Selectivity

### Hydrophobic Basic Compounds



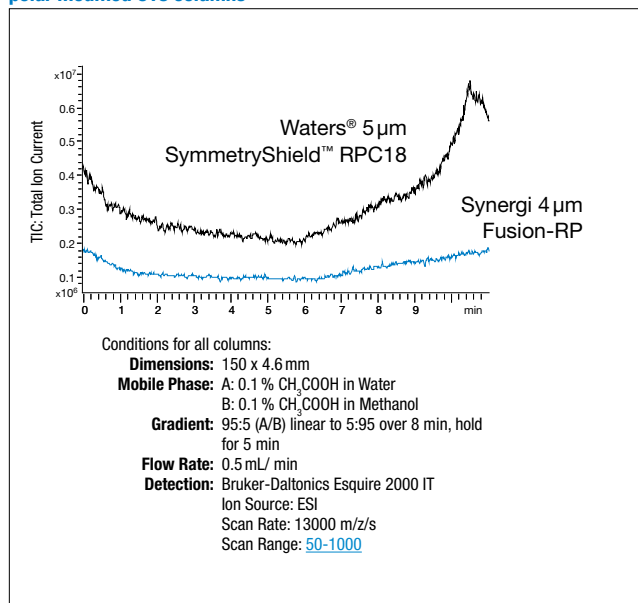
### Antihistamines



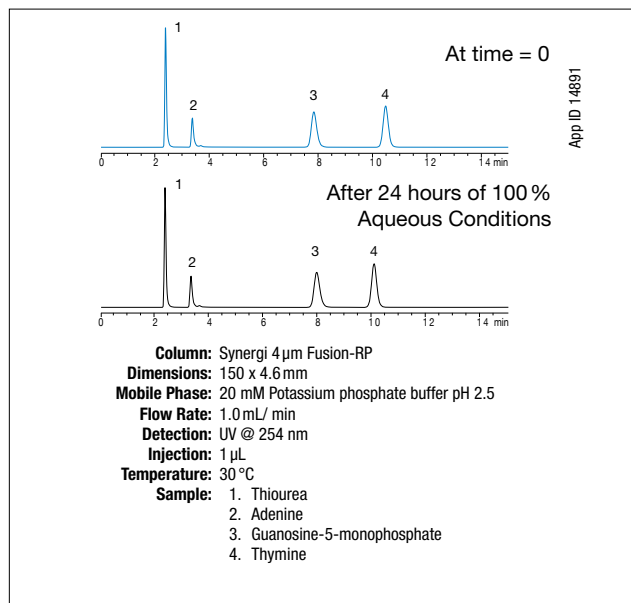
\*See p. 349 for disclaimer information. Comparative separations may not be representative of all applications.

## Synergi Fusion-RP (cont'd)

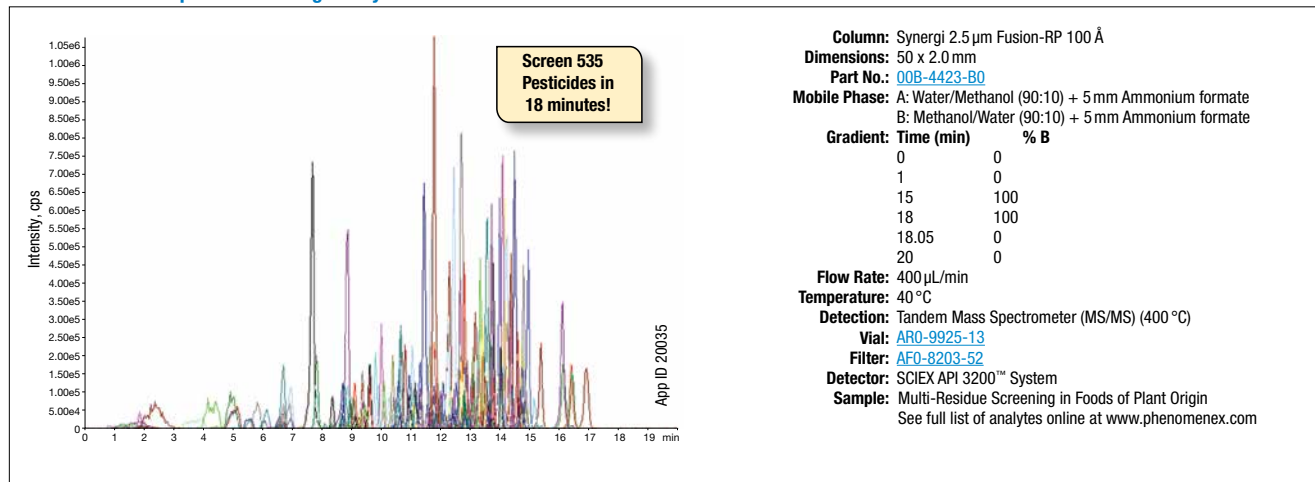
Synergi Fusion-RP has negligible MS bleed compared to other polar modified C18 columns



100% aqueous stable for added method flexibility



Excellent Multi-Compound Screening Ability

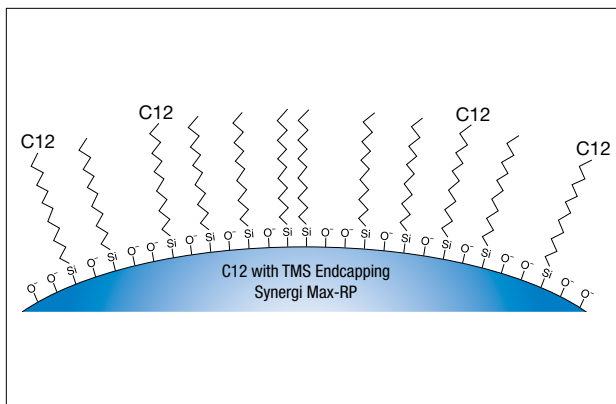


\*Comparative separations may not be representative of all applications.

Columns used for comparison studies were manufactured by and purchased from Agilent Technologies Inc., Waters Corporation, GL Sciences Inc., Macherey-Nagel, and Sigma-Aldrich Co., LLC.



## Synergi Max-RP A Reversed Phase C12 Column



### Synergi Max-RP

USP: L87

LC-MS  
Certified

**pH Stability:** 1.5 – 9.0\*\*

**Particle Size:** 2.5 µm, 4 µm, and 10 µm

**Phase:** Reversed phase C12

**Application:** For hydrophobic, non-polar compounds over a wide pH range, with little or no MS phase bleed

**Strength:** Sharp peak shape for basic compounds at neutral pH

\*\*pH range is 1.5 - 10.0 under isocratic conditions.  
pH range is 1.5 - 9 under gradient conditions.

### Sample Challenge:

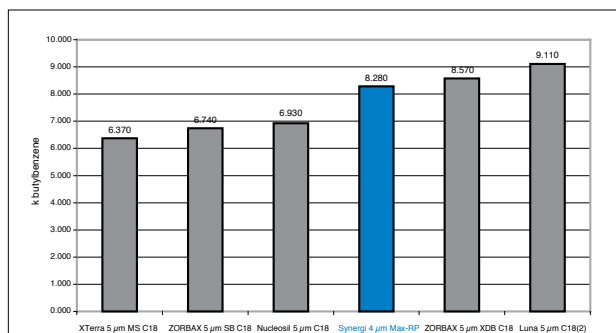
You need to retain compounds based on hydrophobic selectivity exclusively, but cannot accomplish peak separation with C18 column.

### Selectivity Solution:

The C12 ligands on Synergi Max-RP give a hydrophobic selectivity that may separate peaks where C18 columns cannot.



### Hydrophobic Retention: Synergi Max-RP (C12) Performs Like a C18\*

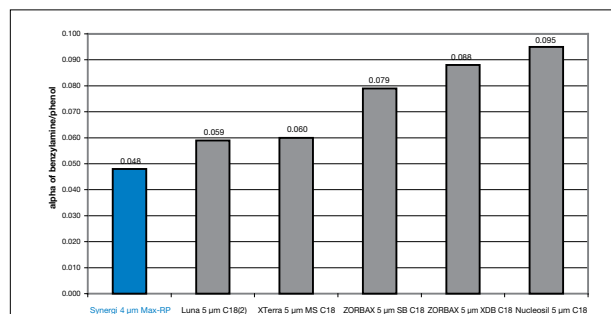


Conditions for all columns:

**Columns:** Waters XTerra 5 µm MS C18  
Agilent Technologies ZORBAX 5 µm SB C18  
Macherey Nagel Nucleosil 5 µm C18  
Synergi 4 µm Max-RP  
Agilent Technologies ZORBAX 5 µm XDB C18  
Luna 5 µm C18(2)

**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** Acetonitrile/Water (80:20)  
**Flow Rate:** 1 mL/min  
**Detection:** UV @ 254 nm  
**Injection:** 1 µL  
**Temperature:** Ambient  
**Sample:** Butylbenzene

### Silanol Activity at Low pH: C12 vs. C18 Phases



Conditions for all columns:

**Columns:** Waters XTerra 5 µm MS C18  
Agilent Technologies ZORBAX 5 µm SB C18  
Macherey Nagel Nucleosil 5 µm C18  
Synergi 4 µm Max-RP  
Agilent Technologies ZORBAX 5 µm XDB C18  
Luna 5 µm C18(2)

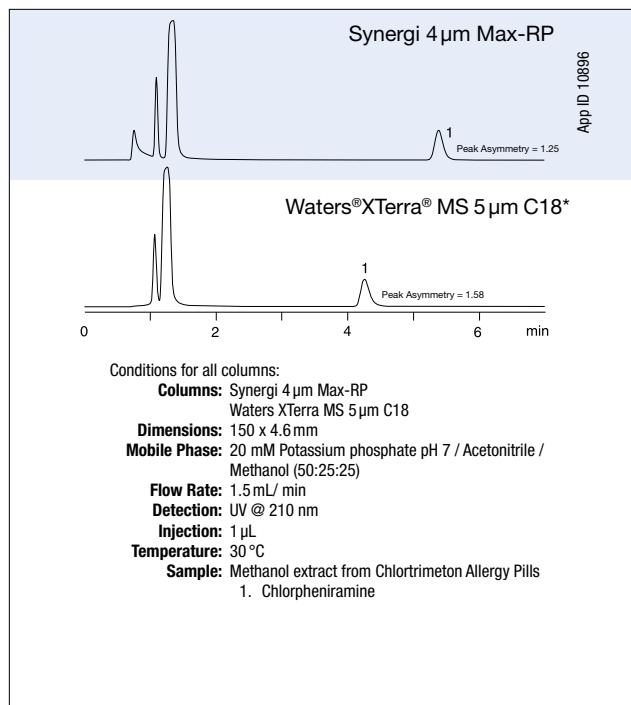
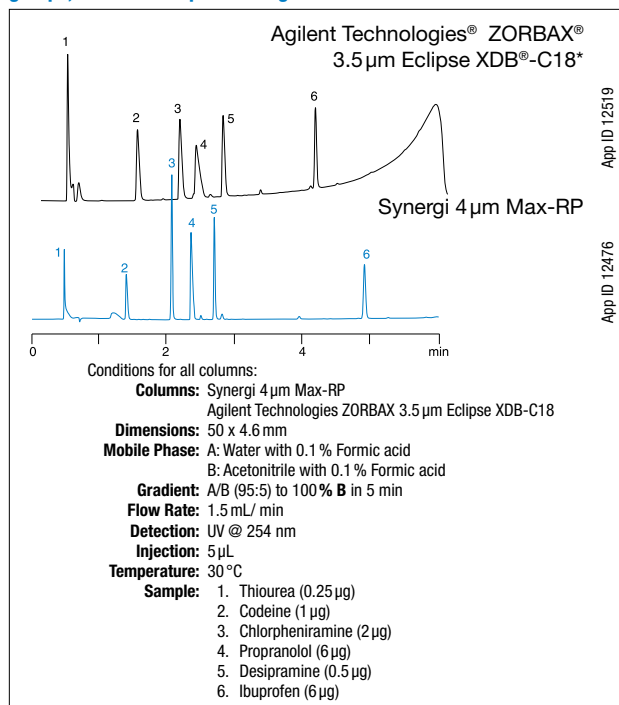
**Dimensions:** 150 x 4.6 mm  
**Mobile Phase:** Methanol/20 mM Potassium phosphate, pH 2.5 (30:70)  
**Flow Rate:** 1 mL/min  
**Detection:** UV @ 254 nm  
**Injection:** 5 µL  
**Temperature:** Ambient  
**Sample:** 1. Benzylamine  
2. Phenol

\*See p. 349 for disclaimer information. Comparative separations may not be representative of all applications.

## Synergi Max-RP (cont'd)

### Sharper Peaks

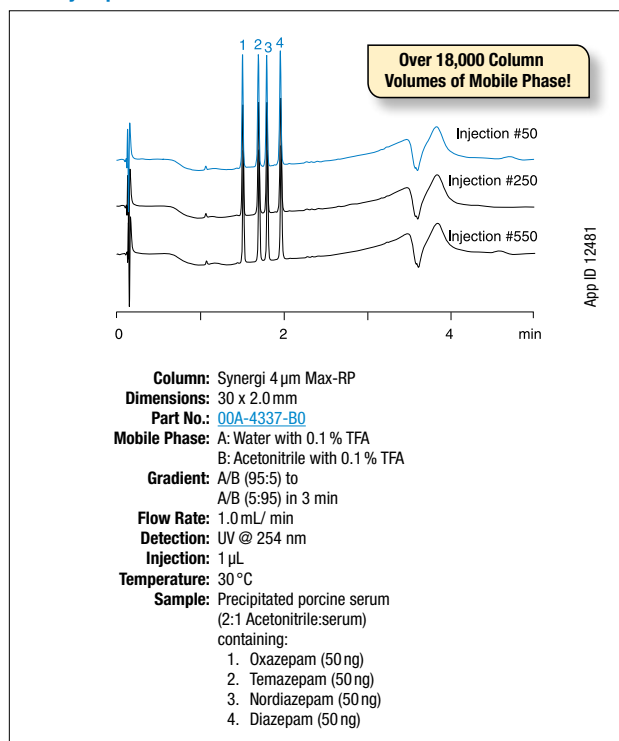
The Synergi Max-RP C12 ligands are densely bound to silica surface, significantly decreasing the number of active silanol groups, which cause peak tailing



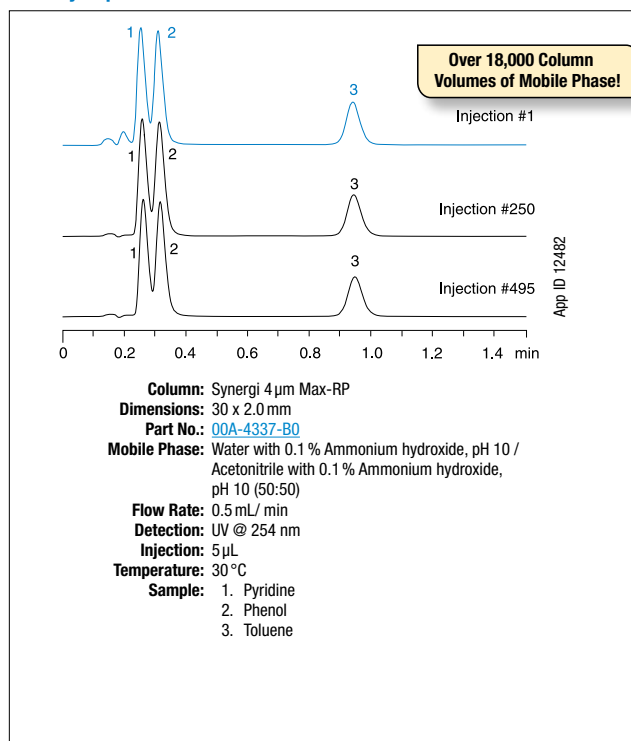
\*See p. 349 for disclaimer information. Comparative separations may not be representative of all applications.

## Achieve Reproducibility and Long Column Lifetimes Even at pH Extremes with Synergi Max-RP

### Stability @ pH 1.5



### Stability @ pH 10.0





## Fast LC Solutions

### Ordering Information

2.5 µm High Speed Technology (HST) Columns (mm)						
Phases	30 x 2.0	50 x 2.0	100 x 2.0	50 x 3.0	100 x 3.0	50 x 4.6
Max-RP	<a href="#">00A-4372-B0</a>	<a href="#">00B-4372-B0</a>	<a href="#">00D-4372-B0</a>	<a href="#">00B-4372-Y0</a>	<a href="#">00D-4372-Y0</a>	<a href="#">00B-4372-E0</a>
Hydro-RP	<a href="#">00A-4387-B0</a>	<a href="#">00B-4387-B0</a>	<a href="#">00D-4387-B0</a>	<a href="#">00B-4387-Y0</a>	<a href="#">00D-4387-Y0</a>	<a href="#">00B-4387-E0</a>
Polar-RP	<a href="#">00A-4371-B0</a>	<a href="#">00B-4371-B0</a>	<a href="#">00D-4371-B0</a>	<a href="#">00B-4371-Y0</a>	<a href="#">00D-4371-Y0</a>	<a href="#">00B-4371-E0</a>
Fusion-RP	<a href="#">00A-4423-B0</a>	<a href="#">00B-4423-B0</a>	<a href="#">00D-4423-B0</a>	<a href="#">00B-4423-Y0</a>	<a href="#">00D-4423-Y0</a>	<a href="#">00B-4423-E0</a>



For information about HST Columns, contact your Phenomenex technical consultant or local distributor.

### Ordering Information

2.5 µm MercuryMS LC-MS Cartridges (mm)					Columns (mm)	
Phases	10 x 2.0	10 x 4.0	20 x 2.0	20 x 4.0	20 x 2.0	20 x 4.0
Max-RP	<a href="#">00N-4372-B0-CE</a>	—	<a href="#">00M-4372-B0-CE</a>	<a href="#">00M-4372-D0-CE</a>	—	—
Hydro-RP	<a href="#">00N-4387-B0-CE</a>	—	<a href="#">00M-4387-B0-CE</a>	—	—	—
Polar-RP	<a href="#">00N-4371-B0-CE</a>	<a href="#">00N-4371-D0-CE</a>	<a href="#">00M-4371-B0-CE</a>	—	<a href="#">00M-4377-B0</a>	—
Fusion-RP	<a href="#">00N-4423-B0-CE</a>	—	—	—	—	<a href="#">00M-4423-D0</a>

## MercuryMS™ Cartridge Holders



Direct-Connect Holder



Standard Holder

### Ordering Information

#### Direct-Connect Cartridge Holders

Part No.	Description
<a href="#">CHO-7187</a>	10 mm direct-connect holder
<a href="#">CHO-7188</a>	20 mm direct-connect holder

#### Standard Cartridge Holders

Part No.	Description
<a href="#">CHO-5846</a>	10 mm standard holder
<a href="#">CHO-5845</a>	20 mm standard holder



Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 417-418

## Micro LC Columns

### Ordering Information

4 µm Synergi Micro LC Columns (mm)					
Phases	50 x 0.3	150 x 0.3	50 x 0.5	150 x 0.5	250 x 0.5
Max-RP	—	—	<a href="#">00B-4337-AF</a>	<a href="#">00F-4337-AF</a>	—
Hydro-RP	<a href="#">00B-4375-AC</a>	<a href="#">00F-4375-AC</a>	<a href="#">00B-4375-AF</a>	—	<a href="#">00G-4375-AF</a>
Fusion-RP	—	<a href="#">00F-4424-AC</a>	—	<a href="#">00F-4424-AF</a>	—
Polar-RP	—	—	—	<a href="#">00F-4336-AF</a>	—



For information on Micro LC Columns, Traps, and Fittings, see pp. 359-361



# Synergi™ Full Range Selectivity LC Columns

## HPLC Columns

### Ordering Information

4 μm MicroBore and Minibore Columns (mm)							SecurityGuard™ Cartridges (mm)	
Phases	50 x 1.0	150 x 1.0	30 x 2.0	50 x 2.0	75 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0*
Max-RP	00B-4337-AO	—	00A-4337-B0	00B-4337-B0	00C-4337-B0	00F-4337-B0	—	AJO-6073
Hydro-RP	00B-4375-AO	00F-4375-AO	00A-4375-B0	00B-4375-B0	00C-4375-B0	00F-4375-B0	00G-4375-B0	AJO-7510
Polar-RP	—	—	00A-4336-B0	00B-4336-B0	00C-4336-B0	00F-4336-B0	00G-4336-B0	AJO-6075
Fusion-RP	00B-4424-AO	00F-4424-AO	00A-4424-B0	00B-4424-B0	00C-4424-B0	00F-4424-B0	00G-4424-B0	AJO-7556

for ID: 2.0-3.0 mm

4 μm MidBore™ Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phases	30 x 3.0	50 x 3.0	150 x 3.0	250 x 3.0	4 x 2.0*
Max-RP	—	00B-4337-YO	00F-4337-YO	00G-4337-YO	AJO-6073
Hydro-RP	—	00B-4375-YO	00F-4375-YO	00G-4375-YO	AJO-7510
Polar-RP	00A-4336-YO	00B-4336-YO	00F-4336-YO	00G-4336-YO	AJO-6075
Fusion-RP	—	00B-4424-YO	00F-4424-YO	00G-4424-YO	AJO-7556

for ID: 2.0-3.0 mm



For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

4 μm Analytical Columns (mm)					SecurityGuard™ Cartridges (mm)	
Phases	30 x 4.6	50 x 4.6	75 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
Max-RP	00A-4337-E0	00B-4337-E0	00C-4337-E0	00F-4337-E0	00G-4337-E0	AJO-6074
Hydro-RP	00A-4375-E0	00B-4375-E0	00C-4375-E0	00F-4375-E0	00G-4375-E0	AJO-7511
Polar-RP	—	00B-4336-E0	00C-4336-E0	00F-4336-E0	00G-4336-E0	AJO-6076
Fusion-RP	—	00B-4424-E0	00C-4424-E0	00F-4424-E0	00G-4424-E0	AJO-7557

for ID: 3.2-8.0 mm

## Preparative Columns

### Ordering Information

Axia™ Packed Preparative Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	15 x 21.2**
<b>4 μm</b>					
Max-RP	—	—	00F-4337-PO-AX	00G-4337-PO-AX	AJO-7842
Hydro-RP	00B-4375-PO-AX	—	00F-4375-PO-AX	00G-4375-PO-AX	AJO-7843
Polar-RP	00B-4336-PO-AX	00D-4336-PO-AX	00F-4336-PO-AX	00G-4336-PO-AX	AJO-7845
Fusion-RP	—	00D-4424-PO-AX	00F-4424-PO-AX	00G-4424-PO-AX	AJO-7844
<b>10 μm</b>					
Hydro-RP	—	—	Inquire	00G-4376-PO-AX	AJO-7843
Polar-RP	—	—	Inquire	00G-4351-PO-AX	AJO-7845
Fusion-RP	—	—	00F-4425-PO-AX	00G-4425-PO-AX	AJO-7844

for ID: 18-29 mm

### Ordering Information

Axia™ Packed Preparative Columns (mm) continued		SecurityGuard™ Cartridges (mm)
Phases	250 x 30	15 x 30.0*
<b>4 μm</b>		
Max-RP	00G-4337-UO-AX	AJO-8304

for ID: 30-49 mm

## Pilot Scale Columns and Bulk Material

### Ordering Information

10 μm Analytical and Semi-Prep Columns (mm)			SecurityGuard™ Cartridges (mm)	
Phases	250 x 4.6	250 x 10	4 x 3.0*	10 x 10†
Max-RP	—	00G-4350-N0	AJO-6074	AJO-7275
Hydro-RP	00G-4376-E0	00G-4376-N0	AJO-7511	AJO-7512
Polar-RP	00G-4351-E0	00G-4351-N0	AJO-6076	AJO-7276
Fusion-RP	00G-4425-E0	00G-4425-N0	AJO-7557	AJO-7558

for ID: 3.2-8.0 mm 9-16 mm

### 10 μm Bulk Packings

Phases	100 g	1 kg
Max-RP	04G-4350	04K-4350
Hydro-RP	04G-4376	04K-4376
Polar-RP	04G-4351	04K-4351
Fusion-RP	04G-4425	04K-4425

Larger quantities of bulk media available upon request.

### Ordering Information

4 μm Semi-Prep Columns (mm)		SecurityGuard™ Cartridges (mm)
Phases	250 x 10	10 x 10†
<b>4 μm</b>		
Max-RP	00G-4337-N0	AJO-7275
Hydro-RP	00G-4375-N0	AJO-7512
Polar-RP	00G-4336-N0	AJO-7276
Fusion-RP	00G-4424-N0	AJO-7558

for ID: 9-16 mm

\*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJO-4282](#)

†SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJO-9281](#)

\*\*PREP SecurityGuard™ Cartridges require holder, Part No.: [AJO-8223](#)

\*PREP SecurityGuard™ Cartridges require holder, Part No.: [AJO-8277](#)



For more dimensions and phases of Axia packed preparative columns, see pp. 393-394, or contact your Phenomenex Technical Consultant

## Synergi Bulk Media

Beyond our largest preparative column dimensions, Synergi phases are available in bulk quantities for HPLC purification at the process, pilot, and commercial scale. These medias offer a complementary selectivity to the standard C18, C8, or Silica phases traditionally employed in larger scale HPLC. Additionally, due to the diverse chemical properties of each of the Synergi phases, dramatic differences in chromatographic parameters such as retention time, selectivity, and resolution are often observed. For those challenging purifications where chromatography still makes the most sense, the Synergi family offers an excellent alternative to evaluate! Get your Synergi preparative scout column(s) and evaluate these phases today!



# Ultracarb™

- Excellent peak shape for basic compounds, free fatty acids, triglycerides, fat-soluble vitamins, and other lipophilic compounds

Ultracarb C8 offers a high carbon load material with somewhat different selectivity than the two Ultracarb ODS phases.

## Ordering Information

Analytical Columns (mm)					SecurityGuard™ Cartridges (mm)
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0
3 µm ODS (20)	<a href="#">00B-0205-E0</a>	<a href="#">00D-0205-E0</a>	<a href="#">00F-0205-E0</a>	—	<a href="#">AJ0-4287</a>
5 µm C8	—	—	<a href="#">00F-2134-E0</a>	<a href="#">00G-2134-E0</a>	<a href="#">AJ0-4290</a>
5 µm ODS (20)	—	—	<a href="#">00F-0206-E0</a>	<a href="#">00G-0206-E0</a>	<a href="#">AJ0-4287</a>
5 µm ODS (30)	—	<a href="#">00D-0351-E0</a>	<a href="#">00F-0351-E0</a>	<a href="#">00G-0351-E0*</a>	<a href="#">AJ0-4287</a>

for ID: 3.2-8.0 mm



\*IMPORTANT: Phenomenex highly recommends the use of 150 mm column length, as opposed to the “traditional” 250 mm column length, when the 5 µm ODS (30) phase is desired. In those cases when the additional retention and resolution of a 250 mm column is desired, please be aware that column backpressure with Ultracarb 5 µm ODS (30) can be 50 to 100 % higher than that experienced with “standard” ODS columns. This relatively high backpressure is a function of the hydrophobicity of the 5 µm ODS (30) phase; higher backpressure is completely “natural” with this phase and will have no ill consequence for the column.

SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

# Ultremex™

- For all new methods we recommend Luna columns
- Spherical, silica material

## Ordering Information

5 µm Analytical Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	150 x 4.6	250 x 4.6	4 x 3.0
C8	<a href="#">00F-0047-E0</a>	—	<a href="#">AJ0-4290</a>
C18	<a href="#">00F-0048-E0</a>	<a href="#">00G-0048-E0</a>	<a href="#">AJ0-4287</a>

for ID: 3.2-8.0 mm

SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)

# Ultron® ES

Manufactured by Shinwa Chemical Industries, Ltd.

- Two complementary protein-based chiral stationary phases
- Easy to use with reversed-phase mobile phases
- Racemic separation without derivatization
- pH range from 3.0 to 7.5



Protect your valuable column investment with the disposable KrudKatcher™ pre-column filter, see p. 15

For In-line Filters specifically designed to protect your chiral column investment, see p. 15



For Chiral Column Performance Check Standards, see p. 425



For HPLC Column Heater System (25-90°C), see p. 416

## Ordering Information

Ultron ES Chiral Columns			
Column	µm	Size (mm)	ES-OVM
Analytical	5	150 x 4.6	702111651
Analytical & Guard	5	150 x 4.6	702111651A

## Affordable, Ultra-High Resolution Size Exclusion Chromatography for HPLC/UHPLC Systems

- Save money with extremely affordable prices
- Achieve better results through larger exclusion ranges and higher efficiencies
- Enhance recovery using more inert Yarra particles
- Gain time with faster, more productive HPLC/UHPLC runs
- Feel at ease knowing you have an unmatched product guarantee

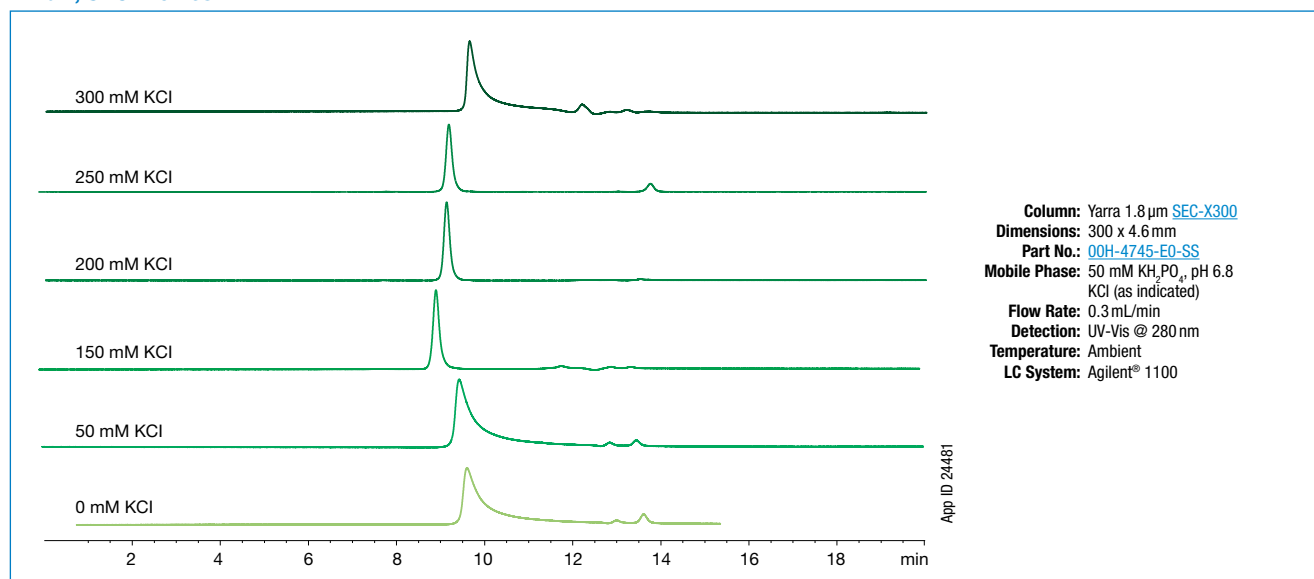
### Yarra vs. Waters® BEH SEC

Yarra 1.8 μm 150 x 4.6 mm		vs.	Waters 1.7 μm 150 x 4.6 mm	
			BEH125 SEC	BEH200 SEC
1.8	1.8	Particle Size (μm)	1.7	1.7
150	300	Pore Size (Å)	125	200
1 k - 450 k	10 k-700 k	MW Range in native conditions (Da)	1 k - 80 k	10 k - 450 k
>30,000	>30,000	Efficiency (plates/column)	>30,000	>30,000

\*Waters specifications taken from Waters website.

## Buffer Optimization for mAb Aggregate Analysis

### mAb 1, SEC Profiles



### Ordering Information

Yarra 1.8 μm SEC Stainless Steel Columns (mm)			SecurityGuard ULTRA Cartridges***
Phases	150 x 4.6	300 x 4.6	3/pk
Yarra 1.8 μm SEC-X150	00F-4631-E0-SS	00H-4631-E0-SS	AJ0-9512
Yarra 1.8 μm SEC-X300	00F-4743-E0-SS	00H-4743-E0-SS	AJ0-9513

\*\*\*SecurityGuard ULTRA cartridges require holder, Part No.: AJ0-9000

## High Resolution Size Exclusion for Biomolecules

- Extremely high efficiency 3 μm particle
- Huge cost savings
- Extreme surface inertness

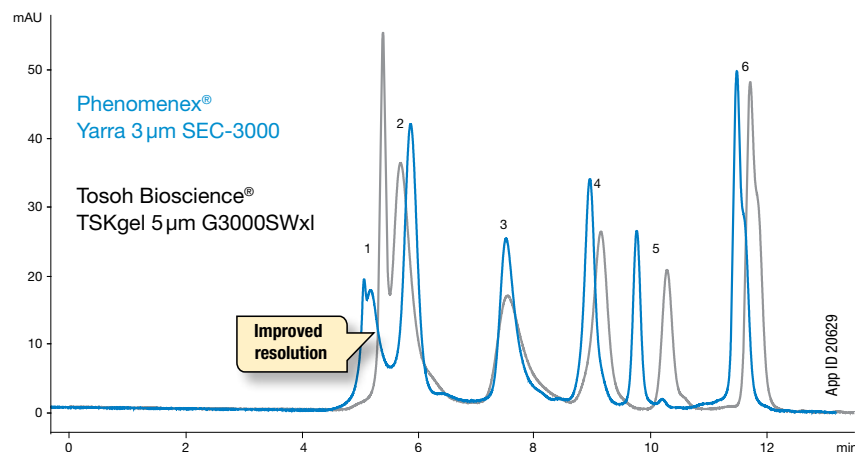
Starting with 3 μm ultra-pure silica, Yarra particles are densely bonded with a proprietary hydrophilic surface chemistry. Coupled with tight particle and pore size distribution as well as strict packing and QC specifications, Yarra columns allow for very high efficiency and resolution.

## Higher Efficiency, Much Lower Price Compared to TSKgel® — GUARANTEED!

Yarra			VS.	TSKgel*†		
3	3	3		G2000SWxl	G3000SWxl	G4000SWxl
145	290	500	<b>Particle Size (μm)</b>	5	5	8
1 k - 300 k	5 k - 700 k	15 k - 1,500 k	<b>Pore Size (Å)</b>	125	250	450
2.5 - 7.5	2.5 - 7.5	2.5 - 7.5	<b>MW Range in native conditions (Da)</b>	5 k - 150 k	10 k - 500 k	20 k - 7,000 k
3000	3000	1700	<b>pH Stability</b>	2.5 - 7.5	2.5 - 7.5	2.5 - 7.5
50	50	50	<b>Maximum Backpressure (psi)</b>	1015	1015	508
1.5	1.5	1.2	<b>Maximum Temperature (°C)</b>	30	30	30
48,000	48,000	38,000	<b>Maximum Flow Rate (mL/min)</b>	1.2	1.2	1.2
			<b>Efficiency (minimum theoretical plates)</b>	20,000	20,000	16,000

\*Also guaranteed against other aqueous GFC columns 3 μm or above.

## Compare Yarra's Resolving Power to TSKgel's



Conditions for both columns:

**Columns:** Yarra 3 μm SEC-3000  
TSKgel 5 μm G3000SWxl

**Dimensions:** 300 x 7.8 mm

**Mobile Phase:** 50 mM Sodium Phosphate pH 6.8  
/ 0.3 M Sodium Chloride

**Flow Rate:** 1 mL/min

**Backpressure:** 99 bar

**Temperature:** Ambient

**Detection:** UV @ 220 nm

**Sample:** 1. IgM  
2. Thyroglobulin (669 kDa)  
3. Beta Amylase  
4. Ovalbumin (44 kDa)  
5. Myoglobin (17 kDa)  
6. Uridine

Comparative separations may not be representative of all applications.

†All TSKgel specifications were taken from Tosoh Bioscience 2004-5 Laboratory Products Catalog



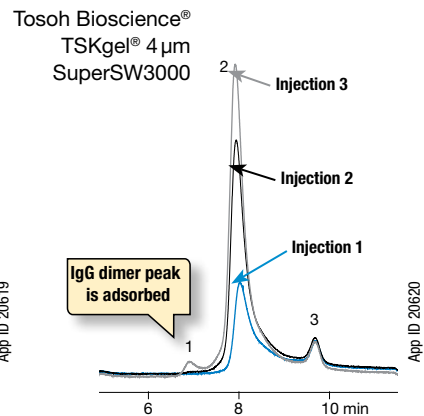
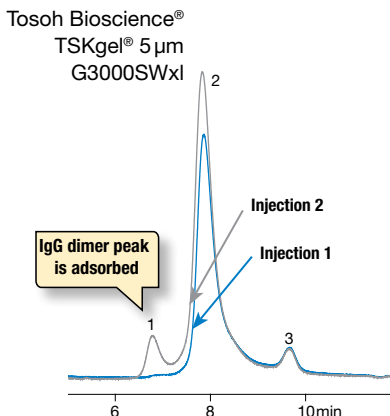
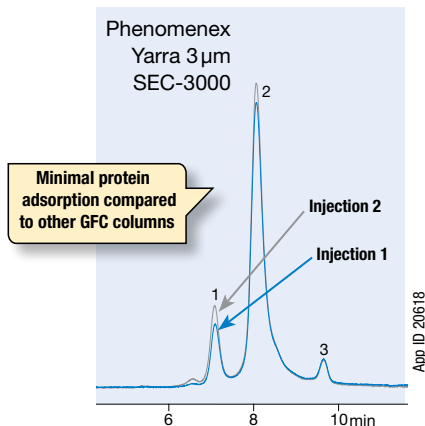
# Yarra™ 3 μm Aqueous GFC/SEC Columns

## Extreme Surface Inertness for Accurate and Confident Recoveries

Phenomenex's proprietary surface chemistry provides an inertness hard to match by other GFC columns. The result is minimal

adsorption of proteins and other protein aggregates leading to more accurate quantitation.

### Minimal "Priming Effect" with Yarra Columns



Conditions for all columns (except where noted):

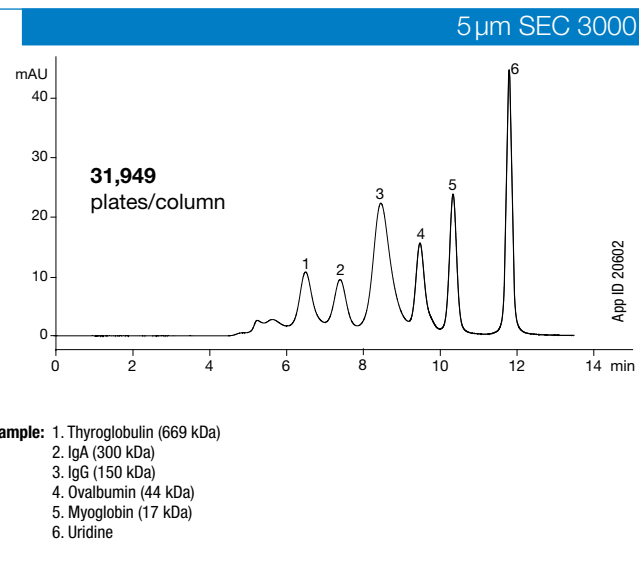
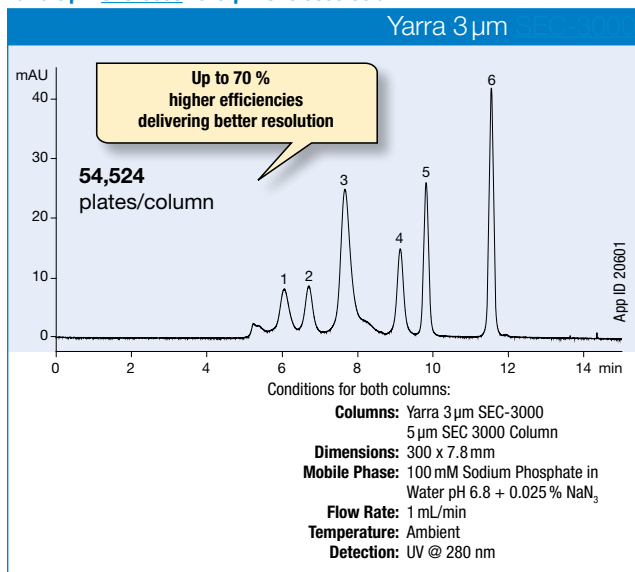
**Columns:** Yarra 3 μm SEC-3000  
TSKgel 5 μm G3000SWxl  
TSKgel 4 μm SuperSW3000  
**Dimensions:** 300 x 7.8 mm

**Mobile Phase:** 50 mM Sodium Phosphate pH 5.0/  
0.1 M Sodium Sulfate  
**Flow Rate:** 1 mL/min  
0.35 mL/min (SuperSW3000)  
**Temperature:** Ambient

**Detection:** UV @ 280 nm  
**Sample:** 1. IgG Dimer  
2. IgG Monomer  
3. Albumin

## Ultra-High Resolution Size Exclusion for Biomolecules

### Yarra 3 μm SEC-3000 vs. 5 μm SEC 3000 Column



Comparative separations may not be representative of all applications.

### Ordering Information

Yarra 3 μm SEC Columns (mm)	Narrow Bore	Analytical	Analytical	SecurityGuard™ Cartridges (mm)
Phases	300 x 4.6	150 x 7.8	300 x 7.8	4 x 3.0*
Yarra 3 μm SEC-2000	00H-4512-E0	00F-4512-K0	00H-4512-K0	AJO-4487
Yarra 3 μm SEC-3000	00H-4513-E0	00F-4513-K0	00H-4513-K0	AJO-4488
Yarra 3 μm SEC-4000	00H-4514-E0	—	00H-4514-K0	AJO-4489

\*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJO-4282](#)

for ID: 4.6 - 7.8 mm



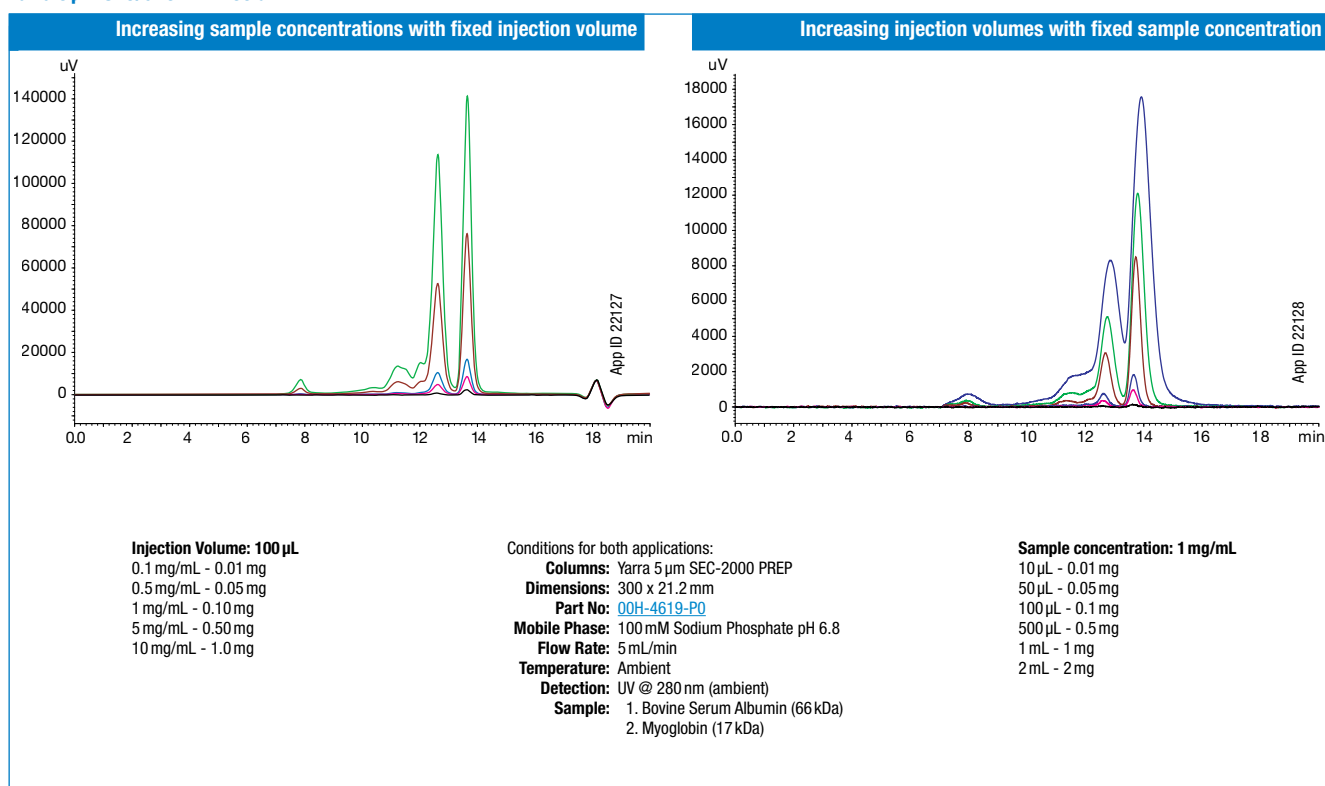
For information on SecurityGuard column protection, see p. 330

# Yarra™ 5 μm PREP Aqueous GFC/SEC Columns

## Higher Performance for Preparative BioSeparations at a Lower Price

Enjoy the same selectivity and ultra-high efficiency of Yarra 3 μm for your preparative gel filtration applications. Yarra SEC PREP features a 5 μm particle size version of the original Yarra 3 μm particle with the same chemistry on a 21.2 mm ID column for preparative purification, desalting, and characterization of biomolecules. Yarra 5 μm PREP is available at an affordable price while maintaining the high performance given with the analytical columns.

### Yarra 5 μm SEC/GFC PREP Column



Yarra 5 μm PREP SEC Columns (mm)	Preparative	SecurityGuard™ Cartridges (mm)
Phases	300 x 21.2	15 x 21.2**
		/ea
Yarra 5 μm SEC-2000 PREP	<a href="#">00H-4619-P0</a>	<a href="#">AJ0-8588</a>
Yarra 5 μm SEC-3000 PREP	<a href="#">00H-4620-P0</a>	<a href="#">AJ0-8589</a>
Yarra 5 μm SEC-4000 PREP	<a href="#">00H-4621-P0</a>	<a href="#">AJ0-8590</a>

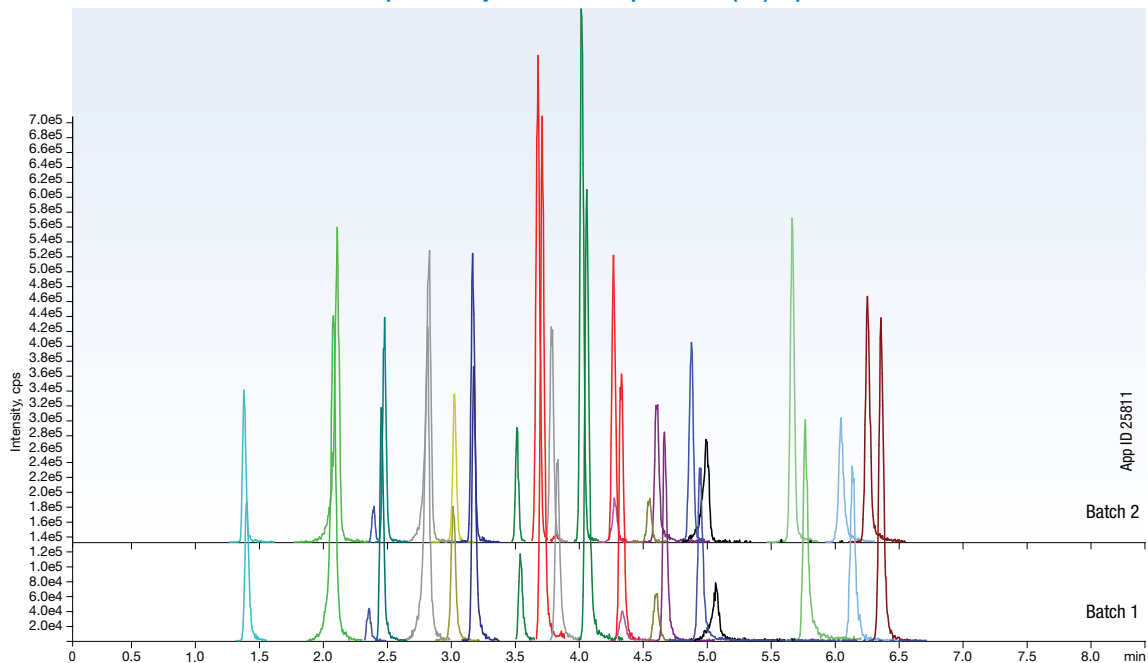
\*\*PREP SecurityGuard™ Cartridges require holder, Part No.: [AJ0-8223](#) for ID: 18 - 29 mm



## Reproducible Micro Columns

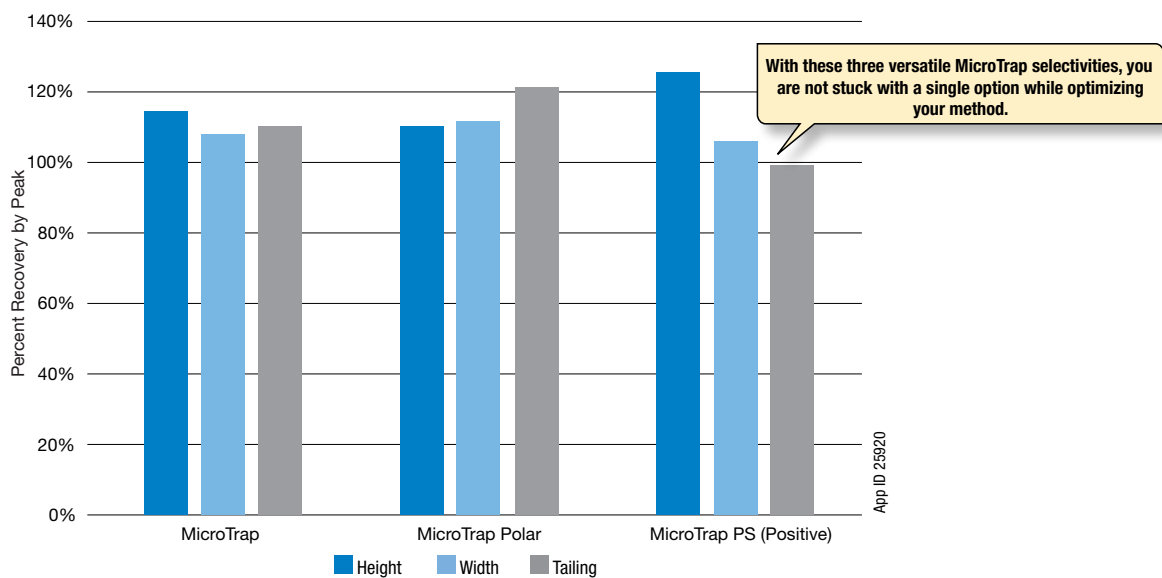
Our micro columns are manufactured with hardware and surface chemistries that are designed to be consistent analytical tools for your analysis. They undergo extensive quality testing to ensure dependability and reproducibility to bring confidence to your application.

Micro LC Kinetex® Batch-to-Batch Reproducibility: 20 Stable-Isotope-Labeled (SIL) Peptides



## Complementary Micro LC Column and Trap Selectivity

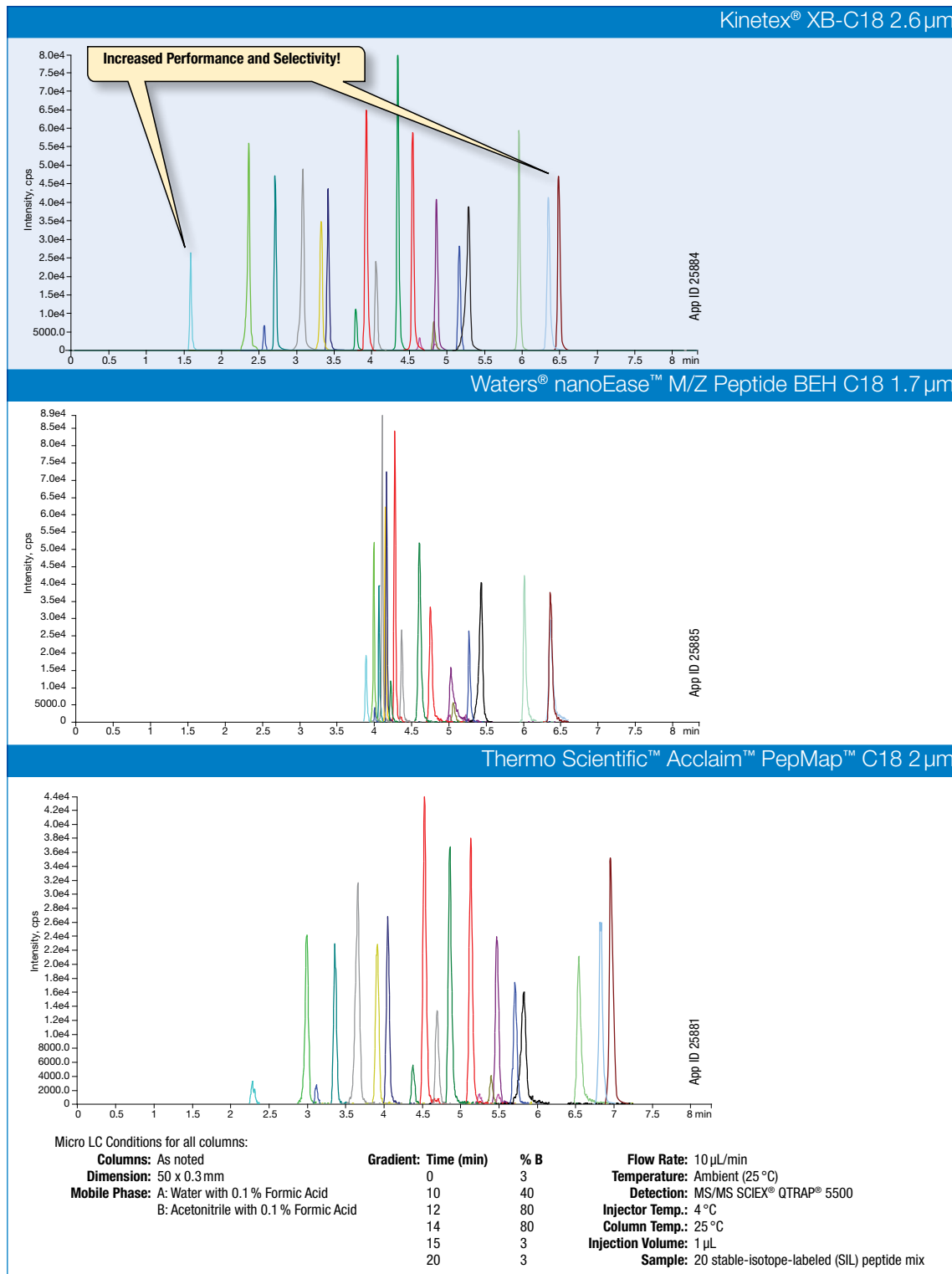
Luna® Omega Polar Column with MicroTrap C18, MicroTrap Polar, or MicroTrap PS



MicroTrap Phases & Dimension		
MicroTrap C18	10 x 0.3 mm	10 x 0.5 mm
MicroTrap Polar	10 x 0.3 mm	10 x 0.5 mm
MicroTrap PS	10 x 0.3 mm	10 x 0.5 mm

## Bring Diverse Micro Selectivity and Improved Performance to Your Lab!

Kinetex Core-Shell Technology packed in a highly compatible micro LC column hardware makes choosing easy; now you get both selectivity and performance gains.



# Micro LC Columns, Traps, and Fittings

## Micro LC Columns

### Ordering Information

2.6 µm Micro LC Columns (mm)						
Phase	30 x 0.3	50 x 0.3	100 x 0.3	150 x 0.3	50 x 0.5	150 x 0.5
Kinetex® Biphenyl 100Å	—	<a href="#">00B-4622-AC</a>	—	<a href="#">00F-4622-AC</a>	<a href="#">00B-4622-AF</a>	—
Kinetex C18 100Å	<a href="#">00A-4462-AC</a>	<a href="#">00B-4462-AC</a>	—	<a href="#">00F-4462-AC</a>	<a href="#">00B-4462-AF</a>	—
Kinetex EVO C18 100Å	—	<a href="#">00B-4725-AC</a>	—	<a href="#">00F-4725-AC</a>	<a href="#">00B-4725-AF</a>	—
Kinetex F5 100Å	—	<a href="#">00B-4723-AC</a>	<a href="#">00D-4723-AC</a>	<a href="#">00F-4723-AC</a>	<a href="#">00B-4723-AF</a>	—
Kinetex XB-C18 100Å	<a href="#">00A-4496-AC</a>	<a href="#">00B-4496-AC</a>	<a href="#">00D-4496-AC</a>	<a href="#">00F-4496-AC</a>	<a href="#">00B-4496-AF</a>	<a href="#">00F-4496-AF</a>

3 µm Micro LC Columns (mm)						
Phase	50 x 0.3	100 x 0.3	150 x 0.3	50 x 0.5	100 x 0.5	150 x 0.5
Luna® C8(2)100Å	<a href="#">00B-4248-AC</a>	—	—	<a href="#">00B-4248-AF</a>	—	—
Luna C18(2) 100Å	<a href="#">00B-4251-AC</a>	<a href="#">00D-4251-AC</a>	<a href="#">00F-4251-AC</a>	<a href="#">00B-4251-AF</a>	<a href="#">00D-4251-AF</a>	<a href="#">00F-4251-AF</a>
Luna NH <sub>2</sub> 100Å	—	—	<a href="#">00F-4377-AC</a>	—	—	—
Luna HILIC 200Å	—	—	—	<a href="#">00B-4449-AF</a>	—	—
Luna Phenyl-Hexyl 100Å	—	<a href="#">00D-4256-AC</a>	—	—	<a href="#">00D-4256-AF</a>	—
Luna Omega PS C18 100Å	<a href="#">00B-4758-AC</a>	<a href="#">00D-4758-AC</a>	<a href="#">00F-4758-AC</a>	<a href="#">00B-4758-AF</a>	<a href="#">00D-4758-AF</a>	<a href="#">00F-4758-AF</a>
Luna Omega Polar C18 100Å	<a href="#">00B-4760-AC</a>	<a href="#">00D-4760-AC</a>	<a href="#">00F-4760-AC</a>	<a href="#">00B-4760-AF</a>	<a href="#">00D-4760-AF</a>	<a href="#">00F-4760-AF</a>
Gemini® C18 110Å	<a href="#">00B-4439-AC</a>	—	<a href="#">00F-4439-AC</a>	<a href="#">00B-4439-AF</a>	—	—

4 µm Micro LC Columns (mm)						
Phase	50 x 0.3	150 x 0.3	250 x 0.3	50 x 0.5	150 x 0.5	250 x 0.5
Synergi™ Max-RP 80Å	—	—	—	<a href="#">00B-4337-AF</a>	<a href="#">00F-4337-AF</a>	—
Synergi Hydro-RP 80Å	<a href="#">00B-4375-AC</a>	<a href="#">00F-4375-AC</a>	<a href="#">00G-4375-AC</a>	<a href="#">00B-4375-AF</a>	—	<a href="#">00G-4375-AF</a>
Synergi Fusion-RP 80Å	—	<a href="#">00F-4424-AC</a>	—	—	<a href="#">00F-4424-AF</a>	—
Synergi Polar-RP 80Å	—	—	—	—	<a href="#">00F-4336-AF</a>	—
Jupiter® Proteo 90Å	<a href="#">00B-4396-AC</a>	<a href="#">00F-4396-AC</a>	—	—	<a href="#">00F-4396-AF</a>	—

5 µm Micro LC Columns (mm)					
Phase	50 x 0.3	150 x 0.3	50 x 0.5	150 x 0.5	250 x 0.5
Luna C8(2) 100Å	—	<a href="#">00F-4249-AC</a>	—	—	—
Luna C18(2)100Å	—	<a href="#">00F-4252-AC</a>	—	<a href="#">00F-4252-AF</a>	<a href="#">00G-4252-AF</a>
Luna Phenyl-Hexyl 100Å	<a href="#">00B-4257-AC</a>	—	<a href="#">00B-4257-AF</a>	—	—
Luna Omega Polar C18 100Å	<a href="#">00B-4760-AC</a>	<a href="#">00F-4760-AC</a>	<a href="#">00B-4760-AF</a>	<a href="#">00F-4760-AF</a>	—
Luna Omega PS C18 100Å	<a href="#">00B-4758-AC</a>	<a href="#">00F-4758-AC</a>	<a href="#">00B-4758-AF</a>	<a href="#">00F-4758-AF</a>	—
Jupiter C18 300Å	<a href="#">00B-4053-AC</a>	—	<a href="#">00B-4053-AF</a>	<a href="#">00F-4053-AF</a>	—
Jupiter C4 300Å	<a href="#">00B-4167-AC</a>	—	<a href="#">00B-4167-AF</a>	—	—

## Micro LC Trap Selectivities

### Ordering Information

MicroTraps			
Phase	10 x 0.3 mm	10 x 0.5 mm	Unit
MicroTrap C18	<a href="#">05N-4252-AC</a>	<a href="#">05N-4252-AF</a>	3/pk
MicroTrap Polar	<a href="#">05N-4754-AC</a>	<a href="#">05N-4754-AF</a>	3/pk
MicroTrap PS	<a href="#">05N-4753-AC</a>	<a href="#">05N-4753-AF</a>	3/pk
MicroTrap WP C4	<a href="#">05N-4167-AC</a>	<a href="#">05N-4167-AF</a>	3/pk

### Ordering Information

MicroTraps Fittings		
Part No.	Description	Unit
<a href="#">AQO-7602</a>	PEEKlok™ fittings with 6-40 thread for 1/32" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
<a href="#">AQO-7603</a>	PEEKlok fittings with 6-32 thread for 1/32" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
<a href="#">AQO-7601</a>	PEEKlok fittings with 10-32 thread for 1/16" OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea



**i** It's recommended that you optimize the selectivity between your Micro LC trap and column configuration to maximize your separation performance.



# Industry Focused Guides

Download as many as you need at  
[www.phenomenex.com/guides](http://www.phenomenex.com/guides)





*“ You have very intelligent chromatographers on hand to answer method development questions. ”*

**Timothy E. Mason**  
**AkzoNobel**

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

363- 372

### SFC Media

Chiral: Lux SFC Media .....	364
Achiral: Kinetex, Luna and Synergi SFC Media .....	370
Preparative SFC Media .....	369

## Supercritical Fluid Chromatography (SFC)

SFC is recognized by scientists worldwide as a clean, green, and efficient tool for analysis and purification. With recent advancements and accessibility of instrumentation, improved column hardware, and the wide variety of surface chemistries available, SFC has enjoyed an ever-increasing range of applications in many industries:

- Pharmaceutical
- Nutraceutical
- Petrochemical
- Natural Products
- Food & Beverage
- Environmental
- Academic
- and more...

### Complete SFC Product Offering

Phenomenex offers solutions for your SFC needs.

- Over 20 selectivities for use in SFC
- Chiral and achiral phases available
- Multiple particle sizes ranging from 1.7  $\mu\text{m}$  to 20  $\mu\text{m}^*$
- Scalable packed column dimensions (2.0mm – 50.0mm ID)

### Chiral columns (pp. 365-369)

#### 6 Coated Lux Polysaccharide Chiral Stationary Phases

- Lux Amylose-1
- Lux Amylose-2
- Lux Cellulose-1
- Lux Cellulose-2
- Lux Cellulose-3
- Lux Cellulose-4

#### 3 Immobilized Lux Phases

- Lux i-Amylose-1
- Lux i-Amylose-3
- Lux i-Cellulose-5

\*Not all media available in a full range of particle sizes, please inquire.



### Expanding the Range of Selectivity for SFC

Selecting a column is one of the most critical parameters during SFC method development. Having a variety of complementary and orthogonal selectivities to choose from can mean the difference between partial or no separation and achieving an optimal fully resolved separation that can be validated and scaled-up in your lab or contract lab.

Phenomenex offers a large collection of packed SFC analytical and preparative columns that have earned their reputations for performance, reliability, high efficiency, reproducibility, and long lifetimes.

