Chiral LC

HPLC Column Selection

HPLC Column Protection

HPLC / UHPLC Columns

HPLC/UHPLC

"At first, I honestly didn't believe the marketing claim that their Core-Shell 5µ particles had greater efficiency than fully porous 3µ particles. But wow! Now I can issue my awesome, cutting edge chromatography, and QC can have their jumbo, 5µ, abuse-proof particles. Everybody wins."

Chester Chan
Nexgen Pharma, USA

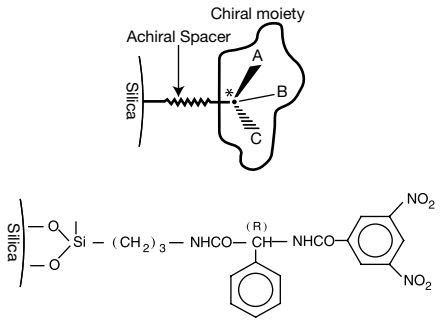
The opinions stated herein are solely those of the speaker and not necessarily those of any company or organization.

Chiral LC Column Types

LC Chiral Stationary Phase (CSP) Classification Diagram

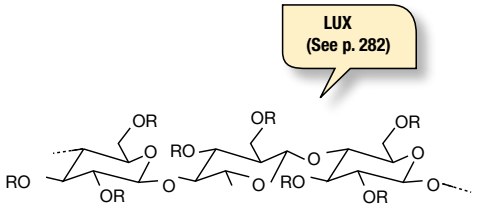
Type	Description	Chemistry	Mechanism	Brands	Page
I	Brush (Pirkle)	Low molecular weight chiral selectors Ionic or covalent bonding	Attractive interactions Hydrogen bonding Charge transfer (π-π interaction) Dipole stacking	Chirex Sumichiral OA	213 Inquire
II	Helical Polymers	Cellulose and amylose derivatives	Attractive interactives Insertion complexes	Lux Cellulose and Amylose	282
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	213 Inquire
V	Protein	α-acid glycoprotein Bovine Serum Albumin	Hydrophobic interactions Polar interactions	Ultron ES	335
VI	Macrocyclic	Antibiotics Glycopeptides	Hydrogen bonding Charge transfer (π-π interaction) Inclusion complexation Ionic interactions Peptide bonding	None	
Other Types	Carbon-Based (Hypercarb) and Ceramic-based (Ceramospher)				

Type I Brush (Pirkle)



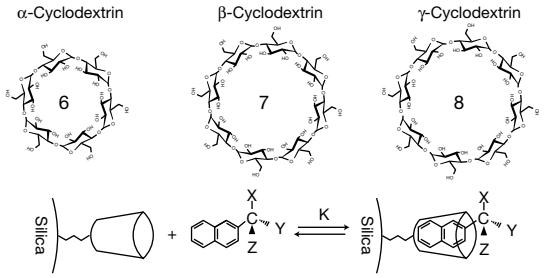
Example: Chirex 3001

Type II Helical Polymers (Polysaccharide)



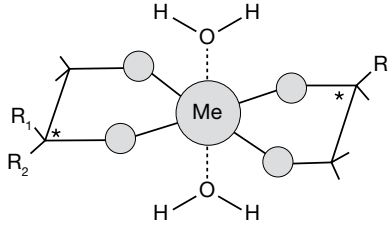
Example: linear poly (1 - 4 - β - D -glucose)