### Achiral columns (pp. 370-372)

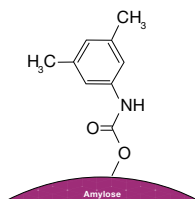
- Kinetex Phenyl-Hexyl
- Kinetex F5
- Kinetex Biphenyl
- Kinetex HILIC
- Luna HILIC
- Luna PFP(2)
- Luna NH<sub>2</sub>
- Luna Si
- Luna CN
- Synergi Polar-RP





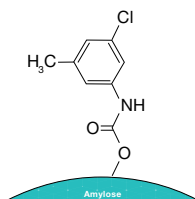
## Chiral SFC Media

### Three Robust Immobilized Chiral Columns



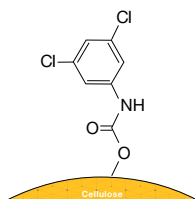
**Lux i-Amylose-1**

Amylose tris  
(3,5-dimethylphenylcarbamate)



**Lux i-Amylose-3**

Amylose tris  
(3-chloro-5-methylphenylcarbamate)



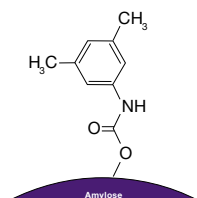
**Lux i-Cellulose-5**

Cellulose tris  
(3,5-dichlorophenylcarbamate)



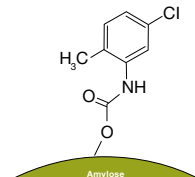
See pp. 301-310 for additional information on Immobilized and Coated Lux Polysaccharide Chiral Phases

### Combined with Six Coated Lux Polysaccharide LC/SFC Chiral Stationary Phases



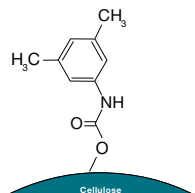
**Lux Amylose-1**

Amylose tris  
(3,5-dimethylphenylcarbamate)



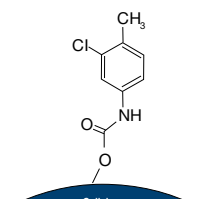
**Lux Amylose-2**

Amylose tris  
(5-chloro-2-methylphenylcarbamate)



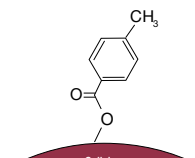
**Lux Cellulose-1**

Cellulose tris  
(3,5-dimethylphenylcarbamate)



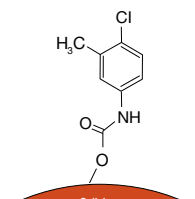
**Lux Cellulose-2**

Cellulose tris  
(3-chloro-4-methylphenylcarbamate)



**Lux Cellulose-3**

Cellulose tris  
(4-methylbenzoate)



**Lux Cellulose-4**

Cellulose tris  
(4-chloro-3-methylphenylcarbamate)

### Easily upgrade from your existing chiral columns to Lux LC/SFC columns!

If you are using one of the DAICEL® columns below:	Guaranteed alternative:	Phase description:
CHIRALPAK® IA®	<b>Lux i-Amylose-1</b>	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK IG® and IG-3	<b>Lux i-Amylose-3</b>	Amylose tris(3-chloro-5-methylphenylcarbamate)
CHIRALPAK IC® and IC-3	<b>Lux i-Cellulose-5</b>	Cellulose tris(3,5-dichlorophenylcarbamate)
CHIRALPAK AD®, AD-H®, AD-3, AD-RH®, and AD-3R	<b>Lux Amylose-1</b>	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK AY®, AY-H®, AY-3, AY-RH®, and AY-3R	<b>Lux Amylose-2</b>	Amylose tris(5-chloro-2-methylphenylcarbamate)
CHIRALCEL® OD®, OD-H®, OD-3, OD-RH®, and OD-3R	<b>Lux Cellulose-1</b>	Cellulose tris(3,5-dimethylphenylcarbamate)
CHIRALCEL OZ®, OZ-H®, OZ-3, OZ-RH®, and OZ-3R	<b>Lux Cellulose-2</b>	Cellulose tris(3-chloro-4-methylphenylcarbamate)
CHIRALCEL OJ®, OJ-H®, OJ-3, OJ-RH®, and OJ-3R	<b>Lux Cellulose-3</b>	Cellulose tris(4-methylbenzoate)
CHIRALCEL OX-H®, OX-3, OX-RH®, and OX-3R	<b>Lux Cellulose-4</b>	Cellulose tris(4-chloro-3-methylphenylcarbamate)

## Chiral SFC Media (cont'd)

Exceptional Stability and Separating Power under SFC Conditions

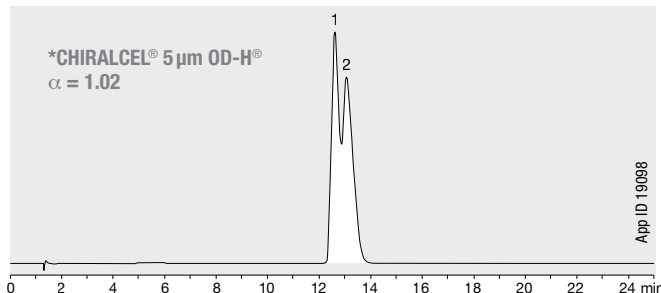
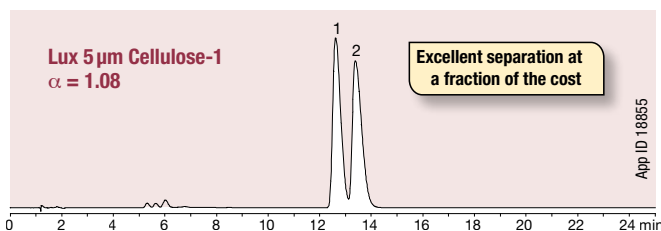
- Multiple complementary polysaccharide stationary phases
- High efficiency and loading capacity
- Pressure stability up to 300 bar
- 3  $\mu\text{m}$ , 5  $\mu\text{m}$  packed columns and 10 and 20  $\mu\text{m}$  bulk media for scale-up

## Extreme Stability and Separating Power under SFC Conditions.

Never fear crushed media or loss in efficiency again. With a pressure stability up to 300 bar (4350 psi), you can feel confident about running at high operating pressures (if necessary). Lux media is

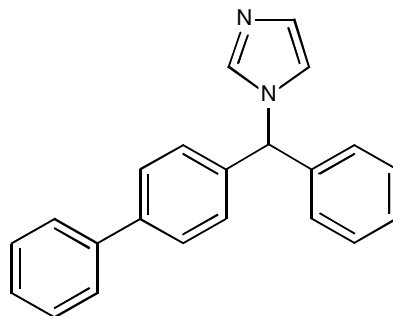
SFC approved and versatile enough to satisfy all of your chiral separation needs.

### Bifonazole



Conditions for both columns:

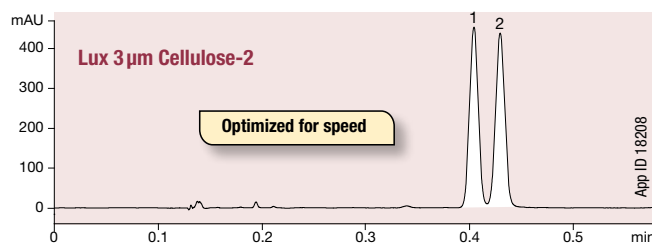
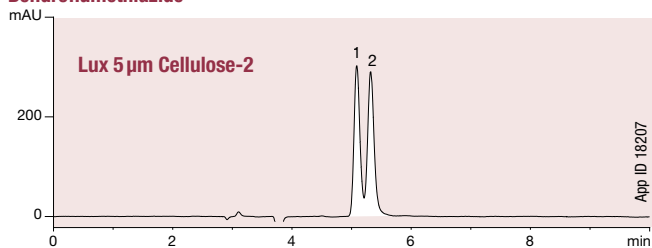
- Dimensions:** 250 x 4.6 mm
- Mobile Phase:** 0.1 % Diethylamine in Methanol / Carbon Dioxide (15:85)
- Flow Rate:** 2.5 mL/min
- Temperature:** 35 °C
- Detection:** Diode Array Detector



## Smaller Particles for Higher Efficiency

Scaling down to a 3  $\mu\text{m}$  particle gives you exceptional efficiencies and significantly reduced runtimes without compromising enantioselectivity.

### Bendroflumethiazide



- Column:** Lux 5  $\mu\text{m}$  Cellulose-2
- Dimensions:** 250 x 4.6 mm
- Part No.:** [00G-4457-E0](#)
- Mobile Phase:** 0.1 % Diethylamine with 0.1 % Trifluoroacetic acid in Methanol / Carbon Dioxide (30:70)
- Flow Rate:** 2 mL/min
- Detection:** UV @ 273 nm
- Temperature:** Ambient

- Column:** Lux 3  $\mu\text{m}$  Cellulose-2
- Dimensions:** 50 x 4.6 mm
- Part No.:** [00B-4456-E0](#)
- Mobile Phase:** 0.1 % Diethylamine with 0.1 % Trifluoroacetic acid in Methanol / Carbon Dioxide (30:70)
- Flow Rate:** 4 mL/min
- Detection:** UV @ 273 nm
- Temperature:** Ambient

\* Comparative separations may not be representative of all applications. Columns used for comparison were manufactured by DAICEL Corporation.



## Chiral SFC Media (cont'd)

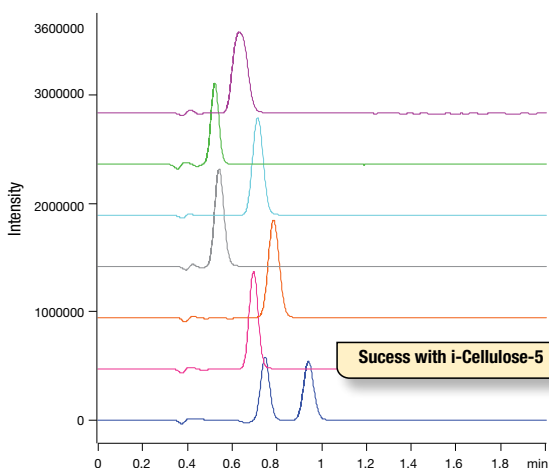
Eight distinct yet complementary Lux® CSPs allow for excellent success rate over reversed phase, polar organic, normal phase, and SFC conditions, with the i-Amylose-3, i-Cellulose-5, and i-Amylose-1, adding strong solvent capability to this versatile family of products.

For SFC, having this breadth of selectivities is incredibly useful for

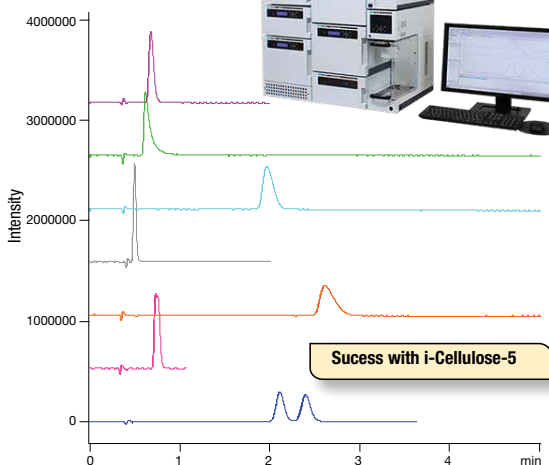
### A variety of compounds were separated including:

- Beta-Blockers
- Anti-Anxiety
- Pain Relievers
- Anti-Allergenic agents
- Anti-Arrhythmia
- Anti-Asthmatic
- Anti-Coagulants
- Anti-Depressive
- Anti-Inflammatory
- Calcium Channel Blockers

#### Nimopidine



#### Acebutolol

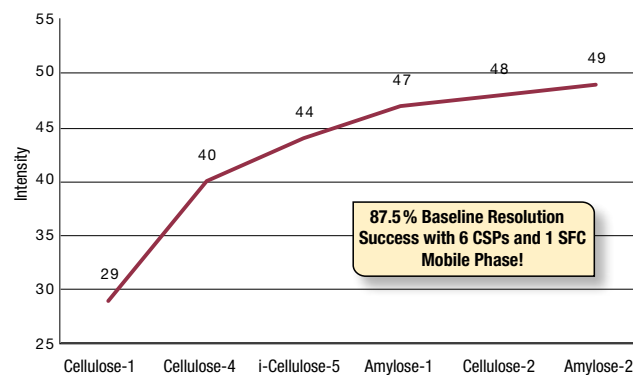


#### Nimopidine and Acebutolol

- Columns:** Lux 3 µm Amylose-2  
 Lux 3 µm Amylose-1  
 Lux 3 µm Cellulose-4  
 Lux 3 µm Cellulose-3  
 Lux 3 µm Cellulose-2  
 Lux 3 µm Cellulose-1  
 Lux 3 µm i-Cellulose-5
- Dimensions:** 150 x 3.0 mm

screening and discovery work. Below is a portion of a study where 56 racemic pharmaceutical compounds were run on a variety of Lux stationary phases under various mobile phase options to help develop useful screening protocols. Over the course of the study, it was determined that with one SFC mobile phase and the use of 6 different Lux CSPs, a lab could get 87.5% success (baseline resolution).

#### Cumulative baseline separation with Lux phases



#### SFC Screen

- Columns:** Lux 5 µm Cellulose-1  
 Lux 5 µm Cellulose-4  
 Lux 5 µm i-Cellulose-5  
 Lux 5 µm Amylose-1  
 Lux 5 µm Cellulose-2  
 Lux 5 µm Amylose-2

**Dimensions:** 250 x 4.6 mm

Conditions for all columns:

- Mobile Phase:** 80% CO<sub>2</sub> / 20% Methanol + 0.1% Isopropylamine and 0.1% TFA
- Flow Rate:** 3 mL/min
- Detection:** UV @ 220 nm
- Temperature:** 30 °C
- System:** JASCO® 4000 Series Analytical SFC



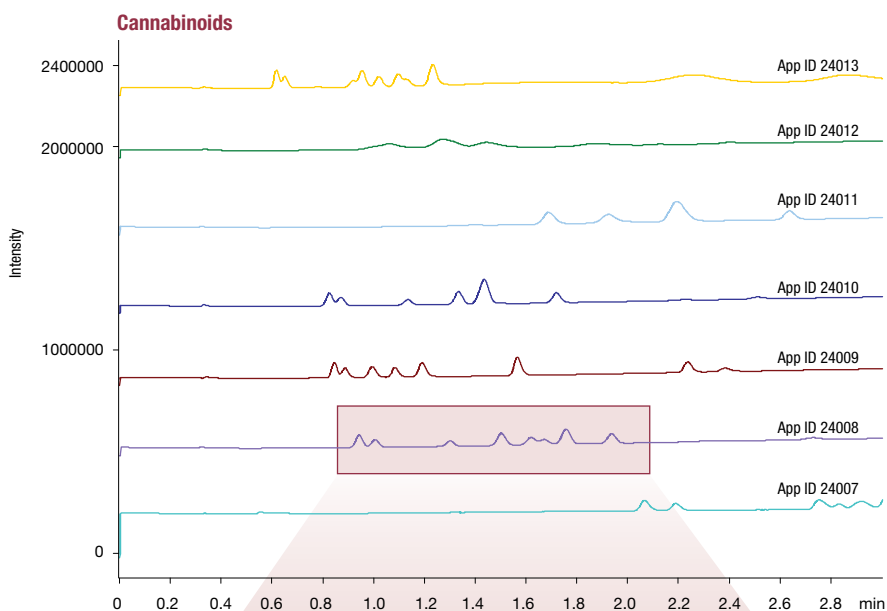
Lux columns are interchangeable between normal phase and SFC modes with a simple solvent switch. Request Technical Note, [TN-9004](#), for more details on chiral SFC screening strategies.

## Chiral SFC Media (cont'd)

### Achiral SFC Success with Chiral Columns!

While the incredible range of interaction mechanisms (polar, electrostatic, hydrophobic, van der Waals, and others) present in each Lux material are fundamental for ensuring baseline separation of chiral compounds, these same interaction mechanisms can also be used as an excellent screening tool for achiral work. Here we

present an achiral screening of natural cannabinoids using 7 Lux selectivities under one SFC mobile phase. The initial resolution and separation provided by the Lux Cellulose-2 was then further optimized to provide even greater resolution.



Conditions for all columns:

**Columns:** Lux 3  $\mu$ m i-Cellulose-5  
 Lux 3  $\mu$ m Amylose-2  
 Lux 3  $\mu$ m Amylose-1  
 Lux 3  $\mu$ m Cellulose-4  
 Lux 3  $\mu$ m Cellulose-3  
 Lux 3  $\mu$ m Cellulose-2  
 Lux 3  $\mu$ m Cellulose-1

**Dimensions:** 150 x 3.0 mm

**Mobile Phase:** A: Carbon Dioxide  
 B: Methanol

Gradient:	Time (min)	% B
	0	5
	2.5	25
	3	25

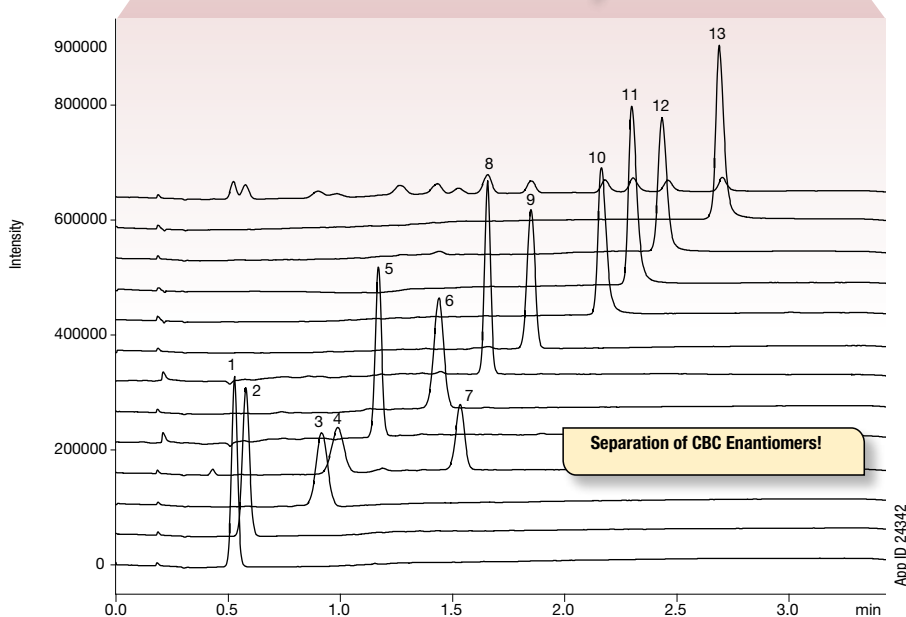
**Flow Rate:** 3 mL/min

**Detection:** UV @ 220 nm

**Temperature:** 40 °C

**Sample:** Cannabinoid mix of 8

Expanded and optimized method separates achiral and chiral species!



**Column:** Lux 3  $\mu$ m Cellulose-2

**Dimensions:** 150 x 3.0 mm

**Part No.:** [00F-4456-Y0](#)

**Mobile Phase:** A: Carbon Dioxide  
 B: Methanol

Gradient:	Time (min)	% B
	0	4
	3	25
	3.5	25

**Flow Rate:** 5 mL/min

**Detection:** UV @ 220 nm

**Temperature:** 40 °C

**Sample:** Cannabinoid mix of 12

- |                       |           |
|-----------------------|-----------|
| 1. CBDV               | 8. THCV   |
| 2. CBN                | 9. CBG    |
| 3. Delta-8-THC        | 10. CBDVA |
| 4. CBC (Enantiomer 1) | 11. CBDVA |
| 5. CBD                | 12. THCA  |
| 6. Delta-9-THC        | 13. CBGA  |
| 7. CBC (Enantiomer 2) |           |

Separation of CBC Enantiomers!

App ID 24342

## Chiral SFC Media (cont'd)

### Chiral Material Characteristics

Packing Material Porous	Particle Size (µm)	Pressure Stability (bar)	pH Stability
Lux Cellulose	3, 5, 10, 20	300	2.0 - 9.0
Lux Amylose	3, 5, 20*	300	2.0 - 9.0

\* Please inquire

### 3.0mm ID Lux Screening Columns

#### Ordering Information

3 µm MidBore™ Columns (mm)†		SecurityGuard™ Cartridges (mm)
Phases	150 x 3.0	4 x 2.0*
		/10pk
i-Cellulose-5	<a href="#">00F-4755-Y0</a>	<a href="#">AJ0-8631</a>
Cellulose-1	<a href="#">00F-4458-Y0</a>	<a href="#">AJ0-8402</a>
Cellulose-2	<a href="#">00F-4456-Y0</a>	<a href="#">AJ0-8398</a>
Cellulose-3	<a href="#">00F-4492-Y0</a>	<a href="#">AJ0-8621</a>
Cellulose-4	<a href="#">00F-4490-Y0</a>	<a href="#">AJ0-8626</a>
Amylose-1	<a href="#">00F-4729-Y0</a>	<a href="#">AJ0-9337</a>
Amylose-2	<a href="#">00F-4471-Y0</a>	<a href="#">AJ0-8471</a>
	for ID:	2.0–3.0mm

† Additional dimensions available upon request.

\* SecurityGuard Analytical Cartridges require holder, Part No.: [KJO-4282](#)



#### Ordering Information

Supercritical Fluid Chromatography (SFC) Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phase	150 x 4.6**	250 x 4.6**	250 x 10	4 x 3.0*	10 x 10.0 ‡
<b>Chiral Columns†</b>					
Lux 5 µm i-Amylose-1	<a href="#">00F-4762-E0</a>	<a href="#">00G-4762-E0</a>	<a href="#">00G-4762-N0</a>	<a href="#">AJ0-8641</a>	<a href="#">AJ0-8642</a>
Lux 5 µm i-Amylose-3	<a href="#">00F-4779-E0</a>	<a href="#">00G-4779-E0</a>	<a href="#">00G-4779-N0</a>	<a href="#">AJ0-8650</a>	<a href="#">AJ0-8652</a>
Lux 5 µm i-Cellulose-5	<a href="#">00F-4756-E0</a>	<a href="#">00G-4756-E0</a>	<a href="#">00G-4756-N0</a>	<a href="#">AJ0-8632</a>	<a href="#">AJ0-8633</a>
Lux 5 µm Cellulose-1	<a href="#">00F-4459-E0</a>	<a href="#">00G-4459-E0</a>	<a href="#">00G-4459-N0</a>	<a href="#">AJ0-8403</a>	<a href="#">AJ0-8404</a>
Lux 5 µm Cellulose-2	<a href="#">00F-4457-E0</a>	<a href="#">00G-4457-E0</a>	<a href="#">00G-4457-N0</a>	<a href="#">AJ0-8366</a>	<a href="#">AJ0-8399</a>
Lux 5 µm Cellulose-3	<a href="#">00F-4493-E0</a>	<a href="#">00G-4493-E0</a>	<a href="#">00G-4493-N0</a>	<a href="#">AJ0-8622</a>	<a href="#">AJ0-8623</a>
Lux 5 µm Cellulose-4	<a href="#">00F-4491-E0</a>	<a href="#">00G-4491-E0</a>	<a href="#">00G-4491-N0</a>	<a href="#">AJ0-8627</a>	<a href="#">AJ0-8628</a>
Lux 5 µm Amylose-1	<a href="#">00F-4732-E0</a>	<a href="#">00G-4732-E0</a>	<a href="#">00G-4732-N0</a>	<a href="#">AJ0-9336</a>	<a href="#">AJ0-9344</a>
Lux 5 µm Amylose-2	<a href="#">00F-4472-E0</a>	<a href="#">00G-4472-E0</a>	<a href="#">00G-4472-N0</a>	<a href="#">AJ0-8470</a>	<a href="#">AJ0-8472</a>
	for ID:			3.2–8.0mm	9–16mm

\*\*Available in 3 µm. †Additional dimensions available upon request.

for ID: 3.2–8.0mm

9–16mm

#### Supercritical Fluid Chromatography (SFC) Columns (mm) (cont'd)

Supercritical Fluid Chromatography (SFC) Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phase	250 x 21.2	250 x 30	250 x 50	15 x 21.2	15 x 30.0*
<b>Chiral Columns†</b>					
Lux 5 µm i-Amylose-1	<a href="#">00G-4762-P0-AX</a>	<a href="#">00G-4762-U0-AX</a>	<a href="#">00G-4762-V0-AX</a>	<a href="#">AJ0-8643</a>	<a href="#">AJ0-8644</a>
Lux 5 µm i-Amylose-3	<a href="#">00G-4779-P0-AX</a>	<a href="#">00G-4779-U0-AX</a>	<a href="#">00G-4779-V0-AX</a>	<a href="#">AJ0-8653</a>	<a href="#">AJ0-8654</a>
Lux 5 µm i-Cellulose-5	<a href="#">00G-4756-P0-AX</a>	<a href="#">00G-4756-U0-AX</a>	<a href="#">00G-4756-V0-AX</a>	<a href="#">AJ0-8634</a>	<a href="#">AJ0-8635</a>
Lux 5 µm Cellulose-1	<a href="#">00G-4459-P0-AX</a>	<a href="#">00G-4459-U0-AX</a>	<a href="#">00G-4459-V0-AX</a>	<a href="#">AJ0-8405</a>	<a href="#">AJ0-8406</a>
Lux 5 µm Cellulose-2	<a href="#">00G-4457-P0-AX</a>	<a href="#">00G-4457-U0-AX</a>	<a href="#">00G-4457-V0-AX</a>	<a href="#">AJ0-8400</a>	<a href="#">AJ0-8401</a>
Lux 5 µm Cellulose-3	<a href="#">00G-4493-P0-AX</a>	<a href="#">00G-4493-U0-AX</a>	<a href="#">00G-4493-V0-AX</a>	<a href="#">AJ0-8624</a>	<a href="#">AJ0-8625</a>
Lux 5 µm Cellulose-4	<a href="#">00G-4491-P0-AX</a>	<a href="#">00G-4491-U0-AX</a>	<a href="#">00G-4491-V0-AX</a>	<a href="#">AJ0-8629</a>	<a href="#">AJ0-8630</a>
Lux 5 µm Amylose-1	<a href="#">00G-4732-P0-AX</a>	<a href="#">00G-4732-U0-AX</a>	<a href="#">00G-4732-V0-AX</a>	<a href="#">AJ0-9338</a>	<a href="#">AJ0-9339</a>
	for ID:			18–29mm	30–49mm

†Additional dimensions available upon request.

for ID: 18–29mm

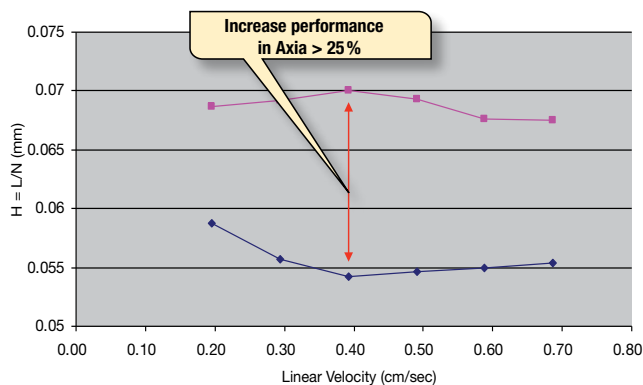
30–49mm

Bulk SFC media is available. Please contact your Phenomenex representative for more information.

For all other SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334

## SFC Preparative Advantage Using Axia™ Packed Technology

Expect up to 25% higher resolution when using the same material packing in Axia versus standard hardware.



◆ Axia Technology

■ Standard Hardware



\*SecurityGuard Analytical Cartridges require holder, Part No.: [KJO-4282](#).

†SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#).

\*\*SFC PREP 21.2mm ID SecurityGuard Cartridges require holder, Part No.: [AJ0-8617](#).

\*SFC PREP 30.0mm ID SecurityGuard Cartridges require holder, Part No.: [AJ0-8618](#).

# SFC Supercritical Fluid Chromatography

## Achiral SFC Media

- Core-shell and fully porous media
- High surface area for increased loading
- Easy scale-up from lab to pilot plant
- Polar and non-polar selectivities for screening
- Columns interchangeable between SFC and HPLC modes

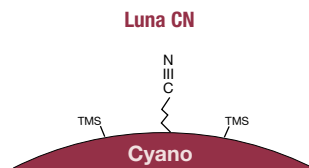
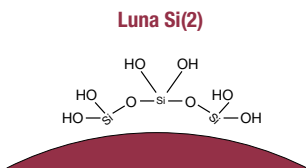
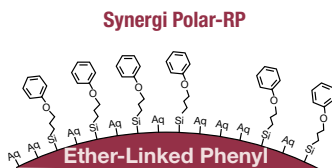
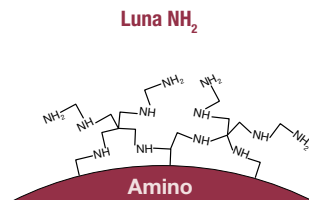
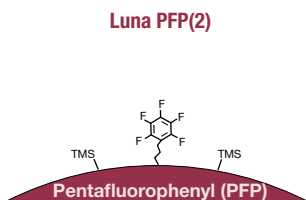
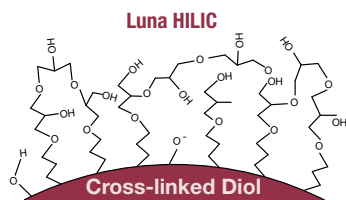
## Media Selectivity is Critical for Success

Utilizing differences in surface chemistries will ensure that you achieve a successful separation for any given project, as in the example below. Once the ideal column phase is identified, you have the ability to optimize for additional improvements in performance:

- Changing retention
- Increasing efficiency
- Altering selectivity
- Reversing elution orders

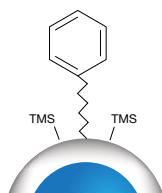
These optimization steps can easily be achieved by adjusting a few simple parameters. For instance, you can try different modifiers and/or additives, change the percent concentration of your modifier, or you can simply change your pressure, temperature, and/or flow rate.

## Fully Porous Particles

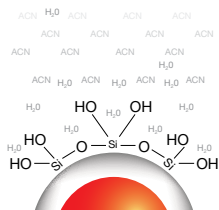


## Core-Shell Particles

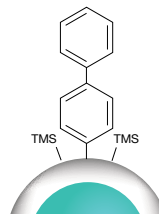
**Kinetex Phenyl-Hexyl**



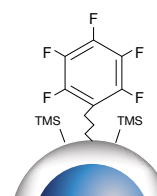
**Kinetex HILIC**



**Kinetex Biphenyl**

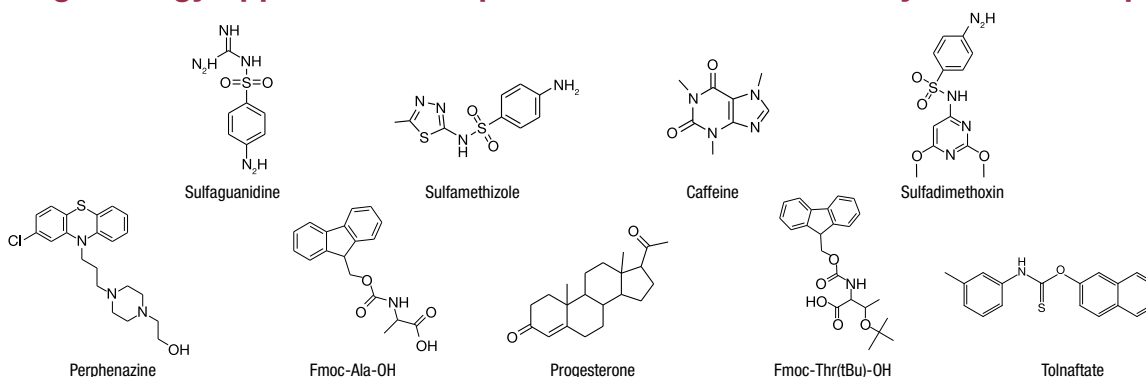


**Kinetex F5**



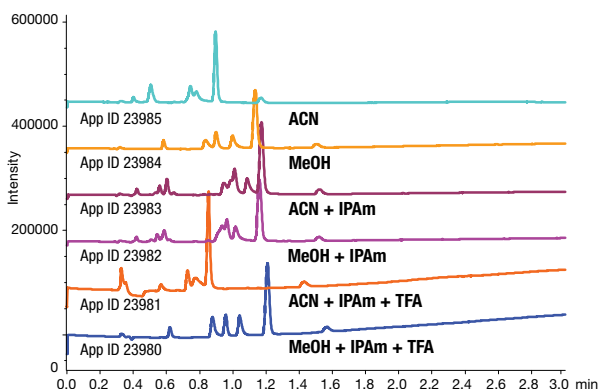
## Achiral SFC Media (cont'd)

### Screening Strategy Applied to the Separation of Pharmaceutically Related Compounds



#### Step 1. Screen Co-Solvents

- Use an appropriate sample that has a representative chromatographic profile
- Use a single column; this work used a Kinetex core-shell Biphenyl LC column
- Evaluate additives, this work used methanol to evaluate acidic, basic, acid/base mixed, and without any additives
- Use a fast gradient, an example would be 5% to 25% over 2 min with a 30 second hold
- Interpret results by comparing peak shape, retention and how many peaks were observed
- Evaluate other solvents such as acetonitrile, isopropanol, or mixtures if necessary
- Select the most promising conditions and move on to Step 2



**Column:** Kinetex 2.6  $\mu$ m Biphenyl  
**Dimensions:** 150 x 3.0 mm  
**Part No.:** [00F-4622-Y0](#)  
**Mobile Phase:** A: Carbon Dioxide  
 B: As described

**Gradient:**

Time (min)	% B
0	5
2.5	25
3	25

**Flow Rate:** 3 mL/min  
**Temperature:** 40 °C  
**Detection:** UV @ 220 nm

#### Step 3. Method Optimization

##### Expand the gradient around the observed peaks

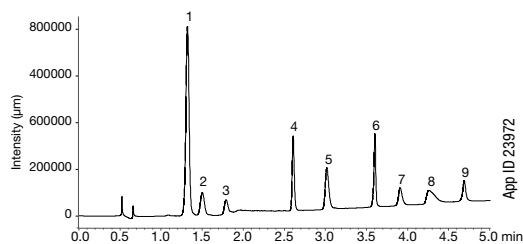
- If all of the peaks are early, lower the final gradient % co-solvent
- If all of the peaks are late, raise the initial gradient % co-solvent
- If the peaks are very close, extend the gradient over a longer period of time

##### Determine if a gradient is needed

- Evaluate if the chromatographic selectivity is dependent on the eluent density by screening with backpressure set higher and lower than typical; 20 – 30 bar difference is suitable

##### Finalize the gradient slope (if necessary)

- If the peaks are well resolved, shorten the time for the gradient
- If the peaks need more resolution, lengthen the time for the gradient



**Column:** Luna 3  $\mu$ m HILIC  
**Dimensions:** 150 x 3.0 mm  
**Part No.:** [00F-4449-Y0](#)  
**Mobile Phase:** A: Carbon Dioxide  
 B: Methanol

**Temperature:** 40 °C  
**Detection:** UV @ 220 nm  
**Sample:**

- Tolnaftate
- Progesterone
- Caffeine
- Fmoc thr(tbu)
- Sulfamethizol
- Fmoc-ala
- Sulfadimethoxine
- Perphenazine
- Sulfaguandine

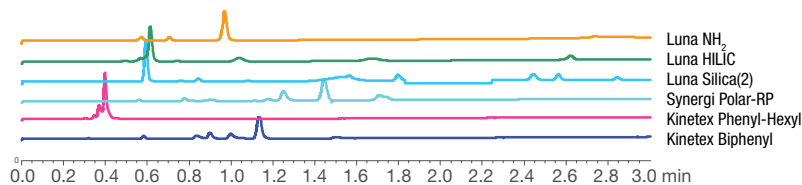
**Gradient:**

Time (min)	% B
0	1
1	1
5	40

**Flow Rate:** 3 mL/min

#### Step 2. Column Screening

- Use the best co-solvent additive combination found in Step 1
- Evaluate columns that have been previously successful with achiral SFC
- Use a gradient similar to the one used in Step 1
- Interpret results by comparing peak shape, retention and how many peaks were observed
- If nothing is promising, select other column chemistries and repeat
- If promising conditions are found, move on to Step 3



**Column:** As described  
**Dimensions:** 150 x 3.0 mm  
**Mobile Phase:** A: Carbon Dioxide  
 B: Methanol

**Gradient:**

Time (min)	% B
0	5
2.5	25
3	25

**Flow Rate:** 3 mL/min  
**Temperature:** 40 °C  
**Detection:** UV @ 220 nm



## Achiral SFC Media (cont'd)

### Achiral Material Characteristics

Packing Material Porous	Particle Size (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load %	End Capping	pH Stability
Luna Silica(2)	3, 5, 10, 15	100	400	0	No	2.0 - 7.5
Luna HILIC	3, 5	200	400	5.7	No	1.5 - 8.0
Luna PFP(2)	3, 5	100	400	11.5	Yes	1.5 - 9.0
Luna CN	3, 5, 10	100	400	7.0	Yes	1.5 - 7.0
Luna NH <sub>2</sub>	3, 5, 10	100	400	9.5	No	1.5 - 11.0
Synergi Polar-RP	2.5, 4, 10	80/100*	475/400*	11	proprietary	1.5 - 7.0
Packing Material Core-Shell						
Kinetex HILIC	1.7, 2.6, 5	100	200	0	No	2.0 - 7.5
Kinetex Biphenyl	1.7, 2.6, 5	100	200	11	Yes	1.5 - 8.5**
Kinetex Phenyl-Hexyl	1.7, 2.6, 5	100	200	11	Yes	1.5 - 8.5**
Kinetex F5	1.7, 2.6, 5	100	200	9	Yes	1.5 - 8.5**

\*\*Columns are pH stable from 1.5 - 10 under isocratic conditions. Columns are pH stable under 1.5 - 8.5 under gradient conditions.

\*Specs. for 2.5µm Synergi Polar-RP

### Ordering Information

Phase	Supercritical Fluid Chromatography (SFC) Columns (mm)			Axia™ Packed Preparative Columns		SecurityGuard™ Cartridges (mm)			
	150 x 4.6	250 x 4.6	250 x 10	250 x 21.2	250 x 30	4 x 3.0*	10 x 10 <sup>‡</sup>	15 x 21.2**	15 x 30 <sup>°</sup>
<b>Achiral Columns<sup>†</sup></b>						/10pk	/3pk	/ea	/ea
Luna 5 µm Silica(2)	<a href="#">00F-4274-E0</a>	<a href="#">00G-4274-E0</a>	<a href="#">00G-4274-N0</a>	<a href="#">00G-4274-P0-AX</a>	<a href="#">00G-4274-U0-AX</a>	<a href="#">AJ0-4348</a>	<a href="#">AJ0-7223</a>	<a href="#">AJ0-7229</a>	<a href="#">AJ0-8312</a>
Luna 5 µm HILIC	<a href="#">00F-4450-E0</a>	<a href="#">00G-4450-E0</a>	<a href="#">00G-4450-N0</a>	<a href="#">00G-4450-P0-AX</a>	<a href="#">00G-4450-U0-AX</a>	<a href="#">AJ0-8329</a>	<a href="#">AJ0-8902</a>	—	—
Luna 5 µm PFP(2)	<a href="#">00F-4448-E0</a>	<a href="#">00G-4448-E0</a>	<a href="#">00G-4448-N0</a>	<a href="#">00G-4448-P0-AX</a>	—	<a href="#">AJ0-8327</a>	<a href="#">AJ0-8376</a>	<a href="#">AJ0-8377</a>	<a href="#">AJ0-8378</a>
Luna 5 µm CN	<a href="#">00F-4255-E0</a>	<a href="#">00G-4255-E0</a>	<a href="#">00G-4255-N0</a>	<a href="#">00G-4255-P0-AX</a>	<a href="#">00G-4255-U0-AX</a>	<a href="#">AJ0-4305</a>	<a href="#">AJ0-7313</a>	<a href="#">AJ0-8220</a>	<a href="#">AJ0-8311</a>
Luna 5 µm NH <sub>2</sub>	<a href="#">00F-4378-E0</a>	<a href="#">00G-4378-E0</a>	<a href="#">00G-4378-N0</a>	<a href="#">00G-4378-P0-AX</a>	—	<a href="#">AJ0-4302</a>	<a href="#">AJ0-7364</a>	<a href="#">AJ0-8162</a>	<a href="#">AJ0-8309</a>
Synergi 4 µm Polar-RP	<a href="#">00F-4336-E0</a>	<a href="#">00G-4336-E0</a>	<a href="#">00G-4336-N0</a>	<a href="#">00G-4336-P0-AX</a>	<a href="#">00G-4336-U0-AX</a>	<a href="#">AJ0-6076</a>	<a href="#">AJ0-7276</a>	<a href="#">AJ0-7845</a>	<a href="#">AJ0-8307</a>
<b>Core-Shell Kinetex Technology</b>						/3pk	/3pk	/ea	/ea
Kinetex 2.6 µm HILIC	<a href="#">00F-4461-E0</a>	<a href="#">00G-4461-E0</a>	—	—	—	<a href="#">AJ0-8772</a>	—	—	—
Kinetex 5 µm Biphenyl	<a href="#">00F-4627-E0</a>	<a href="#">00G-4627-E0</a>	<a href="#">00G-4627-N0</a>	<a href="#">00G-4627-P0-AX</a>	—	<a href="#">AJ0-9207</a>	<a href="#">AJ0-9280</a>	<a href="#">AJ0-9272</a>	<a href="#">AJ0-9273</a>
Kinetex 5 µm F5	<a href="#">00F-4724-E0</a>	<a href="#">00G-4724-E0</a>	<a href="#">00G-4724-N0</a>	<a href="#">00G-4724-P0-AX</a>	<a href="#">00G-4724-U0-AX</a>	<a href="#">AJ0-9320</a>	<a href="#">AJ0-9323</a>	<a href="#">AJ0-9324</a>	<a href="#">AJ0-9325</a>
Kinetex 5 µm Phenyl-Hexyl	<a href="#">00F-4603-E0</a>	<a href="#">00G-4603-E0</a>	—	<a href="#">00G-4603-P0-AX</a>	<a href="#">00G-4603-U0-AX</a>	<a href="#">AJ0-8774</a>	—	<a href="#">AJ0-9147</a>	<a href="#">AJ0-9216</a>

<sup>†</sup>Additional phases and dimensions available upon request.

for ID: 3.2-8.0 mm 9-16 mm 18-29 mm 30-49 mm

\* SecurityGuard ULTRA Cartridges require holder Part No.: [AJ0-9000](#)

\* SecurityGuard Analytical Cartridges require holder Part No.: [KJ0-4282](#)

‡ SemiPrep SecurityGuard Cartridges require holder Part No.: [AJ0-9281](#)

\*\* SFC PREP SecurityGuard Cartridges require holder Part No.: [AJ0-8617](#)

° SFC PREP SecurityGuard Cartridges require holder Part No.: [AJ0-8618](#)

### Additional Non-Polar Phases Available

- C18/C8/C4
- Phenyl-Hexyl
- TWIN™ Technology C18
- TWIN Technology C6-Phenyl
- Fusion-RP
- Hydro-RP and more...



For more information on core-shell Kinetex media, please see p. 246



Bulk SFC media is available. Please contact your Phenomenex representative for more information.



# Flash Chromatography



373 - 382

## Flash Chromatography

### CLARICEP™ Irregular Flash Media

Irregular CS Silica Columns.....	375
Irregular CM Silica Columns.....	377

### CLARICEP Spherical Flash Media

Spherical Silica Columns.....	378
Spherical C18 Columns.....	379
Spherical AQ C18 Columns.....	380

## Seamlessly Upgrade from Traditional Columns to CLARICEP Flash

Bonna-Agela Technologies have developed a technology that effectively deactivates the silica surface. As a result, CLARICEP Flash columns have less surface activity than ordinary silica columns and demonstrate significantly improved chromatographic performance.

### Traditional Column

- High surface activity that causes instability of certain compounds
- Unwanted tailing or overly long retention of basic compounds due to secondary ionic reactions or metal chelating effects
- Poor reproducibility
- Limited selectivity range
- Pressure limited

Vs.

### CLARICEP Column

- Deactivated silica surface promotes compound stability
- Excellent peak shape and performance for both acidic and basic compounds
- High quality and reproducibility
- Wide range of selectivities
- High pressure tolerance



# Flash Chromatography

## CLARICEP™ Irregular CS Silica Columns

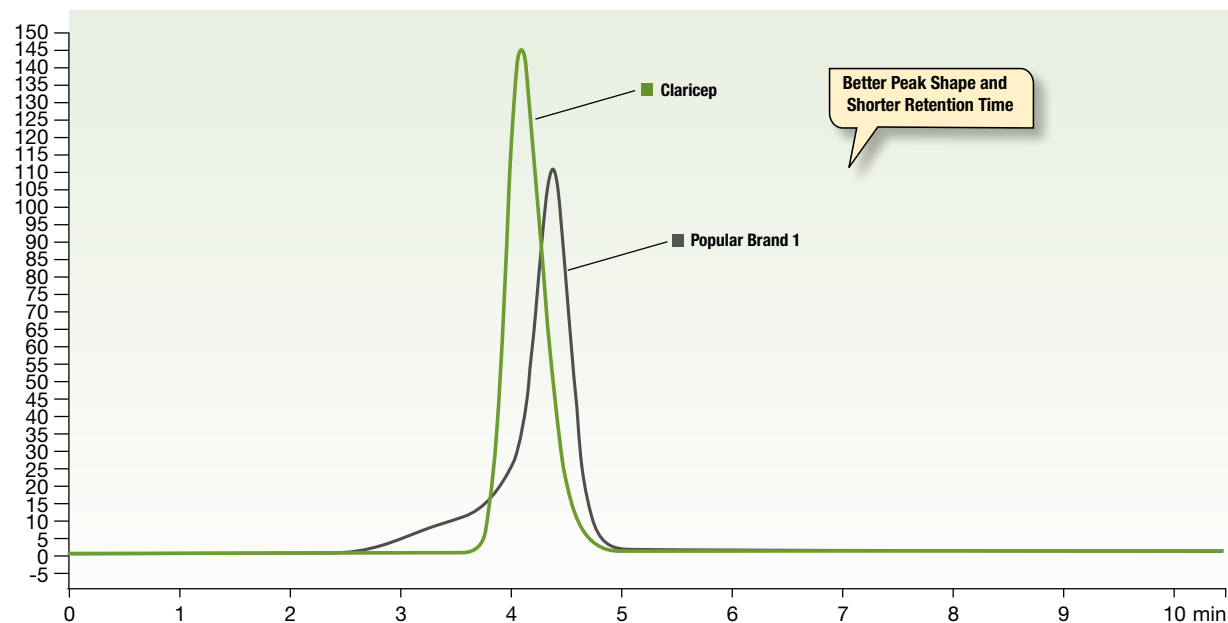
- Ultra pure silica packing
- Additional acid and deionized water wash
- Narrow particle size range
- Carefully controlled water content

### Technical Specifications

Surface Area:	480 m <sup>2</sup> /g
Surface pH:	6.3-7.2
Water Content:	3.0-5.0%
Average Particle Size:	40-60 μm
Average Pore Size:	60 Å

## Improved Peak Shape and Faster Analysis

### Aniline Peak Symmetry and Retention Test



#### Flash Conditions:

**Column:** Claricep Irregular Silica CS (40-60 μm, 60 Å, 40 g)  
**Brand I:** Flash Irregular Silica (40 g)  
**Mobile Phase:** Dichloromethane/ Methanol (99 : 1)  
**Flow Rate:** 20 mL/min  
**Detector:** UV @ 254 nm  
**Temperature:** Ambient  
**Retention Time:** CLARICEP CS: 4.090 min  
Brand I: 4.373 min  
**Sample:** Aniline

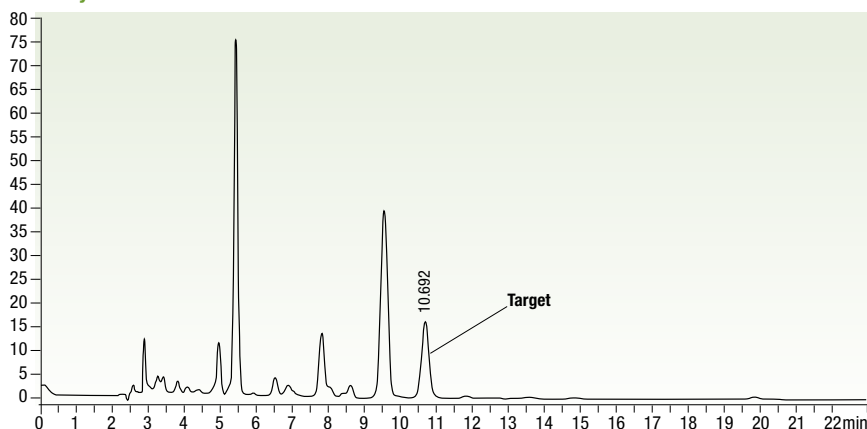
Comparative separations may not be representative of all applications.

# Flash Chromatography

## CLARICEP™ Irregular CS Silica Columns (cont'd)

### The Purity of Sesamol in Sesame Oil

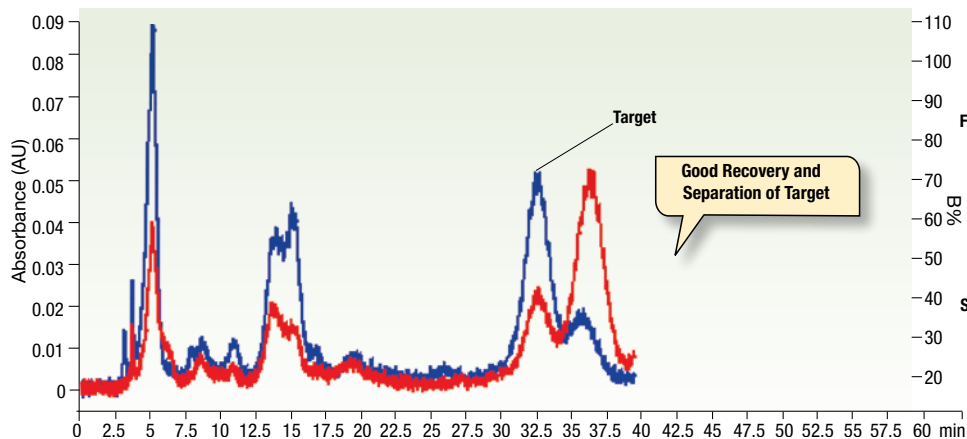
#### HPLC Analysis



**Column:** Fully Porous, 5 µm, C18 Column  
**Dimensions:** 4.6 x 150 mm  
**Mobile Phase:** Methanol/Water (75:25)

#### Flash Purification

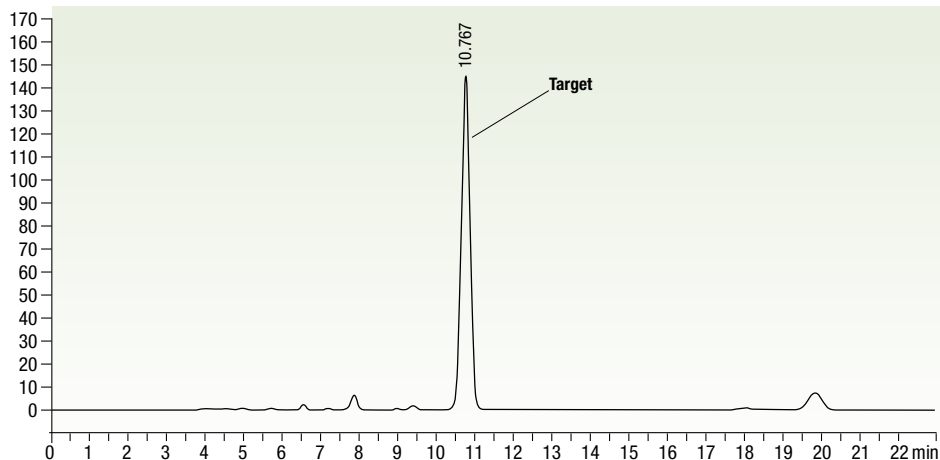
FLASH CHROMATOGRAPHY | CLARICEP



#### Flash Conditions:

**Column:** Claricep™ Irregular Silica CS (40-60 µm, 60 Å, 12 g)  
**Part No.:** CS140012-0  
**Mobile Phase:** Acetic ether/ Petroleum ether (12:88)  
**Flow Rate:** 18 mL/min  
**Injection Volume:** 4 mL  
**Sample Concentration:** 400 mg/20 mL  
**Instrument:** CHEETAH™ MP 100

#### Purity Confirmation





# Flash Chromatography

## CLARICEP™ Irregular CM Silica Columns

- Significantly improved performance over regular flash columns
- Silica deactivated by proprietary process
- Alternative selectivity for complex purification requirements

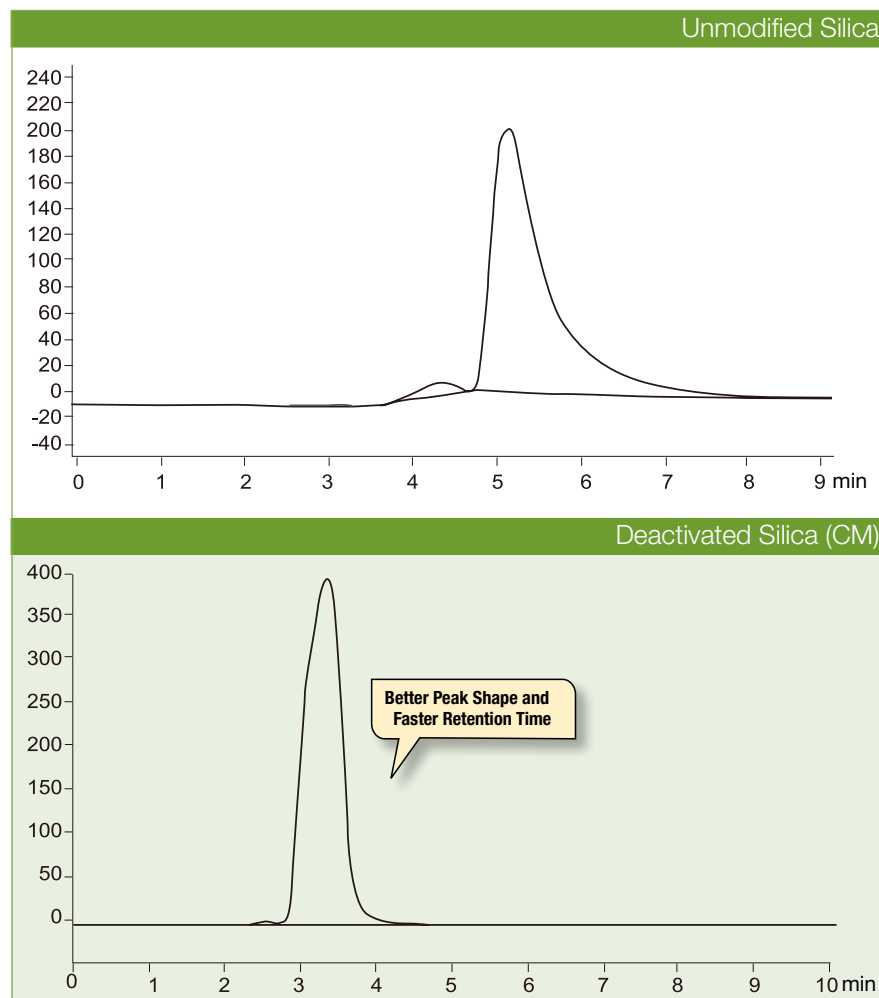
### Technical Specifications

Average Particle Size:	40-60 µm
Average Pore Size:	60 Å

## Better Peak Shape With CM Silica

### HPLC Test:

Unmodified and Deactivated Silica were packed into individual stainless steel columns (4.6 x 150 mm) and then evaluated on a HPLC System



### HPLC Conditions:

**Dimensions:** 4.6 x 150 mm  
**Mobile Phase:** Dichloromethane/Methanol (98:2)  
**Flow Rate:** 1.8 mL/min  
**Injection Volume:** 5 µL  
**Temperature:** 30 °C  
**Detector:** UV @ 254 nm  
**Sample:** Catechol 100 µg/mL

# Flash Chromatography

## CLARICEP™ Spherical Silica Columns

### Technical Specifications

Average Particle Size:	20 µm	20-35 µm	
Surface Area:	320 m <sup>2</sup> /g	480 m <sup>2</sup> /g	320 m <sup>2</sup> /g
Water Content:	3.0 - 5.0%	3.0 - 5.0%	3.0 - 5.0%
Average Pore Size:	100Å	60Å	100Å

- |                       |                           |                      |
|-----------------------|---------------------------|----------------------|
| • Higher Resolution   | • Lower Backpressure      | • Lower Backpressure |
| • Better Purification | • Faster Flow Rate        | • Faster Flow Rate   |
|                       | • Higher Loading Capacity |                      |

### Purification of a Sample with Methacrylic Acid Ester Target Compound

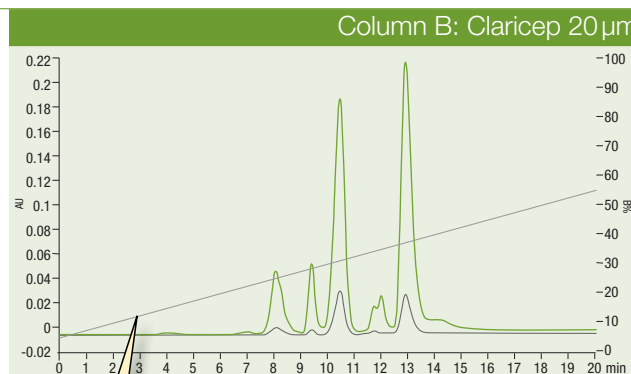
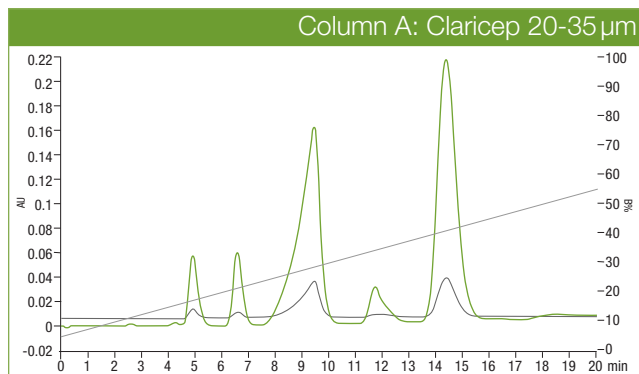
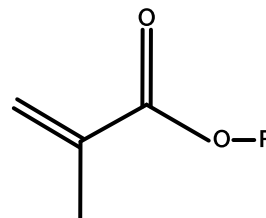
#### Sample Information:

The sample is colorless liquid, with about 60% target compound by weight

Dissolve 0.2 mL of sample into 1.5 mL ethanol sonication

#### Structure:

Small molecular weight with UV absorption of methacrylic acid ester R: no UV absorption



#### Flash Conditions:

**Column A:** Claricep Spherical Silica (20-35 µm, 100Å, 12 g, 2 columns in tandem)

**Column B:** Claricep Spherical Silica (20 µm, 100Å, 12 g, 2 columns in tandem)

**Mobile Phase:** A: Hexane B: Ethanol

<b>Gradient:</b>	<b>Time/min</b>	<b>B %</b>
	0	5
	20	55

**Flow Rate:** 12 mL/min

**Detector:** UV @ 254/220 nm

**Sample Loading:** 0.2 mL

Claricep Flash silica 20 µm is a better choice for complex sample polarity. It provides higher resolution and better purification performance.

# Flash Chromatography

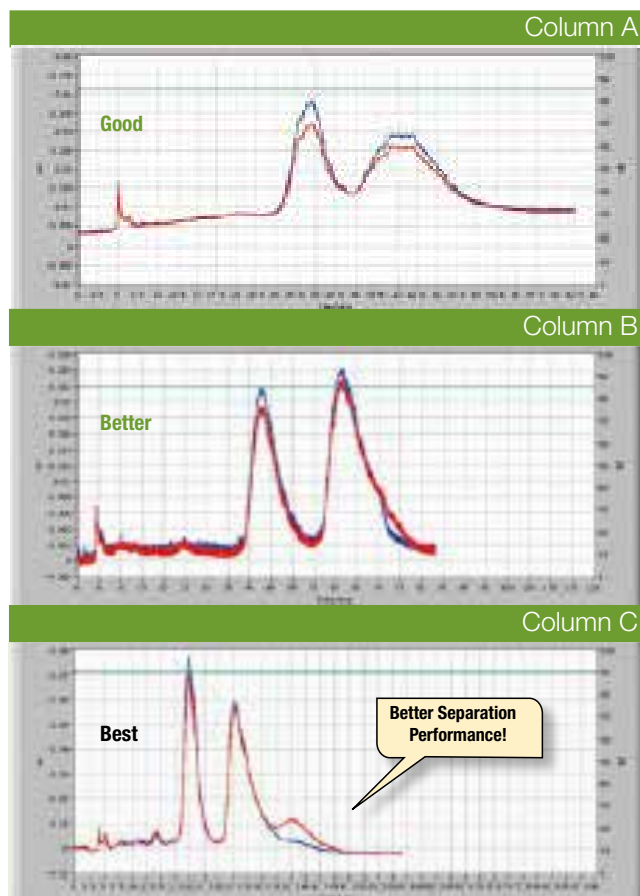
## CLARICEP™ Spherical C18 Columns

- Significantly improved performance over regular flash columns
- Silica deactivated by proprietary process
- Alternative selectivity for complex purification requirements

### Technical Specifications

Average Particle Size:	20 µm	20 - 35 µm		40 - 60 µm
Average Pore Size:	100Å	60Å	100Å	100Å
Carbon Loading:	14%	15%	14%	14%

### Tetrandrine Extracted from Natural Products, Formulation



#### Flash Conditions:

**Column A:** Brand X Flash Irregular C18 (40-60 µm 100Å, 12 g, 3 columns in tandem)

**Column B:** Claricep Spherical C18 (20-35 µm 100Å, 12 g, 3 columns in tandem)

**Column C:** Claricep Spherical C18 (20 µm 100Å, 12 g, 3 columns in tandem)

**Mobile Phase:** A: Water

B: Methanol with 0.06% diethylamine

**Gradient:**

Time/min	% B
0	85
100	85

**Detector:** UV @ 254/282 nm

**Sample:** Tetrandrine

### Did You Know?



**Flash Chromatography** also known as medium pressure chromatography is:

- A pressure driven hybrid for medium and short column chromatography optimized for rapid separation
- Popularized years ago by Clark Still of Columbia University
- An alternative to slow and inefficient gravity-fed chromatography

Comparative separations may not be representative of all applications.

# Flash Chromatography

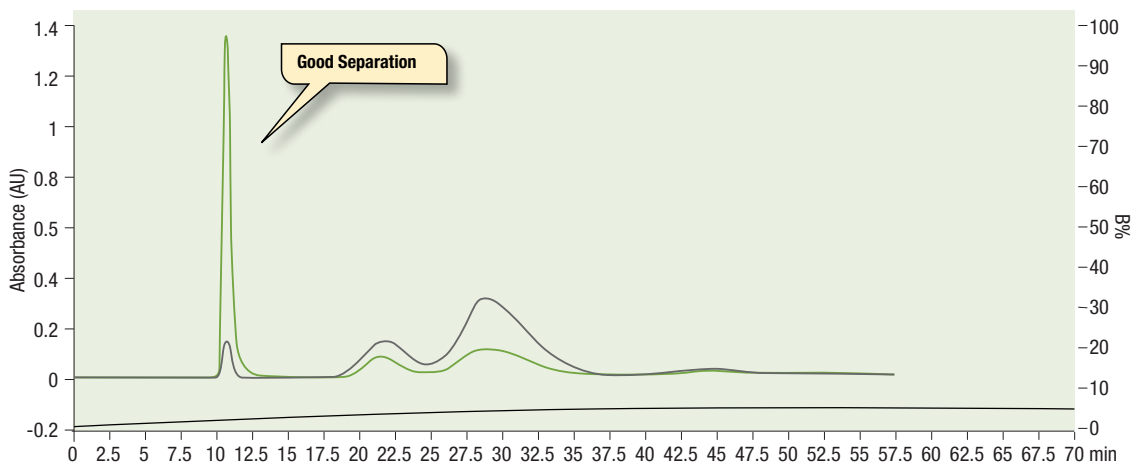
## CLARICEP™ Spherical AQ C18 Columns

- Greater polar retention under reversed phase
- Applicable for both hydrophilic and hydrophobic compounds
- Useful for mixtures of compounds with varying polarities

### Technical Specifications

Surface Area:	300 m <sup>2</sup> /g	320 m <sup>2</sup> /g	320 m <sup>2</sup> /g
Average Particle Size:	40-60 μm	20-35 μm	20 μm
Average Pore Size:	100 Å	100 Å	100 Å
Carbon Loading:	14%	15%	15%

### High Resolution Separation of Iridoids



#### Flash Conditions:

**Column:** Claricep Spherical AQ C18 (20-35 μm, 100 Å)  
**Mobile Phase:** Methanol/ Water/Formic Acid  
**Flow Rate:** 26 mL/min  
**Detector:** UV @ 231/214 nm  
**Sample:** Iridoid Compounds



# Flash Chromatography

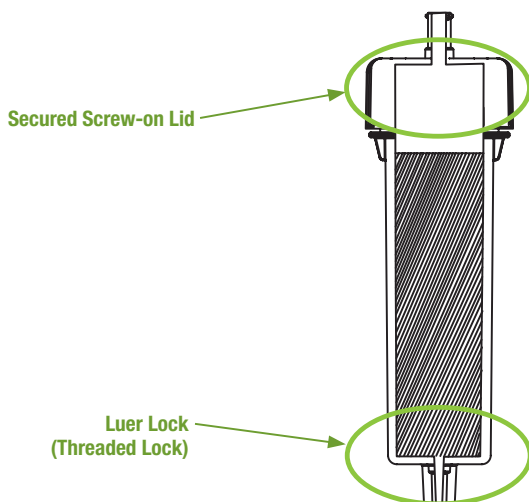
## CLARICEP™ Screw-on Flash Columns

This first series of Flash Screw-on is a new feature of Claricep columns that allows the user to load solid samples directly on the column.

### CLARICEP i-Series

The i-Series features a managed column head space with a secured screw-on lid. This new design allows either loading of liquid samples directly onto the column head or loading of impregnated solid sample directly into the space. Users will benefit from:

- Choice of loading method based on sample properties
- Narrow band for liquid samples because of wide loading area
- Dry-loading of solid impregnated samples minimizes band broadening
- Customized loading method upon user preference

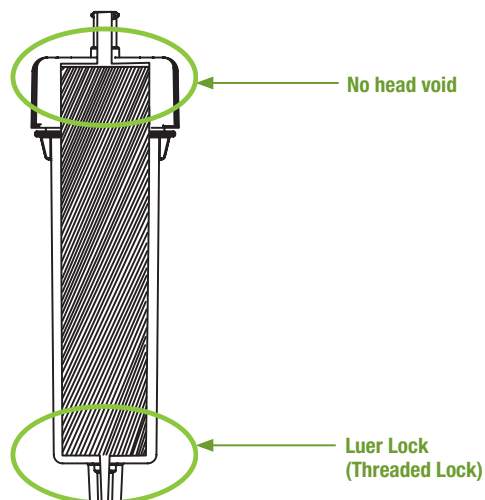


### s-Series

The s-Series columns are fully packed without a head void. In addition, the Luer lock fittings for both inlet and outlet allows easy operation of tandem columns or the coupling of a loading cartridge.

Compatible with the following instrument:

- Biotage

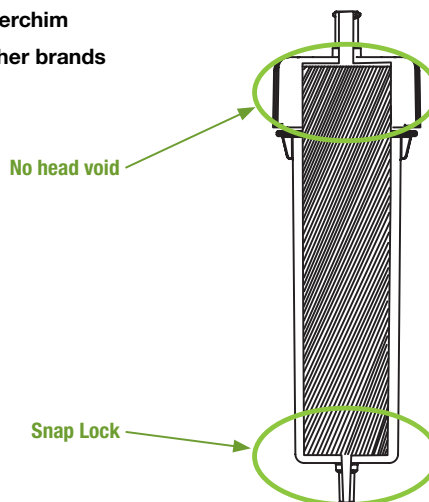


### c-Series

The c-Series shares the same design, but the column outlet does not have a luer lock structure, this simplifies tubing connection across various flash systems.