Type III Cavity

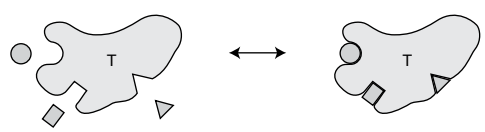


Schematic showing the reversible inclusion complex formation

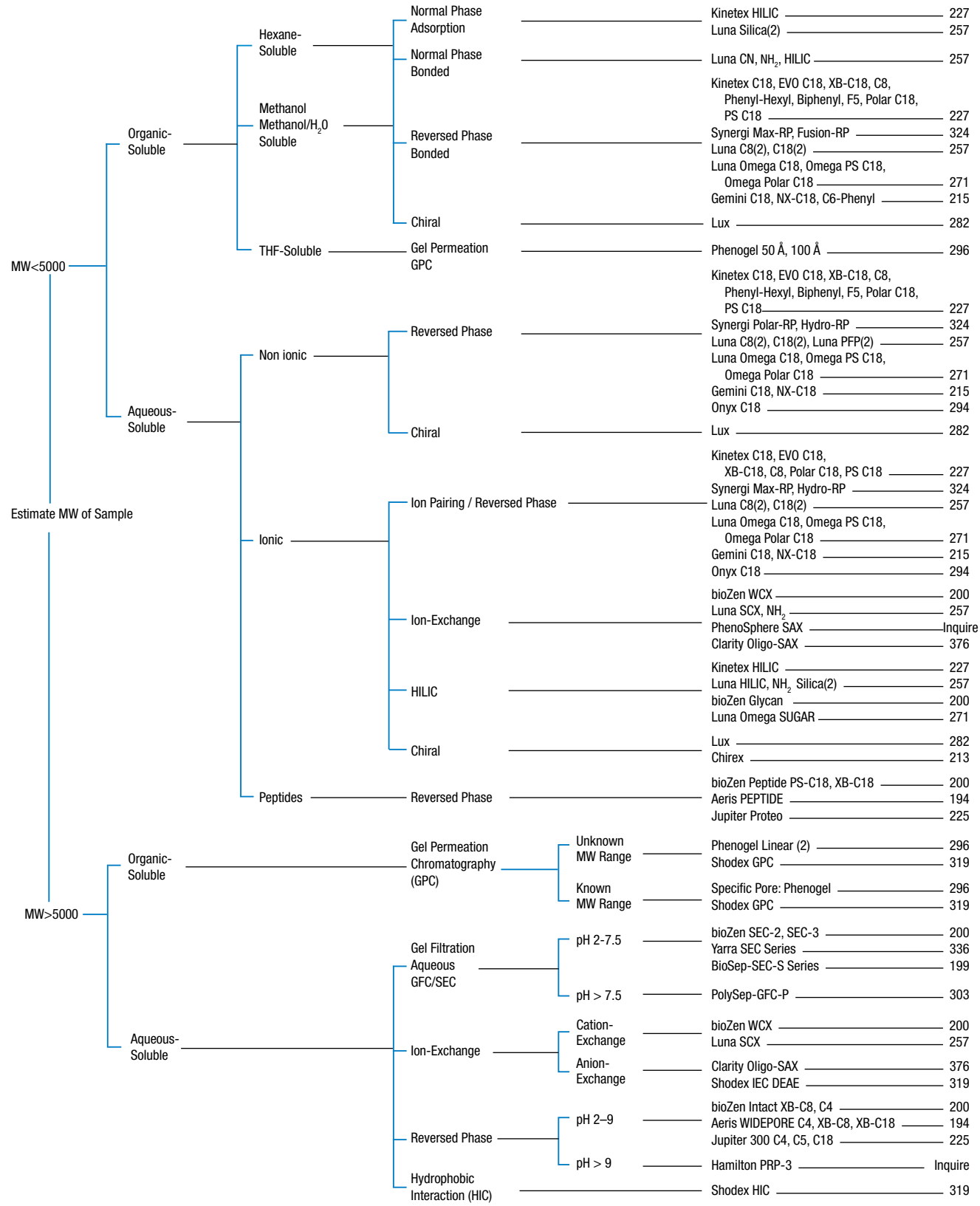
Type IV Ligand Exchange



Type V Protein



HPLC Column Selection Tree



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)	372
Phenomenex Chirex (chiral)	213
Phenomenex Lux (chiral)	282
Phenomenex Kinetex EVO C18 (FMOC or OPA derivatized)	227
Anions	
Phenomenex Luna NH_2	257
Phenomenex STAR-ION A300	323
Phenomenex Lux (chiral)	282
Phenomenex PhenoSphere SAX	Inquire
Hamilton PRP	Inquire
Shodex IC	319
Phenomenex Clarity Oligo-SAX	376
Phenomenex Rezex ROA-Organic Acid	305
Antibiotics	
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Luna	257
Phenomenex Luna Omega	271
Phenomenex Synergi	324
Biotechnology/Life Sciences	
Phenomenex Aeris WIDEPORE / PEPTIDE	194
Phenomenex bioZen Intact XB-C8 / C4	200
Phenomenex Clarity	376
Phenomenex Jupiter 300/Jupiter Proteo	225
Phenomenex bioZen SEC-2 / SEC-3	200
Phenomenex BioSep-SEC-S	199
Phenomenex Yarra SEC	336
Phenomenex PolySep-GFC-P	303
Phenomenex Luna SCX	257
Phenomenex bioZen Peptide PS-C18 / XB-C18	200
Phenomenex Luna NH_2	257
Phenomenex bioZen Glycan	200
Phenomenex bioZen WCX	200
Shodex GFC, KW	319
Carbohydrates	
Phenomenex Rezex	305
Phenomenex Luna Omega SUGAR	271
Phenomenex Luna NH_2	257
Shodex SUGAR	319
Cations	
Phenomenex Luna SCX	257
Phenomenex bioZen WCX	200
Hamilton PRP	Inquire
Enantiomers (Chiral)	
Phenomenex Lux	282
Phenomenex Chirex	213
Environmental (Carbamates, PAHs, Explosives)	
Phenomenex Zebron (GC)	87
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Luna	257
Phenomenex Luna Omega	271
Phenomenex Synergi	324
Foods, Flavors and Fragrances	
Phenomenex Rezex	305
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Luna	257
Phenomenex Luna Omega SUGAR	271
Phenomenex Lux (chiral)	282
Phenomenex Synergi	324
Phenomenex Zebron (GC)	87

Nucleosides and Nucleotides	Page
Phenomenex Kinetex EVO C18	227
Phenomenex Luna NH_2, SCX	257
Phenomenex Luna Omega Polar C18, Luna Omega PS C18	271
Phenomenex Synergi Polar-RP	324
Phenomenex PhenoSphere SAX	Inquire
Phenomenex Clarity Oligo-SAX	376
Oligonucleotides	
Phenomenex Clarity Oligo-XT	376
Phenomenex Clarity Oligo-RP	376
Phenomenex Clarity Oligo-MS	376
Phenomenex Clarity Oligo-SAX	376
Phenomenex Aeris WIDEPORE	194
Organic Acids	
Phenomenex Luna Omega PS C18	271
Phenomenex Rezex	305
Phenomenex Synergi Hydro-RP	324
Peptides/Proteins	
Phenomenex Aeris WIDEPORE / PEPTIDE	194
Phenomenex bioZen PEPTIDE PS-C18 / XB-C18	200
Phenomenex Jupiter 300/Jupiter Proteo	225
Phenomenex bioZen Glycan	200
Phenomenex bioZen Intact	200
Phenomenex Luna SCX, NH_2	257
Phenomenex bioZen SEC	200
Phenomenex Yarra SEC	336
Phenomenex BioSep-SEC-S	199
Phenomenex bioZen WCX	200
Pesticides, Herbicides, and Dioxins	
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Synergi	324
Phenomenex Luna	257
Phenomenex Luna Omega	271
Phenomenex Zebron (GC)	87
Pharmaceuticals	
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Synergi	324
Phenomenex Luna	257
Phenomenex Luna Omega	271
Phenomenex Lux (chiral)	282
Phenomenex Chirex (chiral)	213
Polymers, Plastics, Rubber	
Phenomenex Zebron (GC)	87
Phenomenex Phenogel	296
Shodex Asahipak GF	Inquire
Vitamins	
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Synergi	324
Phenomenex Luna	257
Phenomenex Luna Omega	271
Taxanes	
Phenomenex Kinetex F5	227
Phenomenex Luna PFP(2)	257
Textiles/Dyes	
Phenomenex Kinetex	227
Phenomenex Gemini / Gemini NX	215
Phenomenex Synergi	324
Phenomenex Luna	257
Phenomenex Luna Omega	271
Phenomenex Phenogel GPC	296

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**
Agilent Technologies / Varian / Polymer Labs		
Advanced AAA	Gemini	Kinetex EVO
Advanced Bio Glycan	bioZen Glycan	—
Advanced Bio SEC	Yarra	bioZen SEC
Advanced Bio PEPTIDE plus	bioZen XB-C18	bioZen PS-C18
Advanced Bio RP-Ab	Aeris	bioZen Intact
Advanced Bio Oligonucleotide	Clarity XT	Clarity MS/RP
Bio MAb (WCX)	bioZen WCX	—
Bio SEC	BioSep-SEC-S	Yarra
Chiradex	Shiseido Chiral CD-pH	Shinwa Ultron
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	Aeris WIDEPORE
Poroshell 120	Kinetex	Kinetex
ProSEC 300S	Yarra	bioZen SEC
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	Yarra
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_2/ Luna Omega SUGAR	Rezex
Hichrom Ltd.		
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
Bio-Rad		
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**
Chiral Technologies/DAICEL Corporation		
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	—
E.S. Industries		
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 SEC
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	Develosil TMS-UG (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	—
GL Sciences		
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 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
MAC-MOD/Bischoff/ACT/Advanced Materials Technology		
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 Intact
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	Develosil RP-Aqueous(C30)
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
Restek		
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	Jupiter