Compatible with instruments from the following:

- Teledyne ISCO
- Agela Technologies
- Buchi
- Grace
- Interchim
- Other brands



## Easy to Order Screw-On Flash Columns

### Ordering Information Screw-On Flash Columns

Part No.	Description
<b>For i-series</b>	
SN	Part Number starts with "SN". As an example, to order CS140012-0 in i-series, Part Number to order is SN-CS140012-0
<b>For s-series</b>	
S	Part Number starts with "S". As an example, to order CS140012-0 in s-series, Part Number to order is S-CS140012-0
<b>For c-series</b>	
C	Part Number starts with "C". As an example, to order CS140012-0 in c-series, Part Number to order is S-CS140012-0



# Flash Chromatography

## Claricep™ Irregular and Spherical Silica and Spherical Bonded Phase Flash Columns

### Ordering Information

#### Irregular Silica Phase

Type	Average Particle Size (µm)	Pore Size (µm)	Part No.	Silica Amount (g)	Unit (pk)
Silica (CS) Standard Silica	40 - 60 µm	60 Å	<a href="#">CS140004-0</a>	4	20
			<a href="#">CS140012-0</a>	12	20
			<a href="#">CS140020-0</a>	20	20
			<a href="#">CS140040-0</a>	40	10
			<a href="#">CS140080-0</a>	80	5
			<a href="#">CS140120-0</a>	120	5
			<a href="#">CS140330-0</a>	330	1
			<a href="#">CS140800-0</a>	800	1
			<a href="#">CS1401500-0</a>	1500	1

Also available in i-series, s-series & c-series (12 g, 20 g, 40 g, 80 g, & 120 g) per request (Contact your Sales Rep)

#### Spherical Silica Phase

Type	Average Particle Size (µm)	Pore Size (µm)	Part No.	Silica Amount (g)	Unit (pk)
Spherical Silica	20 - 35 µm	60 Å	<a href="#">SS130004-0</a>	4	20
			<a href="#">SS130012-0</a>	12	20
			<a href="#">SS130020-0</a>	20	20
			<a href="#">SS130040-0</a>	40	10
			<a href="#">SS130080-0</a>	80	5
			<a href="#">SS130120-0</a>	120	5
			<a href="#">SS130330-0</a>	330	1

Also available in i-series, s-series & c-series (12 g, 20 g, 40 g, 80 g, & 120 g) per request (Contact your Sales Rep)

#### Spherical Bonded Phase

Type	Average Particle Size (µm)	Pore Size (µm)	Part No.	Silica Amount (g)	Unit (pk)
C18	40 - 60 µm	100 Å	<a href="#">S0240004-0</a>	4	20
			<a href="#">S0240012-0</a>	12	20
			<a href="#">S0240020-0</a>	20	20
			<a href="#">S0240040-0</a>	40	10
			<a href="#">S0240080-0</a>	80	5
			<a href="#">S0240120-0</a>	120	5
			<a href="#">S0240330-0</a>	330	1
			<a href="#">S0240800-0</a>	800	1
			<a href="#">S02401500-0</a>	1500	1

Also available in i-series, s-series & c-series (12 g, 20 g, 40 g, 80 g, & 120 g) per request (Contact your Sales Rep)

#### Spherical Bonded Phase

Type	Average Particle Size (µm)	Pore Size (µm)	Part No.	Silica Amount (g)	Unit (pk)
C18	20 - 35 µm	100 Å	<a href="#">S0230004-0</a>	4	20
			<a href="#">S0230012-0</a>	12	20
			<a href="#">S0230020-0</a>	20	20
			<a href="#">S0230040-0</a>	40	10
			<a href="#">S0230080-0</a>	80	5
			<a href="#">S0230120-0</a>	120	5
			<a href="#">S0230330-0</a>	330	1

Also available in i-series, s-series & c-series (12 g, 20 g, 40 g, 80 g, & 120 g) per request (Contact your Sales Rep)

#### Spherical Bonded Phase

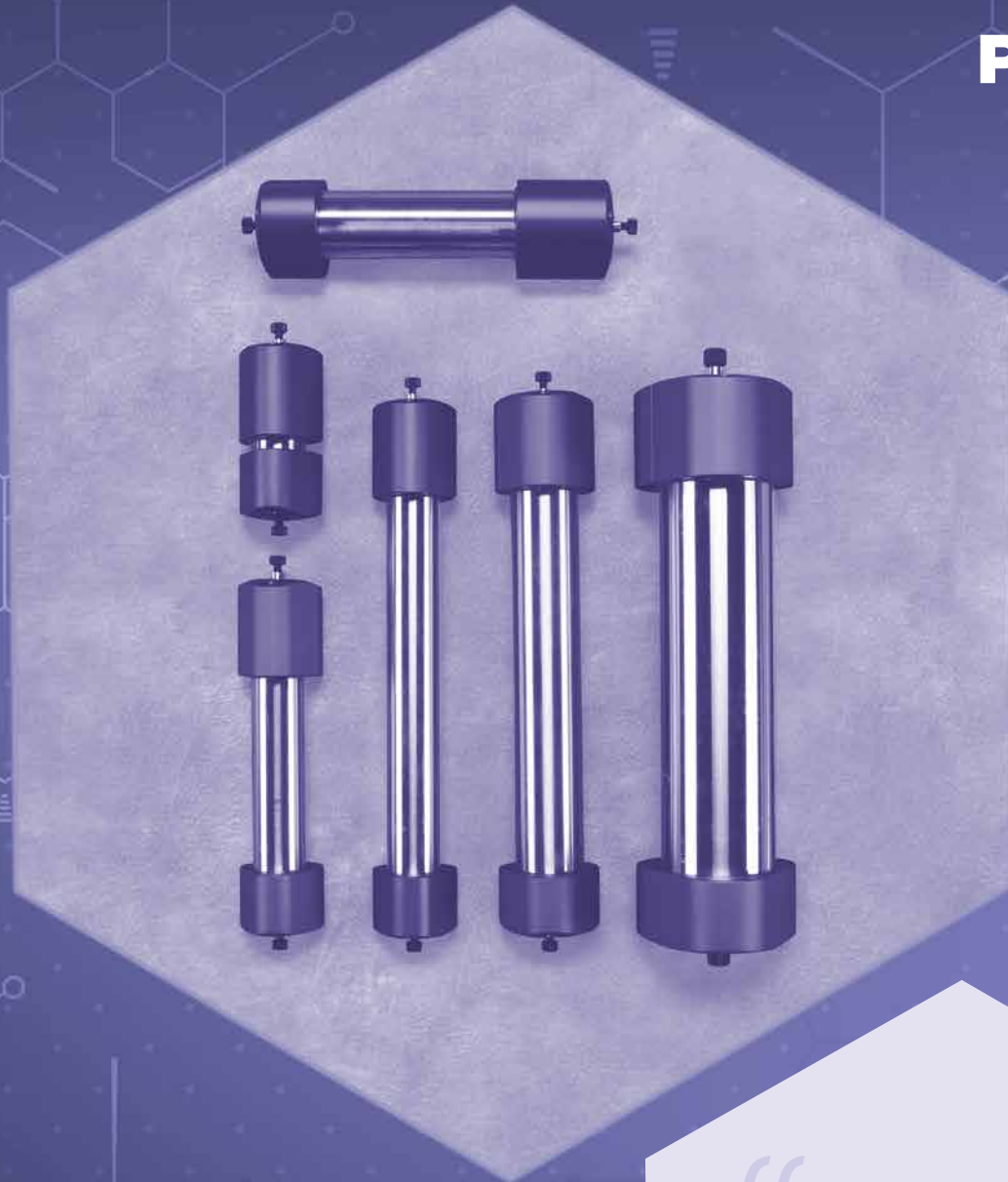
Type	Average Particle Size (µm)	Pore Size (µm)	Part No.	Silica Amount (g)	Unit (pk)
AQ C18	20 - 35 µm	100 Å	<a href="#">SQ230004-0</a>	4	20
			<a href="#">SQ230012-0</a>	12	20
			<a href="#">SQ230020-0</a>	20	20
			<a href="#">SQ230040-0</a>	40	10
			<a href="#">SQ230080-0</a>	80	5
			<a href="#">SQ230120-0</a>	120	5
			<a href="#">SQ230330-0</a>	330	1

Also available in i-series, s-series & c-series (12 g, 20 g, 40 g, 80 g, & 120 g) per request (Contact your Sales Rep)



NOTE: Additional CLARICEP Flash Column Phases, Formats, and Sizes Available. Contact Your Sales Rep or Our Technical Support.

# Prep Columns and Bulk Media



“ We routinely use Axia packed columns from Phenomenex for peptide purifications. Among various preparative HPLC columns we have used, the Axia packed Luna columns (5 $\mu$ m) stand out. We have been very satisfied with the increased loading capacity and excellent performance. ”

**Guangcheng Jiang**  
**Ferring Research Institute, Inc., USA**

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

383 - 402

Axia Packed Preparative LC and SFC Columns .....	384-394
Process Chromatography .....	395-401
Bulk Media .....	395-398, 400
Columns, Scout and Preparative .....	398-399
Sepra Bulk Sorbents .....	401

U.S. Patent No. 7, 674, 383

## AXIA Preparative Chromatography Redefined

AXIA patented technology is an advanced column packing and hardware design that eliminates media bed collapse as a source of premature failure in chiral and achiral preparative columns.

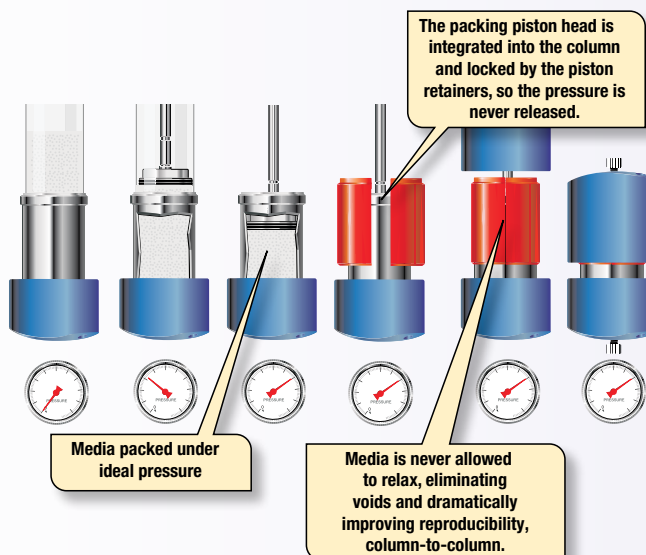
### AXIA Packing Technology

AXIA packed preparative columns involve a single axial compression step, unlike conventional packed preparative columns. The ideal column bed density is custom calculated and automated for each specific media and column size. Computer control of the entire process ensures both proper bed density and column uniformity every time.

During the AXIA packing process, the packing piston is locked in place, eliminating any decompression and then recompression of the media sorbent, thus maintaining media and column bed integrity. This solves common lifetime and performance problems associated with conventional packing processes for preparative columns.



### AXIA Packing Process Involves: Compression → Final Column



### Traditional Slurry Packing

Traditional slurry packing processes, like the Waters® OBD™ (Optimum Bed Density) column packing approach, involves the column being removed from the column packing station once it is packed.

Several potential problems with this packing method are:

- Variability in column performance due to increased number of manual operations required for assembly
- Potential silica media damage during recompression
- Level of process control is based on traditional slurry packing technology



### Conventional Packing Process Involves: Compression → Decompression → Recompression → Final Column

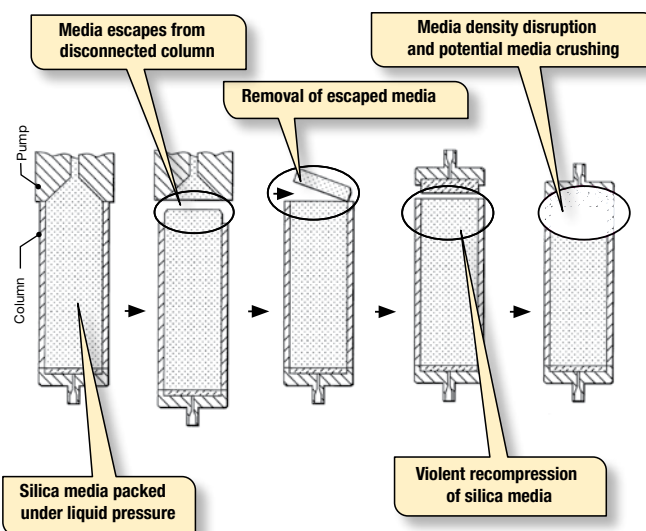


Diagram from Waters Corporation U.S. Patent No. 7,399,410

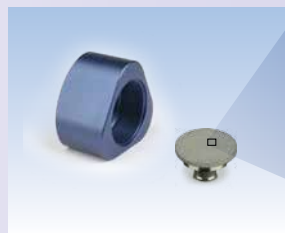


View loading comparison, see p. 387

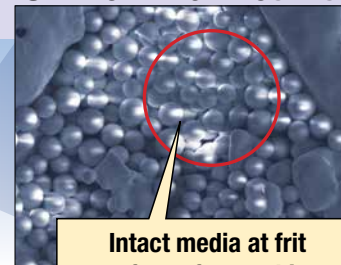
## Axia packed columns produce uniform media bed with intact particles

The highly tuned patented process and hardware eliminates potential decompression ensuring bed stability and optimal packing density.

The media found on the inlet frit of the Axia packed column shows no signs of damage unlike the media found on inlet frit of traditionally packed prep columns.



\*SEM of Axia inlet frit



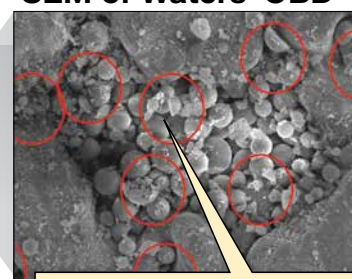
Intact media at frit surface after packing

## Traditional packed preparative columns produce non-uniform media beds with sheared and crushed particles

Decompression and then recompression during packing can damage the media and lead to increased column-to-column variability, flow disturbances, and decreased column lifetimes.



\*SEM of Waters® OBD™



Crushed media or silica fines at frit surface after packing

\*The images are believed to be representative, but individual columns may vary.

“ I find Axia Columns to be very robust and durable. I often use the prep column for much longer than predicted with reproducible peaks. This saves us a significant amount of money. ”

David Wisnoski  
GlaxoSmithKline, USA

“ Axia columns provide me with first rate quality and engineering. Reliability, reproducibility, and durability are provided with all Axia columns that I use. I can literally purify 2500 samples per column. The time and cost savings are tremendous. ”

Derrick Miyao  
Large Biotech Manufacturer, USA

“ We have used Phenomenex Axia prep-HPLC columns for several years and they consistently provide excellent separation and reproducibility for a variety of different compounds. ”

Jeremy R. Wolf  
ABC Laboratories, USA

View an animated packing process comparison at:  
[www.AxiaPrep.com](http://www.AxiaPrep.com)



The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.



# Axia™ Packed Preparative Columns

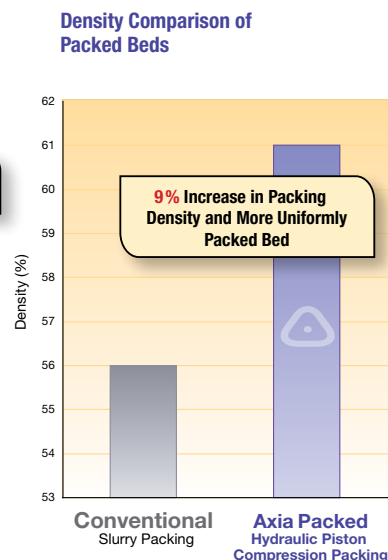
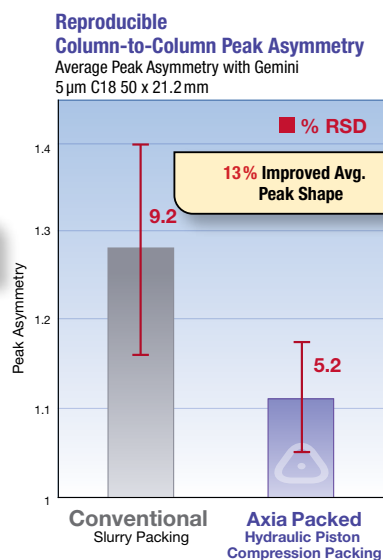
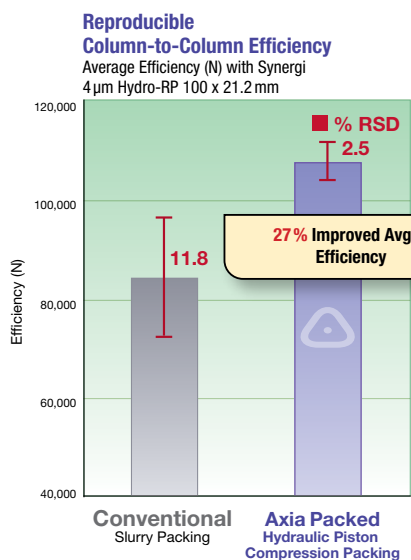
U.S. Patent No. 7, 674, 383

## Expect Better Performance. Expect an Excellent Axia Column. Every Time.

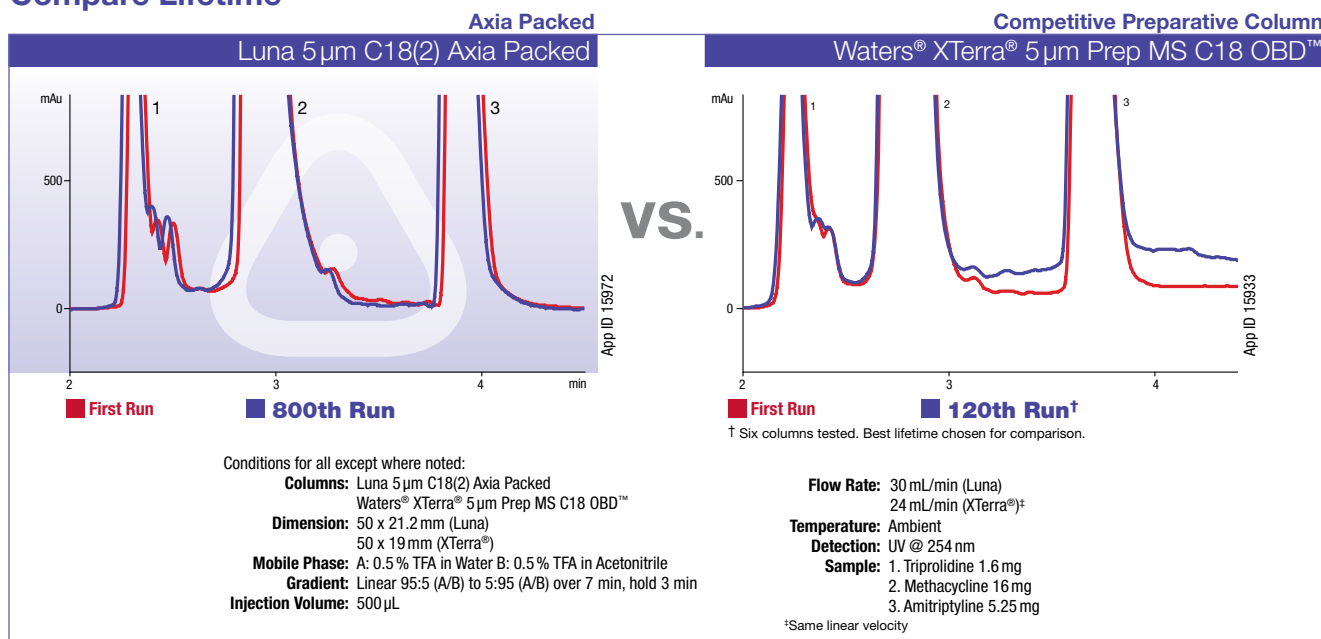
The completely automated packing system offers feedback control and infinite tuning of packing density to specific media characteristics such as mechanical strength and porosity. An optimum higher bed density can be consistently reproduced column-to-column.

This directly translates into consistent efficiency and peak asymmetry measurements and decreases the column variability seen in traditionally packed preparative columns.

### Consistent Quality. Column-to-Column. Batch-to-Batch



### Compare Lifetime





U.S. Patent No. 7, 674, 383

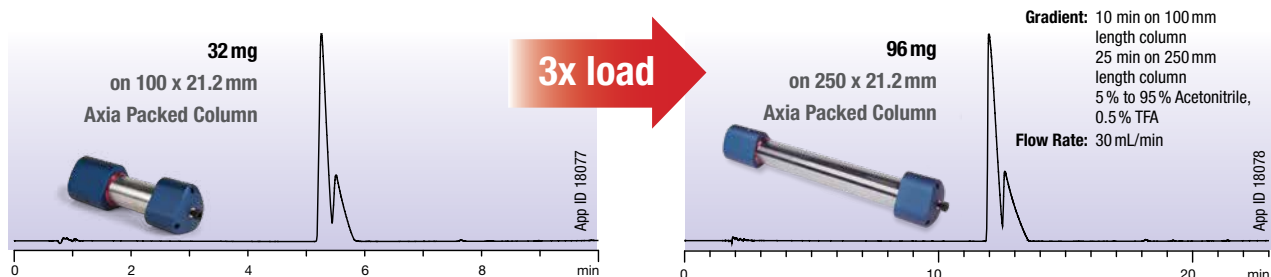
## Seamless Scalability: 2 Options to Increase Sample Load

### Option 1: Increase Column Length

Increase sample load without increasing your flow rate by using a longer column. With Axia technology, each preparative column is optimized for:

- Analytical-like efficiency
- Long column lifetime
- High sample load with high-surface area media such as Kinetex, Aeris, Gemini, Luna, Luna Omega, or Synergi

As a result, load generally increases as a direct proportion to column length. In this example, the sample load tripled by increasing column length.



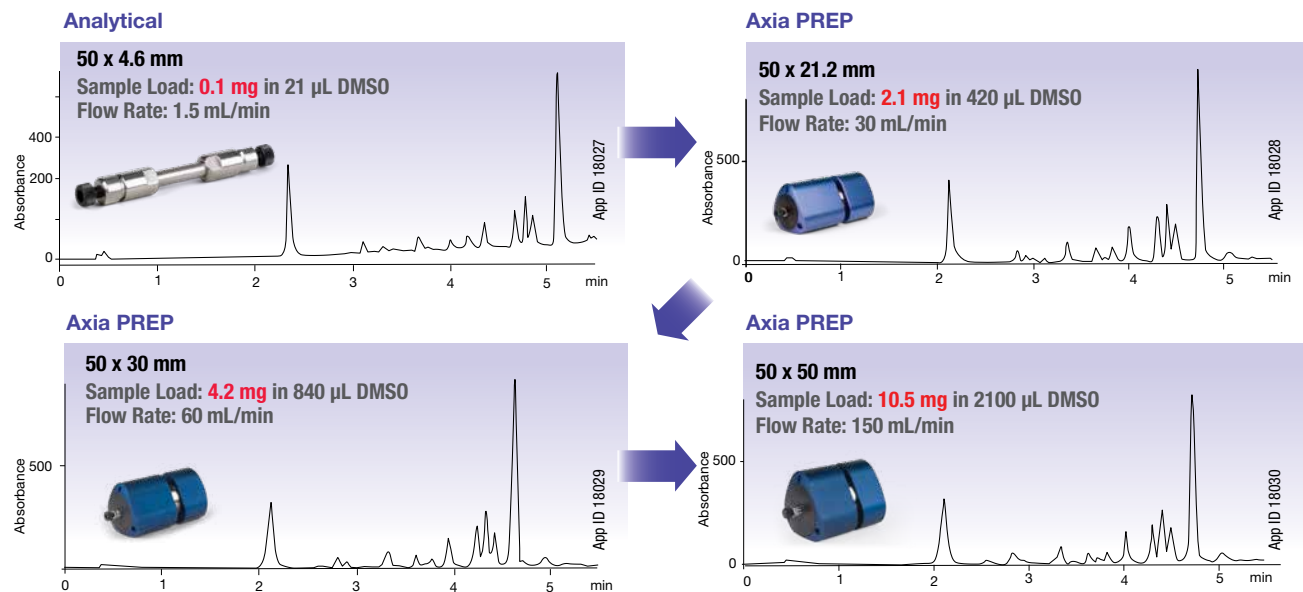
### Option 2: Increase Column ID

For maximizing load without increasing the run time, consider scaling up to a larger column ID. Axia packed columns provide the three important benefits you need.

- Reproducible performance across all column diameters
- Increased throughput without sacrificing purity
- High efficiency from analytical to preparative

Conditions for all except where noted:

- **Columns:** Luna 5  $\mu$ m C18(2)
- **Dimensions:** As Noted
- **Mobile Phase:** A. 0.5% TFA in Water  
B. 0.5% TFA in Acetonitrile
- **Gradient:** A/B (95:5) to A/B (5:95) in 5 minutes
- **Flow Rate:** As Noted
- **Temperature:** Ambient
- **Injection:** As Noted
- **Detection:** UV @ 254 nm
- **Sample:** Suzuki reaction mixture



U.S. Patent No. 7, 674, 383

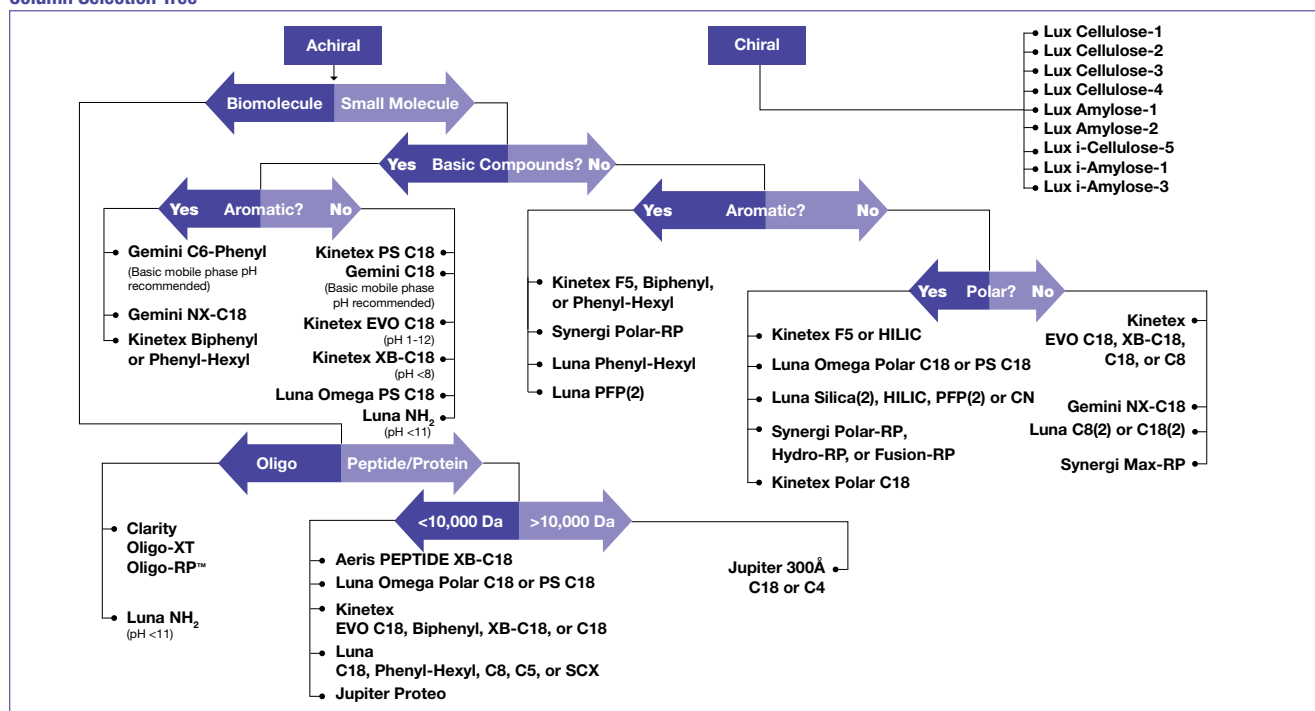
## Selectivity Options

### Stationary Phase Selectivity

With high surface areas, Phenomenex media—Gemini NX-C18 and Gemini (375 m<sup>2</sup>/g), Luna (400 m<sup>2</sup>/g) and Synergi (475 m<sup>2</sup>/g)—maximize loading capabilities. Use the selection tree below to select the best media for your targeted purification.

ize loading capabilities. Use the selection tree below to select the best media for your targeted purification.

#### Column Selection Tree

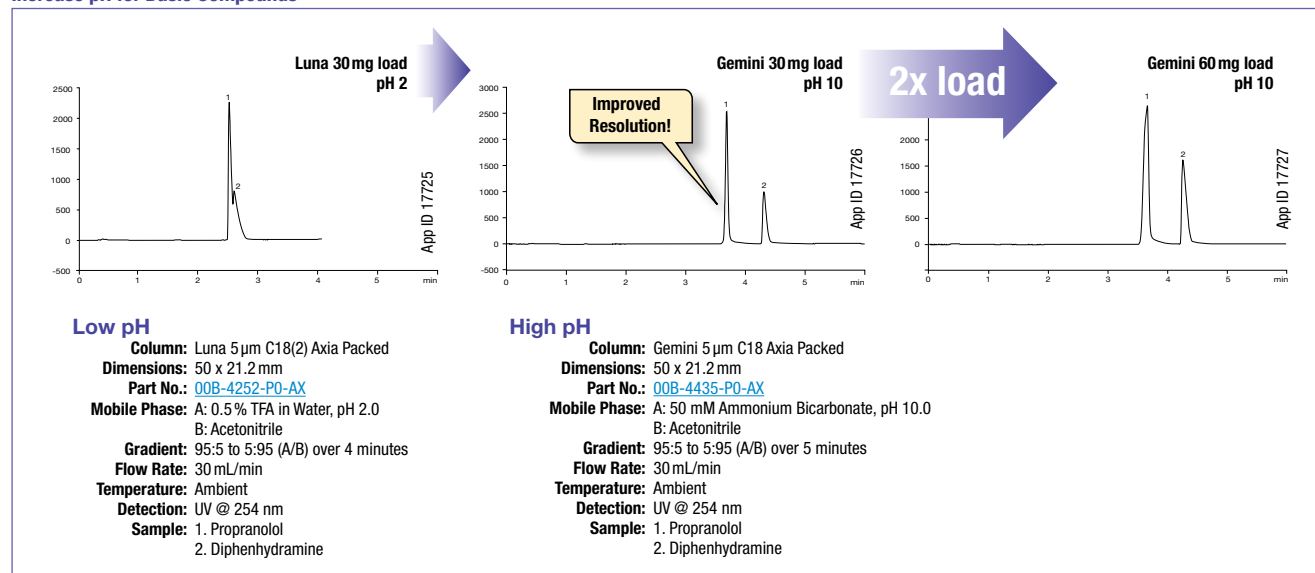


### pH Selectivity

In reversed phase chromatography, compounds retain better when neutral. With the advent of pH stable (1-12) media such as Gemini NX-C18, C18, and C6-Phenyl, and Kinetex EVO C18 improving retention and resolution of basic compounds at high pH

is now possible without compromising column lifetime. Under these conditions, you can easily double or triple the loading compared to your current low pH purifications.

#### Increase pH for Basic Compounds



U.S. Patent No. 7, 674, 383

## Chiral Media Packed in Axia Technology



### Resolve 92 % of Your Enantiomers with Lux Chiral Preparative Columns\*

Resolve Your Enantiomers with Nine Distinct Phases:

**Lux i-Cellulose-5: Immobilized 3,5-Dichloro Phenylcarbamate Selector** Cellulose tris (3, 5-dichlorophenylcarbamate)

**Lux i-Amylose-1: Immobilized 3,5-Dimethyl Phenylcarbamate Selector** Amylose tris (3, 5-dimethylphenylcarbamate)

**Lux i-Amylose-3: Immobilized 3-Chloro, 5-Methyl Phenylcarbamate Selector** Amylose tris (3-chloro-5-methylphenylcarbamate)

**Lux Cellulose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector** Cellulose tris (3, 5-dimethylphenylcarbamate)

**Lux Cellulose-2: Coated 3-Chloro, 4-Methyl Phenylcarbamate Selector** Cellulose tris (3-chloro-4-methylphenylcarbamate)

**Lux Cellulose-3: Coated 4-Methyl Phenylacetate Selector** Cellulose tris (4-methylbenzoate)

**Lux Cellulose-4: Coated 4-Chloro, 3-Methyl Phenylcarbamate Selector** Cellulose tris (4-chloro-3-methylphenylcarbamate)

**Lux Amylose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector** Amylose tris (3, 5-dimethylphenylcarbamate)

**Lux Amylose-2: Coated 5-Chloro, 2-Methyl Phenylcarbamate Selector** Amylose tris (5-chloro-2-methylphenylcarbamate)

\* based on screening 233 compounds on five Lux phases†

Availability in 3 µm and 5 µm packed columns as well as 20 µm bulk media for process scale purification  
All Lux columns are pressure stable up to 300 bar and pH stable 2-9

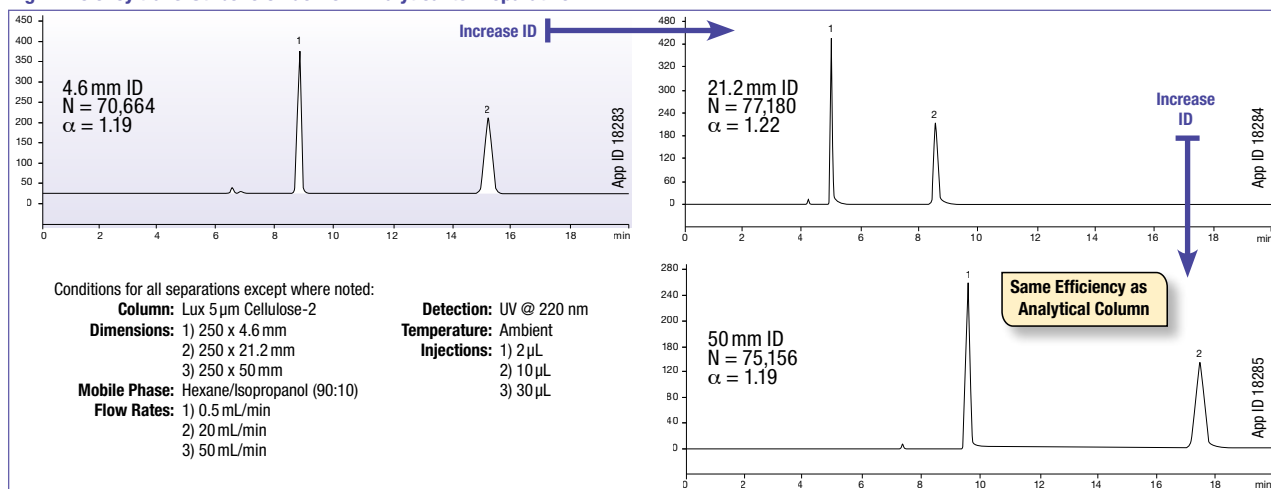


For more chiral column information, see p. 301

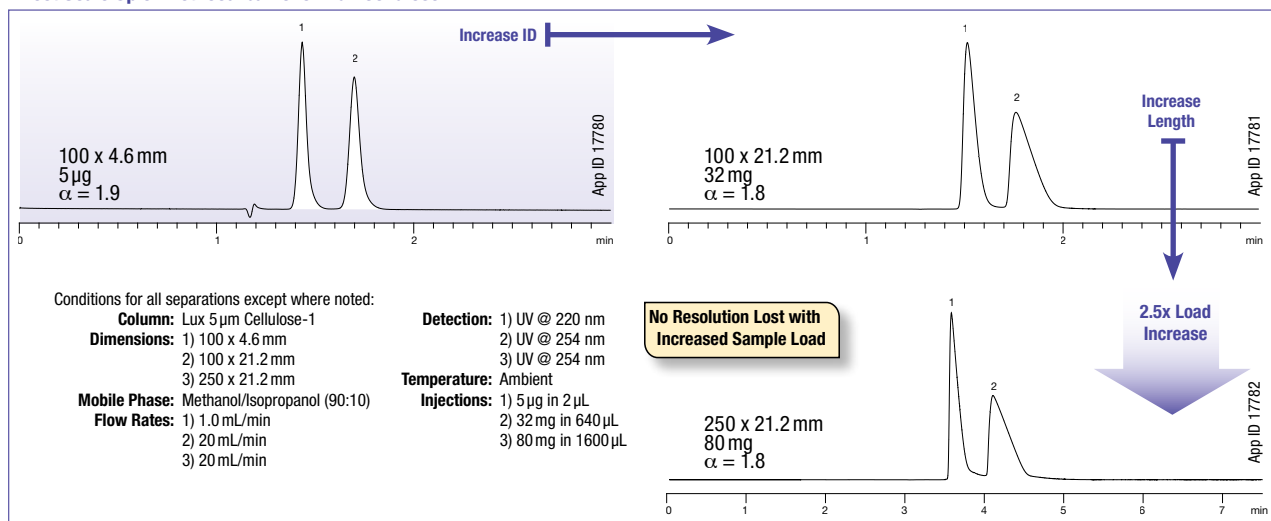
### Higher Purity Preparative Separations

With award-winning Axia technology, analytical-like efficiency is achieved in a preparative column format.

#### High Efficiency trans-Stilbene Oxide from Analytical to Preparative



#### Direct Scale Up of Methocarbamol on Lux Cellulose-1



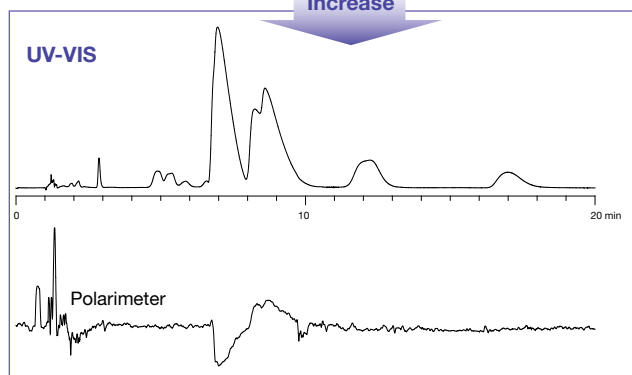
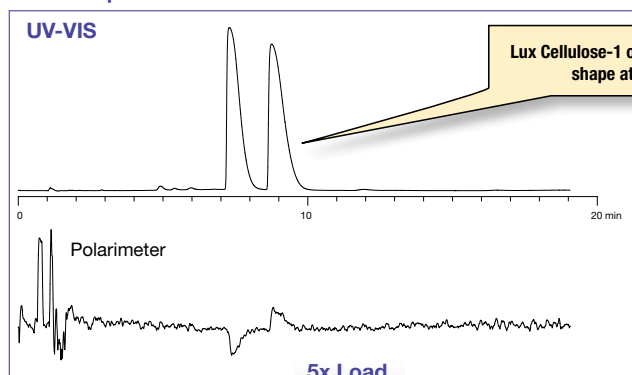
# Axia™ Packed Preparative Columns

U.S. Patent No. 7, 674, 383

## Axia: SFC Approved Complete SFC Screening

From analytical to Axia packed preparative achiral columns, Luna, Gemini, Synergi, Kinetex, and Lux chiral columns offer complementary selectivities, high efficiency, and pressure stability up to 300 bar (4300 psi) for SFC separations.

### Baseline Separation of Enantiomers

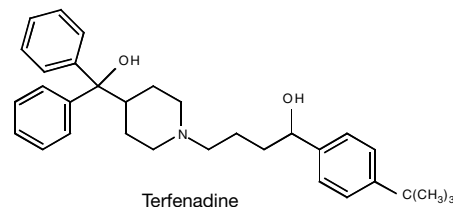


Overloading study with increased analytical load showing impurities eluting after major enantiomers only detected at 254 nm



## Seamless Scale Up from Laboratory, to Pilot Plant and Production.

Increase column ID for higher loading and greater purification. Axia packed 21.2 and 30mm diameter columns provide same purification capability and performance as the 4.6mm analytical screening columns.



### Conditions for all columns:

**Columns:** Lux 5  $\mu$ m Cellulose-1  
**Mobile Phase:** Methanol with 0.1% DEA/  
 Carbon Dioxide (25:75)  
**Column Temperature:** 35 °C  
**Polarimeter:** ALP-PDR-Chiral  
**Sample:** Terfenadine with ethanol  
 dissolution solvent

**Dimensions:** 250 x 4.6 mm  
**Flow Rate:** 2.5 mL/min  
**Detection:** UV @ 220 nm  
**Load:** 300  $\mu$ g in 10  $\mu$ L

**Dimensions:** 250 x 4.6 mm  
**Flow Rate:** 2.5 mL/min  
**Detection:** UV @ 254 nm  
**Load:** 1.5 mg in 50  $\mu$ L

High loading capacity media along with stacking injections allow for increased yields

Closer stacked injections can not be used due to the impurities eluting after the major enantiomers

7.5 cycles  
per hr/  
787 mg per hr

**Dimensions:** 250 x 21.2 mm  
**Flow Rate:** 50 mL/min  
**Detection:** UV @ 220 nm  
**Load:** 105 mg in 3.5 mL



For additional SFC information and applications, see p. 364

# Axia™ Packed Preparative Columns

U.S. Patent No. 7, 674, 383

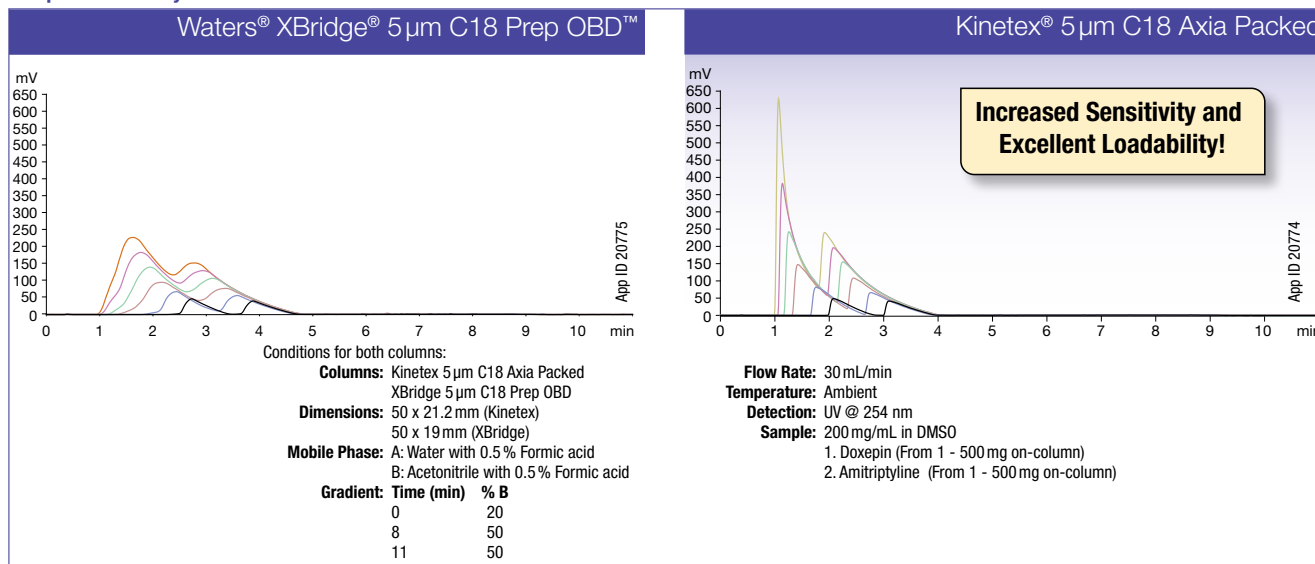
## First and Only Core-Shell Material for Preparative Purifications

### Kinetex Axia Packed Preparative HPLC Columns

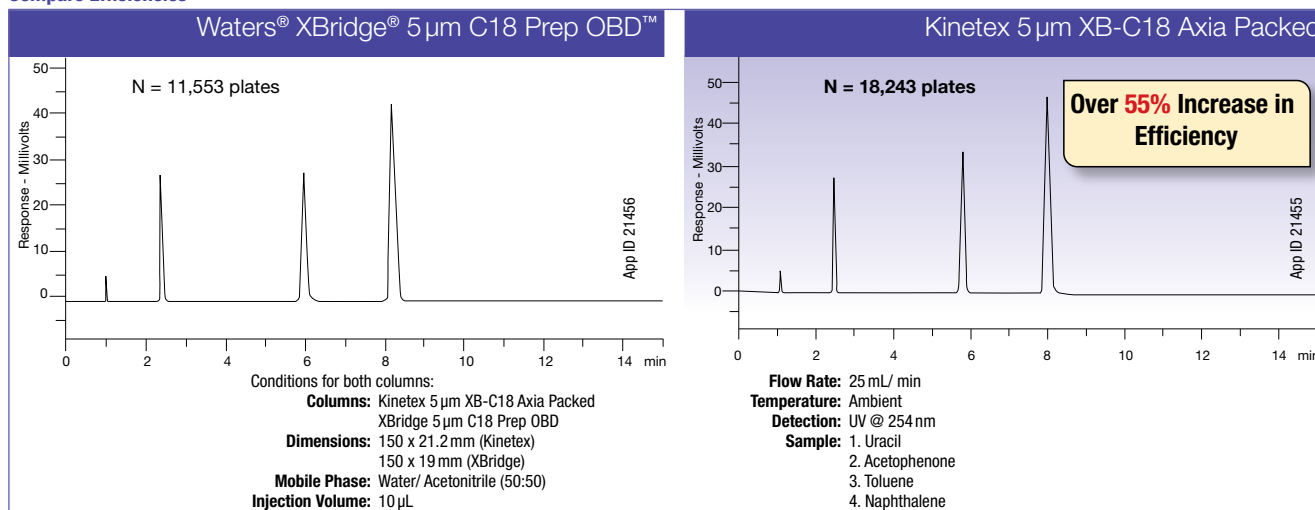
- Core-shell performance in a preparative format
- Easy method scale-up from Kinetex analytical HPLC and UHPLC columns
- Reduce solvent consumption with faster purifications

Axia columns packed with Kinetex 5 µm core-shell media provide higher efficiencies and loadability that is as good or better than columns packed with fully porous 5 µm media. Even under very challenging conditions, such as the purification of strong bases using a mobile phase containing formic acid (0.1%) as the modifier, the Axia packed Kinetex 5 µm media outperforms a fully porous Waters XBridge Prep column.

#### Compare Loadability



#### Compare Efficiencies



Comparative separations may not be representative of all applications.



# Axia™ Packed Preparative Columns

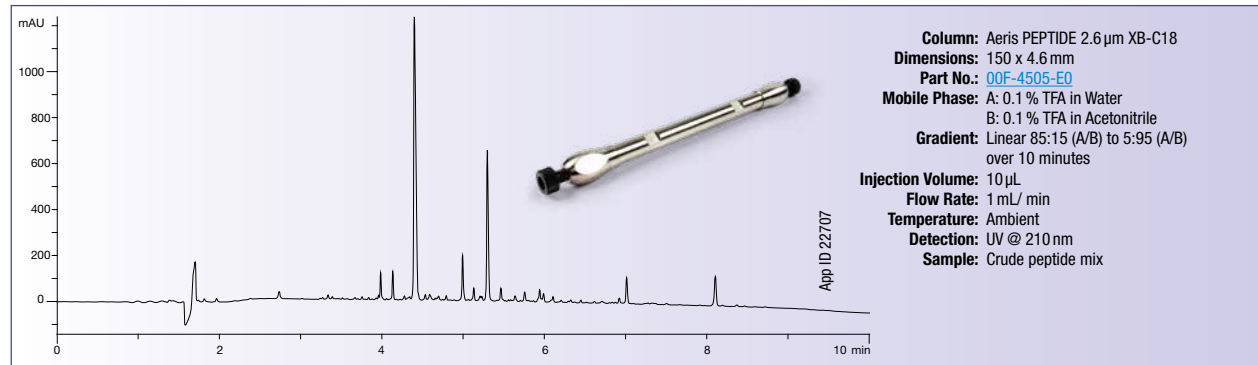
U.S. Patent No. 7, 674, 383

## Develop, Purify, and Analyze Peptide Fractions with One Media

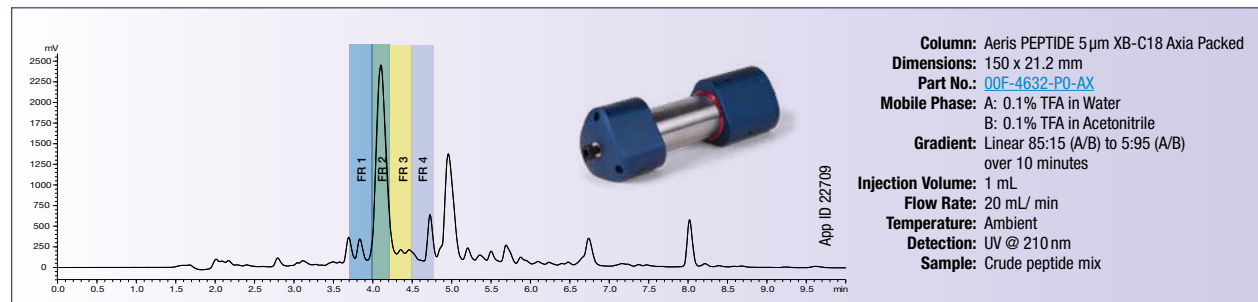
Aeris PEPTIDE is fully scalable in retention and selectivity with its 4 unique particle sizes (1.7 µm, 2.6 µm, 3.6 µm, and 5 µm) for easy transfer from HPLC and UHPLC methods to preparative applications.

### Seamless Scalability from HPLC/UHPLC to PREP

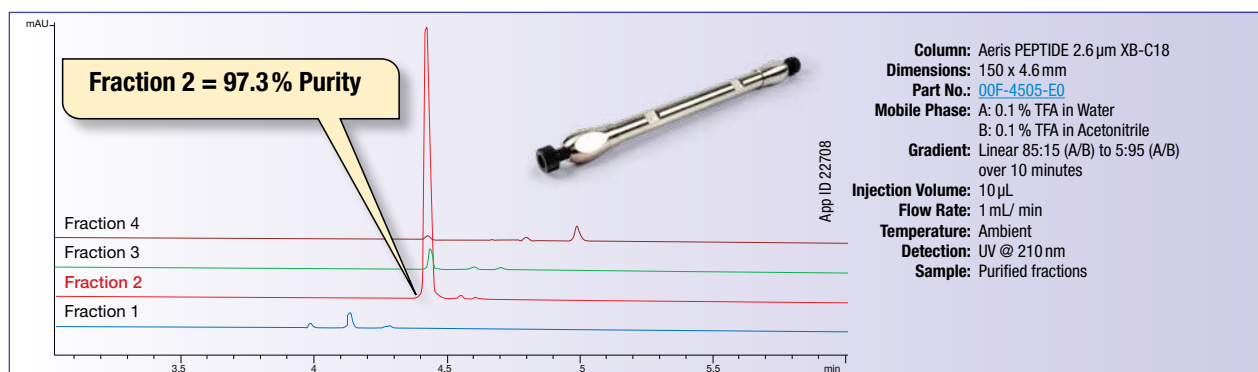
Analytical method — Aeris PEPTIDE 2.6 µm XB-C18



Preparative scale-up and fraction collection — Aeris PEPTIDE 5 µm XB-C18



Analytical fraction analysis — Aeris PEPTIDE 2.6 µm XB-C18



## SecurityGuard™ PREP System

(Highly recommended for extending column lifetime)

Protect your Axia Packed column and prolong its lifetime with SecurityGuard, the advanced HPLC guard cartridge system.

- Get full protection with minimal impact on your chromatographic results.
- Contaminants are retained by an inexpensive, 15 x 21.2 or 15 x 30 mm ID disposable cartridge. See pp. 333-334. For Aeris and Kinetex Core-Shell SecurityGuard PREP cartridges, see p. 334.

### Ordering Information

#### SecurityGuard PREP System

Part No.	Description	Unit
<a href="#">AJ0-8223</a>	SecurityGuard PREP HPLC Guard Cartridge Holder Kit, 21.2 mm ID, includes column coupler	ea
<a href="#">AJ0-8277</a>	SecurityGuard PREP HPLC Guard Cartridge Holder Kit, 30.0 mm ID, includes column coupler	ea



For Aeris PEPTIDE 5 µm PREP, see p. 204

# Axia™ Packed Preparative Columns


U.S. Patent No. 7, 674, 383


## Axia Packed Columns


### Achiral Phases

#### Ordering Information

Aeris™			
Phase	Length	ID	Part No.
<b>5 µm</b>			
PEPTIDE XB-C18	150	21.2	<a href="#">00F-4632-PO-AX</a>
	250	21.2	<a href="#">00G-4632-PO-AX</a>
<b>Kinetex®</b>			
Phase	Length	ID	Part No.
<b>5 µm</b>			
XB-C18	50	21.2	<a href="#">00B-4605-PO-AX</a>
	50	30	<a href="#">00B-4605-UO-AX</a>
	100	21.2	<a href="#">00D-4605-PO-AX</a>
	100	30	<a href="#">00D-4605-UO-AX</a>
	150	21.2	<a href="#">00F-4605-PO-AX</a>
	150	30	<a href="#">00F-4605-UO-AX</a>
	250	21.2	<a href="#">00G-4605-PO-AX</a>
	250	30	<a href="#">00G-4605-UO-AX</a>
EVO C18	50	21.2	<a href="#">00B-4633-PO-AX</a>
	50	30	<a href="#">00B-4633-UO-AX</a>
	100	21.2	<a href="#">00D-4633-PO-AX</a>
	100	30	<a href="#">00D-4633-UO-AX</a>
	150	21.2	<a href="#">00F-4633-PO-AX</a>
	150	30	<a href="#">00F-4633-UO-AX</a>
	250	21.2	<a href="#">00G-4633-PO-AX</a>
	250	30	<a href="#">00G-4633-UO-AX</a>
Biphenyl	100	21.2	<a href="#">00D-4627-PO-AX</a>
	100	30	<a href="#">00D-4627-UO-AX</a>
	150	21.2	<a href="#">00F-4627-PO-AX</a>
	150	30	<a href="#">00F-4627-UO-AX</a>
	250	21.2	<a href="#">00G-4627-PO-AX</a>
HILIC	100	21.2	<a href="#">00D-4606-PO-AX</a>
	150	21.2	<a href="#">00F-4606-PO-AX</a>
	250	21.2	<a href="#">00G-4606-PO-AX</a>
C18	50	21.2	<a href="#">00B-4601-PO-AX</a>
	50	30	<a href="#">00B-4601-UO-AX</a>
	100	21.2	<a href="#">00D-4601-PO-AX</a>
	100	30	<a href="#">00D-4601-UO-AX</a>
	150	21.2	<a href="#">00F-4601-PO-AX</a>
	150	30	<a href="#">00F-4601-UO-AX</a>
	250	21.2	<a href="#">00G-4601-PO-AX</a>
	250	30	<a href="#">00G-4601-UO-AX</a>
C8	50	21.2	<a href="#">00B-4608-PO-AX</a>
	100	21.2	<a href="#">00D-4608-PO-AX</a>
	150	21.2	<a href="#">00F-4608-PO-AX</a>
	150	30	<a href="#">00F-4608-UO-AX</a>
	250	21.2	<a href="#">00G-4608-PO-AX</a>
Phenyl-Hexyl	50	21.2	<a href="#">00B-4603-PO-AX</a>
	100	21.2	<a href="#">00D-4603-PO-AX</a>
	100	30	<a href="#">00D-4603-UO-AX</a>
	150	21.2	<a href="#">00F-4603-PO-AX</a>
	150	30	<a href="#">00F-4603-UO-AX</a>
	250	21.2	<a href="#">00G-4603-PO-AX</a>
	250	30	<a href="#">00G-4603-UO-AX</a>
	150	30	<a href="#">00F-4724-UO-AX</a>
F5	50	30	<a href="#">00B-4724-UO-AX</a>
	100	30	<a href="#">00D-4724-UO-AX</a>
	150	21.2	<a href="#">00F-4724-PO-AX</a>
	150	30	<a href="#">00F-4724-UO-AX</a>
	250	21.2	<a href="#">00G-4724-PO-AX</a>
150	30	<a href="#">00F-4603-UO-AX</a>	

 Make your Axia columns last longer with SecurityGuard PREP Holders and Cartridges. See pp. 330-334

 For additional phases and sizes not displayed, please visit the Phenomenex.com website's individual product pages or contact your Phenomenex technical consultant or local distributor.

 For Axia Reducing Adapter, see p. 419  
For PREP Column In-Line Filter, see p.16  
For SFC Information, see p. 364

Jupiter®			
Phase	Length	ID	Part No.
<b>4 µm</b>			
Proteo 90 Å	250	30	<a href="#">00G-4396-UO-AX</a>
<b>10 µm</b>			
Proteo 90 Å	100	21.2	<a href="#">00D-4397-PO-AX</a>
	250	21.2	<a href="#">00G-4397-PO-AX</a>
	250	30	<a href="#">00G-4397-UO-AX</a>
C18 300 Å	250	30	<a href="#">00G-4055-UO-AX</a>
C4 300 Å	250	21.2	<a href="#">00G-4168-PO-AX</a>

Gemini®			
Phase	Length	ID	Part No.
<b>5 µm</b>			
NX-C18	50	21.2	<a href="#">00B-4454-PO-AX</a>
	50	30	<a href="#">00B-4454-UO-AX</a>
	75	30	<a href="#">00C-4454-UO-AX</a>
	100	21.2	<a href="#">00D-4454-PO-AX</a>
	100	30	<a href="#">00D-4454-UO-AX</a>
	150	21.2	<a href="#">00F-4454-PO-AX</a>
	150	30	<a href="#">00F-4454-UO-AX</a>
	250	21.2	<a href="#">00G-4454-PO-AX</a>
	250	30	<a href="#">00G-4454-UO-AX</a>
	C18	50	21.2
50		30	<a href="#">00B-4435-UO-AX</a>
100		21.2	<a href="#">00D-4435-PO-AX</a>
100		30	<a href="#">00D-4435-UO-AX</a>
150		21.2	<a href="#">00F-4435-PO-AX</a>
C6-Phenyl	100	21.2	<a href="#">00D-4444-PO-AX</a>
	150	21.2	<a href="#">00F-4444-PO-AX</a>
	250	21.2	<a href="#">00G-4444-PO-AX</a>

<b>10 µm</b>				
NX-C18	50	21.2	<a href="#">00B-4455-PO-AX</a>	
	100	21.2	<a href="#">00D-4455-PO-AX</a>	
	100	30	<a href="#">00D-4455-UO-AX</a>	
	100	50	<a href="#">00D-4455-V0-AX</a>	
	150	21.2	<a href="#">00F-4455-PO-AX</a>	
	150	30	<a href="#">00F-4455-UO-AX</a>	
	150	50	<a href="#">00F-4455-V0-AX</a>	
	250	21.2	<a href="#">00G-4455-PO-AX</a>	
	250	30	<a href="#">00G-4455-UO-AX</a>	
	250	50	<a href="#">00G-4455-V0-AX</a>	
	C18	100	21.2	<a href="#">00D-4436-PO-AX</a>
		100	30	<a href="#">00D-4436-UO-AX</a>
		150	21.2	<a href="#">00F-4436-PO-AX</a>
		150	30	<a href="#">00F-4436-UO-AX</a>
		150	50	<a href="#">00F-4436-V0-AX</a>
250		21.2	<a href="#">00G-4436-PO-AX</a>	
250		30	<a href="#">00G-4436-UO-AX</a>	
250		50	<a href="#">00G-4436-V0-AX</a>	
C8(3)	250	21.2	<a href="#">00G-4763-PO-AX</a>	
	250	30	<a href="#">00G-4763-UO-AX</a>	
	250	50	<a href="#">00G-4763-V0-AX</a>	

Clarity®			
Phase	Length	ID	Part No.
<b>5 µm</b>			
Oligo-RP™	100	21.2	<a href="#">00D-4442-PO-AX</a>
	100	30	<a href="#">00D-4442-UO-AX</a>
	250	21.2	<a href="#">00G-4442-PO-AX</a>
	250	30	<a href="#">00G-4442-UO-AX</a>
Oligo-XT	100	21.2	<a href="#">00D-4745-PO-AX</a>
	150	21.2	<a href="#">00F-4745-PO-AX</a>
	150	30	<a href="#">00F-4745-UO-AX</a>
	250	21.2	<a href="#">00G-4745-PO-AX</a>
<b>10 µm</b>			
Oligo-RP	150	21.2	<a href="#">00F-4445-PO-AX</a>
	150	30	<a href="#">00F-4445-UO-AX</a>
	250	21.2	<a href="#">00G-4445-PO-AX</a>

# Axia™ Packed Preparative Columns

U.S. Patent No. 7, 674, 383

## Axia Packed Columns (cont'd)

### Achiral Phases (cont'd)

#### Ordering Information (cont'd)

Luna®			
Phase	Length	ID	Part No.
<b>5 µm</b>			
<b>C18(2)</b>	50	21.2	<a href="#">00B-4252-PO-AX</a>
	50	30	<a href="#">00B-4252-UO-AX</a>
	75	30	<a href="#">00C-4252-UO-AX</a>
	100	21.2	<a href="#">00D-4252-PO-AX</a>
	100	30	<a href="#">00D-4252-UO-AX</a>
	150	21.2	<a href="#">00F-4252-PO-AX</a>
	150	30	<a href="#">00F-4252-UO-AX</a>
	250	21.2	<a href="#">00G-4252-PO-AX</a>
	250	30	<a href="#">00G-4252-UO-AX</a>
	<b>C8(2)</b>	75	30
100		30	<a href="#">00D-4249-UO-AX</a>
150		21.2	<a href="#">00F-4249-PO-AX</a>
250		21.2	<a href="#">00G-4249-PO-AX</a>
<b>CN</b>	250	21.2	<a href="#">00G-4255-PO-AX</a>
<b>Phenyl-Hexyl</b>	150	21.2	<a href="#">00F-4257-PO-AX</a>
<b>NH<sub>2</sub></b>	150	21.2	<a href="#">00F-4378-PO-AX</a>
	250	21.2	<a href="#">00G-4378-PO-AX</a>
<b>HILIC</b>	100	21.2	<a href="#">00D-4450-PO-AX</a>
	150	21.2	<a href="#">00F-4450-PO-AX</a>
	250	21.2	<a href="#">00G-4450-PO-AX</a>
	250	30	<a href="#">00G-4450-UO-AX</a>
<b>PPF(2)</b>	100	21.2	<a href="#">00D-4448-PO-AX</a>
	100	30	<a href="#">00D-4448-UO-AX</a>
	150	21.2	<a href="#">00F-4448-PO-AX</a>
	250	21.2	<a href="#">00G-4448-PO-AX</a>
<b>Silica (2)</b>	100	21.2	<a href="#">00D-4274-PO-AX</a>
	150	21.2	<a href="#">00F-4274-PO-AX</a>
	250	21.2	<a href="#">00G-4274-PO-AX</a>
	250	30	<a href="#">00G-4274-UO-AX</a>
<b>10 µm</b>			
<b>C18(2)</b>	50	21.2	<a href="#">00B-4253-PO-AX</a>
	100	21.2	<a href="#">00D-4253-PO-AX</a>
	150	21.2	<a href="#">00F-4253-PO-AX</a>
	150	30	<a href="#">00F-4253-UO-AX</a>
	250	21.2	<a href="#">00G-4253-PO-AX</a>
	250	30	<a href="#">00G-4253-UO-AX</a>
<b>C8(2)</b>	250	50	<a href="#">00G-4253-V0-AX</a>
	250	21.2	<a href="#">00G-4250-PO-AX</a>
	250	50	<a href="#">00G-4250-V0-AX</a>
<b>Silica (2)</b>	250	21.2	<a href="#">00G-4091-PO-AX</a>
<b>15 µm</b>			
<b>C18(2)</b>	250	50	<a href="#">00G-4273-V0-AX</a>
<b>C8(2)</b>	250	50	<a href="#">00G-4272-V0-AX</a>
<b>Luna Omega</b>			
Phase	Length	ID	Part No.
<b>5 µm</b>			
<b>Polar C18</b>	100	21.2	<a href="#">00D-4754-PO-AX</a>
	100	30	<a href="#">00D-4754-UO-AX</a>
	150	21.2	<a href="#">00F-4754-PO-AX</a>
	150	30	<a href="#">00F-4754-UO-AX</a>
	250	21.2	<a href="#">00G-4754-PO-AX</a>
	250	30	<a href="#">00G-4754-UO-AX</a>
	250	50	<a href="#">00G-4754-V0-AX</a>
	250	50	<a href="#">00G-4754-V0-AX</a>
<b>PS C18</b>	50	21.2	<a href="#">00B-4753-PO-AX</a>
	50	30	<a href="#">00B-4753-UO-AX</a>
	100	21.2	<a href="#">00D-4753-PO-AX</a>
	100	30	<a href="#">00D-4753-UO-AX</a>
	150	21.2	<a href="#">00F-4753-PO-AX</a>
	150	30	<a href="#">00F-4753-UO-AX</a>
	250	21.2	<a href="#">00G-4753-PO-AX</a>
	250	30	<a href="#">00G-4753-UO-AX</a>
	250	50	<a href="#">00G-4753-V0-AX</a>
	250	50	<a href="#">00G-4753-V0-AX</a>

Synergi™			
Phase	Length	ID	Part No.
<b>4 µm</b>			
<b>Fusion-RP</b>	100	21.2	<a href="#">00D-4424-PO-AX</a>
	150	21.2	<a href="#">00F-4424-PO-AX</a>
	250	21.2	<a href="#">00G-4424-PO-AX</a>
<b>Hydro-RP</b>	50	21.2	<a href="#">00B-4375-PO-AX</a>
	150	21.2	<a href="#">00F-4375-PO-AX</a>
	250	21.2	<a href="#">00G-4375-PO-AX</a>
<b>Max-RP</b>	150	21.2	<a href="#">00F-4337-PO-AX</a>
	250	21.2	<a href="#">00G-4337-PO-AX</a>
<b>Polar-RP</b>	50	21.2	<a href="#">00B-4336-PO-AX</a>
	100	21.2	<a href="#">00D-4336-PO-AX</a>
	100	30	<a href="#">00D-4336-UO-AX</a>
	150	21.2	<a href="#">00F-4336-PO-AX</a>
	150	30	<a href="#">00F-4336-UO-AX</a>
	250	21.2	<a href="#">00G-4336-PO-AX</a>
<b>10 µm</b>			
<b>Fusion-RP</b>	150	21.2	<a href="#">00F-4425-PO-AX</a>
	250	21.2	<a href="#">00G-4425-PO-AX</a>
<b>Hydro-RP</b>	250	21.2	<a href="#">00G-4376-PO-AX</a>
<b>Polar-RP</b>	250	21.2	<a href="#">00G-4351-PO-AX</a>

### Chiral Phases

Lux®			
Phase	Length	ID	Part No.
<b>5 µm</b>			
<b>Amylose-1</b>	150	21.2	<a href="#">00F-4732-PO-AX</a>
	250	21.2	<a href="#">00G-4732-PO-AX</a>
	250	30	<a href="#">00G-4732-UO-AX</a>
	250	50	<a href="#">00G-4732-V0-AX</a>
<b>Amylose-2</b>	150	21.2	<a href="#">00F-4472-PO-AX</a>
	250	21.2	<a href="#">00G-4472-PO-AX</a>
	250	30	<a href="#">00G-4472-UO-AX</a>
<b>Cellulose-1</b>	150	21.2	<a href="#">00F-4459-PO-AX</a>
	250	21.2	<a href="#">00G-4459-PO-AX</a>
	250	30	<a href="#">00G-4459-UO-AX</a>
	250	50	<a href="#">00G-4459-V0-AX</a>
<b>Cellulose-2</b>	150	21.2	<a href="#">00F-4457-PO-AX</a>
	250	21.2	<a href="#">00G-4457-PO-AX</a>
	250	30	<a href="#">00G-4457-UO-AX</a>
	250	50	<a href="#">00G-4457-V0-AX</a>
	250	50	<a href="#">00G-4457-V0-AX</a>
<b>Cellulose-3</b>	150	21.2	<a href="#">00F-4493-PO-AX</a>
	250	21.2	<a href="#">00G-4493-PO-AX</a>
	250	30	<a href="#">00G-4493-UO-AX</a>
	250	50	<a href="#">00G-4493-V0-AX</a>
	250	50	<a href="#">00G-4493-V0-AX</a>
<b>Cellulose-4</b>	150	21.2	<a href="#">00F-4491-PO-AX</a>
	250	21.2	<a href="#">00G-4491-PO-AX</a>
	250	30	<a href="#">00G-4491-UO-AX</a>
	250	50	<a href="#">00G-4491-V0-AX</a>
	250	50	<a href="#">00G-4491-V0-AX</a>
<b>i-Cellulose-5</b>	150	21.2	<a href="#">00F-4756-PO-AX</a>
	250	21.2	<a href="#">00G-4756-PO-AX</a>
	250	30	<a href="#">00G-4756-UO-AX</a>
	250	50	<a href="#">00G-4756-V0-AX</a>
	250	50	<a href="#">00G-4756-V0-AX</a>
<b>i-Amylose-1</b>	150	21.2	<a href="#">00F-4762-PO-AX</a>
	250	21.2	<a href="#">00G-4762-PO-AX</a>
	250	30	<a href="#">00G-4762-UO-AX</a>
	250	50	<a href="#">00G-4762-V0-AX</a>
	250	50	<a href="#">00G-4762-V0-AX</a>
<b>i-Amylose-3</b>	150	21.2	<a href="#">00F-4779-PO-AX</a>
	250	21.2	<a href="#">00G-4779-PO-AX</a>
	250	30	<a href="#">00G-4779-UO-AX</a>
	250	50	<a href="#">00G-4779-V0-AX</a>
	250	50	<a href="#">00G-4779-V0-AX</a>

# Process Chromatography

## Bulk HPLC Media

- Grams to Multi-Kilogram, Phenomenex can deliver
- Over 20 different media available
- Long lifetime and excellent reproducibility

## Quick, Direct Scale-up from Analytical Methods

Scaling up is easier when using an HPLC media that provides near identical performance across all particle sizes and with increases in column diameter. Any mobile phase conditions developed on a Luna or Jupiter analytical column can be easily transferred to a 10 $\mu$ m or 15 $\mu$ m preparative column with equivalent resolution, selectivity, and proportional mass loading. Lux analytical columns also easily scale to 20 $\mu$ m preparative columns.