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**
Supelco / Sigma-Aldrich / MilliporeSigma / Sepax Technologies		
Antibodix	—	Clarity Oligo-WAX
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
Proteomix	—	Clarity Oligo-WAX
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	PhenoSphere-NEXT	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_2-NP	—	Luna NH_2
Supelcosil LC-PCN	Luna CN	Develosil CN-UG
Supelcosil LC-SAX	PhenoSphere SAX	Clarity SAX
Supelcosil LC-SCX	PhenoSphere SCX	Luna SCX
Titan	Luna Omega	Kinetex
Unix SEC	Yarra	Yarra
SRT GFC	Yarra	Yarra
Zenix GFC	Yarra	Yarra
Thermo Fisher Scientific / Thermo Scientific Dionex		
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	—	Asahipak IEC/ES
Aquasil	Synergi Hydro-RP	Develosil ODS-MG
BetaBasic	Luna	Kinetex
BioBasic SEC	Yarra	bioZen SEC
BioBasic IEX	Shodex IEC	Clarity Oligo-WAX
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	Clarity Oligo-WAX
DNASwift	—	Clarity Oligo-RP
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
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 SEC-3	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
Syncronis	Luna	Kinetex
Waters		
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	—
ACQUITY UPLC PEPTIDE CSH	bioZen PEPTIDE PS-C18	—
ACQUITY UPLC Oligonucleotide BEH C18	Clarity	Clarity
Atlantis	Synergi Fusion-RP	Synergi Hydro-RP
BioSuite IEX	Shodex IEC	—
BioSuite SEC	Yarra	bioZen SEC
BioSuite RPC	—	Jupiter 300
Carbamate	—	Synergi Hydro-RP
Carbohydrate	PhenoSphere NH_2	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-RP	Clarity Oligo-MS
PAH C18	Kinetex PAH	—
Protein-Pak IEC	Shodex IEC	—
Protein-Pak SW	Yarra	bioZen SEC
PrST	Aeris WIDEPORE	Jupiter 3 µm C18
PST	Aeris PEPTIDE	bioZen
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	Aeris
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.

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	227
		Kinetex EVO C18	Core-Shell	227
		Kinetex Polar C18	Core-Shell	227
		Kinetex PS C18	Core-Shell	227
		Kinetex XB-C18	Core-Shell	227
		Luna® C18(2)	Spherical	257
		Luna Omega C18	Spherical	271
		Luna Omega PS C18	Spherical	271
		Luna Omega Polar C18	Spherical	271
		Gemini® NX-C18	Spherical	215
		Gemini C18	Spherical	215
		Synergi™ Hydro-RP	Spherical	324
		Synergi Fusion-RP	Spherical	324
		bioZen™ Peptide PS-C18	Spherical	200
		Onyx™ C18	Monolith	294
		Jupiter® C18	Spherical	225
		Clarity® Oligo-RP	Spherical	376
		Clarity Oligo-MS	Core-Shell	376
		Clarity Oligo-XT	Core-Shell	376
		Aeris™ WIDEPORE XB-C18	Core-Shell	194
		bioZen Peptide XB-C18	Core-Shell	200
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	227
		Luna Silica(2)	Spherical	257
		Onyx Silica	Monolith	294
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	227
		Luna C8(2)	Spherical	257
		Onyx C8	Monolith	294
		bioZen Intact XB-C8	Core-Shell	200
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_2	Spherical	257
		Luna Omega SUGAR	Spherical	271
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	257
L10	Nitrile groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna CN	Spherical	257
L11	Phenyl groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex Biphenyl	Core-Shell	227
		Kinetex Phenyl-Hexyl	Core-Shell	227
		Synergi Polar-RP	Spherical	324
		Luna Phenyl-Hexyl	Spherical	257
		Gemini C6-Phenyl	Spherical	215
		Prodigy PH-3	Spherical	304
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	305
		Rezex ROA-Organic Acid	Spherical	305
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	305
		Rezex RCU-Sugar Alcohols	Spherical	305
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	257
		BioSep™-SEC-S	Spherical	199
		Yarra™ SEC	Spherical	336
L21	A rigid, spherical styrene-divinylbenzene copolymer, 3 to 30 µm in diameter.	PolymerX™ RP-1	Spherical	302
		Phenogel™ 100 Å	Spherical	296
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	305
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	319
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	303
		Shodex OHpak SB-802.5HQ	Spherical	319