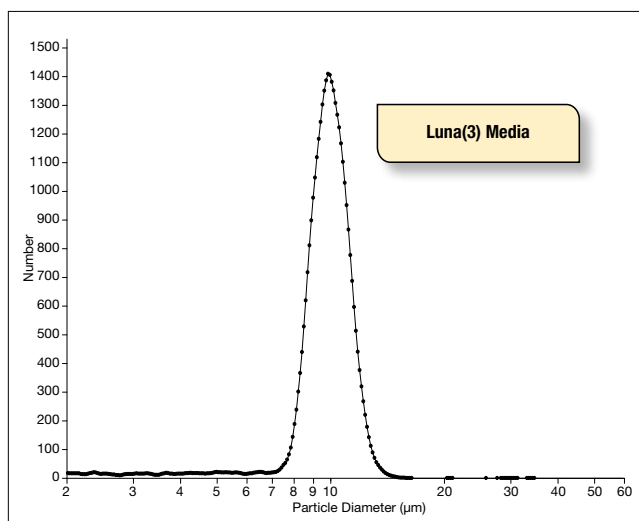
## Mechanically Strong Media

- Media free of crushed or cracked silica and silica fines
- Backpressures that remain stable
- Consistent particle size distribution so performance is maintained
- Longer column lifetimes (frits stay unclogged)

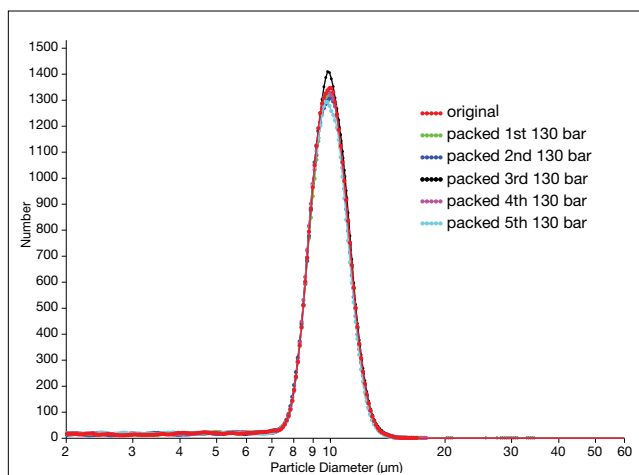
## Withstand Multiple Repacking in Dynamic Axial Compression (DAC) Systems

Dynamic Axial Compression (DAC) systems apply high mechanical stress on the packing media. This, along with high flow rates and backpressures can crack or shear low mechanical strength silica particles, creating silica fines, which will rapidly degrade column efficiency and clog frits. Luna, Jupiter, and Lux media provide exceptional strength over multiple DAC packings without sacrificing performance as well as easily withstanding high mechanical stress.

### Lower Backpressure with Narrower Particle Size Distribution



### Mechanical Stability Demonstrated by Repeated Packing



Overlay of particle size distributions of Luna C18(3) repeatedly packed at 130 bars in a 5 cm ID DAC system



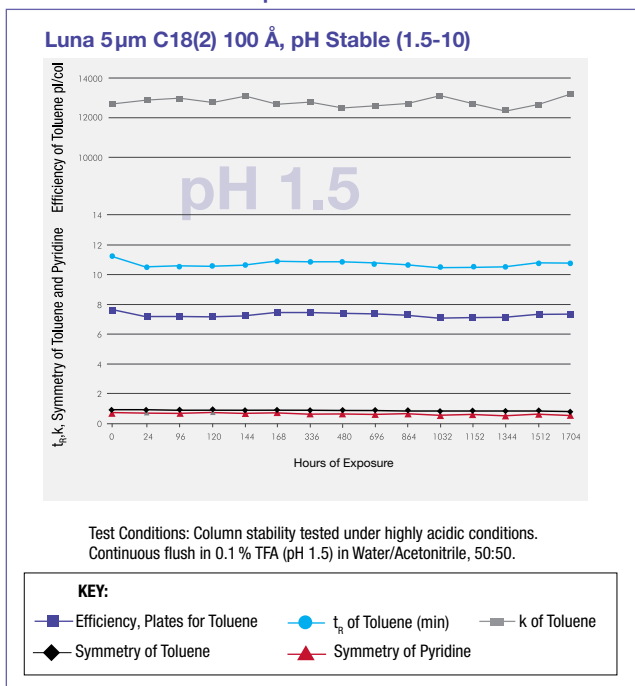
# Process Chromatography

## Chemically Stable Media

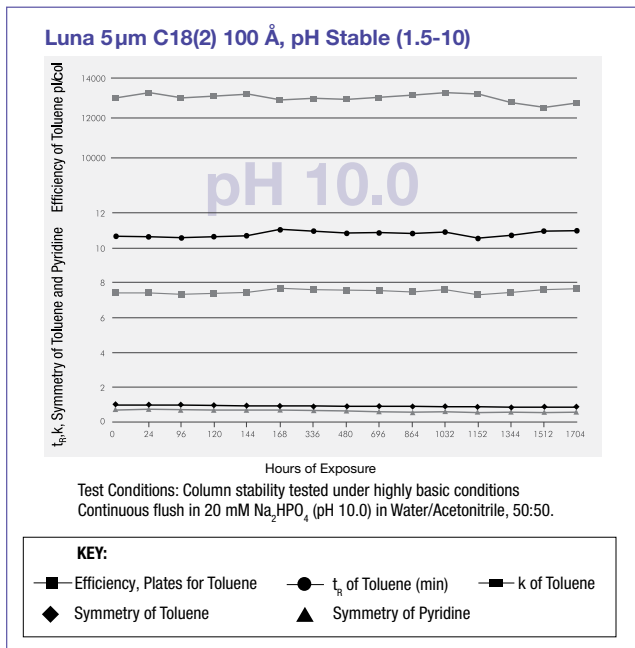
Chemical stability at pH levels outside the normal constraints of 2-7 is a critical factor in today's process environments for several reasons:

- Allows greater loading capacity
- Allows optimization of sample solubility
- pH adjustment to optimize recovery of API
- Clean-in-Place (CIP) processes by means of a caustic wash

### Excellent Performance at Low pH



### Extended Media Lifetime even Under Caustic Washes



## Controlled Manufacturing Process

We engineer and manufacture all of our media with your needs as a guideline. Our state-of-the-art facility gives us the capability to provide some of the most consistent media available on the market. With very high loadability, excellent mechanical strength, extended chemical stability, and batch-to-batch reproducibility, it is no wonder why more and more people turn to Phenomenex media every day.

### Certificates

The development, production, and marketing of Phenomenex Bulk Media follow ISO 9001 guidelines.

#### Product Quality



#### ISO 9001

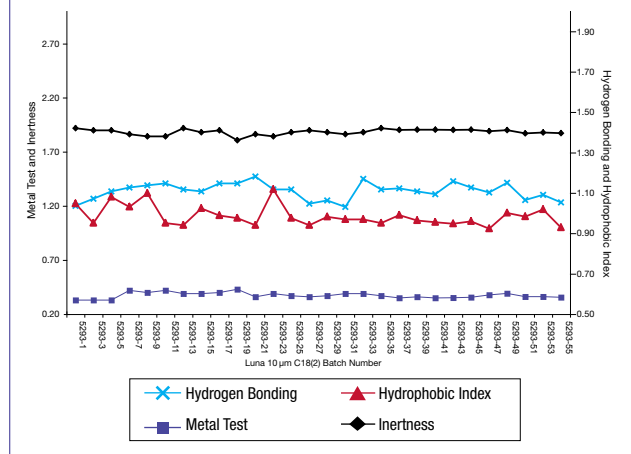


#### BSE/TSE Certificate



### Batch-to-Batch Reproducibility

With over 20 years of proven reproducibility, you can be confident in your choice to develop methods on Luna. The following graph shows consistency in both inertness and hydrophobicity across 40 batches of Luna 10 µm C18(2).



### Exceptional Chemical Stability for Low Leachates

The dense bonded phase density of Luna and Synergi provide revolutionary pH 1.5-10 stability<sup>†</sup>, with Gemini offering an extended pH range of 1.0-12.0. The wide pH range of these media provides flexibility in method development allowing for improvements in resolution and greater mass loading of basic compounds ( $pK_a > 9$ ) at high pH.

<sup>†</sup>Please see Sorbent Characteristics chart pp. 433-434 for exact pH limits of each phase.





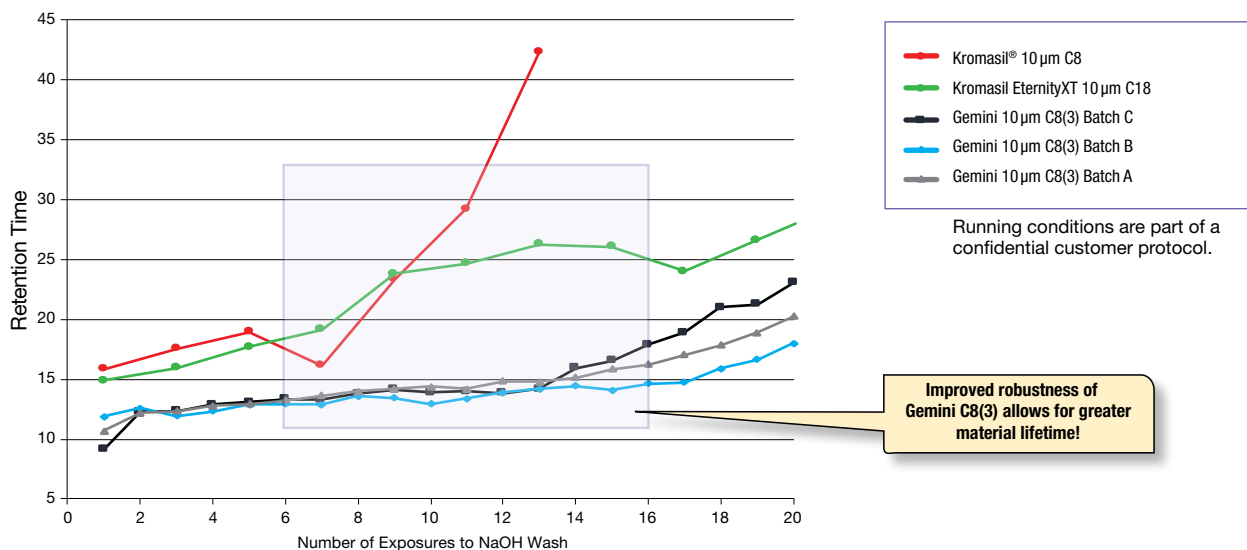
# Process Chromatography

## Gemini C8(3)

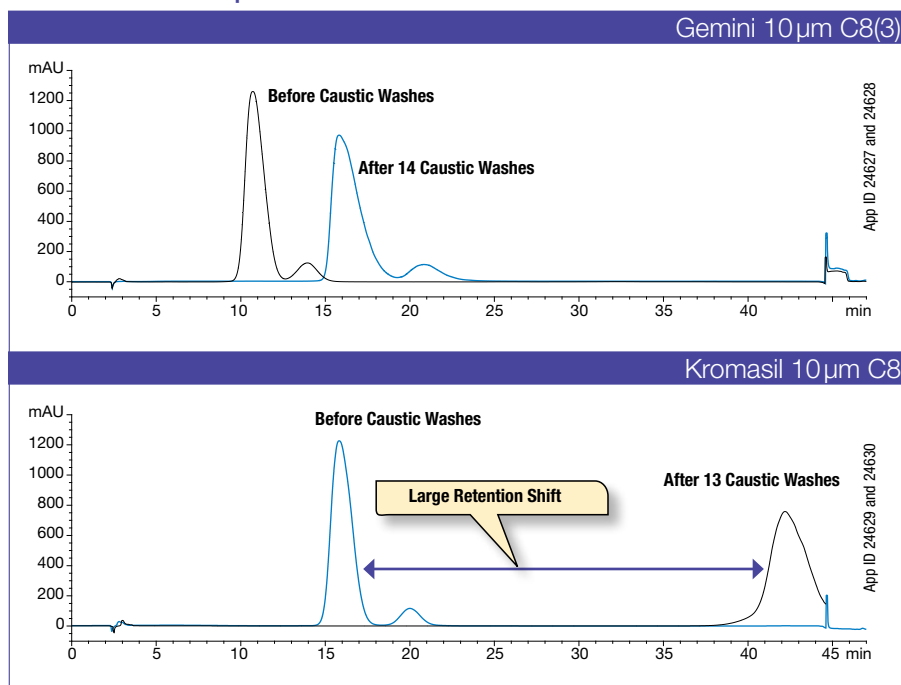
### The Material Developed for High pH Insulin Purification

Many products can separate human insulin and its degradant, while few can withstand high pH caustic washes for aggregate removal. Now, there is a clear media choice. Gemini® C8(3) provides the needed separation, the needed low/high pH robustness, and the overall consistency in terms of efficiency and retention cycle to cycle to cycle. You don't have to choose between consistent performance or robustness; Gemini C8(3) was developed to give you the best of both worlds.

#### Insulin Retention vs. Exposures to NaOH Wash



#### Insulin Retention Comparison



Comparative separations may not be representative of all applications.

# Process Chromatography

## PREP LC Columns and Bulk HPLC Media

- Maintain or increase yield with less media
- Dramatically reduce cost of PREP/Process-LC purifications
- Withstand multiple axial compression packings with high mechanical strength media

## Maintain or Increase Yield with Less Media

Higher silica surface area equals greater mass loading. With 400 m<sup>2</sup>/g surface area, Luna has one of the highest surface areas among popular PREP LC media. Even greater mass loading is possible with the 475 m<sup>2</sup>/g surface area of Synergi 80 Å media. Both Synergi and Luna are unique in that they offer high mass loading with low-density, rugged silica; requiring less media to pack a given volume. Thus while less media is needed to pack a given dimension compared to other common prep sorbents, mass loading remains high with peak resolution and purity maintained. Especially for early eluting target compounds, Luna has been shown to provide greater mass loading compared to some common prep media. This allows for increased loading on less media, and more yield per run.

### Choose the Correct Media for your Application

Bonded Phase	Sorbent	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	pH Stability	Particle Size (µm) ("bulk" indicates bulk media available)	Density	Applications
<b>Achiral Media</b>							
Si (Silica)	Luna Silica(3)	100	400	2.0 – 7.5	10-PREP (bulk)	0.47	Small Organic Molecules, Steroids, Nutraceuticals, Fat Soluble Vitamins, Tocopherols
	Luna Silica(2)	100	400	2.0 – 7.5	10 µm (bulk) 10-PREP (bulk) 15 µm (bulk) 20 µm (bulk)	0.45	Small Organic Molecules, Steroids, Nutraceuticals, Fat Soluble Vitamins, Tocopherols
C18	Luna C18(3)	100	400	1.5 – 10	10-PREP (bulk)	0.60	Pharmaceuticals, Peptides, Nutraceuticals, Agrochemical, Vitamins, Basic Compounds, General Reversed Phase Applications
	Luna C18(2)	100	400	1.5 – 10	10 µm (bulk) 10-PREP (bulk) 15 µm (bulk)	0.58	Pharmaceuticals, Peptides, Nutraceuticals, Agrochemical, Vitamins, Basic Compounds, General Reversed Phase Applications
	Synergi Hydro-RP C18 with Polar Endcapping	80	475	1.5 – 7.5	10 µm (bulk)	0.55	Very Polar Compounds, Pharmaceuticals, Vitamins, Antibiotics
	Jupiter 300 C18	300	170	1.5 – 10	10 µm (bulk), 15 µm (bulk)	0.44	Hydrophilic Proteins, Oligonucleotides (>30 mer)
C12	Synergi Max-RP	80	475	1.5 – 10	10 µm (bulk)	0.55	Pharmaceuticals, Nutraceuticals, Agrochemical, Vitamins, Amino Acids, Basic Compounds, General Reversed Phase Applications
C8	Luna C8(3)	100	400	1.5 – 10	10-PREP (bulk)	0.58	Pharmaceuticals, Peptides, Estrogens, Basic Compounds, General Reversed Phase Applications
	Luna C8(2)	100	400	1.5 – 10	10 µm (bulk) 10-PREP (bulk) 15 µm (bulk)	0.56	Pharmaceuticals, Peptides, Estrogens, Basic Compounds, General Reversed Phase Applications
	Gemini C8(3)	100	400	1.0 – 12.0	10 µm (bulk)	0.60	Small Molecules, Peptides, Proteins, Oligonucleotides
C4	Luna C4(2)	100	400	1.5 – 10	10-PREP (bulk)	0.54	Hydrophobic Compounds, Peptides, Small Proteins
	Jupiter 300 C4	300	170	1.5 – 10	10 µm (bulk), 15 µm (bulk)	0.38	Hydrophobic Proteins
Phenyl	Luna Phenyl-Hexyl	100	440	1.5 – 10	10 µm (bulk) 10-PREP (bulk) 15 µm (bulk)	0.58	Polar and Aromatic Compounds, Peptides, Antibiotics, Lipids, Phenols, Sweeteners
	Luna Polar-RP	100	400	1.5 – 7.0	10-PREP (bulk)	0.55	Polar and Aromatic Compounds, Hydrophilic Peptides, Antibiotics, Phenols, Sweeteners
	Synergi Polar-RP (Ether-Linked Phenyl)	80	475	1.5 – 7.0	10 µm (bulk)	0.55	Polar and Aromatic Compounds, Hydrophilic Peptides, Antibiotics, Phenols, Sweeteners
CN (Cyano)	Luna CN	100	400	1.5 – 7.0	10 µm (bulk)	0.55	Polar Compounds, Pharmaceuticals, Hydrophilic Peptides, Esters, Steroids, Phthalates, Compounds with COOH, CO, NH <sub>2</sub> , NHR, or NR <sub>2</sub> groups
NH <sub>2</sub> (Amino)	Luna NH <sub>2</sub>	100	400	1.5 – 11	10 µm (bulk)	0.57	Sugars, Sugar Alcohols, Anionic Compounds, Steroids, Vitamins, Nucleosides, Oligonucleotides
<b>Chiral Media</b>							
cellulose tris(3,5-dimethylphenyl carbamate)	Lux Cellulose-1	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(3-chloro-4-methyl phenylcarbamate)	Lux Cellulose-2	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(4-methylbenzoate)	Lux Cellulose-3	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds
cellulose tris(4-chloro-3-methyl phenylcarbamate)	Lux Cellulose-4	1000	—	2 – 9	10 µm	0.62	Enhanced enantioselectivity for aromatic, conjugated and other chiral compounds



# Process Chromatography

## Scout Columns

### Achiral Columns

#### Ordering Information

Luna (100 Å)		
Phases	250 x 4.6 mm	250 x 10 mm
<b>10 µm-<i>PREP</i></b>		
C18(3)	<a href="#">00G-4616-E0</a>	<a href="#">00G-4616-N0</a>
C18(2)	<a href="#">00G-4324-E0</a>	—
C8(3)	<a href="#">00G-4623-E0</a>	<a href="#">00G-4623-N0</a>
C8(2)	<a href="#">00G-4323-E0</a>	<a href="#">00G-4323-N0</a>
C4(2)	<a href="#">00G-4460-E0</a>	<a href="#">00G-4460-N0</a>
Phenyl-Hexyl	<a href="#">00G-4325-E0</a>	<a href="#">00G-4325-N0</a>
Polar-RP	<a href="#">00G-4757-E0</a>	<a href="#">00G-4757-N0</a>
Silica(3)	<a href="#">00G-4617-E0</a>	<a href="#">00G-4617-N0</a>
Silica(2)	<a href="#">00G-4322-E0</a>	<a href="#">00G-4322-N0</a>
<b>10 µm</b>		
CN	<a href="#">00G-4300-E0</a>	—
NH <sub>2</sub>	<a href="#">00G-4379-E0</a>	<a href="#">00G-4379-N0</a>
<b>15 µm</b>		
C18(2)	<a href="#">00G-4273-E0</a>	<a href="#">00G-4273-N0</a>
C8(2)	<a href="#">00G-4272-E0</a>	<a href="#">00G-4272-N0</a>
Phenyl-Hexyl	<a href="#">00G-4286-E0</a>	<a href="#">00G-4286-N0</a>
Silica(2)	<a href="#">00G-4271-E0</a>	—
<b>20 µm</b>		
Silica(2)	<a href="#">00G-4437-E0</a>	—

#### Jupiter (300 Å)

Phases	250 x 4.6 mm	250 x 10 mm
<b>15 µm</b>		
300 Å C18	<a href="#">00G-4057-E0</a>	<a href="#">00G-4057-N0</a>
300 Å C4	<a href="#">00G-4169-E0</a>	<a href="#">00G-4169-N0</a>

#### Gemini (110 Å)

Phases	250 x 4.6 mm	250 x 10 mm
<b>10 µm</b>		
C8(3)	<a href="#">00G-4763-E0</a>	<a href="#">00G-4763-N0</a>

### Chiral Columns

#### Ordering Information

Lux (1000 Å)		
Phases	250 x 4.6 mm	250 x 10 mm
<b>10 µm</b>		
Cellulose-1	<a href="#">00G-4501-E0</a>	<a href="#">00G-4501-N0</a>
Cellulose-2	<a href="#">00G-4502-E0</a>	<a href="#">00G-4502-N0</a>
Cellulose-3	<a href="#">00G-4624-E0</a>	—
Cellulose-4	<a href="#">00G-4625-E0</a>	—
<b>20 µm</b>		
Cellulose-1	<a href="#">00G-4473-E0</a>	<a href="#">00G-4473-N0</a>
Cellulose-2	<a href="#">00G-4464-E0</a>	<a href="#">00G-4464-N0</a>
Cellulose-3	<a href="#">00G-4504-E0</a>	<a href="#">00G-4504-N0</a>
Cellulose-4	<a href="#">00G-4503-E0</a>	<a href="#">00G-4503-N0</a>



Additional scout columns available. Contact us for 3µm, 4µm, 5µm, and 10µm media scout columns.

# Process Chromatography

## Bulk HPLC Media

### Achiral Media

#### Ordering Information

Luna (100 Å)				
Phases	100 g	1 kg	5 kg	10 kg
<b>10 µm-<i>PREP</i></b>				
C18(3)	<a href="#">04G-4616</a>	<a href="#">04K-4616</a>	<a href="#">04L-4616</a>	<a href="#">04M-4616</a>
C18(2)	<a href="#">04G-4324</a>	<a href="#">04K-4324</a>	<a href="#">04L-4324</a>	<a href="#">04M-4324</a>
C8(3)	<a href="#">04G-4623</a>	<a href="#">04K-4623</a>	<a href="#">04L-4623</a>	<a href="#">04M-4623</a>
C8(2)	<a href="#">04G-4323</a>	<a href="#">04K-4323</a>	<a href="#">04L-4323</a>	<a href="#">04M-4323</a>
C4(2)	<a href="#">04G-4460</a>	<a href="#">04K-4460</a>	<a href="#">04L-4460</a>	<a href="#">04M-4460</a>
Phenyl-Hexyl	<a href="#">04G-4325</a>	<a href="#">04K-4325</a>	<a href="#">04L-4325</a>	<a href="#">04M-4325</a>
Polar-RP	<a href="#">04G-4757</a>	<a href="#">04K-4757</a>	<a href="#">04L-4757</a>	<a href="#">04M-4757</a>
Silica(3)	<a href="#">04G-4617</a>	<a href="#">04K-4617</a>	<a href="#">04L-4617</a>	<a href="#">04M-4617</a>
Silica(2)	<a href="#">04G-4322</a>	<a href="#">04K-4322</a>	<a href="#">04L-4322</a>	<a href="#">04M-4322</a>
<b>10 µm</b>				
CN	<a href="#">04G-4300</a>	<a href="#">04K-4300</a>	<a href="#">04L-4300</a>	—
NH <sub>2</sub>	<a href="#">04G-4379</a>	<a href="#">04K-4379</a>	—	—
<b>15 µm</b>				
C18(2)	<a href="#">04G-4273</a>	<a href="#">04K-4273</a>	<a href="#">04L-4273</a>	<a href="#">04M-4273</a>
C8(2)	<a href="#">04G-4272</a>	<a href="#">04K-4272</a>	<a href="#">04L-4272</a>	<a href="#">04M-4272</a>
Phenyl-Hexyl	<a href="#">04G-4286</a>	<a href="#">04K-4286</a>	<a href="#">04L-4286</a>	<a href="#">04M-4286</a>
Silica(2)	<a href="#">04G-4271</a>	<a href="#">04K-4271</a>	<a href="#">04L-4271</a>	<a href="#">04M-4271</a>
<b>20 µm</b>				
Silica(2)	<a href="#">04G-4437</a>	<a href="#">04K-4437</a>	—	—

Jupiter (300 Å)				
Phases	100 g	1 kg	5 kg	10 kg
<b>15 µm</b>				
300 Å C18	<a href="#">04G-4057</a>	<a href="#">04K-4057</a>	<a href="#">04L-4057</a>	<a href="#">04M-4057</a>
300 Å C4	<a href="#">04G-4169</a>	<a href="#">04K-4169</a>	<a href="#">04L-4169</a>	<a href="#">04M-4169</a>

Gemini (110 Å)				
Phases	100 g	1 kg	5 kg	10 kg
<b>10 µm</b>				
C8(3)	<a href="#">04G-4763</a>	<a href="#">04K-4763</a>	<a href="#">04L-4763</a>	<a href="#">04M-4763</a>



For Sepra bulk sorbents, see p. 401



### Chiral Media

#### Ordering Information

Lux (1000 Å)			
Phases	10 g	100 g	1 kg
<b>10 µm</b>			
Cellulose-1	<a href="#">04D-4501</a>	<a href="#">04G-4501</a>	<a href="#">04K-4501</a>
Cellulose-2	<a href="#">04D-4502</a>	<a href="#">04G-4502</a>	<a href="#">04K-4502</a>
Cellulose-3	<a href="#">04D-4624</a>	<a href="#">04G-4624</a>	<a href="#">04K-4624</a>
Cellulose-4	<a href="#">04D-4625</a>	<a href="#">04G-4625</a>	<a href="#">04K-4625</a>



Contact your Phenomenex technical consultant or local distributor for additional bulk packings and quantities not listed.



# Process Chromatography

## Sepra™ Bulk Sorbents

- Provides reproducible recoveries from capture to purification
- Removes contaminants and eliminates matrix effects
- Offers controlled selectivity for target analytes
- Results in high-throughput sample purification

Phenomenex offers a wide mix of bulk media including an array of large particle media for today's chemists who need effective capture and concentrating resins.

Sepra media offers purification of proteins, peptides, nucleic acids, antibodies, tryptic digests, nucleotides, viruses, and small molecular weight pharmaceuticals in a low pressure environment. It is an excellent economical alternative to high pressure RPC while still offering high resolution and loading capacity.



### Capture and Concentrate Resins

Media Base Material	Brand	Phase	Particle Size (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	pH Stability	Ordering Information		
								Sepra Bulk Sorbents		
								Phase	100 g	1 kg
Silica	Sepra	C18-E	50	65	500	17	2-9	C18-E	<a href="#">04G-4348</a>	<a href="#">04K-4348</a>
		C18-T	50	135	300	15	2-9	C18-T	<a href="#">04G-4405</a>	<a href="#">04K-4405</a>
		C8	50	65	500	10	2-9	C8	<a href="#">04G-4406</a>	—
		Phenyl	50	65	500	10	2-9	Phenyl	<a href="#">04G-4407</a>	—
		CN	50	65	500	10	2-9	CN	<a href="#">04G-4409</a>	—
		NH <sub>2</sub>	50	65	500	5	2-9	NH <sub>2</sub>	<a href="#">04G-4408</a>	<a href="#">04K-4408</a>
		Florisil®	170 (60/100 mesh)	80	300	0	2-9	Florisil®	<a href="#">04G-4411</a>	<a href="#">04K-4411</a>
		SCX	50	65	500	9	2-9	SCX	<a href="#">04G-4413</a>	<a href="#">04K-4413</a>
		SAX	50	65	500	6	2-9	SAX	<a href="#">04G-4414</a>	<a href="#">04K-4414</a>
		WCX	55	70	500	8	2-9	WCX	<a href="#">04G-S027</a>	—
		Silica	50	65	500	0	2-9	Silica	<a href="#">04G-4410</a>	<a href="#">04K-4410</a>
		EPH	200	70	Proprietary	0	2-7.5	EPH	<a href="#">04G-4508</a>	—
Small Pore Polymer	Sepra ZT	ZT	30	85	800	—	1-14	ZT	<a href="#">04G-4426</a>	—
		ZT-SCX	30	85	800	—	1-14	ZT-SCX	<a href="#">04G-4466</a>	—
		ZT-WCX	30	85	800	—	1-14	ZT-WCX	<a href="#">04G-4478</a>	—
		ZT-SAX	30	85	800	—	1-14	ZT-SAX	<a href="#">04G-4485</a>	—
		ZT-WAX	30	85	800	—	1-14	ZT-WAX	<a href="#">04G-4463</a>	—
Large Pore Polymer	Sepra ZTL	ZTL	115	330	500	—	1-14	ZTL	<a href="#">04G-4470</a>	—
		ZTL-SCX	115	330	500	—	1-14	ZTL-SCX	<a href="#">04G-4467</a>	<a href="#">04K-4467</a>
		ZTL-WCX	115	330	500	—	1-14	ZTL-WCX	Inquire	Inquire
		ZTL-SAX	115	330	500	—	1-14	ZTL-SAX	Inquire	Inquire
		ZTL-WAX	115	330	500	—	1-14	ZTL-WAX	<a href="#">04G-4494</a>	—
Styrenedivinylbenzene Polymer	Sepra SDB-L	SDB-L	95	255	500	—	1-14	SDB-L	<a href="#">04G-4412</a>	<a href="#">04K-4412</a>



Interested in MSPD for your analysis? Please contact us for technique and accessory information.

Florisil® is a registered trademark of U.S. Silica Co.







# On-Demand Webinar Library

Check out our library of informative webinars to learn about trending industry focused solutions, access trainings and workflow support to help boost your analysis, and uncover troubleshooting tips to keep your separation game strong.

[www.phenomenex.com/webinars](http://www.phenomenex.com/webinars)

# Synthetic DNA/RNA

Purification and Analysis



“Very happy with Phenomenex overall. The quality of the products and the customer service, which often goes beyond what I expect, helped me enormously with troubleshooting and method development.”

**Wayne Noonan**  
**Peter MacCallum Cancer Centre,**  
**Australia**

403 - 413

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Synthetic DNA/RNA Purification and Analysis  
Using Clarity BioSolutions .....403-413



# Clarity<sup>®</sup> BioSolutions for Synthetic DNA/RNA

U.S. Patent No. 7, 119, 145

## Optimized Oligo Purification and Analysis

- RPC, HPLC, prep LC, desalting, and extraction solutions
- DNA, RNA/RNAi, longmers, dye-labeled, and modified oligonucleotides
- High efficiency LC-MS protocols for characterization/QC
- Personalized technical support and customer service

Each product in the Clarity BioSolutions portfolio has been designed to efficiently and effectively purify or characterize synthetic oligonucleotides used in biological research, therapeutic development and biochemical manufacturing. Purification solutions include reversed phase HPLC (RP-HPLC), ion-exchange LC (IEX-LC), reversed phase cartridge (RPC), and desalting, while characterization solutions include high efficiency reversed phase (RP-LC-MS) columns.



### Material Characteristics

Clarity Products	Particle Support	Bonded Phase	Particle Shape/Size (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)
Clarity QSP™ Cartridges	Polymer (PSDVB)	Hydrophilic polymer coating	35	500	300
Clarity Oligo-RP™ LC Columns	TWIN (silica, organic composite)	C18	3, 5, 10	110	375
Clarity RP-Desalting™ Tubes	Silica	C18	55	140	300
Clarity Oligo-MS™ LC Columns	Core-Shell	C18	1.7, 2.6, 5	100	200* (*effective)
Clarity OTX™ Extraction Plates	Polymer (surface modified PSDVB)	Mixed-mode anion exchanger	33	85	800
Clarity Oligo-XT LC Columns	Core-Shell	C18	1.7, 2.6, 5	100	200

## Clarity BioSolutions Product Selection

### Purification

	Clarity QSP™	Clarity Oligo-RP™ Clarity Oligo-XT	Clarity RP-Desalting™
Primary Use	High-throughput, trityl-on RPC purification	RP-HPLC purification of failure sequences from target sequences	Quick removal of salt & excess reagent
Purities	>90 %	>90 %	~70 %
Recoveries	~90 %	~70 %	~70 %
Synthesis Scale Load	Up to 50 µmol	Up to 50 µmol	Up to 1 µmol
Oligo Types	DNA, RNA/RNAi, Thioates, Dye-labeled, Modified		

### Characterization / Analysis

	Clarity Oligo-RP™	Clarity Oligo-MS™ Clarity Oligo-XT	Clarity OTX™
Primary Use	RP-LC-MS analysis with optimized selectivity and sensitivity	Rapid, high efficiency RP-LC-MS analysis for QC and characterization	Extraction of oligo therapeutics from biological samples for LC-MS bioanalysis
Oligo Length	≤ 60 mer	≤ 60 mer	≤ 40 mer
Recommended Mobile Phase	TEA / HFIP	TEA/HFIP/MeOH	n/a

U.S. Patent No. 7, 119, 145

## Clarity OTX<sup>™</sup> Extraction Kits

### Rapid Isolation of Oligo Therapeutics from Biological Samples

- > 80% typical extraction recoveries
- No liquid-liquid extraction (LLE) required
- Suitable for a majority of therapeutic oligos, tissues, and fluids
- Optimized for LC-MS bioanalysis
- Can be automated for high-throughput

#### Effective Recovery

The Clarity OTX extraction solution was designed to effectively isolate a wide range of therapeutic oligonucleotides from fluids and tissues. It utilizes a mixed-mode solid phase extraction sorbent in conjunction with carefully formulated buffers to consistently deliver greater than 80% recoveries.

#### Sample Preparation:

- Add an equal volume of Lysis-Loading buffer to biological fluid matrix
- Vortex briefly

#### Extraction Protocol

**Condition:** 1 mL Methanol (Vacuum ~2" Hg)

**Equilibrate:** 1 mL Equilibration buffer (Vacuum ~3" Hg)

**Load sample:** 0.4 mL - 3 mL volume (Vacuum ~3" Hg)

**Vacuum:** ~10" Hg for ~10 seconds to completely evacuate solution through cartridge

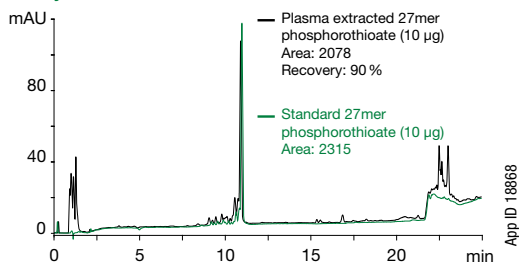
**Wash:** 6 mL Wash buffer (2 mL x 3) (Vacuum 3-4" Hg)

**Vacuum:** 10-15" Hg for ~1 minute

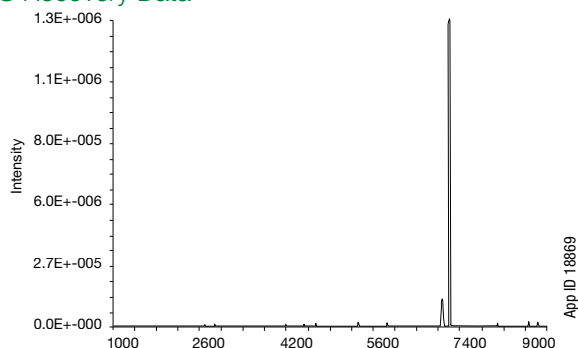
**Elute:** 1 mL Elution buffer (Vacuum ~3" Hg)

**LC-MS Prep:** Dry down or lyophilize and reconstitute in 100 µL water or aqueous buffer

#### UV Recovery Data



#### MS Recovery Data



The above illustrates the recovery of a 27mer thioate from 200 µL of human plasma. The UV data shows that 90% recovery is achieved with the Clarity OTX extraction protocol. The MS data further demonstrates that plasma contaminants are effectively removed and complete isolation and recovery of the target is achieved.

Phenomenex

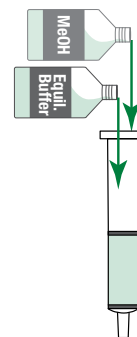
#### Designed for Throughput

In just 4 steps and 15 minutes, scientists can extract therapeutic oligos and their metabolites from biological samples. This is accomplished by eliminating the need for liquid-liquid extraction and providing a 96-well plate format which is amenable to parallel processing.



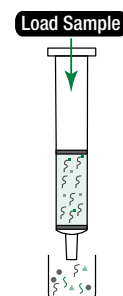
## STEP 1

Preparation of SPE sorbent to selectively retain the oligo of interest and its metabolites.



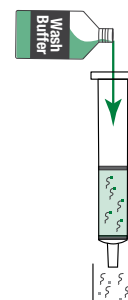
## STEP 2

Salts, sugars, large proteins and genomic DNA flow through the cartridge. The oligo of interest, proteins, and lipids bind to the sorbent via a mixed-mode, weak anionic interaction.



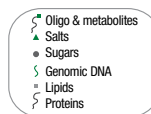
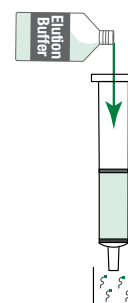
## STEP 3

The Wash Buffer is formulated to strip off lipids and remaining proteins from the sorbent, while not disturbing the oligo therapeutics and its metabolites.



## STEP 4

The addition of the Elution Buffer releases the target oligo therapeutic and its metabolites. The elution volume can be dried down or lyophilized and reconstituted prior to LC-MS analysis.



Request a FREE copy of the Clarity OTX User's Guide for more detailed information on the extraction protocol.

# Clarity<sup>®</sup> BioSolutions for Synthetic DNA/RNA

U.S. Patent No. 7, 119, 145

## Clarity OTX<sup>™</sup> (cont'd)

### Flexible Formats

To test proof of concept or for low sample volumes, Clarity OTX is available as a starter kit, which includes either a 96-well plate or 50 solid phase extraction cartridges and all the buffers (lysis-loading, equilibration, wash, and elution) required for the extraction protocol.



For labs that must process large volumes of biological samples, 96-well plates, 1L quantities of lysis-loading buffer, and the formulations for the other three buffers are available.



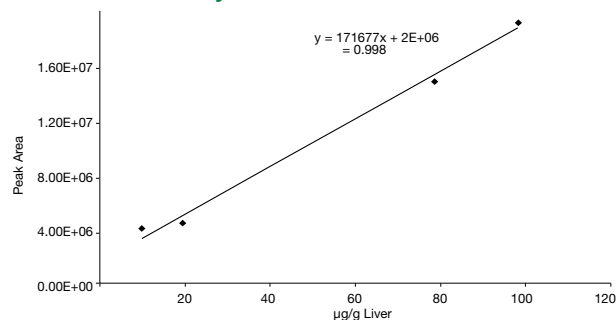
### Eliminate MS Interfering Contaminants

The Clarity OTX extraction protocol effectively removes cell debris such as proteins, genomic DNA, and lipids which significantly mask the oligo therapeutics of interest. By removing these contaminants, MS noise is considerably reduced.

### Excellent Linearity

Significant effort was made to develop an extraction solution that would provide good linearity and reliable quantitative results.

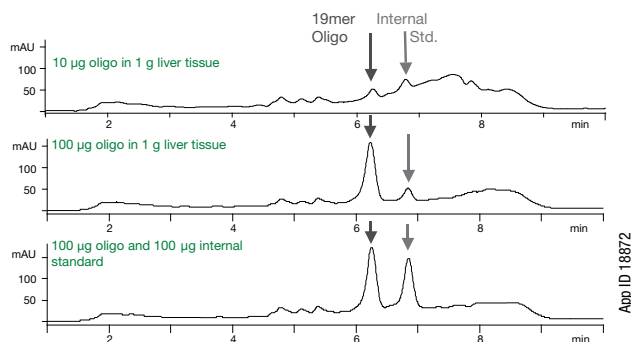
### Liver Tissue Linearity Curve



From low to high concentrations of ng/mL, excellent linearity is achieved on the MS by extracting oligo therapeutics and their metabolites using the Clarity OTX methodology. Linearity for a 19mer P-S oligonucleotide in 1 g of liver tissue, based on MS peak area, was evaluated at four different oligo concentrations in liver tissue from 100 µg to 10 µg. High recovery and good linearity is seen across physiological relevant concentrations for this initial study.

### Detect Low Dosage Levels

Due to the typical 85% and greater recoveries of the parent oligonucleotide therapeutic and its metabolites and the elimination of interfering compounds, detection in low sensitivity ranges is possible when using a sensitive MS.



UV chromatograms of oligonucleotide extracted from liver tissue using Clarity OTX. The 19mer extracted phosphorothioate oligonucleotide was spiked with 10 µg of an oligonucleotide internal standard before analysis. The top two chromatograms represent different levels of the incubated P-S oligo. The bottom chromatogram is an external standard of equal amounts of the 19mer oligo and internal standard. Note the high recovery of the oligonucleotide and low level of plasma contaminants from the incubated samples.

### Ordering Information

Clarity OTX			
Part No.	Description		Unit
<a href="#">KS0-8494</a>	Clarity OTX Starter Kit-Tubes	Includes: 100 mg/3 mL cartridges (x50) Lysis-loading buffer (100 mL) Equilibration buffer (250 mL) Wash buffer (350 mL) Elution buffer (100 mL)	ea
<a href="#">KS0-9253</a>	Clarity OTX Starter Kit-96-Well Plate	100 mg/ 96-well plate (x1) Lysis-loading buffer (100 mL) Equilibration buffer (250 mL) Wash buffer (350 mL) Elution buffer (100 mL)	ea
<a href="#">8M-S103-4GA</a>	Clarity OTX Microelution Well Plate	2 mg/ well	1/box
<a href="#">8E-S103-CGA</a>	Clarity OTX Well Plate	25 mg/ well	1/box
<a href="#">8E-S103-EGA</a>	Clarity OTX Well Plate	100 mg/ well	1/box
<a href="#">8B-S103-EBJ</a>	Clarity OTX Cartridge	100 mg/3 mL	50/box
<a href="#">8B-S103-HCH</a>	Clarity OTX Cartridge	500 mg/6 mL	30/box
<a href="#">AL0-8579</a>	Clarity OTX Lysis-Loading Buffer V2.0	1 L	ea



# Clarity<sup>®</sup> BioSolutions for Synthetic DNA/RNA

U.S. Patent No. 7, 119, 145

## Clarity QSP<sup>™</sup> Cartridges and 96-Well Plates

### High-throughput, RPC Purification

- > 90% typical purities & recoveries for RNA & DNA
- For oligos 10 – 100 mer
- Simple 3-step process for trityl-on oligos
- Cost-effective solution for high purity
- Purification without using ion-pairing agents

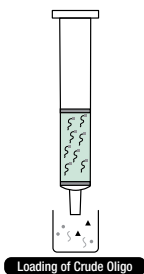
### The Quick, Simple, Pure (QSP) Protocol

Following the easy, step-by-step QSP protocol anyone can deliver high purity RNA and DNA. The process includes brief sample preparation followed by 3 simple steps to isolate the oligo of interest from impurities and failure sequences. The QSP sorbent and loading buffers have been engineered to work synergistically with crude synthetic mixtures to produce greater than 90% recoveries and purities in less than 20 minutes.

**Pre-treatment:** Trityl-on oligo sample preparation. Mix equal volume of loading buffer with cleavage/deprotection solution

## STEP 1

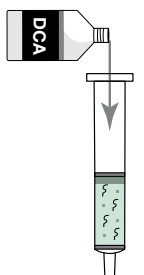
**Load crude oligo cocktail**  
All trityl-off impurities flow directly through; no wash required.



Loading of Crude Oligo

## STEP 2

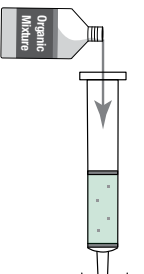
**Detritylate**  
Less than 2% depurination observed. A faint orange band will appear at top half of cartridge indicating DMT retention.



Detritylate

## STEP 3

**Elute target oligo**  
pH buffered solutions used to maintain safe pH for oligo; select elution buffer based on downstream requirements.



Elution of Target Oligo

- Full Length Trityl-On Oligo
- Impurity
- N-1 Sequence
- Detritylated Failure Sequences
- Trityl Group
- Full Length Target Oligo

### Dual-Component System

Two components, loading buffer and SPE cartridge or 96-well plate, are required for Clarity QSP purification. Various loading buffers have been formulated specifically for DNA and RNA chemistries so that one-step loading in synthetic cocktails is permissible and no ion-pairing reagents are required. Multiple SPE formats are available to suit a wide range of synthesis scales and automation requirements. 96-well plates are of a standard footprint and should fit most commercial vacuum manifolds and liquid handling robots.



### Loading Buffers

- DNA: for all DNA and RNA-TOM chemistries
- RNA-TBDMS: for RNA-TBDMS and 2' modified RNA chemistries



### SPE Formats

- 60 mg/ 3 mL cartridges: < 200 nmol scale
- 150 mg/ 3 mL cartridges: < 1 µmol scale
- 5 g/ 60 mL cartridges: 5 – 25 µmol scale



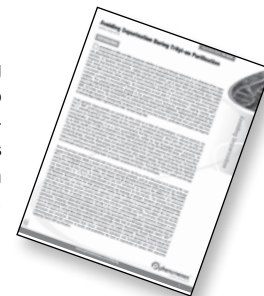
- 50 mg/ 96-well plate: 200 nmol scale per well



96-well plate

### Negligible Depurination

Significant effort was made during the development of Clarity QSP to minimize the causes of depurination. The lower acid concentrations and limited exposure times within the protocol generate less than 2% depurination.



Request a FREE copy of Technical Note [TN-0008](#), Avoiding Depurination During Trityl-on Purification for more information.

## Clarity QSP<sup>™</sup> (cont'd)

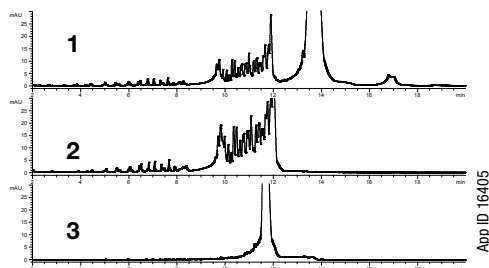
### High Purity, High Yield DNA and RNA

Clarity QSP is a next generation trityl-on purification solution that was specifically designed to complement contemporary synthetic processes and consistently deliver high purities and recoveries for all types of synthetic DNA and RNA sequences. Complete discrimi-

nation between full-length trityl-on sequences from impurities is guaranteed. The final elution step delivers concentrated, full-length sequences in a stable media suitable for in vivo applications and downstream analysis conducive for MS, NMR, CE, and HPLC.

#### 53nt DNA Purification

**Sequence:** ACAGTCGTACAGTCATATATTACAGTGTCTACTGCAGTCGTTATCTAT  
**Synthesis Scale:** 200 nmol  
**Format:** 50 mg / 1 mL

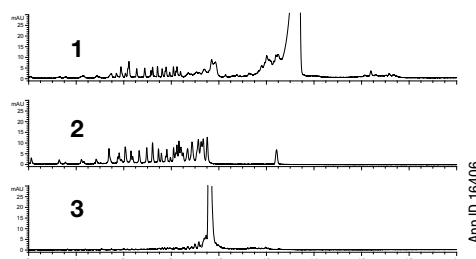


1. Crude Trityl-on
2. Load fraction
3. Detritylated final elution

Crude Trityl-on	Load Fraction	Detritylated Final Elution	Recovery	Purity (Peak area)
39.7	6.51	29.6	89 %	93 %

#### High-Throughput DNA Purification

**Sequence:** GTGGATCTGCGCACTTCAGGCTCCTGGGCT  
**Synthesis Scale:** 200 nmol  
**Format:** 96-Well Plate (50 mg / well)

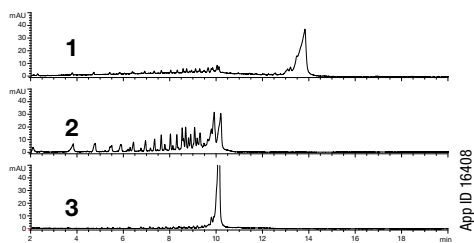


1. Crude Trityl-on
2. Load fraction
3. Detritylated final elution

Crude Trityl-on	Load Fraction	Detritylated Final Elution	Recovery	Purity (Peak area)
28.3	5.3	20.8	90.3 %	92 %

#### Crude 27nt RNA Purification (TBDMS Chemistry)

**Sequence:** Proprietary  
**Synthesis Scale:** 1 μmol  
**Format:** 150 mg / 3 mL



1. Crude Trityl-on
2. Load fraction
3. Detritylated final elution

Crude Trityl-on	Load Fraction	Detritylated Final Elution	Recovery	Purity (Peak area)
33.4	9.22	22.9	94 %	84 %

#### Ordering Information

##### Clarity QSP<sup>™</sup> Well Plate & Cartridges

Part No.	Description		Unit
<b>Formats</b>			
<a href="#">8E-S102-DGB</a>	Clarity QSP 96-Well Plate	50 mg/well	1/box
<a href="#">8B-S102-UBJ</a>	Clarity QSP Cartridge	60 mg/3 mL	50/box
<a href="#">8B-S102-SBJ</a>	Clarity QSP Cartridge	150 mg/3 mL	50/box
<a href="#">8B-S042-LFF</a>	Clarity QSP Cartridge	5 g/60 mL	16/box

##### Buffers\*

<a href="#">AL0-8280</a>	Clarity QSP DNA Loading Buffer	1 L	ea
<a href="#">AL0-8282</a>	Clarity QSP RNA-TBDMS Loading Buffer	1 L	ea

\* RNA-TOM loading buffer available upon request



For more information on the Clarity QSP protocol, depurination, or applications, please request a copy of the Clarity QSP User's Manual.



Request Technical Note [TN-0015](#) Comparing Performance of High-Throughput, Trityl-on RNA/DNA Purification Products to see the benefits of using Clarity QSP over other trityl-on solutions.



## Clarity RP-Desalting<sup>™</sup> Tubes and Well Plates

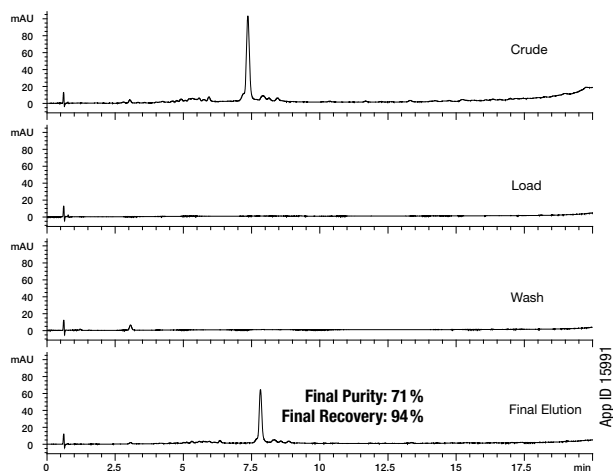
### Quick, Simple Removal of Salt and Reagent

- 70 % typical purity by removing salt and excess reagent
- 80 % typical recovery of target oligo
- For cleanup of trityl-off DNA and RNA sequences
- Removes salt prior to MS analysis
- Also in a high-throughput 96-well plate format

Clarity QSP<sup>™</sup>, and Oligo-RP<sup>™</sup> can be used to yield highly purified target oligonucleotides (> 85 % purity) from a synthesis mixture. For simple desalting and reagent removal of a trityl-off synthetic oligonucleotide, Clarity RP-Desalting tubes can be used. Clarity RP-Desalting tubes are a poly-functional silica-based C18 sorbent that provides a high capacity, fast and effective desalting process.

#### Desalting of Dye-Labeled DNA

**Column:** Clarity 3 μm Oligo-RP C18  
**Dimensions:** 50 x 4.6 mm  
**Part No.:** 00B-4441-E0  
**Mobile Phase:** A: 50 mM TEAA, pH 7.5 / 5 % Acetonitrile  
 B: Methanol  
**Gradient:** A/B (90:10) to A/B (40:60) in 20 min  
**Flow Rate:** 1 mL/min  
**Detection:** UV @ 260 nm  
**Sample:** 25nt DNA oligonucleotide

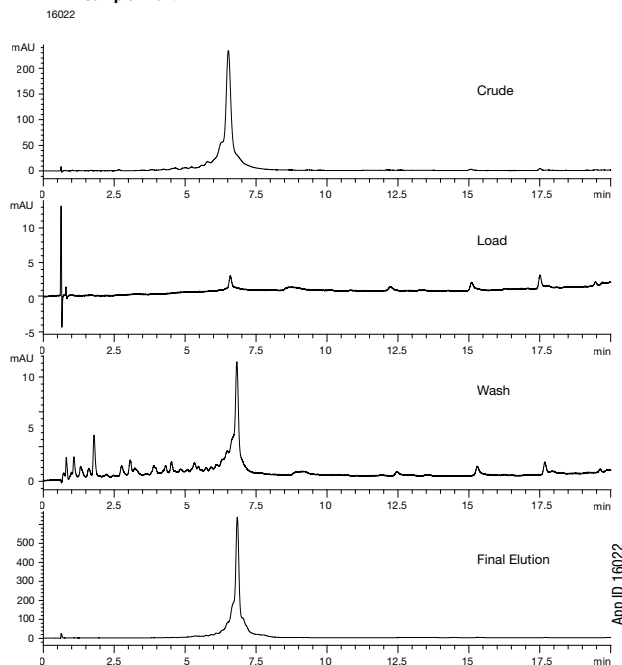


A quencher-labeled sample of DNA (25nt) with the sequence FAMTTGACTTAGACTTAGA-CTTAGTTT was desalted using Clarity RP-Desalting tubes in the 200 mg/3 mL format. Collection fractions were then analyzed for purity and recovery using the above protocol.



#### Crude DNA Desalting

**Column:** Clarity 3 μm Oligo-RP C18  
**Dimensions:** 50 x 4.6 mm  
**Part No.:** 00B-4441-E0  
**Mobile Phase:** A: 50 mM TEAA / 5 % Acetonitrile  
 B: Methanol  
**Gradient:** A/B (90:10) to A/B (40:60) in 20 min  
**Flow Rate:** 1 mL/min  
**Detection:** UV @ 260 nm  
**Sample:** 40nt DNA



#### Ordering Information

##### Clarity RP-Desalting Tubes

	200 mg/3 mL*	500 mg/3 mL**
<b>Phase</b>	50/box	50/box
<b>C18</b>	<a href="#">8B-S041-FBJ</a>	<a href="#">8B-S041-HBJ</a>

##### Clarity RP-Desalting Well Plates\*

Part No.	Description	Unit
<a href="#">8E-S041-SGA</a>	Clarity RP Desalting 150 mg/well	ea



For more information on the Clarity products please contact your Phenomenex technical consultant.

\* For 200 μmol synthesis  
 \*\* For 1 μmol synthesis

# Clarity<sup>®</sup> BioSolutions for Synthetic DNA/RNA

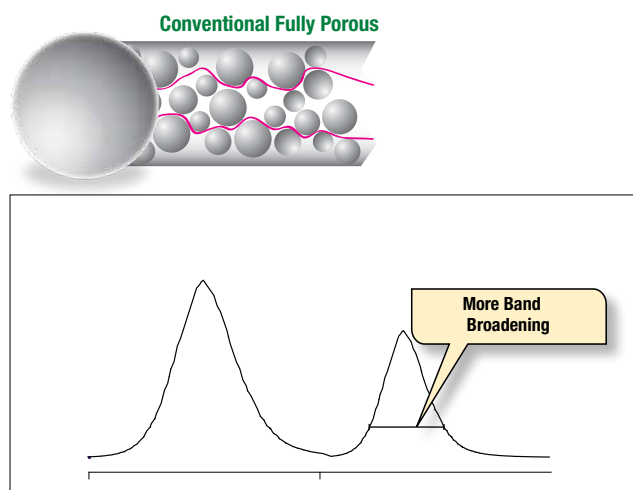
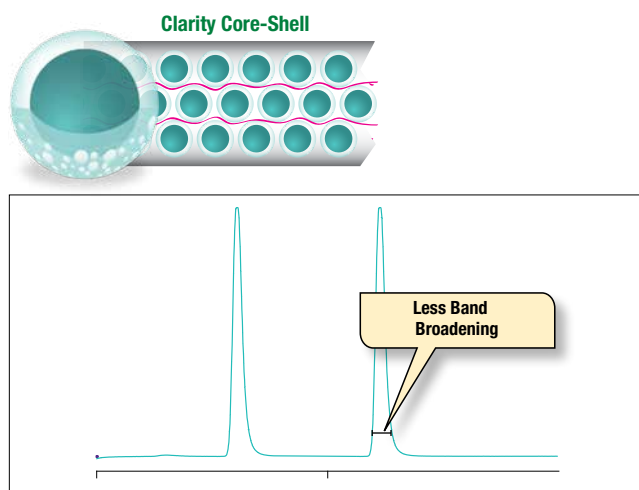
U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

## Clarity Oligo-XT Core-Shell LC Columns

### A Sensitive Solution for Oligo Characterization and Bioanalysis

Unlike traditional fully porous oligo columns, Clarity Oligo-XT relies on the power of core-shell technology to provide extremely high efficiencies for both low and high oligo concentrations. Because the Clarity Oligo-XT particle is not fully porous, analytes spend less time diffusing into and out of the pores as they travel through

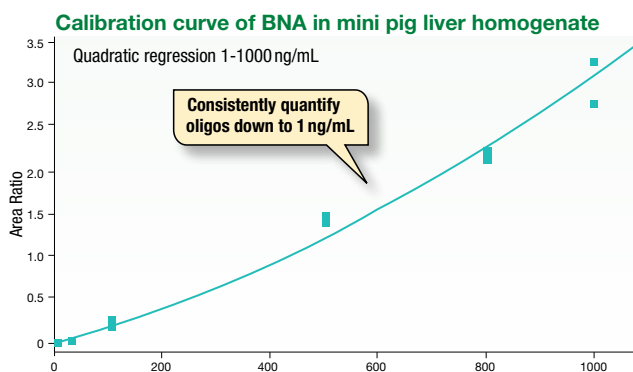
the column, resulting in less band broadening for higher peak efficiencies, making Clarity Oligo-XT a great choice for analyses that require sensitivity such as oligo characterization and oligo analysis from bioanalytical samples.



Fully Porous	VS	Clarity Core-Shell	Average Efficiency Gain with Clarity*
5 $\mu\text{m}$		5 $\mu\text{m}$	90% Higher
3 $\mu\text{m}$		2.6 $\mu\text{m}$	85% Higher
1.7 $\mu\text{m}$		1.7 $\mu\text{m}$	20% Higher

\* May not be representative of all applications

### Sensitive, Reliable Analysis



LC-MS/MS Conditions:

<b>Column:</b> Clarity 5 $\mu\text{m}$ Oligo-XT	<b>Gradient:</b> Time (min)	<b>% B</b>
<b>Dimensions:</b> 50 x 2.1 mm	0.5	30
<b>Part No.:</b> <a href="#">00B-4745-AN</a>	2.5	60
<b>HPLC system:</b> Shimadzu <sup>®</sup> Nexera <sup>®</sup> X2 UHPLC	3	100
<b>Mobile Phase:</b> A: 1.0% HFIP & 0.1% DIEA with 10 $\mu\text{M}$ EDTA in Methanol	3.5	100
B: 1.0% HFIP & 0.1% DIEA with 10 $\mu\text{M}$ EDTA in Methanol/Water (50:50 v/v)	4	30
	5	30
	<b>Flow Rate:</b> 500 $\mu\text{L}/\text{min}$	
	<b>Inj. Volume:</b> 10 $\mu\text{L}$	
	<b>Temperature:</b> 40 $^{\circ}\text{C}$	
	<b>Detection:</b> Thermo Q Exactive <sup>™</sup> Hybrid Quadrupole-Orbitrap <sup>™</sup> Mass Spectrometer, HESI, negative polarity	

## Clarity Oligo-MS<sup>™</sup> LC Columns

### Rapid and Efficient LC-MS Separation for QC and Characterization

- Core-shell particle technology provides improved speed, resolution, and sensitivity
- 2.6 μm particles deliver increased efficiency at reduced backpressures
- Easily transfer quantitative LC-MS methods to any system with 2.6 μm particles
- 1.7 μm particles boost performance of existing sub-2 μm methods

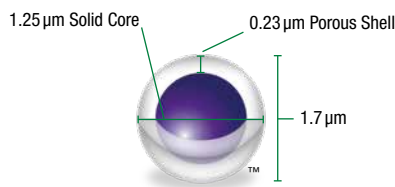
Clarity Oligo-MS, C18 columns have been engineered for the MS characterization of synthetic DNA and RNA samples. This media is based on core-shell technology which generates extremely high efficiencies due to the innovative particle design. This increase in efficiency improves the resolution between critical oligo sequences, gives higher sensitivity for easier MS quantitation, and allows for a decrease in column length for higher throughput.

#### Core-Shell Technology for Synthetic DNA/RNA Analysis

Clarity Oligo-MS media is not fully porous like traditional particles used for the analysis of oligonucleotides. It is a core-shell particle technology which uses a sol-gel processing technique to grow a homogeneous porous shell onto a solid core. This highly optimized process combined with uniform particle size distribution produces a column that generates extremely high plate counts.

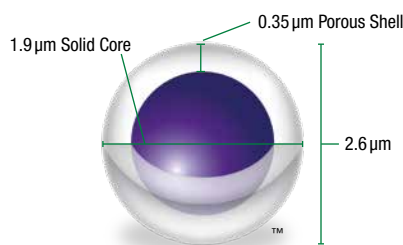
#### 1.7 μm Core-Shell Particle

- Reduced diffusion path maximizes efficiency
- Increased efficiencies compared to traditional fully porous sub-2 μm columns. Typical operating backpressures > 400 bar



#### 2.6 μm Core-Shell Particle

- Reduced diffusion path maximizes efficiency
- Ultra-high performance on any system with Clarity Oligo-MS 2.6 μm columns

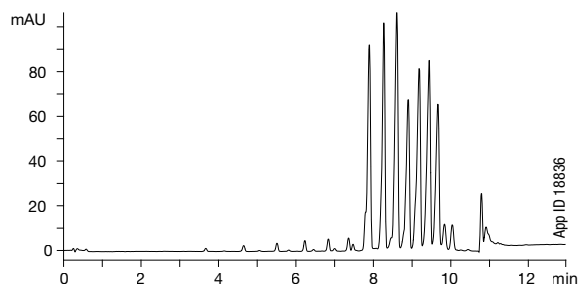


### Achieve Baseline Resolution of N-1 and N+1 Oligo from Target

The high plate counts generated by the Clarity Oligo-MS material produce extremely high efficiencies and thus excellent resolution between oligonucleotides of similar length and structure. Scientists can achieve baseline resolution between synthetic oligonucleotides with just one base difference allowing easier quantitation.

#### Poly dT Standard (12-18mer)

**Column:** Clarity 2.6 μm Oligo-MS C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4479-AN](#)  
**Mobile Phase:** A: 100 mM HFIP / 4 mM TEA / 2% Methanol  
 B: 100 mM HFIP / 4 mM TEA / 98% Methanol  
**Gradient:** A/B (95:5) to A/B (80:20) in 10 min  
**Flow Rate:** 0.5 mL/min  
**Temperature:** 50 °C  
**Detection:** UV @ 260 nm (22 °C)  
**Injection Volume:** 20 μL  
**Sample:** Poly dT (12-18)

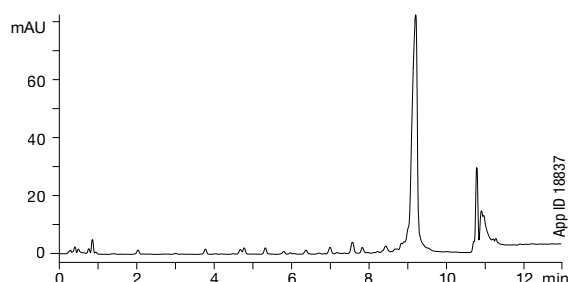


### Rapid Separation of Complex Oligo Samples

Due to the high resolving power of Clarity Oligo-MS columns, high-throughput methods for the separation of complex synthetic mixtures can be developed. Using short (50 mm length) columns, impurities are separated from the peak of interest in less than 12 minutes.

#### Crude DNA 30mer

**Column:** Clarity 2.6 μm Oligo-MS C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4479-AN](#)  
**Mobile Phase:** A: 100 mM HFIP / 4 mM TEA / 2% Methanol  
 B: 100 mM HFIP / 4 mM TEA / 98% Methanol  
**Gradient:** A/B (95:5) to A/B (80:20) in 10 min  
**Flow Rate:** 0.5 mL/min  
**Temperature:** 50 °C  
**Detection:** UV @ 260 nm (22 °C)  
**Injection Volume:** 20 μL  
**Sample:** Crude DNA 30mer





## Clarity Oligo-RP<sup>™</sup> LC Columns

### Reversed Phase LC for Purification and Characterization

- Easily separate N-1 failure sequences from target oligo with > 90 % purities
- Trityl-off purification of DNA, RNA, Thioates, and modified/labeled oligonucleotides
- Preparative dimensions and particle sizes for loads > 5 μmol
- Purify oligos up to 60 mer in length
- Excellent column for reversed phase HPLC quality control (QC) testing

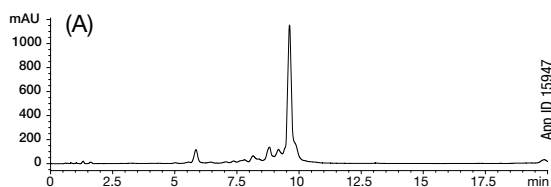
Clarity Oligo-RP has been specifically designed for the reversed phase purification of oligonucleotides with balanced hydrophobicity and polar selectivity. The media is based on composite particle TWIN<sup>™</sup> technology. This technology gives improved selectivity and efficiency for oligonucleotides when compared to other hybrid, polymer, and silica particles found in the marketplace. It is available in 3, 5, and 10 μm particle sized beads and in a variety of dimensions.

#### Preparative Purification on Oligo-RP

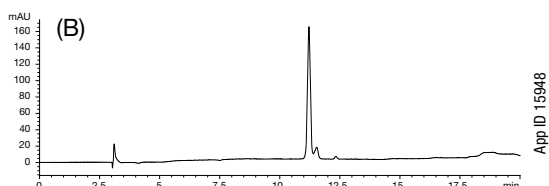
Reversed phase separation of oligonucleotides has advantages over other modes of separations such as ion-exchange. The Oligo-RP phase allows high loadability and delivers high recovery and purity, eliminating the need for extra purification steps. This is achieved through an ion-pair separation of the trityl-off oligonucleotide from failure products and other impurities.

#### DNA Purification (A) Preparative (B) Analytical QC

- Column:** Clarity 3 μm Oligo-RP C18  
**Dimensions:** (A) 50 x 10.0 mm  
 (B) 50 x 4.6 mm  
**Part No.:** (A) [00B-4441-NO](#)  
 (B) [00B-4441-EO](#)  
**Mobile Phase:** A: 50 mM TEAA pH 7.5 / 5 % Acetonitrile  
 B: Methanol  
**Gradient:** 10 % to 60 % B in 20 minutes  
**Flow Rate:** (A) 4.7 mL / min  
 (B) 1.0 mL / min  
**Detection:** UV @ 260 nm  
**Sample:** 20nt DNA



A 200 μg (1 μmol) 20mer DNA sample was loaded onto a 10 mm ID Clarity Oligo-RP column. Impurities were separated from the target sequence.



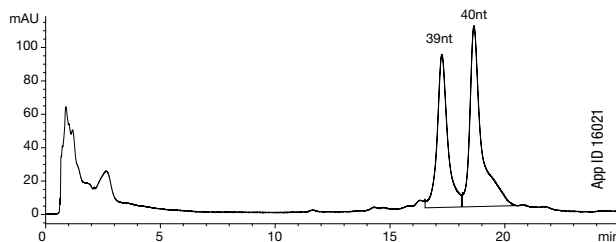
A Clarity Oligo-RP analytical column was used to verify the purity of the preparative purification. A purity of 92 % with a yield of 85 % was determined.

### Separate N-1 Failure Sequences from Target N Sequence

The Oligo-RP sorbent is specifically designed to accommodate all possible interactive features of nucleosides with matching modes of reactivity to its own. The sorbent possesses hydrophobic, dipolar, π-π, and hydrogen bond donor/acceptor sites; this combination of interaction along with an ion-pairing reagent elicits a high degree of differential selectivity between nucleic acids. Thus it can recognize even the slightest changes in nucleotide sequence, such as a difference of one base (N and N-1) or substitution of one base for another.

### DNA Purification of Failure N-1 from Target N Sequence

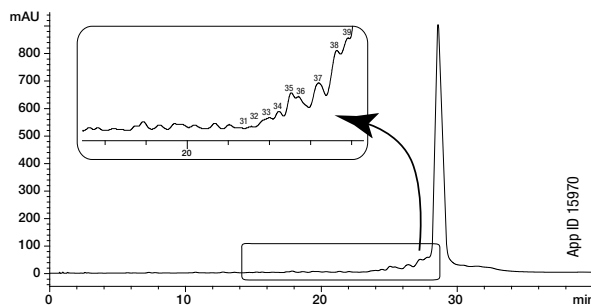
- Column:** Clarity 3 μm Oligo-RP C18  
**Dimensions:** 50 x 4.6 mm  
**Part No.:** [00B-4441-EO](#)  
**Mobile Phase:** A: 50 mM TEAA pH 7.5  
 B: Methanol  
**Gradient:** 10 % to 45 % B in 30 minutes  
**Flow Rate:** 1 mL / min  
**Detection:** UV @ 260 nm  
**Sample:** 1. 40nt DNA with sequence  
 CTCTGAACAGTTGATCTATGCACCTTCAGACTTATGATCA (2.5 μg)  
 2. 39nt DNA with sequence  
 TTCTGAACAGTTGATCTATGCACCTTCAGACTTATGATCA (2.5 μg)



Clarity Oligo-RP successfully separates a 40mer from a 39mer DNA oligonucleotide due to its excellent efficiency and resolving power.

### Fingerprint of 40mer DNA

- Column:** Clarity 3 μm Oligo-RP C18  
**Dimensions:** 50 x 4.6 mm  
**Part No.:** [00B-4441-EO](#)  
**Mobile Phase:** A: 50 mM TEAA pH 7.5 / 5 % Acetonitrile  
 B: Methanol  
**Gradient:** 20 % to 25 % B in 20 minutes; hold at 5 minutes @ 25 % B  
**Flow Rate:** 1 mL / min  
**Detection:** UV @ 260 nm  
**Sample:** 40nt DNA with sequence  
 5'-CTC CTG GGC AGT GGA TCT GCG CACTTC AGG CTC CTG GGC A-3'



Due to the high efficiency of the sorbent and ion-pairing interactions, a fingerprint of a crude 40mer DNA on Clarity Oligo-RP is produced illustrating baseline resolution of impurities from the final product.

## Clarity Oligo-XT, Oligo-MS<sup>™</sup>, and Oligo-RP<sup>™</sup> LC Columns

### Ordering Information

Minibore Columns (mm)				SecurityGuard <sup>™</sup> Cartridges (mm)	SecurityGuard <sup>™</sup> ULTRA Cartridges <sup>†</sup>
Phase	50 x 2.0	100 x 2.0	150 x 2.0	4 x 2.0*	—
3 μm Oligo-RP C18	<a href="#">00B-4441-B0</a>	<a href="#">00D-4441-B0</a>	<a href="#">00F-4441-B0</a>	/10pk <a href="#">AJ0-8134</a>	—
5 μm Oligo-RP C18	—	—	<a href="#">00F-4442-B0</a>	/10pk <a href="#">AJ0-8134</a>	—
Phase	50 x 2.1	100 x 2.1	150 x 2.1	—	2.1
1.7 μm Oligo-MS C18	<a href="#">00B-4480-AN</a>	<a href="#">00D-4480-AN</a>	—	—	/3pk <a href="#">AJ0-9068</a>
2.6 μm Oligo-MS C18	<a href="#">00B-4479-AN</a>	<a href="#">00D-4479-AN</a>	<a href="#">00F-4479-AN</a>	—	/3pk <a href="#">AJ0-9068</a>
1.7 μm Oligo-XT	<a href="#">00B-4747-AN</a>	<a href="#">00D-4747-AN</a>	—	—	/3pk <a href="#">AJ0-9515</a>
2.6 μm Oligo-XT	<a href="#">00B-4746-AN</a>	<a href="#">00D-4746-AN</a>	—	—	/3pk <a href="#">AJ0-9515</a>
5 μm Oligo-XT	<a href="#">00B-4745-AN</a>	—	—	—	<a href="#">AJ0-9515</a>

for ID: 2.0-3.0 mm      for 2.1 mm ID



**Find additional LC columns for oligonucleotide analysis in our Biozen portfolio**

See pp. 210 - 230

Analytical Columns (mm)					SecurityGuard <sup>™</sup> Cartridges (mm)	SecurityGuard <sup>™</sup> ULTRA Cartridges <sup>†</sup>
Phase	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*	4.6
2.6 μm Oligo-MS C18	<a href="#">00B-4479-E0</a>	<a href="#">00D-4479-E0</a>	—	—	—	/3pk <a href="#">AJ0-9066</a>
2.6 μm Oligo-XT	<a href="#">00B-4746-E0</a>	<a href="#">00D-4746-E0</a>	—	—	—	/3pk <a href="#">AJ0-9514</a>
3 μm Oligo-RP C18	<a href="#">00B-4441-E0</a>	<a href="#">00D-4441-E0</a>	<a href="#">00F-4441-E0</a>	—	/10pk <a href="#">AJ0-8135</a>	—
5 μm Oligo-RP C18	<a href="#">00B-4442-E0</a>	—	<a href="#">00F-4442-E0</a>	<a href="#">00G-4442-E0</a>	/10pk <a href="#">AJ0-8135</a>	—
5 μm Oligo-XT	—	—	<a href="#">00F-4745-E0</a>	—	—	/3pk <a href="#">AJ0-9514</a>
10 μm Oligo-RP C18	—	—	<a href="#">00F-4445-E0</a>	<a href="#">00G-4445-E0</a>	/10pk <a href="#">AJ0-8135</a>	—

for ID: 3.2-8.0 mm      for 4.6 mm ID

Semi-Prep Columns (mm)					SecurityGuard <sup>™</sup> Cartridges (mm)
Phase	50 x 10.0	100 x 10.0	150 x 10.0	250 x 10.0	10 x 10 <sup>†</sup>
3 μm Oligo-RP C18	<a href="#">00B-4441-N0</a>	—	—	—	/3pk <a href="#">AJ0-8136</a>
5 μm Oligo-RP C18	<a href="#">00B-4442-N0</a>	<a href="#">00D-4442-N0</a>	<a href="#">00F-4442-N0</a>	<a href="#">00G-4442-N0</a>	/3pk <a href="#">AJ0-8136</a>
5 μm Oligo-XT	<a href="#">00B-4745-N0</a>	<a href="#">00D-4745-N0</a>	<a href="#">00F-4745-N0</a>	—	/3pk <a href="#">AJ0-9516</a>
10 μm Oligo-RP C18	—	—	<a href="#">00F-4445-N0</a>	<a href="#">00G-4445-N0</a>	/3pk <a href="#">AJ0-8136</a>

for ID: 9-16 mm



For more about SecurityGuard ULTRA and cartridge holder ordering information, see p. 335.

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP<sup>™</sup> products on pp. 417-418



For Column Heater, see p. 416

Axia <sup>™</sup> Packed Preparative Columns (mm)					SecurityGuard <sup>™</sup> Cartridges (mm)	
Phase	100 x 21.2	150 x 21.2	250 x 21.2	150 x 30	15 x 21.2**	15 x 30.0*
5 μm Oligo-RP C18	<a href="#">00D-4442-P0-AX</a>	—	<a href="#">00G-4442-P0-AX</a>	—	/ea <a href="#">AJ0-8210</a>	/ea <a href="#">AJ0-8310</a>
5 μm Oligo-XT	<a href="#">00D-4745-P0-AX</a>	<a href="#">00F-4745-P0-AX</a>	<a href="#">00G-4745-P0-AX</a>	<a href="#">00F-4745-U0-AX</a>	/ea <a href="#">AJ0-9517</a>	/ea <a href="#">AJ0-9518</a>
10 μm Oligo-RP C18	—	<a href="#">00F-4445-P0-AX</a>	<a href="#">00G-4445-P0-AX</a>	<a href="#">00F-4445-U0-AX</a>	/ea <a href="#">AJ0-8210</a>	/ea <a href="#">AJ0-8310</a>

for ID: 18-29 mm      30-49 mm

\*SecurityGuard<sup>™</sup> Analytical Cartridges require universal holder Part No.: [KJ0-4282](#)

†SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

\*\*PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)

•PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8277](#)

†SecurityGuard ULTRA cartridges require holder, Part No.: [AJ0-9000](#)

## General Laboratory Consumables

<b>Autosampler Vials and Accessories</b> .....	27-48
Filter Membranes .....	13
Filtration System.....	11
<b>Syringe Filters</b> .....	8-10

## GC Accessories

<b>Autosampler Vials and Accessories</b> .....	27-48
Capillary Unions and Splitters .....	181
Capillary Column Mini-Unions .....	181
Ceramic Scoring Wafer (Capillary Cutter) .....	184
Column Test Standards .....	185
<b>Cool-Lock Nut</b> .....	167-168
<b>Ferrules</b> .....	169-170
Ferrule Remover Tool Kit .....	184
FID Flame Detector Jet Cleaning Kit .....	184
<b>Filtration Products</b> .....	7-16
Gas Management .....	182-183
Gas Purifiers and Traps .....	184
GC Fittings .....	168
<b>Injector Inlet Base Seals</b> .....	165-166
Injector Inlet Septa .....	171-172
<b>Injection Port Inlet Liners</b> .....	173-180
Installation Nuts .....	167-168
Merlin Microseal Septum .....	172
Polyimide Resin .....	181
Sealing Rings.....	171
<b>Septa</b> .....	171-172
<b>Syringes</b> .....	18-22
Test Mixes.....	185
<b>Vials and Accessories</b> .....	27-48

## HPLC Accessories

Adapters .....	419
<b>Autosampler Vials and Accessories</b> .....	27-48
Backpressure Regulators.....	423
Calibration Standards Kits .....	339
<b>Column Protection</b> .....	330, 416, 441
<b>Column Heater</b> .....	416
Column Sealing Plugs .....	422
Column Test Standards.....	424-425
Core-Shell Performance Enhancement Kit .....	421
Couplers.....	422
<b>Equipment</b> .....	416
<b>Filters</b> .....	7-16
Filter Cap .....	12
Filter Membranes .....	13
<b>Filtration Products</b> .....	7-16

## HPLC Accessories (cont'd)

Filtration System.....	11
Fingertight Fittings .....	422
<b>Fittings</b> .....	419-423, 430
Fitting Tightening Tool.....	420
Flangeless Fittings .....	423
<b>Inlet Filters</b> .....	14
<b>In-line Filters</b> .....	15-16
LC-MS Gas Filter.....	182-183
Mixing Tee, PEEK .....	423
<b>Mobile Phase Accessories</b> .....	11-16
Mobile Phase Pickup Adapter .....	12
Mobile Phase Reservoir and Reagent Bottles .....	12
Mobile Phase Safety Products .....	417-418
Polymer Calibration Standards.....	339
Reducing Adapters.....	419
Rheodyne Fitting Wrench.....	427, 431
Sample Injectors.....	428-431
<b>SecurityCAP LC Solvent Safety Products</b> .....	12, 417
SecurityGuard Column Protection.....	330, 416
<b>SecurityLINK UHPLC Connections</b> .....	336-337
Solvent Reservoir, Reagent Bottles, and Caps.....	12
Solvent Safety Products .....	12, 417
<b>Standards</b> .....	424, 425
Sure-Lok Coupler .....	422
<b>Syringes</b> .....	23-24
<b>Syringe Filters</b> .....	8-10
<b>Tubing</b> .....	426-427
UHPLC Fittings.....	336-337, 420-421
Unions.....	419
<b>Valves</b> .....	428-431
<b>Vials</b> .....	27-48
Wrenches / Spanners .....	427
Zero Dead-Volume Unions .....	419

# Accessories and Lab Safety



“Always pleasant dealing  
with Phenomenex. I am a happy  
customer.”

**Avrom Litin  
Enthone**





The opinions stated herein are solely those of the speaker  
and not necessarily those of any company or organization.



# HPLC Column Protection / Equipment

## The Most Important Thing You Can Do... Use Guard Columns

Phenomenex recommends the use of SecurityGuard™ to protect all your valuable HPLC/UHPLC/SFC/PREP columns from chemical contaminants and damaging microparticulates. See page 330.

Analytical	SemiPrep
<p>For analytical separations the SecurityGuard innovative design provides a universal fit to virtually any HPLC column endfitting. Learn more about this unique cartridge system and the many benefits SecurityGuard gives you.</p> <p><b>SecurityGuard ULTRA</b></p>  <p>All core-shell and / or &lt; 3 µm particle columns (&lt; 20000 psi / 1378 bar) Holder P/N <a href="#">AJ0-9000</a> See page 335.</p> <p><b>SecurityGuard Standard</b></p>  <p>All non core-shell and / or ≥ 3 µm particle columns (5000 psi / 345 bar) Holder P/N <a href="#">KJ0-4282</a> See page 330.</p>	 <p>10 mm ID Guard Holder P/N <a href="#">AJ0-9281</a></p>  <p>Use with 9 to 16 mm ID Columns Cartridge size: 10 x 10 mm ID</p>

## Single-Column Heater 25 °C to 90 °C

### ThermaSphere™ TS-130

Maintains the temperature of your HPLC column (and guard, if any) at a precise degree set by user, thus improving reproducibility and chromatographic results.

Essential for improving virtually all types (modes) of HPLC separations.

- Improves reproducibility and chromatographic results
- Improves baseline and overall detector performance
- Reduces analyte identification errors
- Improves peak efficiency and analyte quantitation (especially at low levels)
- Improves the ruggedness of separations (within-lab and lab-to-lab)



Column heater showing front control/display panel

### Specifications

Column Size Accommodated:	Fits up to one 30 cm length column, or 25 cm column with guard column. Multiple inlet and outlet slots allow the shortest length of tubing to be used with any length column.
Temperature Range:	From 25 to 90 °C in 0.1 °C increments.
Temperature Stability:	±0.1 °C Calibration two-point, electronic, factory set.
Accuracy:	0.5 °C over the entire range.
Power:	12 volt DC universal power supply takes voltage inputs from 95 to 265 VAC, 50/60 Hz. CE approved.
Over-temperature Alarm:	Audible with automatic heater shutoff if column temperature exceeds 10 °C of target temperature.
Auto-Off Timer:	Count down timer with audible alarm turns off heater, settable to 30 days in days, hours, minutes and seconds.
Injection Counter:	Trigger on external switch closure.

### Ordering Information

#### ThermaSphere TS-130 Column Heater

Part No.	Description
<a href="#">EH0-7057</a>	ThermaSphere TS-130 HPLC Column Heater 25-90 °C, 95 to 265 VAC, 50/60 Hz



1. The ThermaSphere TS-130 is warranted for one year parts and labor. Each unit is individually calibrated and comes with a Certificate of Performance. No adjustment or re-calibration is ever necessary. CE approved system, UL and CSA approved power supplies.
2. Please specify Line Cord if other than North America (Australia, Germany, Italy and U.K. are available)

PREPARATIVE		
HPLC	SFC	
 <p>21.2 mm ID <b>HPLC Holder</b> P/N <a href="#">AJ0-8223</a></p>	 <p>21.2 mm ID <b>SFC Holder</b> P/N <a href="#">AJ0-8617</a></p>	 <p>Use with 18 to 29 mm ID Columns Cartridge size: 15 x 21.2 mm ID</p>
 <p>30 mm ID <b>HPLC Holder</b> P/N <a href="#">AJ0-8277</a></p>	 <p>30 mm ID <b>SFC Holder</b> P/N <a href="#">AJ0-8618</a></p>	 <p>Use with 30 to 49 mm ID Columns Cartridge size: 15 x 30.0 mm ID</p>



## Increase Lab Safety with HPLC/UHPLC Solvent Protection SecurityCAPs

The SecurityCAP mobile phase and solvent waste safety caps inhibit dangerous vapors and gases from leaving HPLC/UHPLC solvent reservoirs. Over time, these chemicals can have a negative impact on the health of all employees and visitors in the lab. When lab safety and dependable results are a priority, you need SecurityCAPs!

### Mobile Phase Safety Filter and Cap

- Increases Health and Worker Safety**  
Solvent vapors and gasses are restricted to their containers
- Protects HPLC/UHPLC Results**  
Eliminates dust and other air contaminants from testing results
- Confidence During Quality and Safety Audits**  
Eliminate aluminum foil or Parafilm® covering solvent bottles



The SecurityCAP mobile phase safety filters have an integrated one-way valve and filter membrane that captures dust, particulates, and other airborne contaminants. This prevents unwanted items from entering the solvent container which can cause irreproducible HPLC/UHPLC results, solvent contamination, bacterial growth and ghost peaks, all of which could negatively impact both your chromatography and HPLC/UHPLC system.

### HPLC/UHPLC Solvent Top/Cap Comparison

SecurityCAP offers several advantages over insufficient non-sealed tops/caps which can lead to both hazardous lab conditions and poor chromatography results. When it comes to lab safety, saving money on expensive solvents and ensuring solvent protection, there is no comparison to SecurityCAP.

	Open Top	Aluminum foil wrapped bottle top	Cap with two 10 mm holes in the plastic	SecurityCAP™
Protects staff and visitors from volatile organic compounds released into lab	No	No	No	Yes
Ensures confidence during quality and safety audits	No	No	No	Yes
Protects solvents from both atmospheric particulates and contaminants	No	No	No	Yes
Saves money by preventing solvent evaporation	No	No	No	Yes
Prevents chemical spills/ splashes	No	No	No	Yes
Time monitor device for protection	No	No	No	Yes
100% Sealable	No	No	No	Yes
Easy to use	Yes	No	Yes	Yes
Improves lab safety	No	No	No	Yes

### Waste Exhaust Filter and Cap

- Safer Laboratory Work Environment**  
Harmful chemical vapors are safely collected and air quality is protected
- Large Capacity Waste Safety Filter**  
High surface area (560m<sup>2</sup>/g) multi-compound adsorbent
- Easy to Use**  
No more twisting tubes during bottle exchange



SecurityCAP solvent waste caps and exhaust filters ensure lab air quality. Feel confident that volatile vapors from solvent waste containers are being captured safely, beyond fume cupboards or hoods.

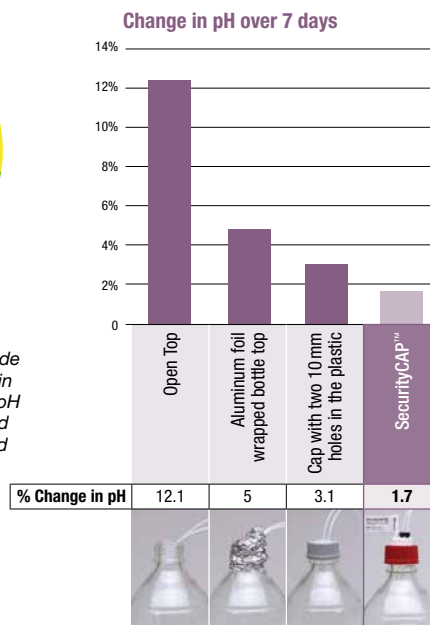
### Prevent Unwanted Changes in Mobile Phase pH

As every chromatographer knows, the pH of the mobile phase can have dramatic effects on selectivity, capacity factor (retention factor), peak shape, resolution, and reproducibility of your HPLC/UHPLC analysis. Because slight variations in pH can have a dramatic impact on the separation, careful mobile phase preparation and protection are essential. When compared to other mobile phase solvent tops, SecurityCAP offers the solution to ensure the mobile phase pH will stay constant during use. This ensures reliable solvent conditions for results you can trust!

Download complete technical note at:  
[www.phenomenex.com/SecurityCAP](http://www.phenomenex.com/SecurityCAP)



A 1L solution of 4 mM ammonium bicarbonate buffer at pH 11 was made for each bottle and left in a hood for 7 days. The pH was checked before and after the experiment and the percent difference was calculated.



Continued on next page

# Lab Safety (cont'd)



## Mobile Phase (Eluent) Safety Starter Kits

### Ordering Information

#### SecurityCAP™ Mobile Phase Starter Kits

Part No.	Description	Unit
<a href="#">AC2-1245</a>	2-port GL45 Cap and 6-month Safety Filter	ea
<a href="#">AC2-4245</a>	2-port GL45 Caps (x4) and 6-month Safety Filter (x4)	ea
<a href="#">AC2-4240</a>	2-port Merck S40 Caps (x4) and 6-month Safety Filter (x4)	ea
<a href="#">AC2-1345</a>	3-port GL45 Cap and 6-month Safety Filter	ea
<a href="#">AC2-4345</a>	3-port GL45 Caps (x4) and 6-month Safety Filter (x4)	ea
<a href="#">AC2-1445</a>	4-port GL45 Cap and 6-month Safety Filter	ea
<a href="#">AC2-4445</a>	4-port GL45 Cap (x1) and 2-port Cap (3x) and 6-month Safety Filter (x4)	ea
<a href="#">AC2-1545</a>	5-port GL45 Cap and 6-month Safety Filter	ea
<a href="#">AC2-1561</a>	5-port S60/S61 Cap and 6-month Safety Filter	ea

## Waste Safety Starter Kits

### Ordering Information

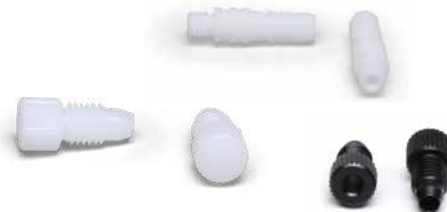
#### SecurityCAP Waste Starter Kits

Part No.	Description	Unit
<a href="#">AC1-1245</a>	2-port GL/DIN45 Cap and 6-month Exhaust Filter and Barbed connector	ea
<a href="#">AC1-1545</a>	5-port GL/DIN45 Cap and 6-month Exhaust Filter	ea
<a href="#">AC1-1551</a>	5-port DIN51 Cap and 6-month Exhaust Filter	ea
<a href="#">AC1-1553</a>	5-port B53 Cap and 6-month Exhaust Filter	ea
<a href="#">AC1-1561</a>	5-port S61 Cap and 6-month Exhaust Filter	ea

Mobile Phase Safety Filter



Waste Safety Filters



## Replacement Filters

### Ordering Information

#### SecurityCAP Mobile Phase Safety Filter

Part No.	Description	Unit
<a href="#">AC2-0161</a>	6-month Capacity, 1/4 in.-28 Threads	ea
<a href="#">AC2-0961</a>	6-month Capacity, 1/4 in.-28 Threads	10/pk

#### SecurityCAP Waste Safety Filters

Part No.	Description	Unit
<a href="#">AC1-0161</a>	6-month Exhaust Filter for SecurityCAP, 1/4 in.-28 Threads	ea
<a href="#">AC1-0361</a>	6-month Exhaust Filter for SecurityCAP, 1/4 in.-28 Threads	3/pk
<a href="#">AC1-0162</a>	6-month Exhaust Filter for Wide-port Caps, GL14 Threads	ea
<a href="#">AC1-0362</a>	6-month Exhaust Filter for Wide-port Caps, GL14 Threads	3/pk

## SecurityCAP Waste Safety Filter Compatibility Table

Supplier	Phenomenex SecurityCAP Filters	
	ea	3/pk
S.C.A.T.® SafetyWasteCaps	<a href="#">AC1-0162</a>	<a href="#">AC1-0362</a>
AIT® Smart Healthy Caps	<a href="#">AC1-0162</a>	<a href="#">AC1-0362</a>
Agilent® InfinityLab Stay Safe Caps	<a href="#">AC1-0162</a>	<a href="#">AC1-0362</a>
VICI Jour® Waste Caps	<a href="#">AC1-0161</a>	<a href="#">AC1-0361</a>
Canary-Safe™ Safety Caps	<a href="#">AC1-0162</a>	<a href="#">AC1-0362</a>
DURAN® DG Safety Caps	<a href="#">AC1-0162</a>	<a href="#">AC1-0362</a>
VapLock™ Safety Caps (with <a href="#">AC3-1111</a> )	<a href="#">AC1-0161</a>	<a href="#">AC1-0361</a>

## Fittings and Accessories

### Ordering Information

#### SecurityCAP Fittings

Part No.	Description	Unit
<a href="#">AC3-1101</a>	for 1/16 in. or 2.0 mm ID Tubing, 1/4 in.-28 Threads (POM), blue	ea
<a href="#">AC3-1201</a>	for 2.3-2.6 mm ID Tubing, 1/4 in.-28 Threads (POM), white	ea
<a href="#">AC3-2101</a>	for 1/8 in. ID Tubing, 1/4 in.-28 Threads (POM), black	ea

#### SecurityCAP Connectors

Part No.	Description	Unit
<a href="#">AC3-1001</a>	Barbed connector, for 5-8 mm ID Tubing (PTFE), white	ea
<a href="#">AC3-1301</a>	Y-connector for 6-8 mm ID Tubing (POM), white	ea

#### SecurityCAP Adapter

Part No.	Description	Unit
<a href="#">AC2-1138</a>	Cap Thread Adapter, PTFE, GPI/GL 38 Female to GL45 Male	ea
<a href="#">AC3-1111</a>	Waste Adapter for Male 1/4 in. NPT-port (PTFE)	ea

#### SecurityCAP Sealing Plug

Part No.	Description	Unit
<a href="#">AC3-2001</a>	1/4 in.-28 Threads (POM), white	ea



POM = polyoxymethylene  
PTFE = polytetrafluoroethylene (Teflon®)

#### Disclaimer

The 6 month SecurityCAP filter lifetime is a general guideline based on running a single instrument for 8 hours a day at 1mL/min. SecurityCAP filters may need to be changed more or less frequently based on the system usage.

# Fittings

## 1/4 in.-28 to 10-32 Standard Adapter

- Make connections between different pieces of liquid handling equipment
- Simple to use fingertight design
- Made of sturdy and inert PEEK
- Pressure rated to 1500 psi (103 bar)



### Ordering Information

#### Standard Adapter

Part No.	Description	Unit
<a href="#">AQO-3351</a>	1/4 in.-28 to 10-32 Standard Adapter, PEEK	ea

## Ultra-High Performance LC/HPLC Stainless Steel Zero Dead-Volume Union

- Pressure rated to 28000 psi (1930 bar)
- For 1/16 in. OD tubing, with 10-32 threading
- 0.010 in. thru hole, 20 nL swept volume
- Includes 2 fittings (nuts and ferrules)



### Ordering Information

#### Zero Dead-Volume Union (Stainless Steel)

Part No.	Description	Unit
<a href="#">AQO-8507</a>	Zero Dead-Volume Union, SS, with Fittings, 10-32, for 1/16 in. Tubing, 28000 psi (1930 bar)	ea

## Reducing Adapters

Two reducing adapters for 50mm ID Prep columns allow smaller 1/16 in. ID system tubing to be used with the larger 1/8 in. ID column inlet end fittings, forming a positive leak-free seal with zero dead volume. The smaller line from your system goes directly into the adapter and the sample goes directly into the column, without the short pieces of connecting tubing required if a reducing union was used instead. Once the fitting is installed, only one wrench is required to remove and reinstall it. Each end of the column requires a fitting.

### [AQO-9222](#)

Reducing Adapter for 50 mm ID Axia Preparative HPLC/SFC Hardware



### [AQO-7555](#)

Reducing Adapter for 50 mm ID Traditional (Non-Axia) HPLC/SFC Hardware



### Ordering Information

#### Reducing Adapters

Part No.	Description	Unit
<b>Complete Assembly</b>		
<a href="#">AQO-9222</a>	Reducing Adapter, 1/8 in. to 1/16 in. for 50 mm ID Axia Preparative HPLC/SFC Hardware, 1.0 mm (0.040 in.) ID thru-hole	2/pk
<a href="#">AQO-7555</a>	Reducing Adapter, 1/8 in. to 1/16 in. for 50 mm ID Traditional (Non-Axia) HPLC/SFC Hardware	2/pk
<b>Replacement Parts</b>		
<a href="#">AQO-7554</a>	1/8 in. Fittings for 50 mm ID Rounded Hardware, 2 Nuts and 2 Ferrules (Non-Axia Columns)	2/pk
<a href="#">AQO-3018</a>	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea

## PEEK Zero Dead-Volume Union

- Chemically inert and fully biocompatible
- Zero dead-volume connection, 0.010 in. thru-hole
- Wrench/fingertight fittings
- Pressure rated to 5000 psi (345 bar)



### Ordering Information

#### PEEK Zero Dead-Volume Union

Part No.	Description	Unit
<a href="#">AQO-1674</a>	PEEK Zero Dead-Volume Union, 0.010 in. thru-hole, with 2 fingertight fittings	ea



### Maximum Temperature Ratings (°C)

Material	Tubing	Fitting
PEEK	100	150
Delrin®	N/A	60
Teflon® (PTFE)	80	80
Polyethylene (UHMW)	N/A	50
Polypropylene	N/A	40
KEL-F®	N/A	80
Tefzel®	80	80

# Fittings

## Ultra-High Performance LC Fittings

### UHPLC / HPLC Sure-Lok™ High Pressure PEEK Male Nut Fittings

- Pressure rated to 12000 psi (827 bar)
- Stable up to temperatures of 200 °C

Made of a proprietary PEEK blend, these ultra-high performance polymeric fittings are compatible for most UHPLC/HPLC applications, and best for ion- and bio-chromatography. High pressure nuts have a knurled surface designed to provide sufficient sealing force on the ferrule without wrenches. For 1/16 in. diameter tubing, there are two design types. The convenient one-piece design is pressure rated on S.S. tubing to 12000 psi (827 bar) and stable up to temperatures of 200 °C. The second type is engineered as a 3-piece unit, with a ferrule and stainless steel gripping ring, that will provide leak-free connections up to 19000 psi (1310 bar), on S.S. tubing. Upper pressure limits of these fittings when used with polymeric tubing (such as PEEK) depends on the pressure rating of the tubing. Phenomenex PEEK tubing is rated to 7000 psi (482 bar). For higher pressure-rated fittings use the stainless steel nut and ferrule set (AQO-8506).

**AQO-8503**  
Pressure rated up to 12000psi (827 bar)



**AQO-8504**  
shown with AQO-8505  
Pressure rated to 19000psi (1310 bar)



#### Ordering Information

##### Sure-Lok High Pressure PEEK Nuts

Part No.	Description	Unit
<a href="#">AQO-8502</a>	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)	2/pk
<a href="#">AQO-8503</a>	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)**	10/pk
<a href="#">AQO-8504</a>	Sure-Lok High Pressure PEEK Nut, 10-32, for 1/16 in. Tubing, 19000 psi (1310 bar) ***†	10/pk
<a href="#">AQO-8505</a>	Sure-Lok PEEK Ferrule Assembly (2-pc), for High Pressure 2-Pc Nut ( <a href="#">AQO-8504</a> )	10/pk

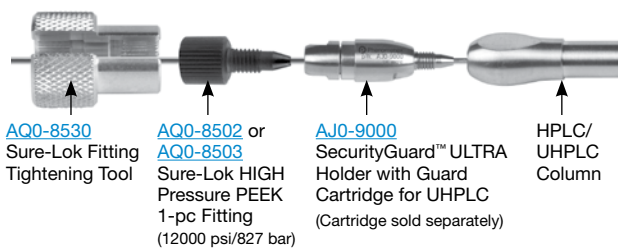
\* Ferrule assembly ([AQO-8505](#)) must be ordered separately.

\*\* Sure-Lok fitting tightening tool is required for [AQO-8503](#) and [AQO-8504](#)

† Recommended for PEEKsil™ tubing applications.

### Sure-Lok™ Fitting Tightening Tool

Use this handy tool to tighten any standard, short- or long-style knurl-headed (high pressure) male nut like the ones above. The tool can also be used with many of the low-pressure nuts commonly used in the lab.



**AQO-8530**  
Sure-Lok Fitting Tightening Tool

**AQO-8502** or **AQO-8503**  
Sure-Lok HIGH Pressure PEEK 1-pc Fitting (12000 psi/827 bar)

**AJ0-9000**  
SecurityGuard™ ULTRA Holder with Guard Cartridge (Cartridge sold separately)

HPLC/ UHPLC Column

#### Ordering Information

##### Sure-Lok Fitting Tightening Tool

Part No.	Description	Unit
<a href="#">AQO-8530</a>	Sure-Lok Fitting Tightening Tool, Aluminum	ea

### Ultra-High Performance LC/HPLC Stainless Steel Nut and Ferrule Set

For the ultra-high pressure connections use this specially-designed 10-32 stainless steel nut and ferrule set. The metal ferrule cuts a ring near the end of the tube to swage the fitting to the tube, and will provide a maximum operational limit of 28000 psi (1930 bar).



#### Ordering Information

##### Nut and Ferrule Set (Stainless Steel)

Part No.	Description	Unit
<a href="#">AQO-8521</a>	Nut and Ferrule Set, SS, 10-32, for 1/16 in. Tubing, 28000 psi (1930 bar)	2/pk
<a href="#">AQO-8506</a>	Nut and Ferrule Set, SS, 10-32, for 1/16 in. Tubing, 28000 psi (1930 bar)	10/pk



Important: To achieve the maximum pressure rating, 45 lbs of torque is required.

### PEEKlok™ Fitting Connections

PEEKlok is designed specifically for PEEKsil™ tubing, delivering better chromatography when connecting columns, valves, and LC modules.

- Holds to 22000 psi (>1500 bar) - Ultra High Pressure Liquid Chromatography (UHPLC) fitting
- For use with 1/16 in. OD and 1/32 in. OD PEEKsil tubing
- 10-32, 6-32, and 6-40 fitting options

**AQO-7600**  
(2 x fittings, 6 x ferrules and 1 x wrench)



**AQO-7602**  
(2 x fittings, 6 x ferrules and 1 x tightening tool)



#### Ordering Information

##### PEEKlok Fittings

Part No.	Description	Unit
<a href="#">AQO-7600</a>	PEEKlok fittings with 10-32 thread for 1/32 in. OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea
<a href="#">AQO-7601</a>	PEEKlok fittings with 10-32 thread for 1/16 in. OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea
<a href="#">AQO-7602</a>	PEEKlok fittings with 6-40 thread for 1/32 in. OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
<a href="#">AQO-7603</a>	PEEKlok fittings with 6-32 thread for 1/32 in. OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea



For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

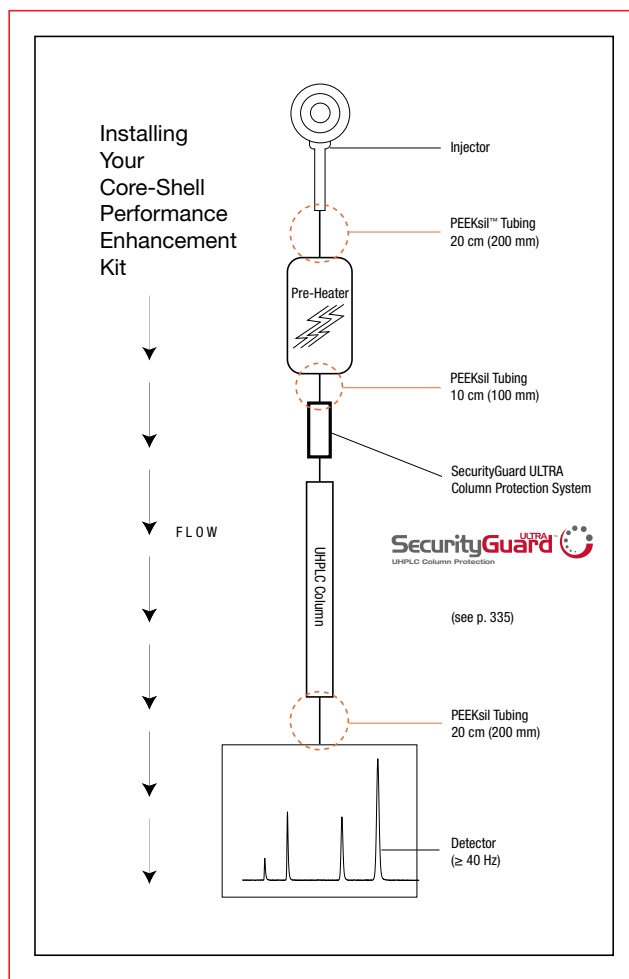
For more about SecurityGuard ULTRA Guard Cartridge System for UHPLC, see p. 335



## Core-Shell Performance Enhancement Kit

- Optimize UHPLC system connections – for both routine and critical applications
- Increase method efficiency, resolution, and detection
- Minimize dead volume between injector and detector
- Improve results for sensitive and demanding applications

The connections made throughout the system are critical to maximizing the benefit from your UHPLC setup. The fittings and tubing used in this kit are carefully chosen to minimize dead volume and reduce band broadening. Combined with a core-shell column and the SecurityGuard™ ULTRA column protection system, the kit will provide reliable connections and quality performance every time.



### Ordering Information

#### Core-Shell Performance Enhancement Kit

Part No.	Description	Unit
<a href="#">AQO-8892</a>	Core-Shell Performance Enhancement Kit, Includes: PEEKsil™ Tubing, Fittings and Tool*	ea

\*Kit [AQO-8892](#) includes the following components:

	Kit Quantity
PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 20 cm L, Red	2/pk
PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 10 cm L, Red	ea
Sure-Lok™ High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing	10/pk
Sure-Lok Fitting Tightening Tool, Aluminum	ea

#### Accessories and Replacement Parts

Part No.	Description	Unit
<a href="#">ATO-8896</a>	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 20 cm L, Red	5/pk
<a href="#">ATO-8897</a>	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 10 cm L, Red	5/pk
<a href="#">AQO-8503</a>	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing	10/pk
<a href="#">AQO-8530</a>	Sure-Lok Fitting Tightening Tool, Aluminum	ea



For more information on: Part No. [ATO-8896](#) and [ATO-8897](#) see p. 426.  
Part No. [AQO-8503](#) and [AQO-8530](#) see p. 420.  
SecurityGuard ULTRA Guard Cartridge System for UHPLC, see p. 335.



## Sure-Lok™ Fingertight Male Nut Fittings

- Fingertight to 5000 psi (345 bar)
- Compatible with all 10-32 HPLC fittings
- Polymer construction compatible with nearly all HPLC and GPC solvents



Sure-Lok Fingertight Male Nut (PEEK)

### Ordering Information

#### Sure-Lok Fingertight Male Nuts

Part No.	Description	Unit
<a href="#">AQO-1388</a>	PEEK Sure-Lok Fingertight Male Nut	ea
<a href="#">AQO-1389</a>	PEEK Sure-Lok Fingertight Male Nut	10/pk

## Nut and Ferrule Plugs

- Wrench tight to 10000 psi (690 bar)



Nut and Ferrule

### Ordering Information

#### Nut and Ferrule

Part No.	Description	Unit
<a href="#">AQO-3018</a>	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea

## Column Sealing Plugs

- Seal column for storage
- 10-32 threads fit most columns



### Ordering Information

#### Column Sealing Plugs

Part No.	Description	Unit
<a href="#">AQO-0217</a>	Column Sealing Plug, 10-32 thread size	10/pk

## Analytical Column Couplers

### Sure-Lok Coupler

- Universal and reusable
- Solvent resistant material
- Low dead-volume connection
- Compatible with all 10-32 internal-threaded fittings

### Applications:

- Filter to column
- Column to column
- Precolumn to column
- Column to detector



Sure-Lok Coupler (PEEK)

Sure-Lok Couplers contain two Sure-Lok male nuts at either end of a 5 cm long 1/16 in. tubing. The PEEK biocompatible coupler has all parts composed of PEEK, including the 0.010 in. ID tubing. Fingertight to 5000 psi (345 bar).

### Ordering Information

#### Sure-Lok Couplers

Part No.	Description	Unit
<a href="#">AQO-1392</a>	PEEK Sure-Lok Coupler, 0.010 in. ID	ea
<a href="#">AQO-1393</a>	PEEK Sure-Lok Coupler, 0.010 in. ID	10/pk

## Column Coupler

Don't let resolution be a limiting factor!

- Couple several columns together
- Maintain separation efficiency
- No influence on backpressure



### Ordering Information

#### Column Coupler

Part No.	Description	Unit
<a href="#">AQO-7654</a>	Onyx Column Coupler, PEEK, 0.020 in. ID	ea

## PREP Column Coupler



### Ordering Information

#### PREP Column Coupler

Part No.	Description	Unit
<a href="#">AQO-8376</a>	PREP Coupler, Stainless Steel Tube, Nuts, and Ferrules 10-32 Threads, 1/16 in. OD x 0.030 in. ID	ea

# Fittings

## 10-32 PEEK Mixing Tee

- Use with 1/16 in. OD polymeric or metal tubing
- Mixing tee for pre- or post-column derivatization
- Simple-to-use fingertight design
- Pressure rated to 4000 psi (276 bar)



### Ordering Information

#### PEEK Mixing Tee

Part No.	Description	Unit
<a href="#">AQ0-2002</a>	PEEK Tee, 0.020 in. thru-hole*	ea

\*Fittings not included, use PEEK Sure-Lok fingertights part no. [AQ0-1389](#), see p. 422



For UHPLC Stainless Steel Zero Dead-Volume Union, see p. 419

## 1/4 in.-28 Flangeless Fittings

- For use with 1/16 in. or 1/8 in. polymeric tubing
- Easy 2-piece design
- Replaces Cheminert® and Omnifit® fittings
- Pressure rated to 1400 psi (97 bar)



### Ordering Information

#### Flangeless Fittings

Part No.	Description	Unit
<a href="#">AQ0-2949</a>	Flangeless Nut and Ferrule for 1/16 in. tubing, 1/4 in.-28 threads, red Delrin	10/pk
<a href="#">AQ0-2950</a>	Flangeless Nut and Ferrule for 1/8 in. tubing, 1/4 in.-28 threads, green Delrin	10/pk
<a href="#">AT0-2951</a>	Teflon Tubing, 5 ft. L x 1/16 in. OD x 0.010 in. ID	ea
<a href="#">AT0-2953</a>	Teflon Tubing, 5 ft. L x 1/16 in. OD x 1/32 in. (0.031 in.) ID	ea
<a href="#">AT0-2955</a>	Teflon Tubing, 5 ft. L x 1/8 in. OD x 1/16 in. (0.062 in.) ID	ea

## Backpressure Regulators

- Adjustable with preset pressure ratings
- Consistent backpressure at various flow rates
- Flow-through, low-volume design (146 mL)



### Ordering Information

#### Backpressure Regulators

Part No.	Description	Unit
<a href="#">AQ0-0222</a>	40 psi Backpressure Regulator	ea
<a href="#">AQ0-0223</a>	75 psi Backpressure Regulator	ea
<a href="#">AQ0-0224</a>	100 psi Backpressure Regulator	ea

## SecurityLINK HPLC/UHPLC Fingertight Fittings

- No Tools  
Easy installation
- Zero Dead-Volume  
Fitting self-adjusts at column inlet
- Torque Limiting  
Prevents system and column damage
- UHPLC/HPLC Compatibility  
Pressure rated to 19000 psi

**SecurityLINK**  
UHPLC Connections in a Click

Try it Today at:  
[www.phenomenex.com/SecurityLINK](http://www.phenomenex.com/SecurityLINK)

# Standards

## HPLC Column Check Standards

We recommend using check standards to verify performance of all new columns and periodically over their lifetime. Standards are grouped by column type (e.g. normal phase standard for Si, -NH<sub>2</sub>, -Diol, -NO<sub>2</sub>, alumina and PAC).



App ID 14744

**Reversed Phase 1**  
(For C1, C18, CN and Phenyl)

**Part No.:** ALO-3034

**Unit quantity:** 2 mL

**Contains:** Uracil; Benzamide; Benzophenone; Biphenyl (refer to product insert for specific details)

**Diluent:** Acetonitrile

**Test Conditions**

**Mobile Phase:** Acetonitrile/Water (percentages depend on phase)

**Flow Rate:** 1.0 mL/min

**Injection Volume:** 1.0 µL for 3 and 5 µm particles\*  
1.5 µL for 10 µm particles

**Detection:** UV @ 254 nm

\* For Onyx C8, Ultracarb C8, ODS(20), ODS(30) inject 1.5 µL for all column sizes.

App ID 14754

**Reversed Phase 2**  
(For Prodigy C8, ODS(2), ODS(3); Luna C5, C8, C18, PFP(2), Phenyl-Hexyl; Jupiter C4, C5, C18; Jupiter Proteo; Columbus C8, C18; Aqua; PhenoSphere-NEXT C8, C18; Synergi; Gemini C18, C6-Phenyl; Gemini NX-C18; Clarity Oligo-RP; Oligo-MS; Kinetex C8, C18, XB-C18, PFP, Phenyl-Hexyl; 4.6 mm ID Aeris WIDEPORE XB-C18, XB-C8, C4; Aeris PEPTIDE XB-C18; Biozen Peptide PS-C18, XB-C18; Biozen Oligo)

**Part No.:** ALO-3045

**Unit quantity:** 2 mL

**Contains:** Uracil; Acetophenone; Toluene; Naphthalene

**Diluent:** Acetonitrile / Water (75:25)

**Test Conditions**

For Jupiter C18, all Luna (except CN), Aqua, Synergi, Gemini, Prodigy, and Clarity Oligo-RP

**Mobile Phase:** Acetonitrile/Water (65:35)\*

**Flow Rate:** 1.0 mL/min; 0.75 mL/min for 3 µm particles

**Injection Volume:** 1.0 µL

**Detection:** UV @ 254 nm

**Test Conditions**

For Jupiter C4 and C5 columns

**Mobile Phase:** Acetonitrile/Water (50:50)

**Flow Rate:** 1.0 mL/min

**Injection Volume:** 1.0 µL

**Detection:** UV @ 254 nm

\* Columns with dimensions of 50 x 2.0 mm, 30 x 2.0 or 1.0 mm, the mobile phase ratio should be 50:50. Some 50 x 2.0 mm columns use 65:35. For other columns not listed above, see test chromatogram enclosed with column purchased.

App ID 15640

**Onyx Monolithic Reversed Phase**  
(For Onyx C8, C18, and HD-C18)

**Part No.:** ALO-7836

**Unit quantity:** 2 mL

**Contains:** Thiourea 10 µg/mL; Progesterone 100 µg/mL; Anthracene 10 µg/mL

**Diluent:** Acetonitrile/Water (60:40)

**Test Conditions**

**Mobile Phase:** Acetonitrile/Water (60:40)

**Flow Rate:** 2.0 mL/min\*

**Injection Volume:** 1.0 µL

**Detection:** UV @ 254 nm

**Storage**

**Conditions:** Refrigerate @ 4 °C

\* For a 50 x 4.6 mm column

App ID 19812

**Aeris™ Narrow ID**  
(For 2.1 mm ID Aeris WIDEPORE XB-C18, XB-C8, C4)  
(For Biozen WidePore C4; Biozen Intact XB-C8)

**Part No.:** ALO-8931

**Unit quantity:** 2 mL

**Contains:** Uracil; Acetophenone; Toluene; Naphthalene; Acenaphthalene (2.5 mg/mL)

**Diluent:** Acetonitrile/Water (50:50)

**Test Conditions**

**Mobile Phase:** Acetonitrile/Water (55:45)

**Flow Rate:** 0.25 mL/min\*

**Injection Volume:** 0.1 µL

**Detection:** UV @ 254 nm

\* For a 150 x 4.6 mm column

App ID 14743

**Normal Phase**  
(For Si, NH<sub>2</sub>, NO<sub>2</sub>, Diol, Alumina, PAC, and Luna CN)

**Part No.:** ALO-3033

**Unit quantity:** 2 mL

**Contains:** Meta-xylene; Nitrobenzene

**Diluent:** Hexane/Acetonitrile (99:1)

**Test Conditions**

**Mobile Phase:** Hexane/Acetonitrile (99:1)

**Flow Rate:** 1.0 mL/min

**Injection Volume:** 1.0 µL

**Detection:** UV @ 254 nm

App ID 16399

**HILIC Phase**  
(For Luna HILIC; Kinetex HILIC; Biozen Glycan)

**Part No.:** ALO-8317

**Unit quantity:** 2 mL

**Contains:** Toluene; Uracil; Cytosine

**Diluent:** Acetonitrile (containing toluene) / Water, no buffer (85:15)

**Test Conditions**

**Mobile Phase:** Acetonitrile/100 mM Ammonium Formate, pH 3.2 (90:10)

**Flow Rate:** 1.0 mL/min\*

**Injection Volume:** 1.0 µL

**Detection:** UV @ 254 nm

\* For a 150 x 4.6 mm column

App ID 14760

**PolymerX™ RP-1**

**Part No.:** ALO-7260

**Unit quantity:** 2 mL

**Contains:** Cytosine 13 mg/mL; Uracil 13 mg/mL; Uridine 33 mg/mL

**Diluent:** Water

**Test Conditions**

**Mobile Phase:** 0.05 M Citric Acid, pH 4.2

**Flow Rate:** 0.75 mL/min\*

**Temperature:** Ambient

**Injection Volume:** 5 µL

**Detection:** UV @ 254 nm

**Storage**

**Conditions:** Refrigerate @ 4 °C

\* For a 5 µm 250 x 4.6 mm column

App ID 14752

**Aqueous SEC 1**  
(For Yarra 3 µm SEC, BioSep-SEC-S, and other protein SEC columns)

**Part No.:** ALO-3042

**Unit quantity:** Dry; Reconstituted to 2 mL

**Contains:** Bovine thyroglobulin; Human gamma globulin (contains IgA and IgG); Ovalbumin; Myoglobin; Uridine (reconstitute with 1 mL of 100 mM Sodium Phosphate pH 6.8)

**Diluent:** 100 mM Sodium phosphate, pH 6.8

**Storage:** Add 0.1% Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> to the solution and refrigerate

**Test Conditions**

**Mobile Phase:** 100 mM Sodium phosphate, pH 6.8

**Flow Rate:** 1.0 mL/min for a 300 x 7.8 mm column

**Injection Volume:** 10 µL

**Detection:** UV @ 280 nm

App ID 14753

**Aqueous SEC 2**  
(For PolySep GFC-P and other aqueous-soluble analysis columns)

**Part No.:** ALO-3043

**Unit quantity:** 2 mL

**Contains:** Ethylene Glycol

**Diluent:** Water

**Test Conditions**

**Mobile Phase:** Water

**Flow Rate:** 0.8 mL/min

**Injection Volume:** 15 µL

**Detection:** RI

App ID 19807

**Aqueous SEC 3**  
(For Biozen dSEC-2 columns)

**Part No.:** ALO-9253

**Unit quantity:** 2 mL Analyte

**Contains:** Bovine Thyroglobulin (2.5 mg/mL); BSA (2.5 mg/mL); Myoglobin (1 mg/mL) (reconstitute 1 mL of 1X PBS Buffer)

**Diluent:** 100 mM Sodium phosphate buffer, pH 6.8

**Storage:** Add 0.025% Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> to the solution and refrigerate

**Test Conditions**

**Mobile Phase:** 100 mM Phosphate buffer, pH 6.8, 0.05% Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>

**Flow Rate:** 0.35 mL/min

**Injection Volume:** 1.4 µL

**Detection:** UV @ 280 nm

**Storage:** Refrigerate at 4 °C

**Conditions:**

**Sample:** 2. Bovine Serum Albumin (66.5 kDa)

**Components:** 4. Thyroglobulin (670 kDa)  
6. Equine Myoglobin (17 kDa)

Note

1. After reconstituting the protein mix, filter solution with regenerated cellulose 0.2 µm syringe filter before use.

2. Flow rate and injection volume are recommended for use with 300 x 4.6 mm ID columns. Some adjustments may not exactly match your specific column, refer to the production test chromatograms received with your column for exact chromatographic profile.



Flow rates and Injection volumes are for 250 x 4.6 mm size columns, unless otherwise noted.

HPLC Column Check Standards ordering information continues on next page

# Standards

## HPLC Column Check Standards (cont'd)

App ID 14756

**Chiral Test Mix 2**  
(Applicable to the following Chirex columns)

**Part No.:** [ALO-3047](#)

Chirex Phase	Phase Description	Bond Type
3010	(S)-Valine and DNAn	Covalent
3011	(S)-Leucine and DNAn	Covalent
3012	(R)-Phenylglycine and DNAn (DNAn = 3,5-Dinitroaniline)	Covalent

**Unit quantity:** 2 mL  
**Contains:** N-dansyl-DL-valine (cyclohexylammonium salt); CAS[84540-67-0]  
**Diluent:** 10 mM ammonium acetate in methanol

**Test Conditions**  
**Mobile Phase:** 10 mM ammonium acetate in methanol  
**Flow Rate:** 1.0 mL/min  
**Injection Volume:** 1.0 µL  
**Detection:** UV @ 254 nm

App ID 14758

**Chiral Test Mix 4**  
(Applicable to the following Chirex columns)

**Part No.:** [ALO-3049](#)

Chirex Phase	Phase Description	Bond Type
3126	N,S-dioctyl-(D)-Penicillamine	Ionic

**Unit quantity:** 2 mL  
**Contains:** DL-Aspartic Acid CAS [617-45-8]  
**Diluent:** 2 mM Copper sulfate pentahydrate in water/isopropanol (95:5)

**Test Conditions**  
**Mobile Phase:** 2 mM Copper sulfate pentahydrate in water/isopropanol (95:5)  
**Flow Rate:** 1.0 mL/min  
**Injection Volume:** 1.0 µL  
**Detection:** UV @ 254 nm

App ID 17476

**Chiral Test Mix 5**  
(Applicable to the following Lux columns)

**Part No.:** [ALO-8412](#)

Phase	Description
Lux Cellulose-1	Cellulose Tris (3,5-Dimethylphenylcarbamate)
Lux Cellulose-2	Cellulose Tris (3-Chloro-4-methylphenylcarbamate)
Lux Cellulose-3	Cellulose Tris (4-Methyl-benzoate)
Lux Cellulose-4	Cellulose Tris (4-Chloro-3-methylphenylcarbamate)
Lux Amylose-2	Amylose Tris (5-Chloro-2-methylphenylcarbamate)

**Unit quantity:** 2 mL  
**Contains:** trans-Stilbene oxide, 0.5 mg/mL, CAS [1439-07-2]  
**Diluent:** Hexane/isopropanol (90:10)

**Test Conditions**  
**Mobile Phase:** Hexane/isopropanol (90:10)  
**Flow Rate:** 0.5 mL/min  
**Injection Volume:** 2.0 µL  
**Detection:** UV @ 220 nm

App ID 14745

**Carbohydrate Mix 1**  
(For Rezex RNM, RAM & other carbohydrate analysis columns)

**Part No.:** [ALO-3035](#)

**Unit quantity:** 2 mL  
**Contains:** Maltotriose Hydrate; Maltose; Ribitol  
**Diluent:** Water

**Test Conditions**  
**Mobile Phase:** Water  
**Flow Rate:** 0.4 mL/min for a 300 x 7.8 mm column  
**Temperature:** 85 °C  
**Injection Volume:** 5.0 µL  
**Detection:** RI

App ID 14746

**Carbohydrate Mix 2**  
(For Rezex RPM & other carbohydrate analysis columns)

**Part No.:** [ALO-3036](#)

**Unit quantity:** 2 mL  
**Contains:** Melezitose; Glucose; Fructose; Ribitol  
**Diluent:** Water

**Test Conditions**  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min for a 300 x 7.8 mm column  
**Temperature:** 85 °C  
**Injection Volume:** 5.0 µL  
**Detection:** RI

App ID 14747

**Carbohydrate Mix 3**  
(For Rezex RCM, RCU & other carbohydrate analysis columns)

**Part No.:** [ALO-3037](#)

**Unit quantity:** 2 mL  
**Contains:** Melezitose; Maltose; Glucose; Mannose; Fructose; Ribitol  
**Diluent:** Water

**Test Conditions**  
**Mobile Phase:** Water  
**Flow Rate:** 0.6 mL/min for a 300 x 7.8 mm column  
**Temperature:** 85 °C  
**Injection Volume:** 1.0 µL  
**Detection:** RI

App ID 14759

**STAR-ION™ A300**

**Part No.:** [ALO-3420](#)

**Unit quantity:** 2 mL  
**Contains:** Fluoride (5 mg/mL); Chloride (10 mg/mL); Nitrite (20 mg/mL); Bromide (20 mg/mL); Nitrate (20 mg/mL); Phosphate (30 mg/mL); Sulfate (20 mg/mL)  
**Diluent:** 1.7 mM NaHCO<sub>3</sub>/1.8 mM Na<sub>2</sub>CO<sub>3</sub>

**Test Conditions**  
**Mobile Phase:** 1.7 mM NaHCO<sub>3</sub>/1.8 mM Na<sub>2</sub>CO<sub>3</sub>  
**Flow Rate:** 1.5 mL/min for a 100 x 4.6 mm column  
**Injection Volume:** 20 µL  
**Detection:** Suppressed Conductivity

App ID 14748

**Oligosaccharide Standard**  
(For Rezex RSO, RNO & other oligosaccharide analysis columns)

**Part No.:** [ALO-3038](#)

**Unit quantity:** 2 mL  
**Contains:** Light corn syrup  
**Diluent:** Water

**Test Conditions**  
**Mobile Phase:** Water  
**Flow Rate:** 0.3 mL/min for a 200 x 10 mm column  
**Temperature:** 85 °C  
**Injection Volume:** 5.0 µL  
**Detection:** RI

App ID 14749

**Organic Acid Standard**  
(For Rezex ROA & other organic acid analysis)

**Part No.:** [ALO-3039](#)

**Unit quantity:** 2 mL  
**Contains:** Oxalic acid; Citric acid; Tartaric acid; Succinic acid; Formic acid; Acetic acid  
**Diluent:** 5 mM Sulfuric Acid

**Test Conditions\***  
**Mobile Phase:** 0.005N H<sub>2</sub>SO<sub>4</sub>  
**Flow Rate:** 0.5 mL/min  
**Temperature:** 85 °C  
**Injection Volume:** 5.0 µL  
**Detection:** UV @ 210 nm

\* For a 300 x 7.8 mm column

App ID 14750

**Cation-Exchange**  
(For SCX, SA, CM)

**Part No.:** [ALO-3040](#)

**Unit quantity:** 2 mL  
**Contains:** Uracil; Cytosine  
**Diluent:** Water

**Test Conditions**  
**Mobile Phase:** 0.15 M (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub>, pH 6.0  
**Flow Rate:** 1.0 mL/min  
**Injection Volume:** 1.0 µL  
**Detection:** UV @ 254 nm

App ID 14751

**Anion-Exchange**  
(For SAX, SB, DEAE, PEI)

**Part No.:** [ALO-3041](#)

**Unit quantity:** 2 mL  
**Contains:** Uracil, UMP (refer to product insert for specific details)  
**Diluent:** Water

**Test Conditions**  
**Mobile Phase:** 0.15 M (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub>, pH 6.0  
**Flow Rate:** 0.6 mL/min  
**Injection Volume:** 1.0 µL  
**Detection:** UV @ 254 nm



Flow rates and Injection volumes are for 250 x 4.6 mm size columns, unless otherwise noted.



For GC Column Performance Check Standards, see p. 185

## Capillary PEEK HPLC Tubing

- Chemically inert and biocompatible
- Pressure rated to 7000 psi (482 bar)
- Easily bendable and cuttable

PEEK HPLC tubing is an excellent alternative to stainless steel tubing for most HPLC applications. PEEK (polyetheretherketone) is chemically inert to virtually all HPLC solvents (only 100 % methylene chloride, THF, concentrated nitric acid or concentrated sulfuric acid will affect PEEK), and is 100 % biocompatible. PEEK tubing can be used with stainless steel nuts and ferrules or polymeric fittings such as the Phenomenex fingertight Sure-Lok™ fittings (see p. 422).

This PEEK HPLC tubing is pressure tested to 7000 psi and rated at 5000 psi for continuous use (for standard 0.010 in. ID tubing). PEEK withstands extremely high temperatures and is rated for continuous use up to 100 °C. PEEK tubing is color coded for easy identification. All colors are permanent and there is no leaching.



Standard PEEK



Polymer Tubing Cutter

### Ordering Information

#### Straight PEEK Tubing

Part No.	Length (feet)	OD (inch)	ID (inch)	Color	Unit
<a href="#">ATO-1107</a>	5	1/16	0.010	blue	ea
<a href="#">ATO-1260</a>	5	1/16	0.007	yellow	ea
<a href="#">ATO-1259</a>	5	1/16	0.005	red	ea

Part No.	Description	Unit
----------	-------------	------

#### PEEK Tubing Kit

<a href="#">ATO-1964</a>	PEEK Tubing Kit, includes one each of: <a href="#">ATO-1259</a> (5 ft. x 1/16 in. x 0.005 in.) <a href="#">ATO-1260</a> (5 ft. x 1/16 in. x 0.007 in.) <a href="#">ATO-1107</a> (5 ft. x 1/16 in. x 0.010 in.) <a href="#">ATO-1265</a> (5 ft. x 1/8 in. x 0.080 in.) <a href="#">ATO-1110</a> (Polymer Tubing Cutter)	ea
--------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----

Part No.	Description	Unit
----------	-------------	------

#### Polymer Tubing Cutter

<a href="#">ATO-1110</a>	Polymer Tubing Cutter	ea
--------------------------	-----------------------	----

**i** PEEKsil is compatible with most organic solvents. Effective pH range from 0 to 10.

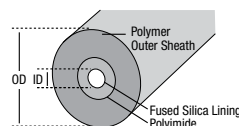
**➔** For more information on Part Nos. [AQ0-8503](#) and [AQ0-8530](#), see p. 420  
See also our Core-Shell Performance Enhancement kit on p. 421

**➔** For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 336-337

## PEEKsil™ Tubing for UHPLC / HPLC

- Minimizes extra-column effects and band broadening
- Exceptionally smooth inner surfaces

PEEKsil is polymer-sheathed fused silica tubing. The PEEK portion is mechanically strong and has ideal sealing characteristics when used with conventional metal or PEEK ferrule systems. Capable of withstanding high pressures up to 10000 psi (689 bar), the exceptionally smooth inner surfaces are free of the imperfections common in steel tubing, which lessens the possibility of path blockages, ultimately providing lower band broadening. The precision-cut, ultra-square and smooth tube ends enable optimal low volume connections to be made, which will improve overall chromatographic performance. For higher efficiencies and improved resolution, PEEKsil tubing is recommended to help optimize your UHPLC system. For critical UHPLC connections a convenient fittings and tubing kit Part No.: [AQ0-8892](#) is available (see p. 421).



PEEKsil tubing showing the precision ground and square cut end enabling a zero dead volume connection.



### Ordering Information

#### PEEKsil Tubing for UHPLC/HPLC

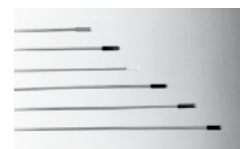
Part No.	Description	Unit
<a href="#">ATO-8896</a>	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 20 cm L, Red	5/pk
<a href="#">ATO-8897</a>	PEEKsil Tubing 0.100 mm ID x 1/16 in. OD x 10 cm L, Red	5/pk

#### Related Accessory Items

<a href="#">AQ0-8503</a>	Sure-Lok High Pressure PEEK 1-Pc Nut, 10-32, for 1/16 in. Tubing	10/pk
<a href="#">AQ0-8530</a>	Sure-Lok Fitting Tightening Tool, Aluminum	ea

## Capillary Stainless Steel Tubing

- Passivated and solvent rinsed
- Precut and polished ends



### Ordering Information

#### Capillary Stainless Steel Tubing

Part No.	Length	Unit
<b>0.005 in. ID x 0.062 in. (1/16 in.) OD</b>		
<a href="#">ATO-2996</a>	5 cm	5/pk
<a href="#">ATO-2997</a>	10 cm	5/pk
<a href="#">ATO-2998</a>	20 cm	5/pk
<b>0.010 in. ID x 0.062 in. (1/16 in.) OD</b>		
<a href="#">ATO-0456</a>	5 cm	5/pk
<a href="#">ATO-0457</a>	10 cm	5/pk
<a href="#">ATO-0458</a>	20 cm	5/pk
<a href="#">ATO-0460</a>	50 cm	2/pk
<a href="#">ATO-0461</a>	1 m	2/pk
<b>0.020 in. ID x 0.062 in. (1/16 in.) OD</b>		
<a href="#">ATO-0465</a>	10 cm	5/pk
<a href="#">ATO-0466</a>	20 cm	5/pk
<a href="#">ATO-0469</a>	1 m	2/pk



# Tubing

## Teflon® (PTFE) Tubing

- Resistant to virtually all corrosive chemicals and organic solvents
- Pressure rated to 500 psi (35 kg/cm<sup>2</sup>)



### Ordering Information

#### Teflon Tubing

Part No.	OD (inch)	ID (inch)	Wall Thickness (inch)	Length (feet)
<a href="#">ATO-2951</a>	1/16	0.010	0.026	5
<a href="#">ATO-2952</a>	1/16	0.010	0.026	10
<a href="#">ATO-2953</a>	1/16	1/32 (0.031)	0.015	5
<a href="#">ATO-2954</a>	1/16	1/32 (0.031)	0.015	10
<a href="#">ATO-2955</a>	1/8	1/16 (0.062)	0.030	5
<a href="#">ATO-2956</a>	1/8	1/16 (0.062)	0.030	10
<a href="#">ATO-8609</a>	1/4	1/8 (0.125)	0.060	5
<a href="#">ATO-8610</a>	1/4	1/8 (0.125)	0.060	10

## Tubing Cutters

Terry Tools are compact tubing cutters for either 1/16 or 1/8 in. OD glass-lined tubing or stainless steel tubing. The specially-hardened cutting wheels make clean, right-angle cuts with minimal burring or chipping of the tubing. Zero dead-volume connections, essential in most GC and MS and all HPLC plumbing applications, can be easily achieved.



Terry Tool  
Stainless Steel Tubing Cutter



The Polymer Tubing Cutter makes clean, square cuts on both 1/16 and 1/8 in. OD polymeric tubing, especially PEEK tubing

### Ordering Information

#### Tubing Cutters

Part No.	Description	Unit
<a href="#">AQO-1305</a>	1/16 in. Terry-Tool tubing cutter	ea
<a href="#">AQO-1306</a>	1/8 in. Terry-Tool tubing cutter	ea
<a href="#">AQO-1307</a>	Replacement cutting wheels for both <a href="#">AQO-1305</a> and <a href="#">AQO-1306</a>	3/pk
<a href="#">ATO-1110</a>	Polymer Tubing Cutter	ea

## Wrenches / Spanners

Three of the most popular sizes of wrenches (spanners) used in UHPLC/HPLC are offered.



### Ordering Information

#### Wrenches/Spanner

Part No.	Description	Unit
<a href="#">AQO-8903</a>	Wrench, Open End, 1/4 x 5/16 in.	ea
<a href="#">AQO-8959</a>	Wrench, Open End, 3/8 x 7/16 in.	ea
<a href="#">AQO-8904</a>	Wrench, Open End, 1/2 x 9/16 in.	ea



SecurityGuard ULTRA installation onto core-shell columns, as well as later cartridge replacement, requires 3 wrenches, which must be purchased separately: one 3/8 in. wrench ([AQO-8959](#) fits core-shell column end-fitting), and two 1/16 in. wrenches ([AQO-8903](#) fits ULTRA cartridge and holder). See SecurityGuard ULTRA p. 335

## Rheodyne Fitting Wrench



### Ordering Information

#### Real Rheodyne Fitting Wrench

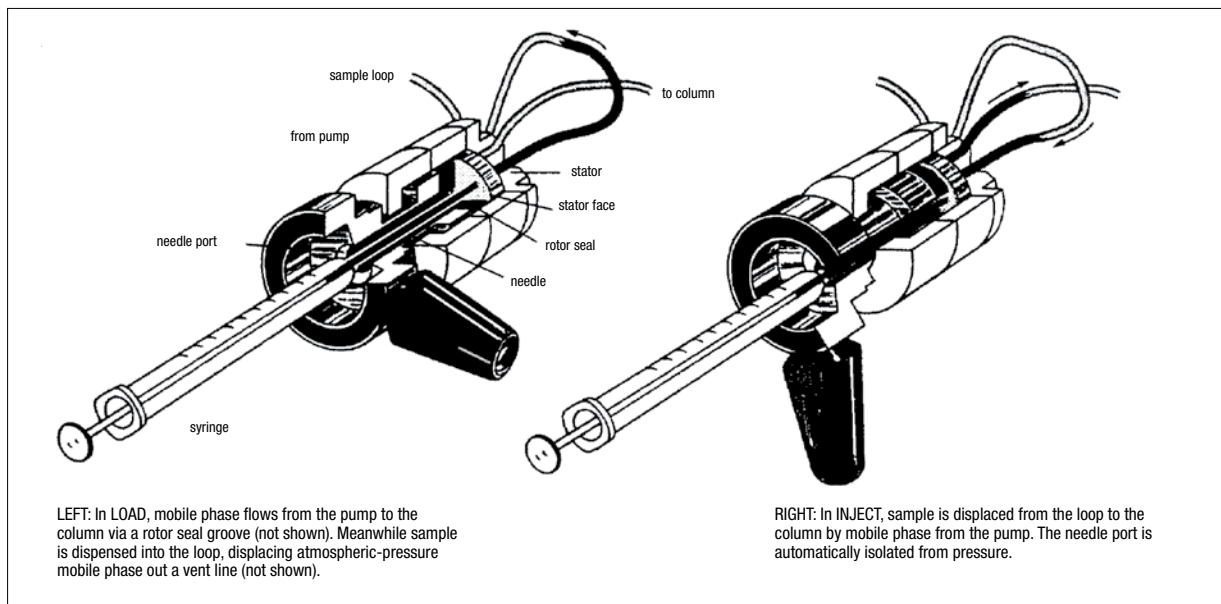
Part No.	Mfr. No.	Description	Unit
<a href="#">AVO-4219</a>	6810	The Real Rheodyne Fitting Wrench	ea

\*For additional information, see p. 431

## Sample Injector

### Rheodyne® 7725

- Sample loading by syringe through built-in needle port
- Continuous flow during switching (no interrupt)
- A front-end pressure screw for easy seal adjustment
- Wide port angles for improved access to fittings
- Pressure rated to 7000 psi (490 kg/cm<sup>2</sup>)
- 5 µL to 5 mL removable sample loops



### Ordering Information

#### 7725 Sample Injectors

Part No.	Mfr. No.	Description
<a href="#">AVO-2346</a>	7725	Sample Injector <sup>1</sup>
<a href="#">AVO-2347</a>	7725i	Sample Injector, with Position Sensing Switch <sup>1</sup>

#### Sample Loops for 7725 Valves Only

<a href="#">AVO-2349</a>	7755-020	5 µL Sample Loop
<a href="#">AVO-2350</a>	7755-021	10 µL Sample Loop
<a href="#">AVO-2351</a>	7755-022	20 µL Sample Loop
<a href="#">AVO-2352</a>	7755-023	50 µL Sample Loop
<a href="#">AVO-2353</a>	7755-024	100 µL Sample Loop
<a href="#">AVO-2354</a>	7755-025	200 µL Sample Loop
<a href="#">AVO-2355</a>	7755-026	500 µL Sample Loop
<a href="#">AVO-2356</a>	7755-027	1 mL Sample Loop
<a href="#">AVO-2357</a>	7755-028	2 mL Sample Loop
<a href="#">AVO-2358</a>	7755-029	5 mL Sample Loop

#### Spare Replacement Parts for Model 7725 Injector

<a href="#">AVO-3500</a>	7725-999	Complete RheBuild® Kit for valves 7725, 7725i, 7726 (see p. 430 for description)
<a href="#">AVO-0169</a>	7125-047	Vespel Rotor Seal
<a href="#">AVO-2416</a>	7125-079	Tefzel Rotor Seal
<a href="#">AVO-2362</a>	7725-026	Stator Face Assembly
<a href="#">AVO-0171</a>	7125-054	Needle Port Cleaner
<a href="#">AVO-0180</a>	7215	#22-Gauge Needle
<a href="#">AVO-2365</a>	6000-263	Nut 10pk
<a href="#">AVO-2366</a>	6000-264	Long Nut 10pk
<a href="#">AVO-2368</a>	6000-110	Ferrule 5pk



<sup>1</sup>The 7725 and 7725i have a 20 µL stainless steel loop installed. They are supplied with instructions, fittings for all ports, needle port cleaner, two vent tubes, two hex wrenches, mounting screws, and a #22-gauge needle with Luer hub. Maximum operating temperature is 80 °C.



Syringes for Rheodyne sample injectors are listed on pp. 23-24.

## Sample Injector

### Rheodyne Injector Model 9725 Totally Metal-Free (PEEK)

- Inert flow passages of Tefzel<sup>®</sup>, PEEK, and alumina-ceramic (pH range 0 to 14)
- Not affected by buffers, acids, bases or halide salts
- Complete fill 5 µL to 5 mL sample loops using excess sample
- Partial-fill 0.1 µL to 5 mL with zero sample waste
- Valve will operate to 5000 psi (344 bar)
- Loops will operate to 5000 psi (344 bar) depending on ID and solvent
- Use with 1 to 2 mm ID micro, 3 to 6 mm analytical or milligram-scale prep columns



#### Ordering Information

##### PEEK Sample Injectors

Part No.	Mfr. No.	Description
<a href="#">AV0-1074</a>	9725	PEEK Sample Injector
<a href="#">AV0-4642</a>	9725i	PEEK Sample Injector, with Position Sensing Switch
<a href="#">AV0-1086</a>	9125-076	Suction Needle Adapter
<a href="#">AV0-3433</a>	9725-999	Complete RheBuild <sup>®</sup> Kit for valves 9725, 9725i (see p. 430 for description)



Although PEEK material is highly resistant to most chemicals, PEEK is not recommended for applications requiring high concentrations of THF (Tetrahydrofuran), methylene chloride, nitric acid or sulfuric acid.

## Sample Injector

### Rheodyne 8125 Low-Dispersion

- For microbore and analytical HPLC columns
- Accurately inject as little as 0.1 µL of sample
- Improve peak resolution

#### Ordering Information

##### Low-Dispersion Sample Injector

Part No.	Mfr. No.	Description
<a href="#">AV0-0181</a>	8125	Low-Dispersion Sample Injector
<a href="#">AV0-3431</a>	8125-999	Complete RheBuild <sup>®</sup> Kit for valve 8125 (see p. 430 for description)

## Sample Injectors

### Rheodyne<sup>®</sup> 3725i Preparative

- For preparative HPLC columns, 1 to 10 cm ID



#### Ordering Information

##### Preparative Sample Injectors

Part No.	Mfr. No.	Description
<a href="#">AV0-2054</a>	3725i	PEEK Preparative Sample Injector, with Position Sensing Switch
<a href="#">AV0-2056</a>	3725i-038	Stainless Steel Preparative Sample Injector, with Position Sensing Switch
<a href="#">AV0-3432</a>	3725-999	Complete RheBuild <sup>®</sup> Kit for valves 3725, 2715i, 3725-038, 3725i-038 (see p. 430 for description)

## Switching Valve/Injector

### Rheodyne Valve Model 7000

- Permits column switching and selection in various configurations
- Enables sample clean-up and trace sample enrichment
- Enables column programming and backflushing
- Enables dual-column selection
- Field-changeable switching patterns



#### Ordering Information

##### Switching Valves

Part No.	Mfr. No.	Description
<a href="#">AV0-2376</a>	7000	Switching Valve/Injector
<a href="#">AV0-2378</a>	7010	Sample Injection Valve
<a href="#">AV0-3430</a>	7010-999	Complete RheBuild <sup>®</sup> Kit for valves 7010, 7000 (see p. 430 for description)
<a href="#">AV0-1073</a>	7012	Loop Filler Port
<a href="#">AV0-1092</a>	9010	PEEK Switching Valve/Injector
<a href="#">AV0-2381</a>	9013	PEEK Needle Port

## Sample Injector Loops and Fittings

Stainless steel external loops are supplied with unattached fittings so the tube can be completely bottomed in the injector port before the ferrule is swaged on. RheFlex PEEK loops do not require this precaution, because the ferrule can slide and reposition itself along the tube when the fitting is reinserted into a port.



### Ordering Information

#### Sample Injector Loops

Part No.	Mfr. No.	Description	Unit
<b>Stainless Steel Loops for 7125 and 7010 Valves</b>			
<a href="#">AVO-2390</a>	7020	5 µL, 0.007 in. ID	ea
<a href="#">AVO-2391</a>	7021	10 µL, 0.012 in. ID	ea
<a href="#">AVO-2392</a>	7022	20 µL, 0.020 in. ID	ea
<a href="#">AVO-2393</a>	7023	50 µL, 0.020 in. ID	ea
<a href="#">AVO-2394</a>	7024	100 µL, 0.020 in. ID	ea
<a href="#">AVO-2395</a>	7025	200 µL, 0.030 in. ID	ea
<a href="#">AVO-2396</a>	7026	500 µL, 0.030 in. ID	ea
<a href="#">AVO-2397</a>	7027	1 mL, 0.030 in. ID	ea
<a href="#">AVO-2398</a>	7028	2 mL, 0.040 in. ID	ea
<a href="#">AVO-2399</a>	7029	5 mL, 0.040 in. ID	ea

#### Loops for 8125 Low Dispersion Injector (Stainless Steel)

<a href="#">AVO-2937</a>	8020	5 µL, 0.008 in. ID	ea
<a href="#">AVO-2938</a>	8021	10 µL, 0.008 in. ID	ea
<a href="#">AVO-2939</a>	8022	20 µL, 0.010 in. ID	ea

#### PEEK (for all valves)

<a href="#">AVO-1076</a>	9055-020	5 µL, 0.007 in. ID	ea
<a href="#">AVO-1077</a>	9055-021	10 µL, 0.010 in. ID	ea
<a href="#">AVO-1078</a>	9055-022	20 µL, 0.010 in. ID	ea
<a href="#">AVO-1079</a>	9055-023	50 µL, 0.020 in. ID	ea
<a href="#">AVO-1080</a>	9055-024	100 µL, 0.020 in. ID	ea
<a href="#">AVO-1081</a>	9055-025	200 µL, 0.020 in. ID	ea
<a href="#">AVO-1082</a>	9055-026	500 µL, 0.030 in. ID	ea
<a href="#">AVO-1083</a>	9055-027	1 mL, 0.030 in. ID	ea
<a href="#">AVO-1084</a>	9055-028	2 mL, 0.030 in. ID	ea
<a href="#">AVO-1085</a>	9055-029	5 mL, 0.030 in. ID	ea

1. Loops for the 7725 Valve are listed with the valve on p. 428. Note: Loops designed for 7125, 7010 and 8125 valves are not interchangeable with the wide-angle ports of 7725 valves.
2. Loops not listed for other valves are available. Call your Phenomenex Technical Consultant.



Knob

Nut

Ferrule Assembly

### Ordering Information

#### RheFlex Fittings

Part No.	Mfr. No.	Description	Unit
<a href="#">AVO-2383</a>	6000-054	RheFlex Std. Fitting Set (5 nuts and 5 ferrules)	ea
<a href="#">AVO-2384</a>	6000-055	RheFlex Short Fitting Set (5 nuts and 5 ferrules)	ea
<a href="#">AVO-2386</a>	6000-051	RheFlex Ferrules (5 ferrules)	ea

## RheBuild® Kits

Each kit contains all the parts necessary to refurbish the corresponding valve. For front-loading injection valves, the kit includes: rotor seal, stator face assembly, isolation seal, needle guide, needle port cleaner, 2 hex keys and repair instructions. Type 70's Switching Valves and Model 7010 Injector Valve do not include Stator Face Assemblies. Refer to the specific valve on the previous pages for ordering information.



# Valves

## Rheodyne® Fitting Wrench

Slotted Wrench for Rheodyne Valves

- Fits around tubing to tighten any ¼ or ⅝ in. nut
- Access hard-to-reach areas
- Saves time and effort

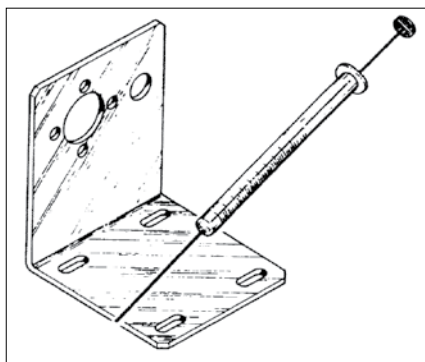


### Ordering Information

Real Rheodyne Fitting Wrench

Part No.	Mfr. No.	Description	Unit
<a href="#">AV0-4219</a>	6810	The Real Rheodyne Fitting Wrench	ea

## Syringe and Injector Accessories



The #22-gauge needle (Mfr. No. 7215) has a Kel-F® luer hub that fits any luer tip syringe.

Model 7160 and 7160-010 mounting bracket (shown) accommodate all Rheodyne high pressure injectors and valves.

### Ordering Information

Syringe and Injector Accessories

Part No.	Mfr. No.	Description	Unit
<a href="#">AV0-0180</a>	7215	#22-Gauge Needle with CTFE Luer Hub	ea
<a href="#">AV0-0170</a>	7125-008	Needle Guide	ea
<a href="#">AV0-0171</a>	7125-054	Needle Port Cleaner	ea
<a href="#">AV0-2425</a>	7160-010	Valve Angle Bracket	ea
<a href="#">AV0-2426</a>	7160	Mounting Panel	ea

→ Syringes for Rheodyne sample injectors are listed on pp. 23-24.

Phenomenex

## Valve Stators



### Ordering Information

Valve Stators

Part No.	Mfr. No.	Description	Unit
<a href="#">AV0-0172</a>	7125-067	Stator Face Assembly for Valve Model 7125	ea
<a href="#">AV0-4719</a>	7725-010	Stator for Valve Models 7725, 7725i	ea
<a href="#">AV0-0175</a>	7010-040	Stator for Valve Models 7000, 7010, 7125, 7030, 7040	ea
<a href="#">AV0-2422</a>	8125-098	Stator for Valve Model 8125	ea
<a href="#">AV0-2423</a>	9125-043	Peek Stator & Support Ring for 9010/9125	ea

## Rotor Seals



### Ordering Information

Rotor Seals

Part No.	Mfr. No.	Description	Unit
<b>VespeI® (pH Range 0 to 10)</b>			
<a href="#">AV0-2412</a>	7010-039	Rotor Seal for Valve Models 7000, 7010, 7040	ea
<a href="#">AV0-0169</a>	7125-047	Rotor Seal for Valve Models 7125, 7725, 7725i	ea
<a href="#">AV0-2414</a>	8125-038	Rotor Seal for Valve Model 8125	ea
<b>Tefzel® (pH Range 0 to 14)</b>			
<a href="#">AV0-2415</a>	7010-071	Rotor Seal for Valve Models 7000, 7010, 7040	ea
<a href="#">AV0-2416</a>	7125-079	Rotor Seal for Valve Models 7125, 7725, 7725i	ea
<a href="#">AV0-2417</a>	8125-097	Rotor Seal for Valve Model 8125	ea
<a href="#">AV0-2418</a>	9010-051	Rotor Seal for Valve Model 9010	ea
<a href="#">AV0-2419</a>	9125-082	Rotor Seal for Valve Models 9725 and 9125	ea

**i** All other Rheodyne valves and accessories not listed are available.

→ For Stainless Steel and PEEK Capillary Tubing used with Rheodyne valves, see p. 426





# ANSWERS

to Your Most Common Chromatography Questions!

With 100s of years of chromatography experience amongst our team, we can surely help answer your most pressing chromatography questions. And now, we've made it easier than ever to find answers.



# SEARCH

Search our Frequently Asked Questions (FAQ) page at:  
[www.phenomenex.com/FAQ](http://www.phenomenex.com/FAQ)



# CHAT



Chat live with our technical gurus at:  
[Phenomenex.com/Chat](http://Phenomenex.com/Chat)



Give us a call,  
we would love to help!



# CALL



“ *Being on the purchasing side of the equation, I have to be focused on factors such as customer service, quality of product and, of course, the ever present bottom line – Phenomenex help me in all 3 of these aspects.*

*Their columns and consumables are top of the line - which keep my chemists happy – and all the products across the board are very reasonably priced. And their customer service and technical consulting are second to none - they are always available with answers to my questions and suggestions for our problems and their chromatography expertise is unmatched.*

*In short, I never hesitate to turn to Phenomenex for any and all of our chromatography needs.*”

**Johnny Brendell**  
**Quality Chemical Laboratories, USA**

The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Abbreviations.....	435
Chromatographic Parameters .....	439
Frequently Asked Questions (FAQs).....	434
GC Column Installation Instructions.....	436-437
GC Column MS Certification - Zebtron .....	437
HPLC Calculations .....	438
HPLC Column Protection .....	441
HPLC Material Sorbent Characteristics .....	443-444
Index .....	445-461
Reversed Phase Method Development.....	440
Probes for Column Characterization .....	439
Solvent Miscibility Table.....	442
Terms and Conditions of Sale.....	463
Trademarks .....	462-463

# Frequently Asked Questions (FAQs)

## We've put together a small sample of questions we are commonly asked.

**Q.** Which Kinetex® C18 (USP: L1) phase would be best for my method?

**A.** The Kinetex Core-Shell column portfolio contains five distinct yet complementary C18 selectivities. The general purpose Kinetex C18 provides the expected hydrophobic selectivity, and the additional four C18 derivatives incorporate stationary phase modifications to provide useful selectivity variations within the portfolio. For example, the Kinetex PS C18's embedded positive charge promotes improved peak shape for basic compounds under acidic conditions, and the Kinetex EVO C18 (pH stable 1 – 12 pH) allows mobile phase flexibility in dealing with compounds with ionizable groups.

**Q.** Do I need an adapter to use a Phenomenex column with a Waters® ACQUITY® UPLC® system?

**A.** No, Phenomenex columns will connect properly to the hardware that comes standard with a Waters ACQUITY UPLC system. The newer Waters columns, including ACQUITY columns, have the same port depth as Phenomenex columns so you will not need any special adapters.

 To watch an Installation video see, [www.youtube.com/watch?v=cfn1UNbloUk](http://www.youtube.com/watch?v=cfn1UNbloUk)

**Q.** What are chiral isomers? How do I recognize chiral centers?

**A.** A molecule and its non-superimposable mirror image is called an enantiomer. A simple example to illustrate an enantiomer is our hands. The left and right hand are mirror images of each other however they cannot be superimposed.

The easiest way to recognize is by identifying asymmetric carbon with 4 different substituents attached to it. There may be multiple asymmetric carbons in a single structure which would lead to a number of enantiomers. If there are no asymmetric carbons, then the plane of symmetry should be considered to figure out the chiral center. In general, a molecule with a plane of symmetry is achiral (no chiral center). Aside from carbon, nitrogen, and sulfur compounds can also confer chirality.

**Q.** What factors affect LC column lifetime?

**A.** The following factors contribute to the degradation of chromatography and subsequent replacement of HPLC columns:

1. Over time, the stationary phase backbone (i.e. silica) will begin to breakdown, resulting in the formation of column voids. This results in peak broadening and splitting, and subsequently loss of sensitivity and resolution.
2. The accumulation of fine particles can also cause an increase in pressure, which will further decrease lifetime.
3. Even under neutral pH, the stationary phase ligand may be lost over time resulting in reduced retention and efficiency.

The injection of problematic samples and/or harsh running conditions can significantly shorten column life (i.e. number of injections). To maximize column lifetime, especially with problematic samples, we recommend SecurityGuard™ and SecurityGuard ULTRA. Phenex™ syringe filters can also increase column lifetimes and improve system uptime by removing particulates from your sample prior to analysis.

**Q.** In SPE, how should I choose the right sorbent mass?

**A.** To choose the correct sorbent mass, the volume of sample to be extracted should be known. There are 2 choices for the SPE sorbent namely: polymeric and silica-based sorbent. The general rule for sample loading is to load no more than 10-15% of the bed mass for a polymeric SPE and 5% of the bedmass for silica-based SPE. For example, you can load approximately 1-1.5 mg of analyte on a 10 mg polymeric SPE sorbent and 0.5 mg of analyte on a 10 mg silica-based sorbent.



Create a customized SPE method in under 1 minute.  
[www.phenomenex.com/mdtool](http://www.phenomenex.com/mdtool)

**Q.** What are the benefits of microelution SPE?

**A.** Microelution SPE provides many benefits over traditional SPE formats such as increased sensitivity, the ability to process small sample volumes, time and cost savings by not drying down the eluted analyte, and a reduction in the loss of thermally labile and very hydrophobic analytes.

**Q.** How can peak capacity be improved in GC?

**A.** The peak capacity (n) of a GC separation can be improved by selecting high efficiency column dimensions and an optimum carrier gas flow rate. In general, smaller IDs and thin film stationary phases are considered high efficiency dimensions because they result in high efficiencies and slim peaks.

The n value can also be increased by the following:

- connecting 2 stationary phases of complementary selectivity in series in one dimensional separation ( $n = n_1 + 2n_2$ )
- connecting 2 stationary phases of complementary selectivity by comprehensive 2-dimensional chromatography ( $n = n_1 \times n_2$ )

**Q.** I am using an inert column for my GC analysis and I still see peak tailing. What could be the reason for this?

**A.** For analysis of active compounds, it is extremely important to use both a highly inert column and a highly inert inlet liner. The liner is the first place of potential analyte interaction during GC analysis, and it is important that your analytes are not adsorbed. Zebtron™ PLUS liners undergo a rigorous deactivation process and are tested for inertness to ensure reliable results when working with highly active compounds such as underivatized acids and active bases.



Don't see what you're looking for?  
Find answers to over 500 questions at  
[www.phenomenex.com/FAQ](http://www.phenomenex.com/FAQ)

# Abbreviations

Å	Angstrom	H <sub>2</sub> SO <sub>4</sub>	sulfuric acid	NO <sub>2</sub>	nitro
ACN	acetonitrile (methyl cyanide)	H <sub>3</sub> PO <sub>4</sub>	phosphoric acid	NP	normal phase
AGP	alpha-1-acid glycoprotein	HAC	hydroxyapatite chromatography	o-CP	o-chlorophenol
alpha	alpha (separation factor)	HCl	hydrochloric acid	OD	outer diameter
amu	atomic mass unit	HETP	height equivalent to a theoretical plate	ODS	octadecylsilane
α	alpha (separation factor)	hex	hexagonal (6-sided) nut	OH	hydroxyl, diol or glycerol phase
aq. sol.	aqueous solution	HF	hydrofluoric acid	PAC	polar amino cyano
AUFS	absorption units full scale	HFIP	hexafluoroisopropanol	PAH	polyaromatic hydrocarbon
BET	Brunner, Emmett and Teller method of surface analysis	HIC	hydrophobic interaction chromatography	PCTFE	Kel-F
BHT	butylhydroxytoluene	HILIC	hydrophilic interaction liquid chromatography	PEEK	polyetherether ketone
BSA	bovine serum albumin	HPCE	high-performance capillary electrophoresis	PEG	polyethylene glycol
BuOAc	butyl acetate	HPLC	high performance liquid chromatography	PEI	polyethyleneimine
C	Celsius	Hz	Hertz	PFA	Teflon, (perfluoroalkoxy monomer copolymerized)
C1	methyl silane phase (trimethyl silyl)	IC	ion chromatography	PFM	pentafluorophenyl
C18	octadecyl silane phase	ID	internal diameter	PFFA	pentafluoropropionic acid
C2	ethyl silane phase	IEC	ion-exchange chromatography	pH	parts hydrogen (measure of acidity)
C3	propyl silane phase	IEX	ion-exclusion chromatography	PHM	polyhydroxymethacrylate
C4	butyl silane phase	in.	inch	PITC	phenylisothiocyanate (Edman's reagent)
C5	pentyl silane phase	IPA	isopropanol (isopropyl alcohol)	pK <sub>a</sub>	dissociation constant of an acid
C6	hexyl silane phase	IPC	ion pair chromatography	PM	permethylated
C8	octyl silane phase	IR	infrared	PMMA	polymethyl methacrylate (acrylic)
CC	chiral chromatography	ISO	International Standards Organization	PMP	polymethylpentene
CCl <sub>4</sub>	carbon tetrachloride	ISRP	internal surface reversed phase	PO <sub>4</sub> <sup>3-</sup>	phosphate ion
CH <sub>3</sub> COOH	acetic acid	IUPAC	International Union of Pure and Applied Chemistry	ppb	parts per billion
CHCl <sub>3</sub>	chloroform	I/O	input/output	ppm	parts per million
Cl	chemical ionization	k	capacity factor	PRP	polymeric reversed phase
CH <sub>2</sub> Cl <sub>2</sub>	dichloromethane (methylene chloride)	kDa	kilo Daltons	PSF	polysulfone
CLP	Contract Lab Program	kg	kilogram	psi	pounds per square inch
cm	centimeter	kg/cm <sup>2</sup>	kilogram per centimeter squared	PTC	phenylthiocarbonyl
CM	carboxymethyl	KH <sub>2</sub> PO <sub>4</sub>	potassium dihydrogen phosphate	PTFE	Teflon [poly(tetrafluoroethylene)]
CMC	critical micelle concentration	L	length	PTH	phenylthiohydantoin
CN	cyano	lbs	pounds	PVA	polyvinyl alcohol
COOH	carboxylic acid	LC	liquid chromatography	PVC	polyvinyl chloride
CSP	chiral stationary phase	LCD	liquid crystal display	PVDF	Kynar, polyvinylidene difluoride
CTA	cellulose triacetate	LC-MS	liquid chromatography/mass spectroscopy	P&A	partition and adsorption chromatography
CTAB	cetyltrimethylammonium bromide	LEC	ligand-exchange chromatography	p/m	plates per meter (N)
CuAc	copper acetate	LED	light-emitting diode	QA	quality assurance
CuSO <sub>4</sub>	copper sulfate	μg	microgram	QC	quality control
CV	coefficient of variation	μL	microliter	RAM	random access memory
D	depth	μm	micrometer	RI	refractive index
Da	Dalton	μM	micromolar	RP	reversed phase
Dabsyl	4-N,N-dimethylaminoazobenzene-4-sulfonyl chloride	μmol/m <sup>2</sup>	micromoles per meter squared	R <sub>s</sub>	resolution
Dansyl	5-N,N-dimethylaminonaphthylene-1-sulfonyl chloride	m <sup>2</sup> /g	meters squared per gram	RS232	registered standard for I/O serial interface
DC	direct current	MB	megabyte	RSD	relative standard deviation
DCM	dichloromethane (methylene chloride)	MC	methylene chloride (dichloromethane)	SAS	short alkyl silyl (C1)
DEAE	diethylaminoethyl	MDEA	methyl-diethylamine	SAX	strong anion-exchange
DEAM	diethylaminomethyl	MECC	micellar electrokinetic capillary chromatography	SCX	strong cation-exchange
df	film thickness dimension (GC)	MeCN	methyl cyanide (acetonitrile)	SDS	safety data sheet
dia	diameter	MeOH	methanol	SDS	sodium dodecyl sulfate
DMAC	dimethylacetamide	meq/g	milliequivalent per gram	SEC	size exclusion chromatography
DMF	dimethylformamide	mg/mL	milligram per milliliter	SFC	supercritical fluid chromatography
DMSO	dimethylsulfoxide	min	minute	SFE	supercritical fluid extraction
DNPH	dinitrophenylhydrazine	mL/g	milliliter per gram	Si	silica
dp	degree of polymerization	mL/min	milliliter per minute	SLE	simplified liquid extraction
ECD	electrochemical detection	mm	millimeter	S/N	signal-to-noise ratio
ECDV	extra column dead-volume	mM	millimolar	sol.	solution
EDTA	ethylenediamine tetraacetic acid	MOS	monoocetyl silane	SPE	solid phase extraction
ELSD	evaporative light scattering detector	Mp	peak molecular weight	SS	stainless steel
em	emission (wavelength)	MS	mass spectrometry	ST	standard taper
EPA	Environmental Protection Agency	MS-DOS	Microsoft Disk Operating System	TEA	triethylamine
ESI	electrospray ionization	msec	milli-seconds	TEAA	tetraethyl ammonium acetate
ETFE	Tefzel, ethylene tetrafluoroethylene copolymer	MTBE	methyl tert-butyl ether	temp.	temperature
EtOAc	ethyl acetate	mV	milli-volt	TFA	trifluoroacetic acid
EtOH	ethanol	MW	molecular weight	THF	tetrahydrofuran
ex	excitation (wavelength)	MWD	molecular weight distribution	TLC	thin-layer chromatography
F	Fahrenheit	MW/Mn	molecular weight per molecular number	TMS	trimethyl chlorosilane
FID	Flame Ionization Detector	N	efficiency	USP	United States Pharmacopoeia
FLR	fluorescence	Na <sub>2</sub> PO <sub>4</sub>	sodium phosphate	UV	ultraviolet
FMOC	9-fluorenylmethylchloroformate	NaCO <sub>3</sub>	sodium carbonate	V	Volt
FPLC	fast protein liquid chromatography	NaHCO <sub>3</sub>	sodium bicarbonate	VA	vanillic acid
FTIR	Fourier-transform infrared	NaN <sub>3</sub>	sodium azide	VAC	volts alternating current
g	gram	NaOAc	sodium acetate	v/v	volume per volume
GC	gas chromatography	NF	National Formulary	w	width
GFC	gel filtration chromatography	NH <sub>2</sub>	amino	w	watts
GLP	good laboratory practice	NH <sub>4</sub> Ac	sodium acetate	WAX	weak anion-exchange
GMP	good manufacturing practice	NIOSH	National Institute of Occupational Safety and Health	WCX	weak cation-exchange
GnHCl	guanidine hydrochloride	NIST	National Inst. of Standards & Technology	w/v	weight per volume
GPC	gel permeation chromatography	nm	nanometer	XLPE	cross-linked high-density polyethylene
H	height	NMP	N-methyl pyrrolidone	ZDV	zero dead-volume

# GC Column Installation Instructions

The following is a brief reminder of the general precautions required in handling and installing any organic-coated fused silica capillary column. Consult your GC manual for more details.

Fused silica capillary columns become brittle if the polyimide coating applied during manufacture is damaged. Avoid temperatures above 370 °C, and excessive bending, twisting, and abrasion of columns, which will damage this protective coating. Remember, even if the column does not break immediately, when the protective coating is damaged the column may break spontaneously later.

All foreign material including debris from the septa or ferrules must be kept out of the column.

The stationary phase, which coats the inside of the column, must also be protected. The ends of the column will be sealed or protected by a septum when you receive the column. Once the ends are open in preparation for installation, the column should be installed in a chromatograph as soon as practical and a flow of dry, oxygen-free carrier gas maintained until the column is removed and resealed.

## Installing the Column

### A. Instrument and Capillary Column Preparation

1. Turn off all heated zones and allow them to cool.
2. Make sure you have carrier gas of sufficient purity; replace carrier gas purifiers, if appropriate.
3. Clean and deactivate injector and detector sleeves as necessary.
4. Replace seals and septum, and deactivate liner if necessary.
5. Inspect the column for damage.
6. Cut a centimeter or two off an end of the column. Use a sapphire scribe or a ceramic scoring-wafer to score the tubing before breaking it.
7. While pointing the end of the column down, install a nut and ferrule on it. Make sure the ferrule is the right size and pointed in the correct direction.
8. Cut an additional centimeter or two from the end of the column to remove ferrule fragments. Check the end. A 20-power magnifying glass is recommended. If the break is not clean and the end square, cut the column again.
9. Mount the column in the GC oven without damaging the column coating. It should not have sharp bends or touch the walls of the oven.
10. Insert the column into the injector exactly the correct distance specified in the instrument manual. Use correction fluid to mark the exact insertion distance.
11. Tighten the ferrule nut until the column resists movement. One-quarter turn past finger tight is about right. Do not connect the column to the detector at this time.
12. Adjust the head pressure to obtain the flow rate listed on the test chromatogram.
13. Check the inlet connections for leaks.
14. Confirm gas flow through the column by observing bubbles when the column outlet end is immersed in a vial of nontoxic solvent such as acetone.
15. Set gas flow rates for the detector including the make up rate.



Warning: It is advisable to wear safety glasses.



Warning: Cyano columns are susceptible to oxidation and hydrolysis. Care must be taken to avoid leaks, water, strong acids and high temperatures.

Figure 1: Proper and Improperly Cut Capillary End

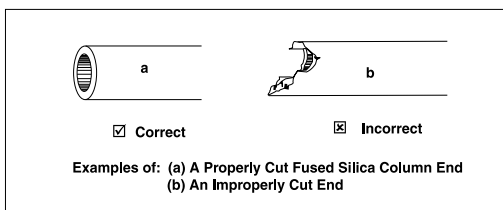


Figure 2: Cutting Fused Silica Tubing

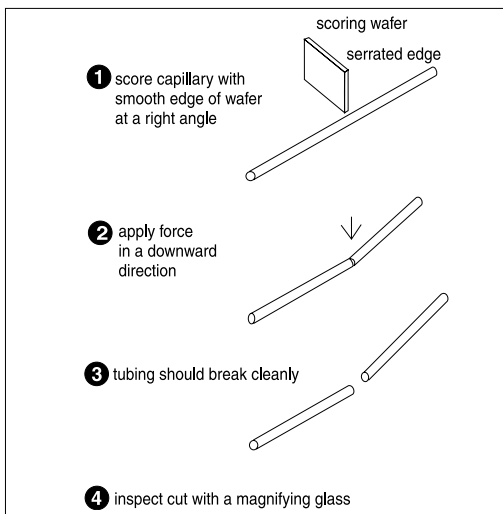
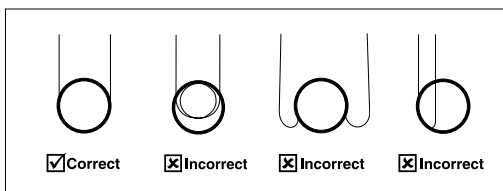


Figure 3: Column Hanging Diagrams



Warning: Avoid sharp bends when installing columns.



# GC Column Installation Instructions

## B. Conditioning and Testing the Capillary Column

- Purge the column with carrier gas for approximately 15 minutes. Further conditioning may be desirable.
- Insert the outlet end of the column into the detector exactly the distance prescribed in the instrument manual, repeating steps 7 through 9. Use correction fluid to mark the exact insertion distance.
- Set gas-flow rates to instrument specifications. Warning! Some detectors may be damaged by heating without proper gas flow.
- Check the system for leaks. It is preferable to use a thermal-conductivity-type leak detector. Do not use soaps or liquid-based leak detectors with capillary columns. Never heat the column without checking thoroughly for leaks first.
- Set injector and detector temperatures. Turn the detector on when steady state temperatures are achieved.
- Increase the oven temperature to the maximum continuous operating temperature for the column. Warning! Do not exceed the maximum operating temperature of the column. Maintain that temperature until a flat baseline is observed. If this takes more than half an hour, it could indicate a problem.
- Inject a detectable unretained sample such as methane to determine dead volume time and linear gas velocity. Adjust gas pressure to obtain proper values for your analytical method.
- Set oven to starting temperature. Inject another sample of a detectable unretained substance. Reset the carrier gas velocity to desired value.
- Check the performance of the GC and the column by injecting a known sample or performance test mix. If all peaks tail, it could indicate loose fittings, improper column installation, or broken liner. See the Section on Troubleshooting Installation Problems.
- Calibrate the instrument.
- Inject a sample, ensuring that the vaporized sample volume does not exceed the inlet sleeve's buffer volume
- For short-term standby operation of the GC instrument continue carrier gas flow at 100-200 °C. Long term standby conditions require that the column be removed from the instrument, flame-sealed or end-capped with septa, and stored away from light in its original box.

## Troubleshooting Installation Problems

More often than not, GC column problems are traceable to something improperly done during installation. For a more complete treatment of the subject, ask for your *FREE* guidebook "GC Troubleshooting".



**High Performance Operation Recommendation Before Use:**  
This column should be conditioned for at least 4 hours at its "maximum" isothermal temperature OR at 20 °C above the maximum temperature of the method, whichever is less.

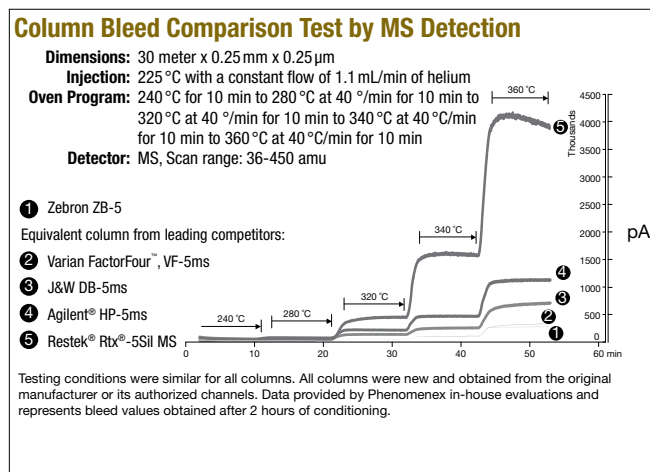
## Zebron GC Columns MS Certification

Simply because GC-MS is one of the most important and rapidly growing techniques, many manufacturers have designated these columns "MS Certified" in order to draw attention to them. Designed to bleed less at higher temperatures, these columns can analyze a broad range of compounds at lower levels than ever before.

To provide such columns, some manufacturers "high-grade" or select the best-performing capillary columns from batches of their standard columns and label these "MS grade". Other manufacturers modify the chemistry of the polymer backbone (with, e.g., silphenylene) in order to make lower bleed at higher temperature limits possible. This last approach can change selectivity, however, which then leads to problems when the method is upgraded from a traditional to the new "MS-certified" column.

Phenomenex MS-certified Zebron columns, however, are neither hand-selected nor will they change selectivity. Instead, they offer excellent thermal performance with identical selectivity compared to traditional "non-MS columns". Every column is manufactured to provide very high levels of batch-to-batch and column-to-column reproducibility, along side some of the most exacting bleed specifications in the industry — your assurance of a quality column that will perform for demanding applications.

Now anyone doing trace analysis can directly transfer their method to a true low bleed, high-temperature column without virtually any selectivity changes. Zebron is the clear choice.



# HPLC Calculations

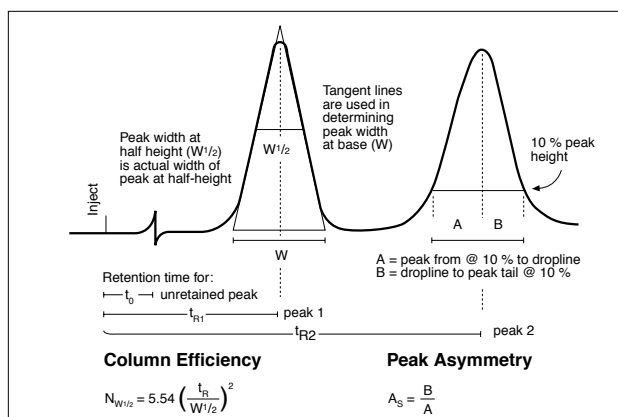
## Column Efficiency

In general, **N** = Number of Theoretical Plates, **a** is a constant depending on method used, **t<sub>R</sub>** = retention time of peak, and **W** = the peak width at a given peak height.

$$N = a \left( \frac{t_R}{W} \right)^2$$

Method	a
Peak Width ½ Peak Height	5.54
Peak Width at 4.4% Peak Height (5s method)	25
Tangential (ca. 13.5%)	16

The peak width at ½ height is the most commonly used method for calculating HPLC column efficiency.



## Peak Asymmetry

$$A_s = B/A \text{ at } 10\% \text{ peak height}$$

## Capacity Factor

(also known as Retention Factor or Relative Retention)

The Capacity Factor, **k**, of a sample component is a measure of the degree to which that component is retained by the column relative to an unretained component (such as uracil).

$$k = (t_R - t_0) / t_0$$

Where **t<sub>R</sub>** is the elution time of retained component, and **t<sub>0</sub>** is the elution time of the unretained sample.

## Separation Factor

(also known as Selectivity)

The selectivity parameter, **α**, is a measure of the spacing between two peaks and is expressed as:

$$\alpha = k_2 / k_1$$

## Resolution

**R<sub>s</sub>**, defined as the amount of separation between two adjacent peaks, is given by:

$$R_s = \frac{\sqrt{N}}{4} \left( \frac{\alpha - 1}{\alpha} \right) \left( \frac{k}{k + 1} \right)$$

where **k** is the average value for the two peaks.

## Adjusting Flow Rate for Different Column IDs

When scaling up from analytical to preparative mode or when scaling down from analytical to microbore LC, it is often desirable to keep retention times constant. The flow rate can be adjusted so that the columns operate at the same linear velocity.

When switching from a column with a radius (0.5 x ID) of **r1** to another with a radius of **r2**, the flow rate must be altered by a factor of **X**, where:

$$X = (r2/r1)^2$$

For example, when scaling up from a 250 x 4.6 mm column to a 250 x 10 mm ID column, the flow rate must be increased by a factor of 4.73 in the 10 mm column to generate the same linear velocity as that of the 4.6 mm ID column, as derived below:

$$X = (5.0/2.3)^2 = 4.73$$

The general formula which will convert flow rate from any given column dimension to any other is as follows:

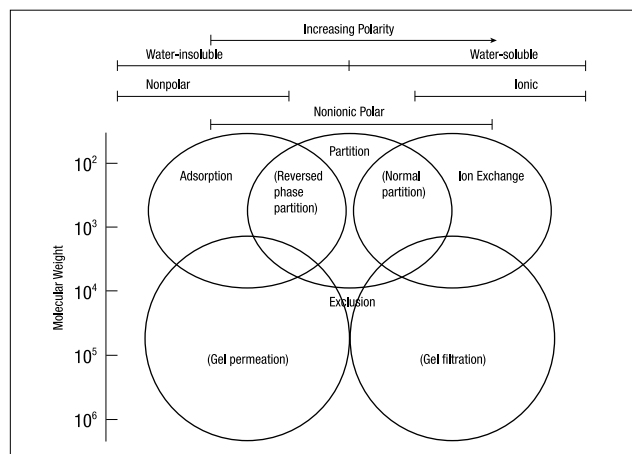
$$F2 = F1 \times (L2/L1) \times (r2/r1)^2$$

Where: **L** = length of the column, in mm  
**r** = radius of the column, in mm  
**F** = flow rate, in mL/min  
**1** designates the first, or reference, column  
**2** designates the second column

## Effect of Different Conditions on Sample Retention

Change in Separation	Effect on Retention Time:		
	t <sub>0</sub>	Run Time	Band Spacing
Flow rate	F	1/F	None
Column volume	V <sub>m</sub>	V <sub>m</sub>	None
Increase in percentage of strong solvent	None	Decrease	Small change
New strong solvent	None	Changes	Changes
pH value	None	Changes	Changes
Column packing (e.g., cyano vs. C18)	Little	Changes	Changes
Increase temperature	None	Decrease	Small change
New mobile phase additives	None	Changes	Changes

## Applications of Liquid Chromatography



(From: D.L. Saunders, in Chromatography, 3rd ed, E. Heftmann, Ed., p. 81, Van Nostrand Reinhold: New York, 1975. With permission.)



Technical information found in this Appendix can also be viewed on our website. Please visit [www.phenomenex.com/chromtips](http://www.phenomenex.com/chromtips).

# Chromatographic Parameters

Parameters	Unit	Symbols Kirkland <i>et al.</i> *	ASTME E-19**	Chromatographia**
Retention time of an unretained solute	s	$t_0$	$t_M$	$t_m$
Retention time, measured from the start	s	$t_R$	$t_r$	$t_{m+s}$
Reduced retention time	s	$t'_R = t_R - t_0$	$t'_R = t_r - t_M$	$t'_s = t_{m+s} - t_m$
Band width	s	$w$	$y_1$	$w_b$
Capacity factor (Retention factor)	—	$k = \frac{t'_R}{t_0}$	$k = \frac{t'_R}{t_M}$	$k = \frac{t'_s}{t_m}$
Selectivity factor	—	$\alpha = \frac{k_2}{k_1} = \frac{t'_{R2}}{t'_{R1}}$	$r_j = \frac{t'_{Rj}}{t'_1}$	$r = \frac{t'_s}{t'_s}$
Resolution	—	$R_s = 2 \left( \frac{t'_{R2} - t'_{R1}}{w_2 + w_1} \right)$	$R_j = 2 \left( \frac{t'_{Rj} - t'_{R1}}{y_j + y_1} \right)$	$R_s = 2 \left( \frac{t'_{m+s} - t'_{m+s}}{w'_b + w'_b} \right)$
Number of theoretical plates	—	$N = 16 \left( \frac{t'_R}{w} \right)^2$	$n = 16 \left( \frac{t'_R}{y_1} \right)^2$	$n = 16 \left( \frac{t'_{m+s}}{w_b} \right)^2$
Column length	cm	L	L	L
Height equivalent of a theoretical plate (plate height)	cm	$H = \frac{L}{N}$	$H = \frac{L}{n}$	$h = \frac{L}{n}$
Linear velocity of the mobile phase	cm s <sup>-1</sup>	$u = \frac{L}{t_0}$	$\bar{u} = \frac{L}{t_m}$	$\bar{u} = \frac{L}{t_m}$

\*Modern Practice of Liquid Chromatography, Ed. J.J. Kirkland, Wiley, New York (1971).  
 \*\*B. Versino and F. Geib, Supplement in: Chromatographia 3 (1970).

## Amounts of Sample That Can Be Separated

Column Type	ID (mm)	Approx. Dead Volume (mL)*	Typical Flow Rate (mL)	Typical and (Max.) Injection Masses (mg)	Typical and (Max.) Injection Volumes (μL)**
Capillary (Fused Silica)	0.32	0.0075	0.001 - 0.02	0.001 (0.01)	1 (10)
Microbore	1.0	0.07	0.02 - 0.1	0.01 (0.1)	5 (25)
Analytical	4.6	1.5	0.5 - 2.0	0.1 (2.5)	10 (200)
Semi-Prep	10.0	7.3	5.0 - 20	1.0 (25)	50 (1000)
Preparative	20.0	29.2	10 - 200	5.0 (500)	200 (5000)

\*The column Dead Volume (Vo) may be estimated from:

$$\text{Column Dead Volume (mL)} = V_0 = 0.487 \times d^2 \times L$$

Where: L = column length (cm); 15 cm (150mm) used for calculation.  
 d = column ID (cm, not mm)

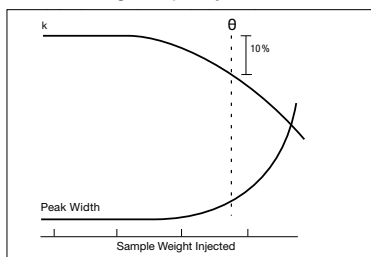
\*\*The maximum allowable Sample Injection Volume (Vi) can be estimated as follows:

$$\text{Maximum Injection Volume} = V_i = \frac{V_r}{2\sqrt{N}}$$

Where: Vr = the retention volume of the first peak (mL)  
 N = number of theoretical plates per column

## Column Loading Capacity

Retention time and peak width are independent of the amount of sample injected up to a point called the column capacity ( $\theta$ ). Above this point, retention times (k) decrease and peak widths increase. When retention decreases by 10% of its normal value, the column capacity has been exceeded. Increases in peak width can cause overlap with adjacent peaks, reducing the purity of collected fractions. Analytical scale columns have capacities on the order of 1 mg, while preparative scale columns can separate tens of milligrams or even grams depending on the diameter of the column.

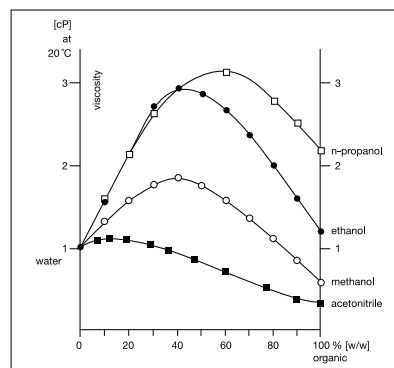


## Probes for Column Characterization

The following tests are not 100% accurate for column characterization and it should be noted that there will be exceptions where a column gives a false value caused by other interaction mechanisms with the stationary phase and analyte probe.

Hydrophobicity:	Tested by k' butylbenzene
Polarity:	Tested by k' caffeine
H-bonding	Tested by $\alpha$ (k' caffeine/k' phenol)
Aromatic Selectivity	An estimate of ligand selectivity by $\pi$ - $\pi$ interaction
Silanol Activity	Tested by $\alpha$ (k' benzylamine/k' phenol)

## Viscosity of Solvent Mixtures as a Function of Composition

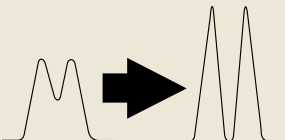
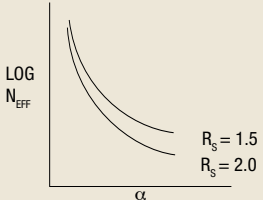
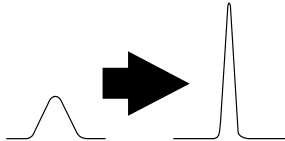
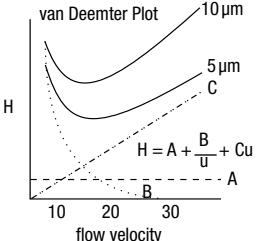
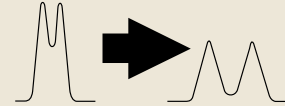
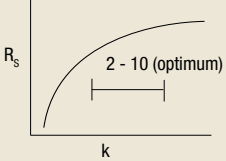


# Reversed Phase Method Development

## Factors Controlling Resolution

The equation below shows how resolution is affected by the controllable factors: Selectivity, Efficiency and Retention:

$$R_s = \frac{\sqrt{N}}{4} \left( \frac{\alpha-1}{\alpha} \right) \left( \frac{k}{k+1} \right)$$

Goal	Factor	Control
	<b>Selectivity Factor</b> $\alpha = k_2 / k_1$ $\alpha$ (alpha) = $k_2 / k_1$ . For closely spaced peaks, the alpha value is close to 1.0, so <b>small</b> changes in alpha have <b>large</b> effects on the resulting resolution. <b>Improve selectivity (<math>\alpha</math>)</b> by altering the composition of the mobile phase or stationary phase. pH and temperature are two other potential variables to control, if appropriate.	
	<b>Efficiency Factor</b> $N = -8 \ln(f) (t_r / w_f)^2$ Since resolution is a function of the square root of N, large changes in N are required to make small changes in resolution. Increasing efficiency is often an overrated method of improving resolution. <b>Improve efficiency (N)</b> by increasing column length, decreasing particle size of column packing, or decreasing flow rate. Minimize extra-column dead volume.	
	<b>Retention Factor</b> $k = (t_r - t_0) / t_0$ This is a function of k, the average retention factor for 2 adjacent bands. When k is small (0-1), this factor severely limits resolution. Larger values of k will improve resolution, yet increase associated retention times. Above k = 20, the amount of improvement is small. <b>Improve k</b> by changing the eluent strength.	

- Where: k = Retention factor =  $(t_r - t_0) / t_0$  (previously known as capacity factor)  
 f = Fractional height of peak, e.g., 0.5, 0.1  
 $W_f$  = Width of peak at fractional height f  
 $t_r$  = Elution time of the retained component  
 $t_0$  = Elution time of an unretained component (one that elutes in the void volume)  
 $H = \frac{L}{N}$  = Height equivalent to a theoretical plate (HETP) =  $\frac{L}{N}$ , or as defined by the terms of the van Deemter plot above  
 A = Eddy diffusion  
 B = Longitudinal diffusion  
 C = Mass transfer kinetics of the analyte between mobile and stationary phase  
 u = Linear velocity



# HPLC Column Protection

## Upon Receipt Of The Column

- Verify the column you received is the column you ordered
- Check the column for physical damage that may have occurred during shipping
- Test the column immediately to verify quality and performance
- All columns are shipped in the testing solvent, unless otherwise specified

Each Phenomenex manufactured HPLC column is individually packed and tested to ensure outstanding column quality. Every column is supplied with its Test Chromatogram and a Specification Sheet that indicates testing conditions, operating parameters, column serial number and identity.

The warranty period begins upon receipt of the column. Testing is especially important if the column is to be placed in storage. Test the column using the same conditions in the test chromatogram. Use the formulas on p. 438 to determine column efficiency and peak asymmetry.

Chromatographic performance depends on the entire system, not just the column. Columns are QC tested using optimum conditions to minimize band-spreading from "Extra Column Effects." See pp. 424-425 for HPLC Column Performance Check Standards. Most variations from the Phenomenex test data are due to extra column effects created by your system's design (e.g., injector, flow cell, connecting tubing, etc.). If you have any questions regarding your test results or the column quality, or if there are signs of damage, contact your local distributor or Phenomenex immediately.

## Mobile Phase Considerations

- Use only HPLC grade solvents
- Use only highest purity chemicals and reagents
- Degas and filter all mobile phases prior to use
- Make sure solvents are miscible (see Table p. 442)
- Always check sample solubility
- If possible, use the mobile phase as the diluent (sample solvent)

## Stationary Phase Considerations

- Maintain pH between 2.0 and 8.0\*\*
- Use guard columns
- Avoid aldehydes and ketones with amino columns

\*\*Consult Phenomenex for columns that have extended pH ranges.

## Backpressure and Flow Rates

- Keep backpressures below 3500 psi (245 bar), for HPLC columns. For Luna and Gemini columns, keep backpressures below 5000 psi (345 bar). For Core-Shell columns, keep backpressures below 6000 psi (400 bar) for 3.0 and 4.6 mm ID columns. For 2.1 mm ID columns the backpressure limit is 15000 psi (1000 bar)
- Avoid any sudden pressure and flow rate changes
- If high backpressure is observed reverse flush the column (Check column care guide before proceeding)
- Use a backpressure regulator if you are experiencing out-gassing problems in the detector cell

Columns can be operated at any flow rate that is consistent with the backpressure limitations described below. Flow rates should be optimized to provide the highest efficiency for your sample.

## Typical Column Flow Rates & Backpressures (RP) \*column length

Particle Size (µm)	Internal Diameter(mm)	Typical Flow Rate (mL/min)	Typical Pressure (psi)	
			150 mm*	250 mm*
1.7	2.1	0.5	6700	NA
2.6	2.1	0.5	6800	NA
2.6	3.0	0.8	5500	NA
2.6	4.6	1.85	5000	NA
3	2.0	0.2	1500	2400
3	3.0	0.6	1500	2400
3	4.6	1.25	1500	2300
5	2.0	0.2	650	1000
5	3.0	0.5	900	1400
5	4.6	1.0	850	1200
10	10.0	5.0	350	500
10	21.2	15.0	350	500

Phenomenex

## Storing The Column

- Column storage conditions affect column lifetime
- Never store columns containing buffers or ion-pairing reagents
- Flush with at least five column volumes of mobile phase without buffer to remove any buffers or salts

## Storage Conditions for Silica-Based HPLC Columns

Column Type	Storage Solvent
Reversed Phase (RP) C18, C12, C8, C4, C2, C1, Phenyl, PFP	65% Acetonitrile/ 35% Water
Normal Phase (NP) Silica, CN, NH <sub>2</sub> , PAC, Diol, Alumina	Isopropanol or Hexane
Ion-Exchange SAX, SCX, WAX, WCX	Methanol*
Size Exclusion Diol	0.05% Na <sub>2</sub> SO <sub>4</sub> in Water or 10% Methanol
HILIC Luna HILIC	80% Acetonitrile/ 20% Water

\*Flush column with 50 mL HPLC grade water prior to storage solvent

## Column Cleaning Procedures

Due to interactions between the stationary phase and sample components, HPLC columns may occasionally require cleaning or regeneration. The following conditions apply to Phenomenex silica-based columns with the exception of chiral columns.

- Flow rates should be 1/5 - 1/2 of the typical flow rate
- To estimate the column volume, use the following equation:

$$V = \pi r^2 L$$

V = column volume in mL  
r = column radius in cm  
L = column length in cm

### UNBONDED SILICA COLUMNS (Si)

Rinse with 10 column volumes each of:

- Hexane
- Methylene Chloride
- Isopropanol
- Methylene Chloride
- Mobile Phase

Water Removal: Flush column with 30 mL 2.5% 2,2-dimethoxy propane and 2.5% glacial acetic acid in hexane.

### REVERSED PHASE COLUMNS (C18, C12, C8, C5, C4, C2, C1, PHENYL, PFP, CN, NH<sub>2</sub>)

Rinse with 10 column volumes each of:

- 95% Water/5% Acetonitrile (for buffer removal)
- THF
- 95% Acetonitrile/5% Water
- Mobile Phase

### REVERSED PHASE PROTEIN/PEPTIDE COLUMNS (C18, C12, C8, C5, C4, Phenyl)

Rinse with 20 column volumes of mobile phase with buffer removed.

Run gradient (2x):

- 0.1% aqueous TFA in water
- 0.1% TFA in Acetonitrile/Isopropanol (1:2)

25% B to 100% B for 30 minutes  
Equilibrate with 10 column volumes of mobile phase. Do not store column in TFA.

### BONDED NORMAL PHASE COLUMNS (CN, NH<sub>2</sub>, DIOL, PAC)

Rinse with 10 column volumes each of:

- Chloroform
- Isopropanol
- Methylene Chloride
- Mobile Phase

**Exception:** Recommended for cleaning Luna Amino when used in reversed phase mode:

- Wash with at least 30 column volumes of Sodium Hydroxide pH 11.0
- Flush with at least 30 column volumes of water (HPLC grade)
- Re-equilibrate to mobile phase conditions.

### GFC/SEC COLUMNS FOR PROTEINS (Yarra SEC, BIOSEP-SEC-S)

Rinse with 5 column volumes of:

- 0.1 M Phosphate buffer pH 3.0
- For strongly retained proteins:  
Run 100% Water to 100% Acetonitrile to 100% Water over 60 minutes OR wash with 5 column volumes of SDS or 6 M Guanidine Thiocyanate or 10% DMSO.  
Do not backflush columns!

### ION-EXCHANGE COLUMNS (SAX, SCX, NH<sub>2</sub>, WAX, WCX)

Rinse with 10 column volumes each of:

- 500 mM Phosphate Buffer pH 7
  - 10% Acetic Acid (Aq)
- 5 column volumes of Water  
10 column volumes of Phosphate Buffer pH 7  
5 column volumes of Water  
10 column volumes of Methanol  
10 column volumes of Water  
For protein removal, follow the above procedure with this exception:  
Substitute 10 column volumes of Methanol with 10 column volumes of 5 M Urea or 5 M Guanidine Thiocyanate.

### HILIC

Rinse with 10 column volumes each of:

- 95% Water/5% Acetonitrile (for buffer removal)
- 95% 100 mM Ammonium Acetate, pH 5.8 / 5% Acetonitrile
- 95% Water/5% Acetonitrile
- Mobile Phase



HPLC columns running water-free, flammable organic solvents (e.g., normal phase, chiral, GPC) can generate static electricity and should be properly grounded to avoid a potentially dangerous electrical discharge.





# Solvent Miscibility Table

Solvent Miscibility Table

Solvent	Polarity Index	Refractive Index @ 20°C	UV(nm) Cutoff @ 1AU	Boiling Point (C°)	Viscosity (cPoise)	Solubility in Water (% w/w)
Acetic Acid	6.2	1.372	230	118	1.26	100
Acetone	5.1	1.359	330	56	0.32	100
Acetonitrile	5.8	1.344	190	82	0.37	100
Benzene	2.7	1.501	280	80	0.65	0.18
n-Butanol	4.0	1.394	254	125	0.73	0.43
Butyl Acetate	3.9	1.399	215	118	2.98	7.81
Carbon Tetrachloride	1.6	1.466	263	77	0.97	0.08
Chloroform	4.1	1.446	245	61	0.57	0.815
Cyclohexane	0.2	1.426	200	81	1.00	0.01
1,2-Dichloroethane <sup>1</sup>	3.5	1.444	225	84	0.79	0.81
Dichloromethane <sup>2</sup>	3.1	1.424	235	41	0.44	1.6
Dimethylformamide	6.4	1.431	268	155	0.92	100
Dimethyl Sulfoxide <sup>3</sup>	7.2	1.478	268	189	2.00	100
Dioxane	4.8	1.422	215	101	1.54	100
Ethanol	5.2	1.360	210	78	1.20	100
Ethyl Acetate	4.4	1.372	260	77	0.45	8.7
Di-Ethyl Ether	2.8	1.353	220	35	0.32	6.89
Heptane	0.0	1.387	200	98	0.39	0.0003
Hexane	0.0	1.375	200	69	0.33	0.001
Methanol	5.1	1.329	205	65	0.60	100
Methyl-t-Butyl Ether <sup>4</sup>	2.5	1.369	210	55	0.27	4.8
Methyl Ethyl Ketone <sup>5</sup>	4.7	1.379	329	80	0.45	24
Pentane	0.0	1.358	200	36	0.23	0.004
n-Propanol	4.0	1.384	210	97	2.27	100
Iso-Propanol <sup>6</sup>	3.9	1.377	210	82	2.30	100
Di-Iso-Propyl Ether	2.2	1.368	220	68	0.37	
Tetrahydrofuran	4.0	1.407	215	65	0.55	100
Toluene	2.4	1.496	285	111	0.59	0.051
Trichloroethylene	1.0	1.477	273	87	0.57	0.11
Water	9.0	1.333	200	100	1.00	100
Xylene	2.5	1.500	290	139	0.61	0.018

 <b>Immiscible</b>	<b>Synonym Table</b>
 <b>Miscible</b>	<sup>1</sup> Ethylene Chloride
	<sup>2</sup> Methylene Chloride
	<sup>3</sup> Methyl Sulfoxide
	<sup>4</sup> tert-Butyl Methyl Ether
	<sup>5</sup> 2-Butanone
	<sup>6</sup> 2-Propanol

Immiscible means that in some proportions two phases will be produced

Solvent Polarity Chart

Relative Polarity	Compound Formula	Group	Representative Solvent Compounds
Nonpolar ↑ Increasing Polarity ↓ Polar	R - H	Alkanes	Petroleum ethers, ligroin, hexanes
	Ar - H	Aromatics	Toluene, benzene
	R - O - R	Ethers	Diethyl ether
	R - X	Alkyl halides	Tetrachloromethane, chloroform
	R - COOR	Esters	Ethyl acetate
	R - CO - R	Aldehydes and ketones	Acetone, methyl ethyl ketone
	R - NH <sub>2</sub>	Amines	Pyridine, triethylamine
	R - OH	Alcohols	Methanol, ethanol, isopropanol, butanol
	R - COHN <sub>2</sub>	Amides	Dimethylformamide
	R - COOH	Carboxylic acids	Acetic acid
Polar	H - OH	Water	Water



Technical information found in this Appendices can also be viewed on our website. Please visit [www.phenomenex.com/chromtips](http://www.phenomenex.com/chromtips).

# a selection of HPLC Material Sorbent Characteristics

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list and the accuracy of data is not guaranteed.

## Phenomenex Sorbents

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m <sup>2</sup> /g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m <sup>2</sup> )	End Capping	pH Range	USP Packing
Aeris WIDEPORE XB-C18	Core-Shell 3.6	—	—	25	—	—	Yes	1.5-9	L1
Aeris WIDEPORE XB-C8	Core-Shell 3.6	—	—	25	—	—	Yes	1.5-9	L7
Aeris WIDEPORE C4	Core-Shell 3.6	—	—	25	—	—	Yes	1.5-9	L26
Aeris PEPTIDE XB-C18	Core-Shell 1.7, 2.6, 3.6, 5	100	—	200	10 <sup>†</sup>	—	Yes	1.5-9	L1
Aqua C18	Spher. 3, 5	125	1.05	320	15	—	Proprietary	2.5-7.5	L1
Aqua C18	Spher. 5	200	1.15	215	11	—	Proprietary	2.5-7.5	L1
Biozen Glycan	Core-Shell 2.6	100	—	200	—	—	—	2.0-7.5	—
Biozen Peptide PS-C18	Spher. 1.6, 3	100	—	260	9	—	—	1.5-8.5 <sup>Δ</sup>	L1
Biozen Peptide XB-C18	Core-Shell 1.7, 2.6	100	—	200	10	—	—	1.5-9 <sup>†</sup>	L1
Biozen WidePore C4	Core-Shell 2.6	400	—	25	<1	—	—	1.5-9 <sup>†</sup>	L26
Biozen Intact XB-C8	Core-Shell 3.6	200	—	25	—	—	—	1.5-9 <sup>†</sup>	L7
Biozen Oligo	Core-Shell 1.7, 2.6	100	—	200	11 <sup>†</sup>	—	—	1-12	—
Biozen WCX	Non-Porous 6	—	—	—	—	—	—	2-12	—
Bondclone Silica	Irreg. 10	148	1.1	300	0	0	No	—	L3
Bondclone C18	Irreg. 10	148	1.1	300	10	Monomeric 1.61	Yes	2.5-7.5	L1
Clarity Oligo-RP	Spher. 3, 5, 10	110	—	375	14	—	Yes	1-12	—
Clarity Oligo-MS	Core-Shell 1.3, 1.7, 2.6, 5	100	—	200	12	—	Yes	1.5-10	L1
Clarity Oligo-XT	Hybrid Core-Shell 1.7, 2.6, 5	100	—	200	11	—	Yes	1-12	L1
Gemini C18	Hybrid Spher. 3, 5, 10	110	—	375	14	—	Yes	1.0-12.0	L1
Gemini C6-Phenyl	Hybrid Spher. 3, 5	110	—	375	12	—	Yes	1.0-12.0	L11
Gemini NX-C18	Hybrid Spher. 3, 5, 10	110	—	375	14	—	Yes	1.0-12.0	L1
HyperClone BDS C8	Spher. 3, 5	130	0.6	155	7	—	Yes	2.0-7.5	L7
HyperClone BDS C18	Spher. 3, 5	130	0.6	155	11	—	Yes	2.0-7.5	L1
HyperClone MOS (C8)	Spher. 3, 5	120	0.6	155	6.5	—	Yes	2.0-7.5	L7
HyperClone ODS (C18)	Spher. 3, 5	120	0.6	155	10	—	Yes	2.0-7.5	L1
HyperClone CN (CPS)	Spher. 3, 5	120	0.6	155	4	—	No	2.0-7.5	L10
Jupiter C4	Spher. 5, 10, 15	300	—	170	5.0	6.30	Yes	1.5-10	L26
Jupiter C5	Spher. 5	300	—	170	5.5	5.30	Yes	1.5-10	—
Jupiter C18	Spher. 5, 10, 15	300	—	170	13.34	5.50	Yes	1.5-10	L1
Jupiter Proteo	Spher. 4, 10	90	—	475	15	—	Yes	1.5-10.0	—
Kinetex EVO C18	Hybrid Core-Shell 1.7, 2.6, 5	100	—	200	11 <sup>†</sup>	—	Yes	1-12	L1
Kinetex C18	Core-Shell 1.3, 1.7, 2.6, 5	100	—	200	12 <sup>†</sup>	—	Yes	1.5-8.5 <sup>Δ</sup>	L1
Kinetex PS C18	Core-Shell 2.6	100	—	200	9 <sup>†</sup>	—	Yes	1.5-8.5 <sup>Δ</sup>	L1
Kinetex XB-C18	Core-Shell 1.7, 2.6, 5	100	—	200	10 <sup>†</sup>	—	Yes	1.5-8.5 <sup>Δ</sup>	L1
Kinetex C8	Core-Shell 1.7, 2.6, 5	100	—	200	8 <sup>†</sup>	—	Yes	1.5-8.5 <sup>Δ</sup>	L7
Kinetex Biphenyl	Core-Shell 1.7, 2.6, 5	100	—	200	11 <sup>†</sup>	—	Yes	1.5-8.5 <sup>Δ</sup>	L11
Kinetex Phenyl-Hexyl	Core-Shell 1.7, 2.6, 5	100	—	200	11 <sup>†</sup>	—	Yes	1.5-8.5 <sup>Δ</sup>	L11
Kinetex F5	Core-Shell 1.7, 2.6	100	—	200	9 <sup>†</sup>	—	Yes	1.5-8.5 <sup>Δ</sup>	L43
Kinetex HILIC	Core-Shell 1.7, 2.6, 5	100	—	200	0	—	No	2.0-7.5	L3
Kinetex Polar C18	Core-Shell 2.6	100	—	200	3.6 <sup>†</sup>	—	Yes	1.5-8.5 <sup>Δ</sup>	L1
Kinetex PAH	Core-Shell 3.5	100	—	200	12 <sup>†</sup>	—	Yes	1.5-8.5 <sup>Δ</sup>	L118
Luna PFP(2)	Spher. 3, 5	100	1.0	400	11.5	2.20	Yes	1.5-9.0 <sup>†</sup>	L43
Luna Phenyl-Hexyl	Spher. 3, 5, 10, 15	100	1.0	400	17.5	4.00	Yes	1.5-9.0 <sup>†</sup>	L11
Luna Silica(2)	Spher. 3, 5, 10, 15	100	1.0	400	0	—	No	2.0-7.5	L3
Luna C5	Spher. 5, 10	100	1.0	440	12.5	7.85	Yes	1.5-9.0 <sup>†</sup>	—
Luna C8	Spher. 5, 10	100	1.0	440	14.75	5.50	Yes	1.5-9.0 <sup>†</sup>	L7
Luna C8(2)	Spher. 3, 5, 10, 15	100	1.0	400	13.5	5.50	Yes	1.5-9.0 <sup>†</sup>	L7
Luna C18	Spher. 5, 10	100	1.0	440	19	3.00	Yes	1.5-9.0 <sup>†</sup>	L1
Luna C18(2)-HST	Spher. 2.5	100	1.0	400	17.5	3.00	Yes	1.5-9.0 <sup>†</sup>	L1
Luna C18(2)	Spher. 3, 5, 10, 15	100	1.0	400	17.5	3.00	Yes	1.5-9.0 <sup>†</sup>	L1
Luna CN	Spher. 3,5,10	100	1.0	400	7.0	3.80	Yes	1.5-7.0	L10
Luna HILIC	Spher. 3, 5	200	—	200	5.7	4.30	No	1.5-8.0	L20
Luna NH <sub>2</sub>	Spher. 3,5,10	100	1.0	400	9.5	5.80	No	1.5-11.0	L8
Luna SCX	Spher. 5,10	100	—	400	0.55% Sulfur Load	—	No	2.0-7.0	—
Luna Omega C18	Spher. 1.6, 3,5	100	—	260	10.35	2.5	Yes	1.5-8.5	L1
Luna Omega PS C18	Spher. 1.6, 3,5	100	—	260	8.8	—	Yes	1.5-8.5	L1
Luna Omega Polar C18	Spher. 1.6, 3,5	100	—	260	8.5	—	Yes	1.5-8.5	L1
Luna Omega SUGAR	Spher. 3	100	—	260	<2	—	Yes	2.0-7.0	L8
Onyx C18	C18 Bonded Rod**	130*	1.0	300	18	3.6	Yes	2.0-7.5	L1
PhenoSphere C6	Spher. 3, 5, 10	80	0.5	220	6, Monomeric	2.27	Yes	2.5-7.5	L15
PhenoSphere SCX	Spher. 5, 10	80	0.5	220	6, Monomeric	0.4 meq/g	No	2.5-7.5	—
PhenoSphere SAX	Spher. 5, 10	80	0.5	220	4, Monomeric	0.6 meq/g	No	2.5-7.5	L14

<sup>†</sup> Effective Carbon Load. <sup>\*\*</sup> Mesopore size listed. Macropore size is 2 µm. <sup>Δ</sup> pH range is 1.5-10 under isocratic conditions. pH range is 1.5-8.5 under gradient conditions. <sup>†</sup> pH range is 1.5-10 under isocratic conditions. pH range is 1.5-9.0 under gradient conditions.

# a selection of HPLC Material Sorbent Characteristics

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list and the accuracy of data is not guaranteed.

## Phenomenex Sorbents (cont'd)

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m <sup>2</sup> /g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m <sup>2</sup> )	End Capping	pH Range	USP Packing
PhenoSphere-NEXT Silica	Spher. 3, 5	120	—	380	—	—	No	—	L3
PhenoSphere-NEXT C8	Spher. 3, 5	120	—	380	10	—	Yes	2.5-7.5	L7
PhenoSphere-NEXT C18	Spher. 3, 5	120	—	380	14	—	Yes	2.5-7.5	L1
PhenoSphere-NEXT Phenyl	Spher. 5	120	—	380	11	—	Yes	2.5-7.5	L11
PolymerX RP-1	Spher. 3, 5, 7, 10, 15	100	—	410	0	N/A	No	0-14	L21
Prodigy ODS(2)	Spher. 5	150	1.1	310	18.5, Monomeric	3.50	Yes	2.0-9.0	L1
Prodigy C8	Spher. 5	150	1.1	310	12.6, Monomeric	5.00	Yes	2.0-9.0	L7
Prodigy ODS (3)	Spher. 3, 5, 10	100	1.0	450	15.5, Monomeric	—	Yes	2.0-9.0	L1
Prodigy Phenyl (PH-3)	Spher. 5	100	—	450	10.0, Polymeric	—	No	2.0-9.0	L11
SphereClone Silica	Spher. 5	80	—	200	—	—	No	—	L3
SphereClone C6	Spher. 5	80	—	200	6	—	Yes	2.5-7.5	L15
SphereClone C8	Spher. 3, 5	80	—	200	6	—	Yes	2.5-7.5	L7
SphereClone ODS (1)	Spher. 3, 5	80	—	200	7	—	Partial	2.5-7.5	L1
SphereClone ODS (2)	Spher. 3, 5, 10	80	—	200	12	—	Yes	2.5-7.5	L1
SphereClone NH <sub>2</sub>	Spher. 3, 5	80	—	200	2	—	No	2.5-7.5	L8
SphereClone SAX	Spher. 5, 10	80	—	200	—	—	No	2.5-7.5	—
Synergi Fusion-RP	Spher. 2.5	100	—	400	12	—	Yes	1.5-9.0 <sup>†</sup>	L1
Synergi Max-RP	Spher. 2.5	100	—	400	17	—	Yes	1.5-9.0 <sup>†</sup>	—
Synergi Hydro-RP	Spher. 2.5	100	—	400	19	—	Proprietary	1.5-7.5	L1
Synergi Polar-RP	Spher. 2.5	100	—	400	11	—	Proprietary	1.5-7.0	—
Synergi Fusion-RP	Spher. 4, 10	80	1.05	475	12	—	Yes	1.5-9.0 <sup>†</sup>	L1
Synergi Max-RP	Spher. 4, 10	80	1.05	475	17	3.21	Yes	1.5-9.0 <sup>†</sup>	L87
Synergi Hydro-RP	Spher. 4, 10	80	1.05	475	19	2.45	Proprietary	1.5-7.5	L1
Synergi Polar-RP	Spher. 4, 10	80	1.05	475	11	3.15	Proprietary	1.5-7.0	L11
Ultracarb C8	Spher. 5	60	0.80	550	14, Monomeric	2.71	Yes	2.5-7.5	L7
Ultracarb ODS (20)	Spher. 3, 5	90	0.75	370	22, Monomeric	3.53	Yes	2.5-7.5	L1
Ultracarb ODS (30)	Spher. 5	60	0.80	550	31, Monomeric	4.06	Yes	2.5-9.0	L1

<sup>†</sup> pH range is 1.5-10 under isocratic conditions. pH range is 1.5-9.0 under gradient conditions.

\*As per Sander, L.C., and Wise, S.A., Anal. Chem. 1984, 56, 504-510,

$$\text{where } N(\mu\text{mol}/\text{m}^2) = \frac{10^{19} P}{1200 n_c - P_c (M-1)} \cdot \frac{1}{S}$$

and P = percent carbon of bonded phase, n<sub>c</sub> is the number of carbon atoms in the bonded silane molecule, M is the molecular weight of the bonded silane molecule, and S is the specific surface area of the bonded silica in m<sup>2</sup>/g.

NOTE: Phenomenex has not verified above values experimentally, and does not guarantee their accuracy. Above specifications subject to change without prior notice.

## Non-Aqueous SEC/GPC Materials

Packing Material	Particle Shape/Size (µm)	Pore Size** (Å)	Exclusion Limit***
Phenogel 50Å	Spher. 5, 10	50	3 x 10 <sup>3</sup>
Phenogel 100Å	Spher. 5, 10	100	6 x 10 <sup>3</sup>
Phenogel 500Å	Spher. 5, 10	500	1 x 10 <sup>4</sup>
Phenogel 10 <sup>3</sup> Å	Spher. 5, 10	10 <sup>3</sup>	7 x 10 <sup>4</sup>
Phenogel 10 <sup>4</sup> Å	Spher. 5, 10	10 <sup>4</sup>	5 x 10 <sup>5</sup>
Phenogel 10 <sup>5</sup> Å	Spher. 5, 10	10 <sup>5</sup>	1 x 10 <sup>6</sup>
Phenogel 10 <sup>6</sup> Å	Spher. 5, 10	10 <sup>6</sup>	1 x 10 <sup>7</sup>
Phenogel Linear	Spher. 5, 10	Mixed	1 x 10 <sup>7</sup>

## Aqueous SEC/GFC Materials

Packing Material	Particle Shape/Size (µm)	Pore Size** (Å)	Exclusion Limit***
Biozen dSEC-2	Spher. 1.8, 3	200	Proprietary
Biozen SEC-2	Spher. 1.8	150	4 x 10 <sup>5</sup>
Biozen SEC-3	Spher. 1.8	300	7 x 10 <sup>5</sup>
Yarra SEC-2000	Spher. 3, 5	145	3 x 10 <sup>5</sup>
Yarra SEC-3000	Spher. 3, 5	290	7 x 10 <sup>5</sup>
Yarra SEC-4000	Spher. 3, 5	500	1 x 10 <sup>6</sup>
BioSep-SEC-S 2000	Spher. 5	145	3 x 10 <sup>5</sup>
BioSep-SEC-S 3000	Spher. 5	290	7 x 10 <sup>5</sup>
BioSep-SEC-S 4000	Spher. 5	500	1 x 10 <sup>6</sup>
PolySep-GFC-P 1000	Spher.	N/A	2 x 10 <sup>3</sup> (PEG)
PolySep-GFC-P 2000	Spher.	N/A	9 x 10 <sup>3</sup> (PEG)
PolySep-GFC-P 3000	Spher.	N/A	50 x 10 <sup>3</sup> (PEG)
PolySep-GFC-P 4000	Spher.	N/A	20 x 10 <sup>4</sup> (PEG)
PolySep-GFC-P 5000	Spher.	N/A	20 x 10 <sup>5</sup> (PEG)
PolySep-GFC-P 6000	Spher.	N/A	10 x 10 <sup>6</sup> (PEG)
PolySep-GFC-P Linear	Spher.	N/A	10 x 10 <sup>7</sup> (PEG)

\*\*Pore Size is expressed in Angstroms (10<sup>-10</sup> meters). This is actually a convention used by manufacturers to indicate the approximate molecular weight of compounds that can be separated on a given SEC packing; these values do not indicate the actual size (diameter) of the pores on the surface of the particle.

\*\*\*Exclusion Limit is expressed in Daltons (the molecular weight) of the specified compound excluded from the pores of the base material. Practically speaking however, the exclusion limit is more accurately a reflection of the hydrodynamic volume occupied by the solvated compound.



For material sorbent characteristics of other HPLC columns manufactured and sold by Phenomenex, please visit the Web link [www.phenomenex.com/chromtips](http://www.phenomenex.com/chromtips)



## A

Abamectin .....	261	Additives & Preservatives.....	96	Anilazine.....	349
Abbreviations.....	435	Adenine .....	282, 297, 349	Aniline .....	114, 158
Accessories and Lab Safety.....	414-431	Aeris Core-Shell LC Columns for Proteins & Peptides.....	204-207	Aniline .....	375
Accessories, GC.....	165-185	Aeris Narrow ID Test Mix.....	424	Anilofos .....	349
Accessories, HPLC.....	414-431	Aflatoxin M1 .....	262	Animal Feed and Molasses .....	299
Accessories, Positive Pressure and Vacuum Manifolds.....	79-81	Aflatoxins: B1, B2, G1, G2 .....	262, 270	Anion Analysis .....	342
Accessories, Sample Preparation .....	79-82	Aggregate Analysis .....	215, 216, 217	Anion-Exchange Test Mix.....	425
Acebutolol.....	253, 267, 367	Air, GC Environmental Methods .....	95	Anthracene.....	107, 108, 109, 114, 149, 268, 271
Acenaphthenes.....	107, 108, 109, 114, 149, 268, 271	Alachlor .....	118, 349	Antibacterials.....	280
Acenaphthylene.....	107, 108, 109, 114, 149, 268, 271	Alanine, Z-.....	233	Antibiotics Screening of Meat .....	270
Acephate .....	261, 263, 349	Alanycarb .....	261, 263, 349	Antibody Drug Conjugates (ADCs) .....	223
Acetal .....	123	Alcoholic Beverages, GC Food & Flavors Methods.....	97	Antihistamines.....	134, 156, 236, 348
Acetaldehyde.....	130, 131, 138, 271	Alcohol, Tert-Butyl (TBA).....	142	Apomyoglobin (16 kD).....	224
Acetaminophen.....	128, 135, 253, 267, 279	Aldicarb .....	261, 263, 271, 349	Appendices.....	433-464
Acetaminophen, USP Method.....	279	Aldicarb Sulfone .....	261, 271	Apple Juice.....	327
Acetamidrid .....	261, 263, 349	Aldicarb Sulfoxide.....	261, 263, 271, 349	Applications of Liquid Chromatography.....	438
Acetic acid.....	327, 347, 425	Aldoxycarb.....	349	Aprobarbital.....	128, 135, 155
Acetochlor .....	349	Aldrin.....	116, 162	Aqua LC Columns .....	208
Acetone .....	123, 130, 131, 138, 140, 142	Aliphatic Acid.....	238	Aqueous GFC Columns, PolySep.....	322
Acetonitrile .....	140, 143	Allate, Di-.....	114, 349	Aqueous GPC (GFC) Columns, Shodex.....	339
Acetophenone.....	114, 128, 248, 335, 391	Allobarbital .....	128, 135, 155	Aqueous SEC 1 Test Mix.....	424
Acetylaminofluorene, 2-.....	114	Alloxydim .....	349	Aqueous SEC 2 Test Mix.....	322, 424
Acetylgalactosamine, N-.....	326	Allyl alcohol .....	123	Aqueous Size Exclusion (SEC)/Gel Filtration (GFC) for Protein and Peptide Analysis .....	209
Acetylglycoseamine, N-.....	326	Alprazolam .....	129, 269	Arachidic acid (C20:0).....	161
Acetylsalicylic acid.....	249	Alprenolol .....	236, 306	Arachidonic acid methyl ester (C20:4n6).....	139
Achiral Bulk Media.....	400	Ametryn.....	118, 134, 261, 263, 349	Aramite.....	114, 349
Achiral Columns and Media, SFC.....	364, 370-372	Amicarbazone.....	349	ARG-Sub P.....	283
Achiral Material Characteristics, SFC.....	372	Amidosulfuron .....	349	Aroclor 1242.....	150
Achiral Phases, Axia Packed Columns .....	393, 394	Amines, Volatile .....	142	Aromatic Amines.....	158
Achiral Scout Columns.....	399	Aminex, Bio-Rad .....	326, 329	Aromatic Compounds.....	286
Achiral SFC Screening Strategy.....	371	Amino Acid Derivatives .....	233	Ascorbic acid.....	284
Achiral SFC with Chiral Columns .....	308	Amino Acids, Chiral HPLC.....	233	Aspon .....	118, 120, 349
Acibenzolar-S-methyl .....	261, 263, 349	Amino Acids, Underivatized "Free".....	233	ASTM Methods GC Column Selection Chart.....	99
Acids, Bases, and Neutrals.....	260, 267	Amino Sugars .....	326	ASTM Methods:	
Acids, Fatty.....	112, 113, 161, 278	Aminobenzoic acid, 4-.....	292	D5134 .....	126
Acids, $\alpha$ - and $\beta$ -acids in Hop Extract.....	279	Aminobenzoic acid, p-.....	345	D5441 .....	126
Acifluorfen .....	118	Aminobiphenyl, 4-.....	114	D5501 .....	122, 126
Aclonifen .....	349	Aminocarb .....	261, 263, 349	D6352 .....	144
Acrolein .....	123	Aminopyralid.....	349	D6729 .....	126
Ad+Humulone .....	279	Amitraz.....	261, 263	D6730 .....	126, 127
Ad+Lupulone.....	279	Amitriptyline .....	237, 253, 259, 386, 391	D6733 .....	126
Adapter Caps, Manifold Accessories.....	80, 81	Amitriptyline .....	243, 386, 391	D7169 .....	125
Adapter, PEEK.....	342, 419	Amitrol.....	349	Atenolol .....	236
Adapter, SecurityCAP .....	418	Ammelide .....	136	Atraton .....	118, 134
Adapters, Reducing.....	419	Ammeline .....	136	Atrazines .....	118, 134, 271, 349
ADCs (Antibody Drug Conjugates) .....	223	Amobarbital .....	128, 135, 155	Autosampler Syringes, GC.....	18, 19, 20
		Amoxapine .....	253	Autosampler Vials, Caps, and Kits .....	30-48
		Amphetamine .....	269, 311, 312	Axia Chiral Columns, Lux .....	309
		Amphetamine Enantiomers .....	311, 312	Axia Packed Columns Achiral Phases .....	393, 394

Axia Packed Columns Chiral Phases..... 394  
 Axia Packed Preparative LC and SFC Columns ..... 383–394  
 Axia Packing Process and Technology..... 384  
 Azaconazole ..... 349  
 Azamethiophos ..... 349  
 Azimsulfuron..... 349  
 Azinphos: ethyl, methyl ..... 118, 120, 349  
 Azobenzene ..... 114  
 Azo Dyes ..... 270  
 Azoxystrobin ..... 261, 263, 349

## B

Backpressure Regulators ..... 423  
 Backpressures, Reversed Phase ..... 441  
 Baclofen ..... 233  
 Bamethan ..... 284  
 Band Width ..... 439  
 Basic Compounds ..... 279, 388  
 Basic Compounds, Non-Polar ..... 242  
 Baygon® (Propoxur) ..... 271  
 Beflubutamid ..... 349  
 Behenic acid (C22:0)..... 161  
 Benalaxyl..... 261, 263, 349  
 Benzazolin..... 349  
 Bendiocarb ..... 261, 263, 349  
 Bendroflumethiazide ..... 366  
 Benefin ..... 118  
 Benfuracarb..... 261, 263, 349  
 Benfuresate ..... 349  
 Benomyl ..... 349  
 Benoxacor ..... 349  
 Bensulfuron-methyl ..... 349  
 Bensulide..... 349  
 Bensultap ..... 349  
 Bentazon (methyl ester) ..... 118  
 Benthiavalicarb-isopropyl ..... 349  
 Benz[a]anthracene..... 106, 107, 108, 109, 110,  
 111, 114, 149, 268  
 Benzaldehyde ..... 279  
 Benzene ..... 123, 127, 138, 142, 143, 157, 160, 248  
 Benzidine..... 114  
 Benzocaine..... 128  
 Benzo[b]fluoranthene..... 106, 107, 108, 109, 110,  
 111, 114, 149, 268, 271  
 Benzo[j]fluoranthene..... 106, 107, 108, 109, 110, 111, 268  
 Benzo[k]fluoranthene..... 106, 107, 108, 109, 110,  
 111, 114, 149, 268, 271

Benzo[c]fluorene..... 106, 107, 108, 110, 111, 268  
 Benzoguanamine ..... 136  
 Benzoic acid ..... 114, 134, 279, 292  
 Benzo[g,h,i]perylene ..... 106, 107, 108, 109, 110,  
 111, 114, 149, 268  
 Benzo[a]pyrene..... 106, 107, 108, 109, 110,  
 111, 114, 149, 268, 271  
 Benzoximate..... 261, 263, 349  
 Benzoyllecgonine..... 269  
 Benzphetamine..... 128, 135, 155  
 Benzyl alcohol..... 114, 267, 279  
 Benzylamine ..... 158  
 Beta Blockers ..... 236  
 Beta β-Glucuronidase Removal Products ..... 56  
 β-Gone..... 56  
 BHC, α- ..... 116, 159, 162  
 BHC, β- ..... 116, 159, 162  
 BHC, γ ..... 116, 162  
 BHC, δ- ..... 116  
 Bifenazate ..... 261, 263, 349  
 Bifenox ..... 349  
 Bifenthrin ..... 349  
 Bifonazole..... 366  
 Bio QC Testing ..... 224  
 Bioallethrin ..... 349  
 Biodiesel..... 147  
 Bioethanol ..... 122  
 Bioethanol Fermentation ..... 325  
 Bio-Inert Hardware ..... 213, 230  
 Biologics, Analysis of ..... 210–221  
 Biomolecules ..... 356  
 Bio-Rad Aminex..... 326, 329  
 Bio QC Testing ..... 224  
 Bioresmethrin ..... 349  
 BioSep Aqueous GFC/SEC Columns..... 209  
 Biotage ISOLUTE SLE..... 52  
 BioTi Biocompatible Hardware ..... 212, 230  
 Biozen Analysis of Biologics ..... 210–230  
 Biozen dSEC-2..... 211, 215, 216, 217  
 Biozen High pH Fractionation Column..... 230  
 bioZen MagBeads ..... 78  
 Biozen Nano ..... 226, 227  
 Biozen Nano LC Columns ..... 225-229  
 Biozen N-Glycan ..... 219  
 Biozen N-Glycan Clean-Up ..... 78  
 Biozen Oligo..... 211, 212, 213  
 bioZen Solid Phase Extraction ..... 78  
 Bisoprolol ..... 236  
 Bitertanol..... 261, 349  
 Blog, Science Unfiltered..... 464

Blood Alcohol Analysis ..... 130, 131  
 BNA ..... 410  
 μBondapak, Guaranteed Replacement,  
 Bondclone HPLC Columns ..... 231  
 Bondclone Cross-Reference Chart..... 231  
 Boscalid..... 261, 263, 349  
 Bottle Filter Cap ..... 12  
 Bovine Cytochrome c..... 244  
 Bovine Serum Albumin..... 358  
 Brodifacoum ..... 349  
 Bromacil ..... 118, 349  
 Bromide..... 342  
 Bromobenzene..... 142  
 Bromochloromethane ..... 142  
 Bromodichloromethane..... 142  
 Bromofluorobenzene, 4- (Surrogate 1) ..... 142  
 Bromoform ..... 142  
 Bromomethane..... 142  
 Bromophos ..... 349  
 Brompheniramine ..... 128, 134, 135, 155, 156, 236  
 Bromuconazole..... 261, 263, 349  
 BTEX..... 160  
 BTO Silicone Septa Plug..... 171  
 Buffer, Elution ..... 406  
 Buffer, Equilibration..... 406  
 Buffer, Lysis-Loading ..... 406  
 Buffer, Wash ..... 406  
 Bulk HPLC Media ..... 353, 395–398, 400  
 Bulk HPLC Media Selection Table ..... 398  
 Bulk Sorbents, Sepra ..... 401  
 Bupirimate..... 261, 263, 349  
 Buprenorphine..... 266, 269  
 Buprofezin ..... 261, 263, 349  
 Butabarbital ..... 135  
 Butachlor ..... 118  
 Butafenacil ..... 261, 263, 349  
 Butalbital ..... 128, 155  
 Butanal..... 271  
 Butanetriol..... 147  
 Butanol, 2- ..... 123, 130, 138  
 Butanol, t- ..... 123, 127, 130  
 Butanone, 2- (MEK)..... 142  
 Butocarboxim ..... 261, 263  
 Butocarboxim-sulfoxide ..... 349  
 Butoxycarboxim ..... 261, 263, 349  
 Butralin..... 349  
 Buturon ..... 349  
 Butylate ..... 118, 349  
 Butylbenzenes ..... 142  
 BZ# 31-189 ..... 150





## C

Cadinene .....	133	CBDs .....	308	Chloronaphthalene, 2- .....	114
Cadusafos .....	349	CD Vial .....	32, 34, 36, 37, 41	Chlorophacinone .....	349
Caffeine .....	128, 135, 155, 279, 371	Celebrating 40 Years .....	2, 3	Chlorophenol, 2- .....	114, 134
Calibration Standards, Pullulan, Shodex .....	339	Centrifuge Tubes, Recombinant and Non-Recombinant Enzyme .....	56	Chlorophenol, 4- .....	132, 185
Canine Cytochrome c .....	244	Ceramic Scoring Wafers .....	184	Chlorotetracycline .....	270
Cannabidiol .....	137	Certified Reference Materials .....	5	Chlorotheophylline, 8- .....	135
Cannabinoids .....	308, 368	Charge Variant Analysis .....	218	Chlorotoluenes .....	142
Cannabinoids In Brownies .....	137	Childrens Tylenol Cold Syrup .....	283	Chlorotoluron .....	261, 349
Cannabinol .....	137	Chinomethionate .....	349	Chloroxuron .....	261, 263, 349
Capacity Factor (Retention factor) .....	438, 439	CHIRALCEL .....	301	Chlorpheniramine .....	128, 134, 135, 253, 256, 257, 267, 279, 283, 295, 348, 351
Capillary Columns, LC (Micro LC) .....	240, 273, 287, 300, 352	Chiral Columns, SFC .....	364, 365-369	Chlorpropham .....	118
Capillary End, Proper and Improperly Cut GC Column .....	436	Chiral LC Column Types .....	188	Chlorpyrifos .....	118, 120
Capillary PEEK HPLC Tubing .....	426	Chiral LC Columns .....	232-233, 301-310, 354	Chlorpyrifos methyl .....	118, 120, 349
Capillary Stainless Steel Tubing .....	426	CHIRALPAK .....	301	Chlorsulfuron .....	349
Caps / Closures, Screw-Top Vials .....	39, 40, 41, 44, 45, 46, 47	Chiral Preparative Columns, Media .....	389	Chlorthiamid .....	349
Capsaicin .....	249	Chiral Scout Columns .....	399	Chlorthiophos .....	349
Capture and Concentrate Resins .....	401	Chiral SFC Media .....	364-369	Chlortoluron .....	263
Carbadox .....	280	Chiral Test Mixes .....	425	Chlortrimeton Allergy Pills .....	351
Carbamate Pesticides .....	271	Chirex Chiral LC Columns .....	232-233	Chromatographic Parameters .....	439
Carbaryl .....	261, 263, 271, 349	Chirex Column Selection Guide .....	232	Chrysene .....	106, 107, 108, 109, 110, 111, 114, 149, 268, 271
Carbendazim .....	261, 263, 349	Chloramben methyl ester .....	118	Cinidon-ethyl .....	349
Carbetamide .....	261, 263, 349	Chloramphenicol .....	270	Citric acid .....	327, 347, 425
Carbofurans .....	261, 263, 271, 349	Chlorantraniliprole .....	261	Citronellal .....	133
Carbohydrate and Organic Acid Analysis .....	324	Chlorbromuron .....	349	CLARICEP Flash Chromatography columns .....	373-382
Carbohydrate Test Mixes .....	425	Chlorbufam .....	349	Clarity BioSolutions for Synthetic DNA/RNA .....	404-413
Carbohydrates and Sugar Alcohols Retention Times .....	329	Chlorcyclizine .....	128, 135, 155	Clarity BioSolutions Product Selection .....	404
Carbon Dioxide Trap .....	183	Chlordane, cis- .....	116	Oligo-MS LC Columns .....	411
Carbon disulfide .....	142	Chlordane, trans- .....	116, 142	Oligo-RP LC Columns .....	412
Carbon tetrachloride .....	142, 143, 157	Chlordane, $\alpha$ .....	159, 162	Oligo-XT Core-Shell LC Columns .....	410
Carbonyl Compounds .....	271	Chlordane, $\gamma$ - .....	159, 162	OTX Extraction Kits .....	405, 406
Carbophenothion .....	120	Chlordimeform .....	349	QSP Cartridges and 96-Well Plates .....	407, 408
Carbosulfan .....	349	Chlorethoxyfos-oxon .....	349	RP-Desalting Tubes and Well Plates .....	409
Carboxin .....	118, 261, 263, 349	Chlorfenvinphos .....	120, 349	Clinical Research and Toxicology Applications, LC .....	269
Carene, 3- .....	133	Chlorfluzuron .....	261, 263, 349	Clodinafop-propargyl .....	349
Carfentrazone-ethyl .....	261, 263, 349	Chlorhexidine .....	293	Clofentazine .....	261, 263, 349
Carisoprodol .....	266, 269	Chloridazon .....	349	Clofenvinfos .....	118
Carpropamid .....	349	Chloride .....	342	Clomazone .....	349
Cartridge Holder, 20 mm, for on-line extraction cartridges .....	64	Chlorimuron-ethyl .....	349	Clomeprop .....	349
Cartridge Holders, Direct Connect, MercuryMS .....	287, 352	Chlorinated Pesticides .....	159, 162	Clomipramine .....	237, 253
Cartridge Holders, Standard, MercuryMS .....	287, 352	Chlormephos .....	349	Clonazepam .....	129, 269
Cartridges and Holders, SecurityGuard .....	330-335	Chloroaniline, 4- .....	114	Clopyralid .....	349
Carvone .....	133	Chlorobenzene .....	142, 143, 185	Cloquintocet-mexyl .....	349
Catechins .....	286	Chlorobenzilate .....	114	Clothianidin .....	261, 263, 349
Catechol .....	377	Chlorobenzoic acid, 4- .....	253	Cloxacillin .....	270
Cation-Exchange Test Mix .....	425	Chlorocinnamic acid, 4- .....	253	Cocaine .....	128, 135, 155, 279
		Chloroethane .....	142	Codeine .....	128, 135, 155, 266, 269, 279, 351
		Chloroform .....	142, 143	Cohumulone .....	279
		Chlorogenic acid .....	258	Cold Pressed Orange Oil .....	133
		Chloromethane .....	142		

Cold Syrup, Childrens Tylenol ..... 283

Collection Plates ..... 82

Column Check Standards, HPLC..... 424–425

Column Cleaning Procedures ..... 441

Column Couplers ..... 16, 422

Column Dead Volume Calculation..... 439

Column Efficiency ..... 438

Column Flow Rates and Typical Backpressures,  
 by Particle Size ..... 441

Column Heater, HPLC..... 416

Column Loading Capacity ..... 439

Column Protection for UHPLC, HPLC,  
 SFC to PREP..... 330–335, 441

Column Sealing Plugs..... 422

Column Selection by Molecular Weight, Phenogel..... 315

Column Selection, GC  
 by ASTM Methods ..... 99  
 by Environmental Methods ..... 94, 95  
 by Film Thickness ..... 92  
 by Food & Flavors ..... 96, 97  
 by Internal Diameter..... 92  
 by Length..... 91  
 by Manufacturer..... 93  
 by Polarities ..... 88, 101  
 by Selectivity..... 88–90  
 by The Master Resolution ..... 88  
 by USP Methods..... 98

Column Selection, HPLC..... 189–203

Column Selection, HPLC:  
 by Application ..... 190  
 by Chiral LC Column Types..... 188  
 by Column Selection Tree..... 189  
 by Column Selection Tree, Achiral and  
 Chiral, Selectivity Options ..... 388  
 by Manufacturer..... 191–193  
 by Molecular Weight, Phenogel..... 315  
 by Ph. Eur. Listing..... 198–203  
 by Separation Mode ..... 193  
 by USP Listing ..... 194–197  
 for Biozen columns ..... 211  
 for Kinetex columns ..... 254–255  
 for Luna columns ..... 276  
 for Lux columns ..... 301  
 for Shodex columns ..... 338

Column/Tubing ID Recommendation Chart ..... 337

Colupulone ..... 279

Conditioning and Testing the GC Capillary Column..... 436, 437

Connecting Units, Gas Management ..... 183

Connectors, SecurityCAP..... 418

Consumables, Laboratory ..... 414

Conventional Packing Process..... 384

Core-Shell HPLC/UHPLC Columns for  
 Proteins and Peptides, Aeris ..... 204–207

Core-Shell Performance Enhancement Kit..... 274, 421

Core-Shell Technology ..... 204, 210, 246, 247,

Couplers, Column ..... 16, 422

Crimp-Top Vial Products..... 33, 42, 44, 46

Crude Peptide Mix..... 392

Cubebene,  $\alpha$  ..... 133

Cubebene,  $\beta$  ..... 133

Cutting Fused Silica GC Tubing..... 436

Cyanuric Acid..... 150

Cyclosporine ..... 261

Cyproconazole ..... 307

## D

DAC (Dynamic Axial Compression) System ..... 395

Dacthal ..... 118

Daimuron ..... 349

Daminozide..... 349

DAR (Drug Antibody Ratio)..... 223

DAS ..... 262

DCB ..... 150

DCM ..... 140

DDD ..... 116, 119, 134, 162

DDE ..... 116, 119, 134, 162

DDT ..... 116, 119, 134, 162

Dead Volume, Column..... 439

Decachlorobiphenyl ..... 116, 159

Decanal ..... 133, 271

Decane (C10)..... 125, 132, 145, 160, 185

DEET ..... 118, 349

Deltamethrin..... 349

Demeton..... 118, 120

Demeton-S-methyl ..... 349

Demeton-S-methyl sulfone ..... 349

Deoxycorticosterone acetate ..... 251, 267

Deoxynivalenol..... 270

Deoxynivalenol, 3-Acetyl- ..... 270

Desipramine ..... 128, 253, 351

Desmedipham ..... 261, 263, 349

Desmethyldoxepin ..... 253

Desmethyl-formamido-pirimicarb ..... 349

Desmethyl-pirimicarb ..... 349

Detailed Hydrocarbon Analysis (DHA) ..... 126

Dextran..... 322

Dextromethorphan ..... 283

DHA (Detailed Hydrocarbon Analysis) ..... 126

Diacetoxyscirpenol..... 270

Dialifos ..... 349

Diamidafos ..... 349

Diatomaceous Earth SLE, Strata DE ..... 54, 55

Diazepam ..... 128, 129, 135, 155, 253, 269, 351

Diazinon ..... 118, 120, 349

Dibenz[a,h]anthracene..... 106, 107, 108, 109, 110,  
 111, 114, 149, 268, 271

Dibenzofuran ..... 114

Dibenzo[a,e]pyrene ..... 106, 107, 108, 110, 268

Dibenzo(a,h)pyrene ..... 106, 107, 108, 110, 268

Dibenzo(a,i)pyrene ..... 106, 107, 108, 110, 268

Dibenzo[a,j]pyrene ..... 106, 107, 108, 110, 268

Dibenzylamine ..... 158

Dibromochloromethane..... 142

Dibromomethane..... 142

Dicamba methyl ester ..... 118

Dichlofenthion ..... 118, 120, 349

Dichlorofluanid..... 349

Dichlorobenzoic acid, 3,5- (methyl ester) ..... 118

Dichlorodifluoromethane ..... 142

Dichloroethanes..... 142, 143

Dichloroethenes..... 142, 143

Dichloromethane ..... 143

Dichloronitroaniline ..... 242

Dichlorophenols..... 114, 134

Dichloropropene, cis-1,3- ..... 142

Dichloropropene, trans-1,3- ..... 127

Dichlorprop methyl ester..... 118

Dichlorvos ..... 118, 120, 349

Diclobutrazol..... 261, 263, 349

Diclofop-methyl ..... 349

Diclosulam ..... 349

Dicrotophos ..... 118, 120, 261, 263, 349

Dicyclanil ..... 349

Dicyclohexylamine ..... 132

Dieldrin..... 116, 159, 162

Diethofencarb ..... 261, 263, 349

Diethylamine..... 142

Diethylaniline, N,N- ..... 158

Difenacoum ..... 349

Difenoconazole ..... 261, 349

Difenoخورن ..... 349

Difenzoquat ..... 349

Diflubenzuron ..... 261, 263, 349

Diflufenzopyr ..... 349

Diflunisal ..... 253, 267, 278

Diglycerides..... 147



Ethoprop.....	118, 120, 349	Fenoxycarb.....	261, 263, 349	Fludioxonil.....	261, 263, 349
Ethoxysulfuron.....	349	Fenpiclonil.....	349	Flufenacet.....	261, 263, 349
Ethyl Acetate.....	123, 138, 140	Fenpropathrin.....	349	Flufenoxuron.....	261, 263, 349
Ethylaniline, N-.....	158	Fenpropidin.....	349	Flumetsulam.....	349
Ethyl Benzene.....	127, 138, 142, 143, 160	Fenpropimorph.....	261, 263, 349	Flunitrazepam.....	269
Ethylene glycol (EG).....	322	Fenpyroximate.....	261, 263, 349	Flunixin.....	270
Ethylthiourea.....	349	Fensulfothion.....	118, 120	Fluometuron.....	261, 263, 349
Ethylhexanoic acid, 2-.....	132, 185	Fentanyl.....	128, 269	Fluoranthene.....	107, 108, 109, 114, 149, 268, 271
Ethyl methanesulfonate.....	114	Fenthion.....	118, 120, 349	Fluorene.....	107, 108, 109, 114, 149, 268, 271
Ethyl paraben.....	279	Fentin.....	349	Fluoride.....	342
Ethylpentane, 3-.....	127	Fenuron.....	261, 263, 349	Fluorobenzene (lstd).....	142
Ethylphenols.....	134	Fenvalerate.....	349	Fluorobiphenyl, 2-.....	114
Etobenzanid.....	349	Ferrule Remover Tool Kit.....	184	Fluoroglycofene-ethyl.....	349
Etofenprox.....	349	Ferrule Selection Guide by Length; by Material.....	169	Fluorophenol, 2-.....	114
Etozazole.....	261, 263	Ferrule Selection Guide for Cool-Lock Nuts.....	169	Fluoxastrobin.....	261, 263, 349
Etrifos.....	349	Ferrules.....	169, 170	Flupyrsulfuron-methyl.....	349
EU 15+1 PAH Analysis.....	106, 107, 108, 110, 111, 268	Filter and Cap, Mobile Phase Safety.....	417-418	Fluquinconazole.....	261, 263, 349
Exclusion Limit.....	444	Filter and Cap, Waste Exhaust.....	417-418	Flurazepam.....	269
Exhaust Filter and Cap, Waste.....	417-418	Filter Membrane Guide.....	8	Fluridone.....	349
Explosives.....	151, 347	Filter Membranes.....	13	Flurochloridone.....	349
Extraction Cartridge, On-line.....	64, 65, 66, 71, 72	Filter Plate, Protein Precipitation.....	57	Fluroxyppy.....	349
Extraction Method, Simplified Liquid Extraction (SLE).....	52	Filter Vial Selection Guide.....	28	Flurprimidol.....	349
Extraction Protocols, Strata-X, Polymeric SPE.....	62	Filters, Gas.....	182, 183	Flurtamone.....	349
		FilterSys Mobile Phase Filtration System.....	11	Flusilazole.....	261, 263, 349
		Filtration.....	7 to 16	Fluthiacet-methyl.....	349
		Filtration Glassware.....	11	Flutolanil.....	261, 263, 349
		Filtration Plate.....	82	Flutriafol.....	261, 263, 349
		Fingertight Fitting, SecurityLINK.....	336-337	Fluvalinate, tau-.....	349
		Fingertight Male Nut Fittings.....	422	Fluxofenim.....	349
		Fipronil.....	261, 349	FMOCs.....	371
		Fitting Tightening Tool.....	420	Fomesafen.....	349
		Fitting Wrench, Rheodyne.....	427, 431	Fonofos.....	118, 120, 349
		Fittings, LC.....	229, 419-423	Food & Flavors.....	133
		Fittings, RheFlex.....	430	Food & Flavors GC Column Selection Chart.....	96, 97
		Fittings, SecurityCAP.....	418	Food Softeners.....	326
		Flame Detector Jet Cleaning Kit.....	184	Food Testing.....	112, 139, 270
		Flamprop-M-isopropyl; -methyl.....	349	Foods of Plant Origin, Multi-Residue Screening.....	349
		Flangeless Fittings.....	423	Foramsulfuron.....	349
		Flash Chromatography.....	373-382	Forchlorfenuron.....	261, 263, 349
		Flavors.....	97	Formaldehyde.....	271
		Flazasulfuron.....	349	Formetanate.....	261, 263, 349
		Flonicamid.....	261, 349	Formic Acid.....	327, 347, 425
		Florfenicol.....	270	Fragrances.....	97
		Flow Rate for Different Column IDs.....	438	Fructose.....	282, 298, 299, 326, 327
		Fluazifops.....	349	Fuberidazole.....	261, 263, 349
		Fluazinam.....	261	Fuels.....	122, 147
		Flubendimide.....	261	Fumonisin.....	270
		Flucarbazone.....	349	Furalaxyl.....	261, 263, 349
		Flucycloxuron.....	349	Furathiocarb.....	261, 263, 349
		Flucythrinate.....	349	Furazolidone.....	280

## F

FAMES.....	97, 112, 113, 139
Famoxadone.....	261, 349
Famphur.....	118, 120, 349
FAQs (Frequently Asked Questions).....	434
Fast Garnet GBC.....	270
Fast LC Solutions.....	287, 352
Fatty Acids.....	97, 112, 113, 161, 278
FB1; FB2.....	262
Fenamidone.....	261, 263, 349
Fenamiphos.....	118, 349
Fenarimol.....	118, 261, 263, 349
Fenazaquin.....	261, 263, 349
Fenbuconazole.....	261, 263, 349
Fenfuram.....	349
Fenhexamid.....	261, 263, 349
Fenitrothion.....	118, 120, 349
Fenobucarb.....	261, 263, 349
Fenoprofen.....	267, 278
Fenothiocarb.....	349
Fenoxanil.....	349
Fenoxaprop-P-ethyl.....	349



## G

Fusarenon X .....	270
Fused silica GC capillary columns, cutting.....	436
Fusel Alcohols.....	123
<b>Galactose..... 298, 299, 326, 327</b>	
Gallic acid.....	286
Gallocatechin gallate.....	286
Gingerols.....	249, 252
Glactose .....	299
Glucose .....	282, 298, 299, 326, 327
Glufosinate .....	349
Glycerol .....	147, 326
Glycolic acid .....	347
Gondonic acid (C20:1c).....	161
Guanosine .....	282
Guanosine-5-Monophosphate.....	297
Gas Chromatography (GC) Columns, Applications, and Accessories .....	87–164, 165–185
Gas Filter, GC .....	182, 183
Gas Filter, LC-MS .....	182, 183
Gas Management.....	182, 183
Gas Management Connecting Units.....	183
Gas Management Traps .....	182, 183
Gas Tight Luer Lock Syringes.....	26
Gastight Syringes.....	18, 19, 20, 21, 25
Gas Traps/Purifiers.....	184
GC Autosampler Syringes.....	18, 19, 20
GC Column Accessories .....	165–185
GC Column Bleed Comparison Test by MS Detection .....	437
GC Column Check Standards .....	185
GC Column Finder Tool.....	91, 96
GC Column Installation Instructions.....	436, 437
GC Columns: Zebtron .....	100–164
GC Column Selection: by ASTM Methods .....	99
by Environmental Methods .....	94, 95
by Film Thickness .....	92
by Food & Flavors .....	96, 97
by GC Interactions.....	89, 90
by Internal Diameter.....	92
by Length.....	91
by Manufacturer.....	93
by Polarities .....	88, 101
by Selectivity.....	88–90

by The Master Resolution Equation.....	88
by USP Methods.....	98
GC Column Selection Guidelines .....	88–101
GC Column Test Mixes .....	185
GC Column Unions.....	181
GC Gas Filters.....	182, 183
GC Gas Traps .....	182, 183
GC Inlet Liners .....	173
GC Liner Finder Tool.....	112, 176
GC Manual Syringes.....	20, 21
GC Selectivity.....	88–90
GC Syringes .....	18, 19, 20, 21, 22
Gemini C8(3).....	397
Gemini pH Flexible LC Columns.....	234–240
General Laboratory Consumables .....	414
Geranial.....	133
GFC (Aqueous GPC) Columns, Shodex .....	339
GFC (Aqueous) /SEC Columns, Yarra.....	355–358
Glass Infusion Technology.....	124
Glassware and Accessories, Filtration .....	11, 12
Glycan Analysis.....	219
Glycerin .....	147
Gold Inlet Base Seals .....	165, 166
Guard Cartridge Holder Kit, Analytical HPLC/SFC .....	331
Guard Cartridge Holders, SecurityGuard .....	331–334
Guard Cartridges, SecurityGuard .....	333, 334
Guard Cartridges, SecurityGuard ULTRA .....	335
Guard Columns, GC.....	163, 164
Guardian Integrated Guard Columns.....	163
Guides, Industry-Focused.....	362

## H

Halfenprox .....	349
Halofofenozide.....	261, 349
Halosulfuron-methyl .....	349
Haloxyfops.....	349
Hamilton Gastight Priming Syringe, 10 mL .....	23
Hamilton Replacement Needles .....	23
Hamilton Syringes.....	18, 19, 20, 21, 23, 25
Headspace Screw- and Crimp-Top Seals / Closures.....	42, 46
Headspace Vials.....	42, 46
Heater, Single-Column .....	416
Hectane (C100).....	125
HeLa Lysate.....	230
Heptachlors .....	116, 159, 162
Heptacontane (C70) .....	125

Heptadecane (C17) .....	125
Heptadecanoic acid .....	278
Heptadecenoic acid methyl ester (C17:1), cis-10- .....	139
Heptanal .....	271
Heptane (C7).....	123, 125, 160
Heptenophos .....	349
Herceptin.....	223
Heroin.....	128, 155
Hexachlorobenzene .....	114
Hexachlorobutadiene .....	114, 142
Hexachlorocyclopentadiene.....	114
Hexachloroethane.....	114
Hexachloropropene.....	114
Hexaconazole .....	261, 263, 349
Hexacontane (C60).....	125
Hexadecane (C16).....	125
Hexadecylamine .....	148
Hexaflumuron .....	261, 349
Hexahydro-1,3,5-trinitro-1,3,5-triazine .....	347
Hexanal .....	271
Hexane .....	123, 143
Hexanone, 2- .....	142, 143
Hexanophenone .....	253, 257, 265, 267, 295
Hexatriacontane (C36) .....	125
Hexazinone.....	118, 349
Hexobarbital .....	128, 135, 155
Hexythiazox .....	261, 263, 349
High Speed Technology (HST) Columns .....	287, 352
HILIC Phase Test Mix.....	424
HILIC Solid Phase Extraction (SPE), N-Glycan Clean-up..	78, 211
Holders, Guard Cartridge, SecurityGuard .....	331–335
Holotransferrin (76-81kD) .....	224
Hop Extract.....	279
Hormones.....	96
HPLC / UHPLC Columns .....	168–361
HPLC Accessories .....	414–431
HPLC Calculations.....	438
HPLC Column Check Standards .....	424–425
HPLC Column Flow Rates.....	441
HPLC Column Protection .....	330–335, 416, 441
HPLC Column Selection Tree .....	189
HPLC Column Selection: by Application .....	190
by Manufacturer.....	191–192
by Ph. Eur. Listing.....	198–203
by Separation Mode .....	193
by USP Listing.....	194–197
HPLC Material Sorbent Characteristics .....	443–444
HPLC Syringes .....	23, 24
HPLC Tubing .....	426



HT-2	270
HT-2 Toxin	262
Human Epidermal Growth Factor	206
Human Plasma Vitamin C	269
Hydramethylnon	261, 263, 349
Hydrocarbon Gas Trap	183, 184
Hydrocarbon, Gas Filter	183
Hydrocarbon/Moisture Gas Filter for LC-MS	183
Hydrocarbons	144, 145, 318
Hydrocarbons C7-C100+	125, 127, 141, 144, 160, 318
Hydrocarbons from Water	134
Hydrocarbons, Closely Related	318
Hydrocodone	128, 135, 155, 266, 269, 279
Hydrocortisones	251, 267, 279, 281
Hydrogen Bonding (Acid-Base Interactions)	89
Hydrolyzed Urine Cleanup	56
Hydromorphone	263, 266, 269, 279
Hydrophobic Basic Compounds	348
Hydrophobic Retention	346, 348, 350
Hydroxylalprazolam	129, 269
Hydroxybenzoic acid, 3-	292
Hydroxycortisone	247
Hydroxyprogesterone, 21-	251, 267
Hydroxythiabenzazole, 5-	349
HyperClone Guaranteed Replacement to Hypersil	241, 242

## I

Ibogaine	128
Ibuprofen	128, 135, 267, 278, 351
Ifenprodil	305
Imazalil	261, 263, 349
Imazamethabenz-methyl	349
Imazapic	349
Imazapyr	349
Imazaquin	349
Imazethapyr	349
Imibenconazole	349
Imidacloprids	261, 263, 349
Imipramine	237, 253, 259
Immobilized Chiral Selectors	302-304
Impact Protein Precipitation Plates	57
Inabentide	349
Indeno[1,2,3-cd]pyrene	106, 107, 108, 109, 110, 111, 114, 149, 268, 271
Index: Products, Applications, and Keywords	445-461
Indomethacin	267, 278

Indoxacarb	261, 349
Industrial Chemicals	160
Industry Focused Guides	362
InertClone Guaranteed Replacement to Inertsil	243
Inertsil Alternative, Prodigy	323
Infant Formula	299
Infliximab	214, 219, 220, 221
Injection Masses and Volumes	439
Injector Septa Plugs	171
Inlet Base Seals	165, 166
Inlet Consumables	180
Inlet Filters, Metal-Free/Biocompatible	14
Inlet Filters, Stainless Steel	14
Inlet Liners:	173-180
for Agilent GC Systems	175, 176
for Bruker/Varian GC Systems	180
for PerkinElmer GC Systems	177
for Shimadzu GC Systems	178
for Thermo Scientific GC Systems	179, 180
Inlet Seal Washer	166
In-Line Filters, Metal-Free/Biocompatible (Analytical)	15
In-Line Filters, Metal-Free/Biocompatible (SemiPrep)	16
In-Line Filters, Stainless Steel (Analytical)	15
In-Line Filters, Stainless Steel (PREP)	16
Inserts for 10 mm Screw-Top Vials	40
Inserts for 8 mm Screw-Top Vials	39
Inserts for 9 mm Screw-Top Vials	38
Installation Nuts	167, 168
Installing GC Column	436
Insulin	239, 295, 397
Intact Mass	222
Iodosulfuron-methyl	349
Ion Chromatography Columns, Shodex	340
Ion-Exchange Columns, Shodex	340
Ion-Exchange Sorbents, SPE	74
Ipconazole	261, 263, 349
Iprodione	349
Iprovalicarb	261, 263, 349
Iridoids	380
Isazofos	349
Isobutanol	138
Isocarbamid	349
Isocarbophos	261
Isodrin	114
Isofenphos	349
Isomers	112
Isophorone	114
Isoprocab	261, 263, 349
Isopropalin	118
Isopropanol / Isopropyl alcohol (IPA)	123, 130, 131, 140

Isopropylamine	142
Isopropylbenzene	142
Isopropyltoluene, 4-	142
Isoprothiolane	349
Isoproturon	261, 263, 349
Isosafrole	114
Isoxaben	349
Isxadifen-ethyl	349
Isoxaflutole	349
Isoxathion	349
Ivermectin	261

## J

Josamycin	270
Jupiter LC Columns for Proteins & Peptides	244, 245

## K

Kadcyla	220
Kava Kava	277
Kawain	277
Kepone	114
Ketoprofen	304, 305
Kinetex Column Characteristics	255
Kinetex Complementary and Orthogonal Selectivities	254
Kinetex Core-Shell LC Columns	246-274
Kresoxim-methyl	261, 263, 349
KrudKatcher Classic	15
KrudKatcher Ultra	15

## L

Lab Safety, Solvent CAPS	417-418
Labetalol	236
Lactofen	349
Lactoglobulin A, beta	209
Lactose	298, 299
Large Reservoir Cartridge (LRC), SPE	75
Lauric acid	278
LC Chiral Stationary Phase (CSP) Classification Diagram	188
LC Solvent Safety Products	417-418
LC-MS Gas Filters	182



Lenacil.....	349
Leptophos.....	118, 120
LiChrosorb.....	275
LiChrospher.....	275
Lidocaine.....	128
Limited Volume Specialty Vials.....	30, 32
Limited Volume Specialty Vials, Crimp-Top.....	33
Limited Volume Specialty Vials, Screw-Top.....	36, 37, 40, 41
Limited Volume Specialty Vials, Snap-Top.....	34
Limonenes.....	133
Linalool.....	133
Linear Columns, GPC.....	319, 320
Linear Velocity.....	438, 439, 440
Liner Geometry Selection Guide.....	174
Linoleic acid (C18:2c).....	161, 278
Linoleic acid methyl ester (C18:2n6c).....	139
Linolelaidic acid (C18:2t).....	161
Linolelaidic acid methyl ester (C18:2n6t).....	139
Linolenic acid (C18:3c).....	161
Linolenic acid methyl ester (C18:3n3).....	139
Linolenic acid methyl ester (C18:3n6), $\gamma$ -.....	139
Linuron.....	261, 263, 349
Loadability, Prep.....	391
Loading Buffer, Lysis.....	406
Loading Capacity Chart, SPE Polymeric Sorbent Mass.....	61
Longitudinal Diffusion.....	440
Loops, Sample Injector.....	428, 430
Lorazepam.....	129, 269
Low-Dispersion Sample Injector.....	429
LSD.....	128
Luer Fittings, Manifold Accessories.....	81
Luer Stopcocks, SPE.....	81
Lufenuron.....	261, 349
Luna Bonded Phase Selectivity Chart.....	276
Luna One of The World's Leading LC Columns.....	276–289
Luna Omega LC Columns.....	290–300
Lux AMP Chiral LC Columns.....	311, 312
Lux Chiral LC & SFC Columns.....	301–311, 365
Lux Amylose-1.....	301, 305, 308, 365, 389
Lux Amylose-2.....	301, 305, 308, 365, 389
Lux Cellulose-1.....	301, 306, 308, 309, 365, 389
Lux Cellulose-2.....	301, 306, 308, 365, 389
Lux Cellulose-3.....	301, 307, 308, 365, 389
Lux Cellulose-4.....	301, 307, 308, 365, 389
Lux i-Amylose-1.....	301, 303, 304, 365, 389
Lux i-Amylose-3.....	303, 304, 365, 389
Lux i-Cellulose-5.....	301, 304, 308, 365, 389
Lux Chiral Preparative Columns.....	309, 389
Lysis-Loading Buffer.....	406
Lysozyme (14.3 kD).....	224

## M

MagBeads.....	78
Malaoxon.....	349
Malate.....	256
Malathion.....	118, 120, 349
Male Nut Fittings.....	422
Maleic acid.....	279, 347, 348
Maleic hydrazide.....	349
Malonic acid.....	347
Maltose.....	282, 298, 299, 326, 327
Maltotriose hydrate.....	425
MAM, 6- (Monoacetylmorphine, 6-).....	128, 135, 266, 269
Mandipropamid.....	261, 263, 349
Manifold, Vacuum and Accessories.....	80–82
Manifold, Positive Pressure.....	79
Mannitol.....	327
Mannose.....	326, 327
Mass Transfer Kinetics.....	440
Master Resolution Equation, GC.....	88
Material Characteristics, Clarity products.....	404
Material Characteristics, Strata SPE Sorbents.....	70
Material Sorbent Characteristics, HPLC.....	443
MCPAs.....	118, 349
MCPP (methyl ester).....	118
MDA.....	269
MDEA.....	269
MDMA.....	269
Mecarbam.....	349
Meclofenamic acid.....	267
Mefenacet.....	261, 263, 349
Mefenpyr-diethyl.....	349
Melamine.....	136, 150
Melamine in Dog Food.....	136
Melezitose.....	282, 326, 327
Mepanipryrim.....	261, 263, 349
Meperidine.....	266, 269
Meprobamate.....	128, 135, 266, 269
Mepronil.....	261, 263, 349
MercuryMS LC-MS Cartridges and Holders.....	273, 287, 352
Merlin Microseal Septum.....	172
Merlot.....	299
Merphos.....	118, 120
Mesosulfuron-methyl.....	349
Mesotrione.....	261, 349
Metaflumizone.....	261, 263
Metalaxyl.....	261, 263, 349
Metamitron.....	349

Metazachlor.....	349
Metconazole.....	261, 263, 349
Methabenzthiazuron.....	261, 263, 349
Methacrifos.....	349
Methacrylic Acid Ester.....	378
Methacycline.....	386
Methadone.....	128, 266, 269
Methamidophos.....	261, 263, 349
Methamphetamine.....	269
Methamphetamine Enantiomers.....	311, 312
Methane.....	141
Methane, bis(2-Chloroethoxy).....	114
Methanol.....	122, 123, 130, 131, 138, 140, 143
Methapyriline.....	114, 134, 135, 155
Methfuroxam.....	349
Methidathion.....	349
Methiocarb.....	261, 263, 271, 349
Methocarbamol.....	389
Methomyls.....	261, 263, 271, 349
Methoprotryne.....	261, 263, 349
Methoxychlor.....	116, 159, 162
Methoxyfenozide.....	261, 349
Methoxypolyethylene glycol.....	326
Methylaniline.....	158, 242
Methyl behenate (C22:0).....	139
Methylbenzaldehyde, 2-Hydroxy-5-.....	253, 267
Methyl benzoate.....	135
Methylbutane, 2-.....	123, 127
Methylbutanol, 3-.....	138
Methyl tert-butyl ether (MTBE).....	127, 139
Methyl butyrate (C4:0).....	139
Methyl caprylate.....	185
Methylcholanthrene, 3-.....	114
Methylchrysenes, 5-.....	106, 107, 108, 110, 111, 268
Methylcyclohexane.....	143
Methylcyclopentane.....	123, 127
Methyl decanoate (C10:0).....	139
Methylecgonine.....	135
Methylene Chloride.....	138, 142, 160
Methyl esters.....	118
Methyl ethyl ketone.....	138
Methyl formate.....	138
Methyl heneicosanoate (C21:0).....	139
Methyl heptadecanoate (C17:0).....	139
Methylhexanes.....	123
Methyl hexanoate (C6:0).....	139
Methyl laurate (C12:0).....	139
Methyl methanesulfonate.....	114
Methyl myristate (C14:0).....	139
Methylnaphthalene, 5-.....	114





Normorphine.....	279
Nornicotine.....	285
Norpropoxyphene.....	269
Nortriptyline.....	237, 253, 257, 267, 295
Novaluron.....	261, 263, 349
Novum PRO SLE.....	52, 53
Novum Simplified Liquid Extraction (SLE).....	51–53
Nuarimol.....	261, 263, 349
Nucleic Acid Bases.....	282, 345
Nucleic Acids, Columns, Shodex.....	340
Nucleosides.....	297
Nut and Ferrule Plugs.....	422
Nut and Ferrule Set, Stainless Steel.....	420

## O

Ochratoxin A.....	262, 270
Octacontane (C80).....	125
Octacosane (C28).....	125
Octadecane (C18).....	125
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX).....	347
Octanal.....	133, 271
Octane (C8).....	125
Ofurace.....	349
Oleic acids.....	139, 161, 278
Oligo Characterization and Bioanalysis.....	212, 213, 404, 410, 411
Oligo Purification.....	404, 412
Oligo Therapeutics.....	405, 406
Oligonucleotides.....	211, 212, 213, 404, 405, 406, 409–412
Oligosaccharide Standard Test Mix.....	425
Oligosaccharides.....	324, 327
Omethoate.....	261, 263, 349
Omics Analysis.....	225
Omics Samples.....	228
On-line Extraction Cartridge.....	64–66, 71, 72
Onyx Column Coupler.....	422
Onyx Monolithic LC Columns.....	313, 314
Onyx Monolithic Reversed Phase Test Mix.....	424
Open Fused-Silica Inlet Fitting.....	227
Opiate Isomers.....	263
Opiates Mix.....	266
Orange II.....	270
Orange Juice.....	299
Orange Oil.....	133
Orbencarb.....	349
Organic Acid Standard Test Mix.....	425

Organic Acids.....	324, 327, 339, 347
Organic GPC Columns, Shodex.....	338
Organic Size Exclusion/Gel Permeation for Polymer Analysis.....	315–320
Organophosphate Pesticides.....	120
O-Ring Replacement for Gas Filter Baseplate.....	183
O-Ring Replacement for Prep and SFC Security Guard Holders.....	332
O-Ring Replacement Set for Gas Trap.....	183
O-Rings for GC Liners.....	171
Ornidazole.....	304
Oxadiargyl.....	349
Oxadiazon.....	118, 349
Oxadixyl.....	261, 263, 349
Oxalic Acid.....	327, 347
Oxamyl.....	261, 262, 263, 349
Oxasulfuron.....	349
Oxazepam.....	129, 269, 351
Oxolinic acid.....	280
Oxycodone.....	266, 269
Oxydemeton-methyl.....	349
Oxyfluorfen.....	118, 349
Oxygen / Moisture Gas Traps.....	183, 184
Oxygen, Gas Filter.....	183
Oxymorphone.....	128, 135, 155, 266, 269
Oxytetracycline.....	321

## P

PABA.....	284, 285
Packing Process, Axia Packed Preparative Columns.....	384
Paclitaxel.....	261, 263, 349
PAH isomers.....	107, 109
PAHs.....	106, 107, 108, 149, 268
Palmitoleic acid (C16:1t).....	161
Palmitic acid (C16:0).....	161, 278
Palmitoleic acid (C16:1c).....	161, 278
Palmitoleic acid methyl ester (C16:1).....	139
Pantothenic acid.....	261, 345
Parabens.....	279
Paraffin Wax.....	146
Paraoxon.....	349
Parathion.....	114, 118, 120, 349
PCBs.....	105, 149, 150
PCP.....	269
Peak Asymmetry.....	438
Pebulate.....	118, 349
PEEK HPLC Tubing, Capillary.....	426

PEEK Male Nut Fittings, High Pressure.....	420
PEEK Needle Port for Injector.....	429
PEEK Sample Injectors.....	429
PEEK Switching Valve/Injector.....	429
PEEKlok Fitting Connections.....	420
PEEKsil SecurityLINK UHPLC Fittings.....	337
PEEKsil Tubing for UHPLC / HPLC.....	421, 426
PEGylated $\beta$ -Lactoglobulin A.....	209
Penconazole.....	261, 263, 349
Pencycuron.....	261, 263, 349
Pendimethalin.....	118, 349
Penicillin G.....	270
Penoxsulam.....	349
Pentachlorobenzene.....	114
Pentachloronitrobenzene.....	114
Pentachlorophenol.....	114, 118, 134
Pentacontane (C50).....	125
Pentadecane (C15).....	125, 132, 141
Pentaerythritol tetranitrate.....	347
Pentanal.....	271
Pentane.....	123, 160
Pentobarbital.....	128, 135, 155
Peptide Fraction Analysis.....	392
Peptide Mapping.....	214
Peptide Mix, Crude.....	392
Peptide Mix, 20 Stable-Isotope-Labeled (SIL).....	359, 360
Peptide Quantitation.....	220
Peptides.....	204–207, 209, 210–221, 244, 283
Peptide Screening, Strata-X Microelution 96-Well Plate.....	63
Permethrin.....	349
Perphenazine.....	371
Perylene-d12.....	114
Pesticide Isomers.....	119
Pesticide Mix.....	263
Pesticide Multi-Compound, Multi-Class Screening, 175+.....	263
Pesticide Panel Screen, Multi-Class 206.....	261
Pesticides & Antimicrobials.....	96
Pethoxamid.....	349
PETN.....	151
pH Selectivity.....	388
Pharmaceutical Compound Mixture.....	295
Pharmaceutical Excipients.....	317
Pharmaceutical GC Column Selection Chart.....	98
Pharmaceutical Preservatives.....	279
Pharmaceutical, LC Application.....	270
Pharmaceutically Related Compounds.....	371
Phellandrine, $\beta$ .....	133
Phenacetin.....	114, 128, 135, 155
Phenanthrene.....	107, 108, 109, 114, 149, 268, 271
Phencyclidine.....	128

Phenex Syringe Filters .....	8, 9, 10, 22, 26	Pirimiphos-ethyl; -methyl.....	349	Profenofos .....	349
Phenmedipham .....	261, 263, 349	Piromidic acid.....	280	Profluralin.....	118
Phenobarbital .....	128, 135, 155	Plate Height.....	439	Progesterone .....	251, 371, 424
PhenoBlue -300.....	171	Plugs, Column Sealing .....	422	Prohexadione.....	349
Phenogel Organic GPC/SEC Columns .....	315–320	Plugs, Manifold Accessories.....	81	Promecarb.....	261, 263, 349
PhenoGreen -400 .....	171	Polar Compounds.....	344, 345, 347	Prometon.....	118, 134, 261, 263, 349
PhenoGrey -250.....	171	Polar Embedded C18 Columns.....	343, 348, 349	Prometryn.....	118, 134, 261, 263, 349
Phenols .....	114, 134, 267, 279, 292, 351	Polar Endcapped C18 Columns .....	343, 346, 347	Pronamide.....	114, 118
PhenoRed -400.....	171	Poly dT Standard (12-18mer).....	411	Propachlor.....	118, 349
Phenova Certified Reference Materials.....	5	Poly-( $\alpha$ -Methyl Styrene) (Wide MW Range).....	318	Propamocarb.....	261, 263, 349
Phenthoate.....	349	Polyaromatic Hydrocarbons (PAHs).....	271	Propanal.....	271
Ph.Eur. Listings, HPLC Column Selection .....	198–203	Polybutadienes (Wide MW Range).....	318	Propanil.....	349
Phenylbutazone .....	267	Polyethylene Glycol s(PEG).....	317	Propanols .....	123, 130, 131, 138
Phenylenediamine, $\delta$ -.....	114	Polyethylene Oxide (PEO).....	318	Propaquizafop.....	349
Phenylephrine.....	345, 346, 348	Polyimide Resins.....	181	Propargite.....	261, 263, 349
Phenylethylamine .....	158	Polymer Tubing Cutter.....	426, 427	Propazines.....	118, 134, 271, 349
Phenylpropanolamine .....	345, 346, 348	Polymer-Based Reversed Phase Columns .....	321, 340	Propetamphos .....	349
Phorates.....	114, 118, 120, 349	Polymeric SPE.....	60, 61–70	Propham.....	261, 349
Phosalone.....	349	PolymerX HPLC Columns .....	321	Propiconazole.....	261, 263, 349
Phosmet.....	118, 120, 349	PolymerX RP-1 Test Mix.....	424	Propoxur (Baygon®).....	261, 263, 349
Phosphamidon.....	118, 120, 349	Polymethyl Methacrylates (Wide MW Range).....	318	Propoxycarbazone.....	349
Phosphate .....	342	Polypropylene Manifold Needles, Manifold Accessories .....	81	Propoxyphene.....	128, 269
Phospholipid Removal Products .....	58–59	PolySep-GFC-Polymeric Aqueous GFC/SEC Columns.....	322	Propranolol.....	236, 351, 388
Phoxim .....	349	Polystyrene divinylbenzene (PSDVB) columns.....	321	Propyl paraben.....	279
Phree Phospholipid Removal Solutions.....	58–59	Polystyrenes (Mixed MW Range).....	318, 319	Propylbenzene, n-.....	142
Phthalate Esters.....	281	Polyvinylpyrrolidone.....	317	Propyzamide.....	349
Phthalate, bis(2-Ethylhexyl).....	114, 134, 281	PONA.....	126	Prosulfocarb.....	349
Phthalate, Butyl benzyl.....	114, 281	Porcine serum.....	351	Prosulfuron.....	209
Phthalate, Dibutyl.....	134, 281	Pore Size .....	444	Protein Precipitation Plates .....	57
Phthalate, Dicyclohexyl.....	134	Positive Displacement Syringes.....	20, 21	Proteins .....	204–207, 209, 210–221, 244
Phthalate, Diethyl.....	114, 134, 281	Positive Pressure Manifold.....	79	Proteins Columns by Shodex.....	340
Phthalate, Dimethyl.....	114, 134, 281	Prednisolone.....	253, 267, 282	Prothioconazole.....	261, 349
Phthalate, Di-n-butyl.....	114, 281	Prednisolone 21-acetate.....	282	Prothiophos.....	349
Phthalate, Di-n-hexyl.....	134	Prednisone.....	281	Protriptyline.....	253
Phthalate, Di-n-octyl.....	134, 281	Preparative BioSeparations, Yarra PREP .....	358	Pseudoephedrine.....	256, 283, 312, 345, 346, 348
Phthalate, Dioctyl.....	114, 281	Preparative Chromatography Axia Packed Columns.....	384–394	Pullulan, Calibration Standards, Shodex .....	339
Phthalate, Dipropyl.....	134	Preparative Guard Cartridge Holder, HPLC/SFC.....	332	Purification and Characterization, Synthetic DNA/RNA.....	412
Phytane.....	144	Preparative Purifications using Core-Shell Media.....	391	Purification Media for Human Insulin.....	397
Picloram methyl ester.....	118	Preparative Sample Injectors.....	429	Purification, Preparative.....	390, 391
Picolinafen.....	349	Preparative SFC Chiral Columns.....	369	Purified fractions.....	392
Picoline, 2'-.....	114	PREP Column Coupler.....	16, 422	Pymetrozine.....	114
Picoxystrobin.....	261, 263, 349	Prep LC Columns and Bulk HPLC Media Selection Chart.....	398	Pyracarbolid.....	127, 138, 160
Pilot Scale Columns, Synergi LC columns.....	353	Press-Fit Unions .....	181	Pyraclufos.....	261, 263, 349
Pindolol.....	236, 253, 257, 267, 295	Presston 1000 Positive Pressure Manifold.....	79	Pyraclostrobin.....	261, 263, 349
Pinene, $\alpha$ -.....	133	Pristane.....	144	Pyraflufen-ethyl.....	349
PIONA.....	126	Procaine.....	128, 155	Pyrazophos.....	261, 263, 349
Piperidine.....	158	Process Chromatography.....	395–401	Pyrethrin I.....	349
Piperonyl butoxide.....	261, 263, 349	Prochloraz.....	261, 263, 349	Pyridaben.....	107, 108, 109, 114, 149, 268, 271
Piperophos.....	349	Procymidone.....	349	Pyridalyl.....	349
Pirimicarb.....	261, 263, 349	Prodigy Guaranteed Alternative to Inertsil.....	323	Pyridaphenthion.....	261, 263, 349





Pyridate .....	349
Pyridine .....	114, 349
Pyridoxal.....	349
Pyridoxine.....	114, 143, 242, 267, 351
Pyrifenox .....	261
Pyrimethanil .....	261, 284, 285, 345
Pyriproxyfen.....	349
Pyroquilon .....	261, 263, 349
Pyroxulam.....	261, 263, 349
Pyruvic acid.....	349

## Q

Qsert Vial .....	30, 31, 32, 33, 34, 36, 37, 40
QSP (Quick, Simple, Pure Protocol) for RNA and DNA Purification .....	407
QuEChERS Bulk Sorbent .....	85
QuEChERS Extraction Salt Packets.....	85
QuEChERS Kits, dSPE and Extraction.....	83–85
Quinalphos .....	349
Quinidine.....	267
Quinine.....	253
Quinmerac.....	349
Quinoclamine.....	349
Quinoxifen .....	261, 263, 349
Quizalofop-ethyl.....	349
Quizalofop-P .....	349

## R

Raffinose .....	282
Rapid Protein Precipitation.....	57
Rapid SPE Protocol .....	60
RDX.....	151
Reagent Bottles .....	12
Reduced Retention Time Parameters.....	439
Reducing Adapters.....	419
Reference Standards .....	5, 6
Relative Retention or Retention Factor or Capacity Factor Calculation .....	438, 440
Replacement Needles .....	23, 24
Residual Solvents .....	98, 140, 143, 157
Resmethrin.....	349
Resolution Calculation / Parameters.....	438, 439, 440
Resolution, Master Equation, GC .....	88

Retaining Clips, Manifold Accessories .....	81
Retention Factor or Capacity Factor or Relative Retention Calculation.....	438, 440
Retention Gaps, Z-Guard GC Columns .....	164
Retention Time Parameters.....	439
Retention, Effect of Different Conditions on Sample.....	438
Reversed Phase 1 Test Mix .....	424
Reversed Phase 2 Test Mix .....	424
Reversed Phase Method Development .....	440
Reversed Phase Sorbents, SPE .....	71, 72
Rezex Column Cross Reference Chart .....	329
Rezex Organic Acid and Carbohydrate Columns .....	324–329
Rezex, Specifications and Operating Recommendations .....	328
RheBuild Kits .....	429, 430
RheFlex Fittings.....	430
Rheodyne Fitting Wrench .....	427, 431
Rheodyne Sample Injector Models: 3725i Preparative .....	429
7000.....	429
7775.....	428
8125 Low-Dispersion.....	429
9725 .....	429
Ribitol.....	326, 327
Riboflavin .....	261, 284, 285, 345
Rimsulfuron .....	349
Ring Nut for Gas Filter.....	183
RNase A (13.7 kD).....	224
Ronnel .....	118, 120
roQ QuEChERS Extraction Salt Packets.....	85
roQ QuEChERS Kits, dSPE and Extraction .....	83–85
roQ QuEChERS Sorbents, Bulk .....	84, 85
Rotenone .....	261, 263, 349
Rotor Seals .....	429, 431
Rubber and Plastic.....	109

## S

Saccharides.....	326, 327
Safrole.....	114
Salicin .....	327
Salicylic acid.....	249, 292
Salicylicamide.....	292
Salt and Reagent Removal .....	409
Sample Handling .....	7, 17, 27
Sample Injector Loops and Fittings.....	428, 429, 430
Sample Injectors .....	428, 429
Sample Preparation .....	49–86

Sample Preparation Accessories .....	80–82
Sample Preparation Resources .....	86
Sample Preparation Solutions and Formats.....	50
Sample Retention, Effect of Different Conditions on.....	438
Scalability from HPLC/UHPLC to PREP.....	387, 389, 390, 392, 395
Scale Up .....	389, 390, 392, 395, 438
Scaling Down .....	438
Science Unfiltered Blog.....	464
Scopolamine.....	256
Scoring Wafers, Ceramic.....	184
Scottish Single Malt Whiskey .....	138
Scout Columns, Achiral .....	399
Scout Columns, Chiral.....	399
Screening Columns.....	390
Screening Columns, Lux, Chiral.....	369
Screening Strategy .....	371
Screw-Top Vials and Kits.....	36–39, 41, 44–47
Sealing Mats.....	82
Sealing Plug, Column.....	422
Sealing Plug, SecurityCAP.....	418
Sealing Tape .....	82
Seals / Closures for Crimp-Top Vials.....	33, 44
Seals / Closures for Snap-Top Vials.....	35, 44
Seals, Rotor .....	431
Sebuthylazine .....	349
Secbumeton .....	118, 134, 261, 263, 349
Secobarbital .....	142
SecurityCAP LC Solvent Safety Products .....	12, 417–418
SecurityCAP Waste Safety Filter Compatibility Table .....	418
SecurityGuard Prep Guard Cartridge Holder.....	332, 392
SecurityGuard SemiPrep Guard Cartridge Holder.....	332
SecurityGuard Standard HPLC and SFC Column Protection .....	330–334
SecurityGuard Standard Kit.....	331
SecurityGuard ULTRA, UHPLC Column Protection.....	335
SecurityLINK UHPLC Fittings .....	336, 337
SecurityLINK Fitting Integrated with Biozen Nano LC Columns .....	227
Selectivity Factor .....	438, 439, 440
Selectivity Options .....	388
Selectivity vs. Polarity .....	88
Selectivity, GC.....	88–90
Semivolatiles Organic Compounds.....	114, 128, 135, 155
Separation Factor .....	438
Septra Bulk Sorbents .....	401
Septa for 8 mm Screw Caps.....	39, 45
Septa Plug, BTO Silicone.....	171
Septa Sizes by GC Instruments .....	171
Septum, Merlin Microseal .....	172

Sesame Oil .....	376	SPE Specialty Sorbents .....	76, 77	SAX (strong anion-exchange) .....	70, 74
Sesamol .....	376	SPE Tube Vacuum Manifold .....	80, 81	Screen-A .....	70, 75
Sethoxydim .....	249	SPE, Polymeric .....	61–70	Screen-C .....	70, 75
SFC (Supercritical Fluid Chromatography) .....	363–372	SphereClone, Guaranteed Replacement to Spherisorb Columns .....	341	Screen-C GF .....	70, 75
SFC Guard Cartridge Holders .....	331–334	Spinetoram .....	261, 263, 349	SCX (strong cation-exchange) .....	70, 74
SFC Chiral Screening .....	390	Spinosad .....	261	SDB-L .....	70, 77
SGE Syringes .....	19, 20, 21, 24, 26	Spinosyn .....	263, 349	Silica (Si-1) .....	70, 73
Shell Vials .....	41	Spiramycin .....	270	Sodium Sulfate .....	77
Shinwa Chemical Industries, Ltd. Columns .....	354	Spirodiclofen .....	261, 263, 349	WCX (weak cation-exchange) .....	70, 74
Shodex .....	338–340	Spiromesifen .....	261, 349	Strata-X Polymeric SPE .....	61–68
Shogaols .....	349	Spirotramat .....	261, 263, 349	X .....	58, 64
Showa Denko K.K. Columns .....	338–340	Spiroxamine .....	261, 263, 349	X-A .....	58, 67
Sialylated glycan .....	219	Splitters, Y .....	181	X-AW .....	58, 68
Siduron .....	261, 263, 349	Stachyose .....	327	X-C .....	58, 65
Silanol Activity at Low pH .....	350	Stainless Steel Manifold Needles, Manifold Accessories .....	81	X-CW .....	58, 66
Silicone Rubber Septa .....	171	Stainless Steel Tubing, Capillary .....	426	X-Drug B .....	58, 69
SilTite Ferrules .....	169, 170	Standards, GC Column Check .....	185	X-Drug B Plus .....	69
SilTite Mini-Unions .....	181	Standards, HPLC Column Check .....	424, 425	X-Drug N .....	58, 69
Silvex methyl ester .....	118	STAR-ION A300 Anion Column (PEEK) .....	342	XL .....	58, 64
Simazines .....	118, 134, 271, 349	STAR-ION A300 Test Mix .....	425	XL-A .....	58, 67
Simetryn .....	118, 134, 261, 263, 349	Stationary Phase Considerations .....	441	XL-AW .....	58, 68
Simple Sugars .....	282	Stationary Phase Selectivity .....	388	XL-C .....	58, 65
Simplified Liquid Extraction (SLE) .....	51–53	Stators, Valve .....	431	XL-CW .....	58, 66
Simulated Distillation .....	124, 125	Stearic acid .....	161, 278	Strata-X PRO Polymeric SPE .....	50, 60
Size Exclusion Chromatography for (SEC) / GFC (Aqueous) .....	355	Sterile Syringe Filters .....	10	Streptavidin Coated Magnetic Beads .....	78, 211
Size Exclusion for Biomolecules .....	357	Steroids .....	142, 267, 279, 282	Strong anion-exchange, SPE .....	67, 74
Slurry Packing .....	384	Sterols .....	97	Strong cation-exchange, SPE .....	65, 74
Snap-Top Vials and Kits .....	34, 44	Stilbene Oxide, trans- .....	302, 389	Styrene .....	283
Solid Phase Extraction (SPE) Sorbents, Strata .....	70–77	Stirofos .....	120	Sub P Fragments .....	283
Solid Phase Extraction (SPE), Polymeric Sorbents, Strata-X .....	61–70	Stopcocks, Luer, SPE .....	80, 81	Substance P .....	282, 298, 299, 326, 327
Solid Waste, GC Column Selection .....	95	Storage Conditions for Silica-Based HPLC Columns .....	441	Subunit Analysis .....	221
Solvent (Eluent) and Waste Protection .....	12	Storage Vial Kits .....	43	Succinic acid .....	327
Solvent and Temperature Compatibility, GPC, Phenogel .....	316	Strata Solid Phase Extraction (SPE) Sorbents .....	70–75	Sucrose .....	282, 298, 299, 326, 327
Solvent Miscibility Table .....	442	ABW .....	70, 75	Suction Needle Adapter .....	429
Solvent Pickup Adapter .....	12	AL-N (Alumina-Neutral) .....	70, 76	Sudan I - IV .....	270
Solvent Polarity Chart .....	442	C8 .....	70, 72	Sudan Orange G .....	270
Solvent Protection SecurityCAPS .....	417–418	C18-E .....	70, 71	Sudan Red G .....	270
Solvent Reservoirs .....	12	C18-T .....	70, 71	Sufentanil .....	257, 269
Solvent Saver Inlet Filter .....	14	C18-U .....	70, 71	Sugar Analysis Columns, Shodex .....	340
Solvent Shielding Technology .....	58	Cyano (CN) .....	70, 73	Sugars .....	97, 326
Solvent Switching Considerations, GPC, Phenogel .....	316	DE Diatomaceous Earth SLE .....	54, 55	Sugars, Simple .....	282
Solvent Top/Cap Comparison .....	417	Eco-Screen .....	70, 76	Sulcotrione .....	349
Sorbent Mass, Selection, Strata, SPE .....	70	EPH (Extractable Petroleum Hydrocarbon) .....	70, 77	Sulfa Drug .....	238
Sorbent Mass, Selection, Strata-X Polymeric SPE .....	61	Florisol (FL-PR pesticide residue grade) .....	70, 76	Sulfadimethoxine .....	270, 280, 371
Sorbitol .....	326, 327	GCB (Graphitized Carbon Black) .....	70, 76	Sulfadoxine .....	270
Sotalol .....	236	Melamine .....	70, 76	Sulfaguandine .....	371
SPE (Solid Phase Extraction) .....	61–78	NH <sub>2</sub> /WAX .....	70, 73	Sulfamerazine .....	238
SPE Positive Pressure Manifold .....	79	PAH (Polycyclic Aromatic Hydrocarbons) .....	70, 77	Sulfamethizol .....	371
		Phenyl .....	70, 72	Sulfamethoxazole .....	238



Sulfamethoxypyridazine .....	270	TCDF, 2,3,7,8- .....	104	THCV .....	308
Sulfaquinoloxaline .....	270, 280	TCMX .....	150	Theoretical Plates .....	439
Sulfate .....	342	TCMX, 2,4,5,6- (Surr) .....	116	Therapeutic oligonucleotides .....	405, 406
Sulfathiazole .....	238, 267	Tebuconazole .....	261, 263, 349	Thermally Modified Fully Porous Particles .....	210, 225, 290
Sulfentrazone .....	261, 349	Tebufenozide .....	261, 263, 349	ThermaSphere TS-130 Heater .....	416
Sulfometuron-methyl .....	349	Tebufenpyrad .....	261, 263, 349	Thiabendazole .....	261, 263, 349
Sulfosulfuron .....	349	Tebupirimfos .....	349	Thiacloprid .....	261, 263, 349
Sulfotep .....	118, 120, 349	Tebuthiuron .....	118, 261, 263, 349	Thiamethoxam .....	261, 263, 349
Sulprofos .....	349	Teflon (PTFE) Tubing .....	427	Thiamine .....	261, 263, 284, 285, 345, 349
Supercritical Fluid Chromatography (SFC) .....	363–372	Teflon Tip Gastight Syringes .....	18, 19, 20, 21	Thiamphenicol .....	280
Superspher .....	275	Teflon Tube, Strata-X SPE .....	64	Thidiazuron .....	261, 263, 349
Supported Liquid Extraction (SLE) .....	54, 55	Teflon Tubing .....	14, 427	Thiencarbazone-methyl .....	349
Sure-Lok Coupler, Analytical .....	16, 422	Teflubenzuron .....	261, 349	Thifensulfuron-methyl .....	349
Sure-Lok Fingertight Male Nut Fittings .....	422	Temazepam .....	129, 269, 351	Thiobencarb .....	261, 263, 349
Sure-Lok Fitting Tightening Tool .....	420	Temephos .....	261, 263, 349	Thiodicarb .....	349
Sure-Lok High Pressure PEEK Male Nut Fittings .....	420	Temperature Maximum Ratings (°C) for Tubing and Fittings .....	419	Thiofanox .....	261, 263, 349
Suzuki reaction mixture .....	387	TEPP .....	120, 349	Thiometon .....	349
Switching Valve/Injector .....	429	Terbacil .....	118, 349	Thionazin .....	114, 118, 120
Synergi Full Range Selectivity LC Columns: .....	343–353	Terbufos .....	118, 120, 349	Thiophanate .....	349
Fusion-RP .....	343, 348, 349	Terbumeton .....	261, 263, 349	Thiophanate-methyl .....	261, 263, 297, 349, 351
Hydro-RP .....	343, 346, 347	Terbutylazine .....	118, 134, 349	Thiourea .....	297, 349, 351
Max-RP .....	343, 350, 351	Terbutryn .....	118, 134, 261, 263, 349	Thymidines .....	345
Polar-RP .....	343, 344, 345	Terfenadine .....	390	Thymine .....	282, 297, 349
Synthetic DNA/RNA Purification and Analysis .....	403–413	Terms and Conditions of Sale .....	463	Tianeptine .....	253
Synthetic SLE sorbent .....	52	Terphenyl-d14, p- .....	114	Tilmicosin .....	270
Syringe and Injector Accessories for Rheodyne Injectors/Valves .....	431	Terpineol, α- .....	133	TMS Endcapped C12 Columns .....	343
Syringe Filter Applications .....	10	Terry Tool Stainless Steel Tubing Cutter .....	427	Tokuthion .....	118, 120
Syringe Filter Finder .....	10, 43	Tert-Butyl Alcohol (TBA) .....	142	Tolclofos-methyl .....	349
Syringe Filter Selection Guide .....	8	Test Mixes, GC Columns .....	185	Tolmetin .....	278
Syringe Filters .....	8, 9, 10, 22, 26	Test Mixes, HPLC Columns .....	424, 425	Tolnaftate .....	371
Syringe Filters, Sterile .....	10	Tetrachloroethene (PCE) .....	142	Toluene .....	123, 127, 138, 140, 142, 143, 160, 242, 248, 335, 351, 391
Syringe, Priming .....	23	Tetrachloro-m-xylene .....	159	Toluidine, m- .....	158
Syringes .....	17	Tetrachlorvinphos .....	118, 120, 349	Toluidine, o- .....	114, 158
Syringes for Use With the Merlin Microseal .....	172	Tetraconazole .....	261, 263, 349	Tolylfluaniid .....	349
Syringes, Disposable, Plastic .....	10, 26	Tetracontane (C40) .....	125, 145	Tools & Maintenance Kits, GC .....	184
Syringes, GC .....	18, 19, 20, 21, 22	Tetracosane (C24) .....	125	Torque Limiting Technology .....	227
Syringes, General Use .....	25, 26	Tetracyclines .....	321	Trademarks .....	462, 463
Syringes, HPLC .....	23, 24	Tetradecane (C14) .....	125	Tralkoxydim .....	349
Syringes, Manual, GC .....	20, 21	Tetraethyl pyrophosphate (methyl ester) .....	118	Tramadol .....	266, 269, 303
		Tetrahydrofuran (THF) .....	140, 143	Trap Fitting Guide .....	229
		Tetralin .....	143	Traps, Gas .....	182, 183
		Tetramethrin .....	349	Trastuzumab .....	214, 218, 219, 222, 302, 389
		Tetrandrine .....	379	Trastuzumab Biosimilar Peptide Map .....	214
		Tetratetracontane (C44) .....	125	Triadimefon .....	223
		Tetryl .....	151	Triadimenol .....	261, 263, 349
		THC, Delta-8- .....	308	Triadimeton .....	118
		THC, Delta-9- .....	308	Triallate .....	349
		THCA .....	308	Triasulfuron .....	349
		THC-COOH .....	56	Triazamate .....	349

## T

T-2 Toxin .....	262, 270
Tartaric acid .....	327, 347
TCDD .....	104
TCDF .....	104

Triazine Pesticides ..... 271

Triazolam ..... 128

Triazophos ..... 349

Triazoxide ..... 349

Tribenuron-methyl ..... 349

Tribromophenol, 2,4,6- ..... 114

Tricaprin ..... 147

Trichlorethylene ..... 143

Trichlorfon ..... 118, 120, 261, 349

Trichloroethene ..... 142

Trichlorofluoromethane ..... 142

Trichloronate ..... 118, 120

Trichlorophenols ..... 114, 134

Trichlorotrifluoroethane ..... 142

Tricyclazole ..... 118, 261, 263, 349

Tricyclic Antidepressants ..... 237, 270

Tridecane ..... 132, 141, 185

Tridemorph ..... 349

Trietazine ..... 349

Triethylamine ..... 142

Triethylene glycol ..... 326

Triethylphosphorothioate, O,O,O- ..... 114

Trifloxystrobin ..... 261, 263, 349

Triflumizole ..... 261, 263, 349

Triflumuron ..... 261, 263, 349

Trifluralin ..... 118

Triflusulfuron-methyl ..... 349

Triglycerides ..... 97, 147

Trimethylbenzene ..... 123

Trimethylpentane, 2,3,3- ..... 127

Trimipramine ..... 128

Trinitrotoluene, 2,4,6- (2,4,6-TNT) ..... 151, 347

Triolein ..... 147

Triphenyl phosphate ..... 349

Triphenylene PAHs ..... 110, 111

Triprolidine ..... 134, 253, 267, 279, 348, 386

Tris-(1,3-dichloro-isopropyl)-phosphate ..... 349

Triticonazole ..... 261, 263, 349

Tritosulfuron ..... 349

Trityl-off DNA and RNA sequences ..... 409

Trityl-on Oligos ..... 407

Troubleshooting GC Installation Problems ..... 437

Tryptic Digest of Bovine Cytochrome c ..... 283

Tube Holders, 96-Well, Tab-less ..... 82

Tube Vacuum Manifold, SPE ..... 81

Tubes, Non-Recombinant Enzyme ..... 56

Tubes, Phospholipid Removal ..... 59

Tubes, Recombinant Enzyme ..... 56

Tubes, Sample Preparation ..... 53, 55, 56, 59, 64-71, 71-77

Tubes, SLE ..... 53, 55

Tubing ..... 426, 427, 428

Tubing Cutters ..... 426, 427

TWIN (Two-In-One) Technology ..... 234

TWIN-NX Technology ..... 234

Tylenol, Childrens Cold Syrup ..... 283

Tylosin ..... 270

## U

UHPLC Column Protection, SecurityGuard ULTRA ..... 335

UHPLC Fittings, SecurityLINK ..... 336

UHPLC / HPLC Sure-Lok High Pressure  
 PEEK Male Nut Fittings ..... 274

Ultracarb ..... 354

Ultra-High Performance LC Fittings ..... 420-421

Ultremex ..... 354

Ultron ES ..... 354

Uniconazole ..... 349

Unifit Adapter ..... 14

Unions, GC:  
 Capillary Column ..... 181  
 Mini-GC ..... 181  
 Press-Fit ..... 181

Unions, LC ..... 419

Universal Click-on Gas Trap ..... 183

Universal, Gas Filter ..... 183

Universal (Helium specific) Gas Filter ..... 183

Universal Guard Cartridge System,  
 SecurityGuard Standard ..... 330

Uracil ..... 242, 247, 248, 257, 282, 295, 335, 391

Urea ..... 326

Uridine ..... 216

Urine, Cleanup ..... 56

USP Column Classification, GC ..... 98

USP Column Classification, HPLC ..... 194-197

USP Method, Acetaminophen ..... 279

USP <467> Procedure ..... 98

USP <467> Residual Solvents ..... 143

USP <467> Residual Solvents Procedure ..... 157

## V

Vacuum Manifold Accessories ..... 80, 81

Vacuum Manifold, 96-Well Plate ..... 81

Vacuum Manifolds, SPE Tube ..... 80

Valencene ..... 133

Valves ..... 429, 430, 431

Valve Stators ..... 431

Vamidothion ..... 261, 263, 349

van Deemter Plot ..... 440

Verex Certified Vial Products ..... 30-48

Verex-EU Vial Products ..... 44, 45, 46

Verex Filter Vials ..... 28-29

Verex-IN Vial Products ..... 47

Vernolate ..... 118

Veterinary Drugs ..... 267, 371

Vial Caps with Bonded-In Septa ..... 36-41

Vial Finder ..... 31, 33

Vial Kits, Storage ..... 43

Vials ..... 27-48

Vials and Kits, Specialty,  
 Limited Volume ..... 30-32, 32-34, 36, 37, 40, 41

Vials, Crimp-Top ..... 31, 33, 44

Vials, Filter ..... 48

Vials, Microsampling ..... 31, 33, 34, 36, 37, 40

Vials, Screw-Top ..... 36, 37, 38, 39, 40, 41

Vials, Shell ..... 41

Vials, Wide Mouth Opening ..... 31, 33

VICI Precision Sampling Syringes ..... 22

VICI Series A-2 Gas Syringes ..... 22

Vinyl Chloride ..... 142

Viscosity of Solvent Mixtures ..... 439

Vitamin C, Human Plasma ..... 269

Vitamin D ..... 269

Vitamin Mix ..... 284

Vitamin Tablet, Multi ..... 29

Vitamins, Water Soluble ..... 261, 285

VOA / ASE Assembled Vial Kits ..... 43

VOA / ASE Vials and Caps ..... 43, 46

VOCs ..... 157

Volatile Amines ..... 142

Volatile Organic Compounds ..... 142

## W

Wall-mounting Clamp Set for Gas Traps ..... 183

Warfarin ..... 309, 349

Wash Buffer ..... 406

Waste Exhaust Filter and Cap ..... 417-418

Waste Safety Filter Compatibility Table ..... 418

Waste Water, GC Column Selection ..... 94

Water Soluble Vitamins ..... 261, 285



Wax Paraffin .....	146
Weak anion-exchange, SPE.....	68
Weak cation-exchange, SPE.....	66, 74
Webinar Library .....	402
Well Plate, 96-.....	52, 55–57, 63–68, 69, 71–75, 77
Well Plate, 96-, Microelution .....	63–68
Well Plate, 96-, Non-Recombinant Enzyme .....	56
Well Plates, 96-, Phospholipid Removal.....	59
Well Plate, 96-, Protein Precipitation .....	57
Well Plate, 96-, Recombinant Enzyme .....	56
Well Plates, 96-, SLE.....	53–55
Well Plates, 96-, Vacuum Manifold Accessories.....	81
Whiskey.....	138
Wrenches/Spanners.....	427

## X

Xylene .....	123
Xylene, m-.....	138, 160
Xylene, m-/Xylene, p-.....	142, 143
Xylene, o-.....	138, 142, 143, 160
Xylene, p-.....	114, 127, 138, 143, 160
Xylitol .....	123, 327
Xylose.....	282, 327

## Y

Yangonin.....	277
Yarra Aqueous GFC/SEC Columns.....	355–358
Y-Splitters.....	181

## Z

Z-Alanine.....	233
Zearalenone.....	270
Zebtron Electronic Indicator, Gas Management.....	182
Zebtron Essentials GC Columns.....	100, 101
Zebtron Essentials GC Liners.....	175, 177, 178, 179
Zebtron Gas Management.....	182, 183, 184
Zebtron GC Columns and Accessories .....	87–164, 165–185
Zebtron GC Columns:	
ZB-1 .....	152
ZB-1HT Inferno .....	144, 145

ZB-1 <i>PLUS</i> .....	132, 133
ZB-1XT SimDist .....	124, 125
ZB-5 .....	153
ZB-5HT Inferno .....	146, 147
ZB-5ms.....	154
ZB-5MS <i>PLUS</i> .....	136, 137
ZB-5 <i>PLUS</i> .....	134, 135
ZB-35 .....	155
ZB-35HT Inferno .....	148, 149
ZB-50 .....	156
ZB-624 .....	157
ZB-624 <i>PLUS</i> .....	140–143
ZB-1701 .....	158
ZB-1701P .....	159
ZB-BAC-1 and -2 .....	130, 131
ZB-Bioethanol .....	122, 123
ZB-CLPesticides-1 and -2 .....	116, 117
ZB-DHA-PONA .....	127
ZB-DHA-PONA-TUNE.....	126, 127
ZB-Dioxin.....	102, 103, 104, 105
ZB-Drug-1 .....	128, 129
ZB-FAME.....	112, 113
ZB-FFAP .....	161
ZB-MultiResidue-1 and -2.....	118–121
ZB-MultiResidue Column Kits.....	121
ZB-PAH-CT.....	110, 111
ZB-PAH-EU.....	106, 107, 108, 109
ZB-SemiVolatiles.....	114, 115
ZB-WAX .....	160
ZB-WAX <i>PLUS</i> .....	138, 139
ZB-XLB .....	162
ZB-XLB-HT Inferno .....	150, 151
Zebtron GC Columns MS Certification.....	437
Zebtron Guard Columns .....	163, 164
Zebtron Guardian Integrated Guard Columns.....	163
Zebtron Inferno Columns.....	100, 101
Zebtron PLUS Columns .....	100, 101
Zebtron PLUS GC Inlet Liners .....	173–175, 177–179
Zebtron Unlimited Columns .....	100, 101
Zero Dead-Volume Nano LC Connections .....	227
Zero Dead-Volume Union, PEEK .....	419
Zero Dead-Volume Union (Stainless Steel).....	419
Z-Guard Columns.....	164
Z-Liner .....	174, 175, 177, 178, 179
Zoxamide.....	270



# Trademarks

1PLUS™	Phenomenex, Inc.	Cyrolite®	Evonik Cyro LLC.	Lux®	Phenomenex, Inc.
5PLUS™	Phenomenex, Inc.	DB®	Agilent Technologies, Inc.	MercuryMS™	Phenomenex, Inc.
5MSPLUS™	Phenomenex, Inc.	Delrin®	Dupont Polymers, Inc.	MICROLITER™	Hamilton Co.
624PLUS™	Phenomenex, Inc.	Develosil®	Nomura Chemical Co.	Microseal™	Merlin Instrument Co.
Acclaim™	Thermo Fisher Scientific	Dionex®	Dionex Corporation	MicroTight®	IDEX Health & Science LLC
ACE®	Advanced Chromatography Technologies (ACT) Limited	Discovery®	Merck KGaA, Darmstadt, Germany	MidBore™	Phenomenex, Inc.
ACQUITY®	Waters Technologies Corporation	Duran®	DWK Life Sciences GmbH	Milli-Q®	Merck KGaA, Darmstadt, Germany
AD®	DAICEL Corporation	Dynabeads™	Thermo Fisher Scientific Inc.	MultiPROBE®	PerkinElmer, Inc.
AD-H®	DAICEL Corporation	Easy Seals™	Phenomenex, Inc.	MultiResidue™	Phenomenex, Inc.
AD-RH®	DAICEL Corporation	Engineered Self Cross-linking™ (ESC)	Phenomenex, Inc.	MXT®	Restek Corp.
Aeris™	Phenomenex, Inc.	Enviro-Inert™	Phenomenex, Inc.	nanoEase™	Waters Technologies Corporation
AIT®	AIT France	EnviroSep™	Phenomenex, Inc.	NerdLife™	Phenomenex, Inc.
Agilent®	Agilent Technologies, Inc.	Equity®	Merck KGaA, Darmstadt, Germany	Nexera®	Shimadzu Corporation
Agilent Technologies®	Agilent Technologies, Inc.	ESC™	Phenomenex, Inc.	NEXT™	Phenomenex, Inc.
Alliance®	Waters Technologies Corporation	EXCEL™	Advanced Chromatography Technologies LTD	Novum™	Phenomenex, Inc.
Aminex®	Bio-Rad Laboratories, Inc.	ExionLC™	AB SCIEX Pte. Ltd.	NUCLEOSIL®	Macherey-Nagel
Antek®	Petroleum Analyzer Company, L.P.	EZ:faast™	Phenomenex, Inc.	Oasis®	Waters Technologies Corporation
API 3200™	AB SCIEX Pte. Ltd.	FabRICATOR®	Genovis, Inc.	OBD™	Waters Technologies Corporation
API 4000™	AB SCIEX Pte. Ltd.	FilterSys™	Phenomenex, Inc.	OD®	DAICEL Corporation
API 5000™	AB SCIEX Pte. Ltd.	Florisil®	U.S.Silica Co.	OD-H®	DAICEL Corporation
API 5500™	AB SCIEX Pte. Ltd.	FOCUS™	Thermo Fisher Scientific Inc.	OD-RH®	DAICEL Corporation
AQUA™	Phenomenex, Inc.	FocusLiner™	SGE	OJ®	DAICEL Corporation
Arylene Matrix Technology™ (AMT)	Phenomenex, Inc.	Fused-Core®	Advanced Materials Technology, Inc.	OJ-H®	DAICEL Corporation
Asahipak®	Showa Denko, K.K.	Gastight®	Hamilton Co.	OJ-RH®	DAICEL Corporation
Ascentis®	Merck KGaA, Darmstadt, Germany	Gemini®	Phenomenex, Inc.	Oligo-MS™	Phenomenex, Inc.
Atlantis®	Waters Technologies Corporation	Giga™	Phenomenex, Inc.	Oligo-RP™	Phenomenex, Inc.
AutoSystem™	PerkinElmer, Inc.	Glass Infusion™	Phenomenex, Inc.	Oligo-WAX™	Phenomenex, Inc.
Axia™	Phenomenex, Inc.	GL Sciences®	GL Sciences Inc.	Omegawax®	Merck KGaA, Darmstadt, Germany
AY®	DAICEL Corporation	GOW-MAC®	GOW-MAC Instrument Co.	Omnifit®	Bio-Chem Fluidics, Ltd.
AY-H®	DAICEL Corporation	GuardFinder™	Phenomenex, Inc.	Onyx™	Phenomenex, Inc.
Baygon®	S.C. Johnson & Son, Inc.	Guardian™	Phenomenex, Inc.	Orbitrap™	Thermo Fisher Scientific
BEH™	Waters Technologies Corporation	GuideRight™	Phenomenex, Inc.	OTX™	Phenomenex, Inc.
BE-HAPPY™	Phenomenex, Inc.	HALO®	Advanced Materials Technology, Inc.	OV®	Ohio Valley Specialty Company
BEH Technology™	Waters Technologies Corporation	Hamilton®	Hamilton Company	OxiClear™	LabClear
β-Gone™	Phenomenex, Inc.	HSPgel™	Waters Technologies Corporation	OZ-H®	DAICEL Corporation
Bio-Rad®	Bio-Rad Laboratories, Inc.	Hypercarb®	Thermo Hypersil-Keystone LLC	Parafilm®	Bemis Co., Inc
BioSep™	Phenomenex, Inc.	HyperClone™	Phenomenex, Inc.	PEEKlok™	Trajan Scientific Australia Pty Ltd.
Bio-Sil®	Bio-Rad Laboratories, Inc.	Hypersil™	Thermo Fisher Scientific, Inc.	PEEKsil™	Trajan Scientific Australia Pty Ltd.
BioSuite™	Waters Technologies Corporation	Hypersil®	Thermo Hypersil-Keystone LLC	PepMap™	Thermo Fisher Scientific
Biotage®	Biotage AB Corp.	Hypersil GOLD®	Thermo Hypersil-Keystone LLC	PerkinElmer®	PerkinElmer, Inc.
BioTI™	Phenomenex, Inc.	IA®	DAICEL Corporation	Petrocol®	Merck KGaA, Darmstadt, Germany
Biozen™	Phenomenex, Inc.	IB-Sil™	Phenomenex, Inc.	Phenex™	Phenomenex, Inc.
Bondapak®/μBondapak®	Waters Technologies Corporation	IC®	DAICEL Corporation	Phenogel™	Phenomenex, Inc.
Bondclone™	Phenomenex, Inc.	IG®	DAICEL Corporation	PhenoBlue™	Phenomenex, Inc.
BTO®	Chromatography Research Supplies, Inc.	Impact™	Phenomenex, Inc.	PhenoGreen™	Phenomenex, Inc.
Canary-Safe™	Analytical Sales and Services, Inc.	Inertsil®	GL Sciences, Inc.	PhenoGrey™	Phenomenex, Inc.
Capcell Pak®	Shiseido Co., Ltd.	Inferno™	Phenomenex, Inc.	PhenoLogix™	Phenomenex, Inc.
Ceramospher®	Shiseido Co., Ltd.	IonPac®	Dionex Corporation	PhenoRed™	Phenomenex, Inc.
Chem Elut®	Agilent Technologies, Inc.	ISOLUTE®	Biotage AB Corp.	PhenoSphere™	Phenomenex, Inc.
Cheminert®	Valco Instruments Co., Inc.	JASCO®	JASCO Corporation	Phenova™	Phenova, Inc.
CHIRALCEL®	DAICEL Corporation	Jordi Resolve™	Jordi Labs	Phree™	Phenomenex, Inc.
CHIRALPAK®	DAICEL Corporation	Jupiter®	Phenomenex, Inc.	PLgel™	Agilent Technologies, Inc.
Chirex™	Chirex, Inc.	Kalrez®	Dupont Polymers, Inc.	PLRP-S™	Agilent Technologies, Inc.
Chromolith®	Merck KGaA, Darmstadt, Germany	KEL-F®	3M Company	POLEFIN®	PSS Polymer Standards Service GmbH
Claricep™	Bonna-Agela Technologies Inc.	Kinetex®	Phenomenex, Inc.	PolySep™	Phenomenex, Inc.
Clarity®	Phenomenex, Inc.	Kromasil®	AkzoNobel	POLYWAX®	Baker Hughes Inc.
Clarus®	PerkinElmer, Inc.	KrudKatcher™	Phenomenex, Inc.	Porasil™/μPorasil™	Waters Technologies Corporation
Columbus™	Phenomenex, Inc.	LiChrosorb®	Merck KGaA, Darmstadt, Germany	Presston™	Phenomenex, Inc.
Cool-Lock™	Phenomenex, Inc.	LiChrospher®	Merck KGaA, Darmstadt, Germany	Pressure-Lok®	Valco Instruments Co., Inc.
Cosmosil™	Nacalai Tesque	Luer-LOK®	Becton, Dickinson and Co.	PrimeSphere™	Phenomenex, Inc.
Curosil™	Phenomenex, Inc.	Luna®	Phenomenex, Inc.		

# Trademarks (cont'd) / Terms and Conditions of Sale

Prodigy™	Phenomenex, Inc.	SiITite®	Trajan Scientific Australia Pty Ltd.	Thermo Scientific®	Thermo Fisher Scientific Inc.
Prominence®	Shimadzu Corporation	SLB®	Merck KGaA, Darmstadt, Germany	Tosoh Bioscience®	Tosoh Corporation
Protein-Pak™	Waters Technologies Corporation	SOL.GEL-1ms™	Trajan Scientific Australia Pty Ltd.	TRACE™	Thermo Fisher Scientific Inc.
PRP®	Hamilton Co.	SOL.GEL-WAX™	Trajan Scientific Australia Pty Ltd.	Triophilic™	Phenomenex, Inc.
PT Manage™	Phenova, Inc.	Solvent Saver™	Phenomenex, Inc.	TSKgel®	Tosoh Corporation
Pursuit®	Agilent Technologies, Inc.	Solvent Shielding Technology™	Phenomenex, Inc.	TWIN-NX™	Phenomenex, Inc.
Q Exactive™	Thermo Fisher Scientific	SOURCE™	GE Healthcare	TWIN™ Technology	Phenomenex, Inc.
QSP™	Phenomenex, Inc.	SP®	Merck KGaA, Darmstadt, Germany	Two-In-One Technology™	Phenomenex, Inc.
QTRAP®	AB SCIEX Pte. Ltd.	SPB®	Merck KGaA, Darmstadt, Germany	Ultracarb™	Phenomenex, Inc.
RCX™	Hamilton Co.	SphereClone™	Phenomenex, Inc.	Ultrastragel™	Waters Technologies Corporation
Restek®	Restek Corp.	Spherex™	Phenomenex, Inc.	Ultremex™	Phenomenex, Inc.
Rezex™	Phenomenex, Inc.	Spherisorb®	Waters Technologies Corporation	Ultron®	Shinwa Chemical Industries
RheBuild®	IDEX Health & Science LLC	SRT™	Sepax Technologies, Inc.	UPLC®	Waters Technologies Corporation
RheFlex®	IDEX Health & Science LLC	StableBond®	Agilent Technologies, Inc.	Valco®	VICI Valco Instruments Co., Inc.
Rheodyne®	IDEX Health & Science LLC	Stabilwax®	Restek Corp.	VapLock™	Western Fluids, LLC.
roQ™	Phenomenex, Inc.	STAR-ION™	Phenomenex, Inc.	Vanquish™	Thermo Fisher Scientific
RP-Desalting™	Phenomenex, Inc.	Strata®	Phenomenex, Inc.	Varian®	Varian Medical Systems Technologies, Inc.
Rt®	Restek Corp.	Stx®	Restek Corp.	Verex™	Phenomenex, Inc.
Rtx®	Restek Corp.	Styragel®/µStyragel™	Waters Technologies Corporation	VespeI®	Dupont Polymers, Inc.
Rx®	Agilent Technologies, Inc.	Sugar-Pak™	Waters Technologies Corporation	VICI®	Valco Instruments Co., Inc.
Rxi®	Restek Corp.	Sunichiral OA™	Sumika Chemical Analysis Service, Ltd.	VICI Jour®	Valco Instruments Co., L.P.
Santoprene™	Exxon Mobil Corporation	SunFire®	Waters Technologies Corporation	Viton®	The Chemours Company FC, LLC.
S.C.A.T.®	S.C.A.T. Europe GmbH	Supelco®	Merck KGaA, Darmstadt, Germany	Vydac®	W.R. Grace & Co.-Conn.
SCIEX®	AB SCIEX Pte. Ltd.	SUPELCOGEL™	Merck KGaA, Darmstadt, Germany	Waters®	Waters Technologies Corporation
SDV®	PSS Polymer Standards Service GmbH	SUPELCOFIL™	Merck KGaA, Darmstadt, Germany	WAX <sub>PLUS</sub> ™	Phenomenex, Inc.
SecurityCAP™	Phenomenex, Inc.	SUPELLOWAX®	Merck KGaA, Darmstadt, Germany	WISP™	Waters Technologies Corporation
SecurityGuard™	Phenomenex, Inc.	Superspher®	Merck KGaA, Darmstadt, Germany	XBridge®	Waters Technologies Corporation
SecurityLINK™	Phenomenex, Inc.	Sure-Fit™	Isolation Technologies	XTerra®	Waters Technologies Corporation
Selectosil™	Phenomenex, Inc.	Sure-Lok™	Phenomenex, Inc.	XTI®	Restek Corp.
Sepra™	Phenomenex, Inc.	Swagelok®	Swagelok Co.	Yarra™	Phenomenex, Inc.
Septa BTO®	Chromatography Research Supplies, Inc.	Symmetry®	Waters Technologies Corporation	Zebtron™	Phenomenex, Inc.
SeQuant®	Merck KGaA, Darmstadt, Germany	SymmetryShield™	Waters Technologies Corporation	Z-Guard™	Phenomenex, Inc.
SGE®	Trajan Scientific Australia Pty Ltd.	Synergi™	Phenomenex, Inc.	ZIC®	Merck KGaA, Darmstadt, Germany
Shimadzu®	Shimadzu Corporation	Tall-Boy™	Phenomenex, Inc.	Z-Liner™	Phenomenex, Inc.
Shiseido®	Shiseido Company, Ltd.	Teflon®	The Chemours Company FC, LLC.	ZORBAX®	Agilent Technologies, Inc.
Shodex®	Showa Denko K.K.	Tefzel®	The Chemours Company FC, LLC.		
Sigma-Aldrich®	Merck KGaA, Darmstadt, Germany	ThermaSphere™	Phenomenex, Inc.		

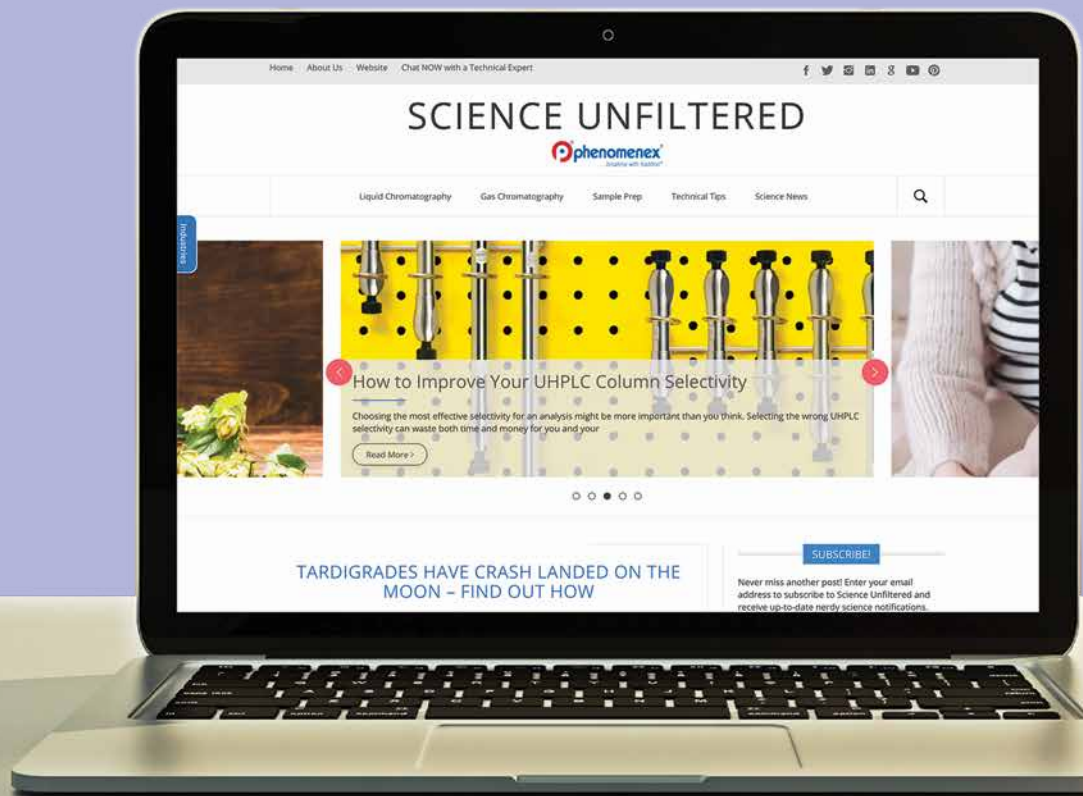
## Terms and Conditions of Sale



[www.phenomenex.com](http://www.phenomenex.com)

FOR RESEARCH USE ONLY. Not for use in clinical diagnostic procedures.

# Subscribe to our nerd-tastic technical blog, **SCIENCE UNFILTERED!**



Follow for trending science news, industry updates, and technical tips for the lab.

[www.phenomenex.blog](http://www.phenomenex.blog)





# NERDLIFE™

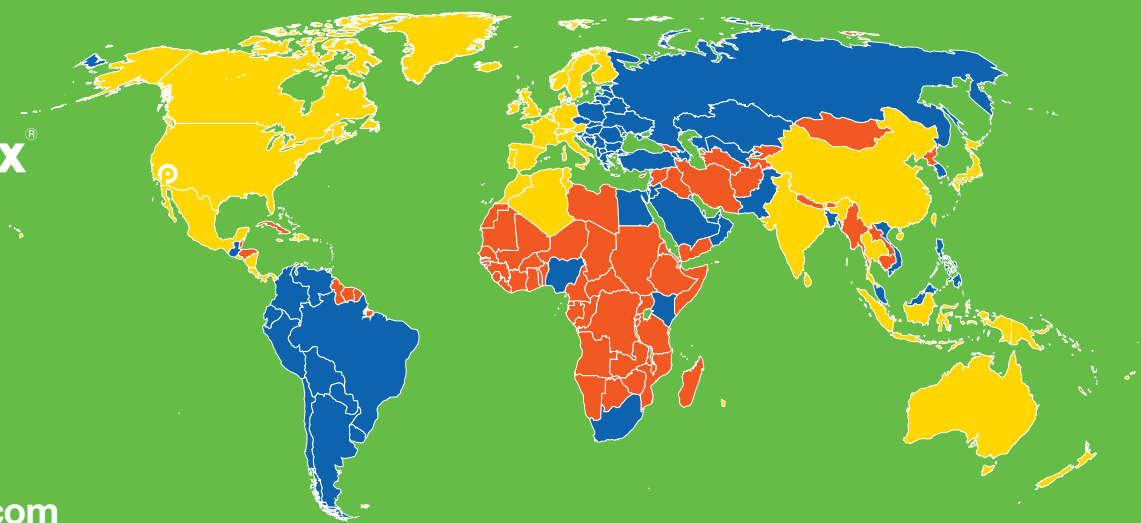
Show off your NerdLife™ gear to the world today!





**Tag and Follow**

▶ **@phenomenex** ◀

on social media because  
we want to see it too!





-  **Headquarters**
-  **Subsidiaries/Direct Sales**
-  **Distributors**
-  **Inquire**

## www.phenomenex.com

Phenomenex products are available worldwide. For the distributor in your country/region, contact Phenomenex USA, International Department at [international@phenomenex.com](mailto:international@phenomenex.com)

- Albania**
- Algeria**
- Argentina**
- Australia**
- Austria**
- Azerbaijan**
- The Bahamas**
- Bangladesh**
- Barbados**
- Belarus**
- Belgium**
- Bolivia**
- Bosnia and Herzegovina**
- Brazil**
- Bulgaria**
- Canada**
- Chile**
- China**
- Colombia**
- Costa Rica**
- Croatia**
- Cyprus**
- Czech Republic**
- Denmark**
- Dominican Republic**
- Ecuador**
- Egypt**
- El Salvador**
- Estonia**
- Fiji**

- Finland**
- France**
- Georgia**
- Germany**
- Greece**
- Guatemala**
- Honduras**
- Hong Kong**
- Hungary**
- Iceland**
- India**
- Indonesia**
- Ireland**
- Israel**
- Italy**

- Jamaica**
- Japan**
- Jordan**
- Kazakhstan**
- Kenya**
- Kuwait**
- Latvia**
- Lebanon**
- Lithuania**
- Luxembourg**
- Macedonia**
- Malaysia**
- Malta**
- Mauritius**
- Mexico**

- Montenegro**
- Morocco**
- The Netherlands**
- New Zealand**
- Nicaragua**
- Nigeria**
- Norway**
- Oman**
- Pakistan**
- Panama**
- Papua New Guinea**
- Paraguay**
- Peru**
- Philippines**

- Poland**
- Portugal**
- Puerto Rico**
- Qatar**
- Romania**
- Russia**
- Saudi Arabia**
- Serbia**
- Singapore**
- Slovakia**
- Slovenia**
- South Africa**
- South Korea**
- Spain**
- Sri Lanka**

- Sweden**
- Switzerland**
- Taiwan**
- Thailand**
- Tunisia**
- Turkey**
- Turkmenistan**
- Ukraine**
- United Arab Emirates**
- United Kingdom**
- Uruguay**
- USA**
- Uzbekistan**
- Venezuela**
- Vietnam**



**Australia**  
PO Box 4084, Lane Cove,  
NSW 2066, Australia  
t: +61 (0)2-9428-6444  
f: +61 (0)2-9428-6445  
[auinfo@phenomenex.com](mailto:auinfo@phenomenex.com)

**Austria**  
Zeppelinstr. 5  
63741 Aschaffenburg, Germany  
t: +43 (0)1-319-1301  
f: +43 (0)1-319-1300  
[anfrage@phenomenex.com](mailto:anfrage@phenomenex.com)

**Belgium**  
Maarssebroeksedijk 13D  
3542 DL Utrecht,  
The Netherlands  
t: +32 (0)2 503 4015 (French)  
t: +32 (0)2 511 8666 (Dutch)  
f: +31 (0)30-2383749  
[beinfo@phenomenex.com](mailto:beinfo@phenomenex.com)

**Canada**  
411 Madrid Ave.  
Torrance, CA  
90501-1430, USA  
t: +1 (800) 543-3681  
f: +1 (310) 328-7768  
[info@phenomenex.com](mailto:info@phenomenex.com)

**China**  
No. 179, Southern Street,  
West TEDA, Tianjin, 300462,  
China  
t: +86 400-606-8099  
t: +86 (0)22 2532-1032  
f: +86 (0)22 2532-1033  
[cninfo@phenomenex.com](mailto:cninfo@phenomenex.com)

**Czech Republic**  
Murmanská 1475/4, 10000 Praha 10,  
Czech Republic  
t: +420 272 017 077  
f: +420 274 021 210  
[cz-info@phenomenex.com](mailto:cz-info@phenomenex.com)

**Denmark**  
Birketofen 13  
3500 Værløse, Denmark  
t: +45 4824 8048  
f: +45 4810 6265  
[nordicinfo@phenomenex.com](mailto:nordicinfo@phenomenex.com)

**Finland**  
Birketofen 13  
3500 Værløse, Denmark  
t: +358 (0)9 4789 0063  
f: +45 4810 6265  
[nordicinfo@phenomenex.com](mailto:nordicinfo@phenomenex.com)

**France**  
Parc des Grillons, Bât. 3  
60 route de Sartrouville  
78232 Le Pacq Cedex, France  
t: +33 (0)1 30 09 21 10  
f: +33 (0)1 30 09 21 11  
[franceinfo@phenomenex.com](mailto:franceinfo@phenomenex.com)

**Germany**  
Zeppelinstr. 5  
63741 Aschaffenburg, Germany  
t: +49 (0)6021-58830-0  
f: +49 (0)6021-58830-11  
[anfrage@phenomenex.com](mailto:anfrage@phenomenex.com)

**Hong Kong**  
Suite 1605, 16th Floor, Tower 3  
China Hong Kong City,  
33 Canton Road,  
Tsim Sha Tsui, Kowloon,  
Hong Kong  
t: +852 6012 8162  
f: +852 3102 0003  
[hkinfo@phenomenex.com](mailto:hkinfo@phenomenex.com)

**India**  
Laxmi Cyber City  
Ground Floor, B Block  
Survey no.: 10  
Kondapur, Hyderabad 500 084  
India  
t: +91 (0)40-3012 2400  
f: +91 (0)40-3012 2411  
[indiainfo@phenomenex.com](mailto:indiainfo@phenomenex.com)

**Indonesia**  
PT. DHH Trading Indonesia  
20th floor, World Trade Center 3  
Jalan Jendral Sudirman Kav.29-31  
South Jakarta 12920, Indonesia  
t: +62 (0)21 5010 9707  
[indoinfo@phenomenex.com](mailto:indoinfo@phenomenex.com)

**Ireland**  
Queens Avenue,  
Hurdsville Ind. Est.,  
Macclesfield,  
Cheshire SK10 2BN, UK  
t: +353 (0)1 247 5405  
f: +44 1625-501796  
[eireinfo@phenomenex.com](mailto:eireinfo@phenomenex.com)

**Italy**  
Via M. Serenari, 15/D  
40013 Castel Maggiore (BO)  
Italy  
t: +39 051 6327511  
f: +39 051 6327555  
[italianinfo@phenomenex.com](mailto:italianinfo@phenomenex.com)

**Japan**  
K.K. AB SCIEX  
Gotenyama Trust Tower 21F,  
4-7-35 Kita Shinagawa  
Shinagawa-ku, Tokyo 140-0001  
Japan  
t: +81 (0)120-149-262  
f: +81 (0)50-3153-1623  
[jpinfo@phenomenex.com](mailto:jpinfo@phenomenex.com)

**Luxembourg**  
Maarssebroeksedijk 13D  
3542 DL Utrecht,  
The Netherlands  
t: +31 (0)30-2418700  
f: +31 (0)30-2383749www  
[nlinfo@phenomenex.com](mailto:nlinfo@phenomenex.com)

**Mexico**  
411 Madrid Ave.  
Torrance, CA  
90501-1430, USA  
t: 01-800-844-5226  
f: 001-310-328-7768  
[tecnicomx@phenomenex.com](mailto:tecnicomx@phenomenex.com)

**The Netherlands**  
Maarssebroeksedijk 13D  
3542 DL Utrecht,  
The Netherlands  
t: +31 (0)30-2418700  
f: +31 (0)30-2383749  
[nlinfo@phenomenex.com](mailto:nlinfo@phenomenex.com)

**New Zealand**  
P O Box 75531  
Manurewa 2243, Auckland  
New Zealand  
t: +64 (0)9-4780951  
f: +64 (0)9-4780952  
[nzinfo@phenomenex.com](mailto:nzinfo@phenomenex.com)

**Norway**  
Birketofen 13  
3500 Værløse, Denmark  
t: +47 810 02 005  
f: +45 4810 6265  
[nordicinfo@phenomenex.com](mailto:nordicinfo@phenomenex.com)

**Poland**  
Al. Jerozolimskie 181A  
Adgar Park West  
02-222 Warsaw, Poland  
t: +48 (0)22 104 21 72  
[pl-info@phenomenex.com](mailto:pl-info@phenomenex.com)

**Portugal**  
C/Valgrande 8 Edificio Thanworth II  
Planta 2.1.B  
28108 Alcobendas  
Spain  
t: +351 221-450-488  
f: +34 91-413-2290  
[ptinfo@phenomenex.com](mailto:ptinfo@phenomenex.com)

**Singapore**  
10 Biopolis Road, #03-06  
Chromos, Singapore  
138670  
t: 800-852-3944  
[sginfo@phenomenex.com](mailto:sginfo@phenomenex.com)

**Slovakia**  
Murmanská 1475/4, 10000 Praha 10,  
Czech Republic  
t: +420 272 017 077  
f: +420 274 021 210  
[sk-info@phenomenex.com](mailto:sk-info@phenomenex.com)

**Spain**  
C/Valgrande 8 Edificio Thanworth II  
Planta 2.1.B  
28108 Alcobendas  
Spain  
t: +34 91-413-8613  
f: +34 91-413-2290  
[espinfo@phenomenex.com](mailto:espinfo@phenomenex.com)

**Sweden**  
Birketofen 13  
3500 Værløse, Denmark  
t: +46 (0)8 611 6950  
f: +45 4810 6265  
[nordicinfo@phenomenex.com](mailto:nordicinfo@phenomenex.com)

**Switzerland**  
Schäferweg 16  
4057 Basel, Switzerland  
t: +41 (0)61 692 20 20  
f: +41 (0)61 692 20 22  
[swissinfo@phenomenex.com](mailto:swissinfo@phenomenex.com)

**Taiwan**  
No. 631, Ruiguang Road  
Neihu District, Taipei City 114  
Taiwan  
t: +886 (0) 0801-49-1246  
[twinfo@phenomenex.com](mailto:twinfo@phenomenex.com)

**Thailand**  
252 SPE Tower, 10th Floor, Suite 1002  
Phahonyothin Rd, Samsen Nai,  
Phaya Thai, Bangkok, Thailand 10400  
t: +66 (0) 2 566 0287  
[thaiinfo@phenomenex.com](mailto:thaiinfo@phenomenex.com)

**United Kingdom**  
Queens Avenue,  
Hurdsville Ind. Est.,  
Macclesfield,  
Cheshire SK10 2BN, UK  
t: +44 (0)1625-501367  
f: +44 (0)1625-501796  
[ukinfo@phenomenex.com](mailto:ukinfo@phenomenex.com)

**USA**  
411 Madrid Ave.  
Torrance, CA  
90501-1430, USA  
t: +1 (310) 212-0555  
f: +1 (310) 328-7768  
[info@phenomenex.com](mailto:info@phenomenex.com)