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 Intact C4	Spherical Core-Shell	225 200
L27	Porous silica particles, 30 to 50 µm in diameter.	Sepra Silica	Irregular	369
L28	A multifunctional support, which consists of a high purity, 100 Å, 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 80 Å.			
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 2000 Å 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	336 199 336 199
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	305
L35	A zirconium-stabilized spherical silica packing with a hydrophilic (diol-type) molecular monolayer bonded phase having a pore size of 150 Å.	(BioSep-SEC-S2000 or Yarra SEC-2000 may be used)	Spherical Spherical	199 336
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	303 319
L38	Methacrylate-based size-exclusion packing for water-soluble samples.	PolySep-GFC-P series Shodex OHpak SB-800HQ	Spherical Spherical	303 319
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	303 319 319
L40	Cellulose tris-3,5-dimethylphenylcarbamate coated porous silica particles, 3 µm to 20 µm in diameter.	Lux Cellulose-1	Spherical	282
L41	Immobilized α-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 by a propyl spacer, 1.5 to 10 µm in diameter.	Kinetex F5 Luna PFP(2)	Core-Shell Spherical	227 257
L44	A multifunctional support, which consists of a high purity, 60 Å, 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^2/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	282
L52	A strong cation-exchange resin made of porous silica with sulfopropyl 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 120 Å.	Ultron ES-OVM	Spherical	335
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	305
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	336 199 336 199
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 10 Å, 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 %).			
L62	C30 silane bonded phase on a fully porous spherical silica, 3 to 15 µm in diameter.	Develosil Combi-RP Develosil RP-Aqueous Develosil RP-Aqueous-AR	Spherical Spherical Spherical	Inquire Inquire Inquire

HPLC Column Selection by USP Listing

USP Column Classification		Recommended Phenomenex Column	Particle Shape	Page
L63	Glycopeptide teicoplanin linked through multiple covalent bonds to a 100Å spherical silica.			
L64	Strongly basic anion-exchange resin consisting of 8% crosslinked styrene divinylibenzene 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	319 319
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 300Å.			
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	282
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 2000Å 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_2P-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 10Å 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, 1.5 to 5 µm in diameter.			
L87	Dodecyl silane chemically bonded to porous silica particles, 1.5 to 10 µm in diameter.	Synergi Max-RP	Spherical	324
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).			
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	282
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	227 227 271 271 227 324 324

HPLC Column Selection by USP Listing

USP Column Classification		Recommended Phenomenex Column	Particle Shape	Page
L97	Weak cation-exchange resin consisting of a highly cross-linked core of 5.5 µm porous particles having a pore size of 2000 Å 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).			
L98	Weak cation-exchange resin consisting of a highly cross-linked core of 8 µm microporous particles having an average pore size of 10 Å 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).			
L99	Amylose tris-(3,5- dimethylphenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 µm in diameter	Lux i-Amylose-1	Spherical	282
L100	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).			
L101	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.			
L102	(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.			
L103	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 2000 Å and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene electrostatically bonded with hyperbranched alkanol quaternary ammonium ions.			
L104	Triazole groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter.			
L105	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.			
L106	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 100 Å 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).			
L107	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	282
L108	A chiral-recognition protein, cellobiohydrolase (CBH), chemically bonded to silica particles, about 5 µm in diameter.			
L109	Spherical particles of porous graphitic carbon, 3 to 30 µm in diameter.			
L110	A strong anion-exchange resin consisting of a highly cross-linked 13 µm microporous (less than 10 Å) particles coated with very low cross-linked latex (0.5 %) to provide alkanol quaternary ammonium ion-exchange sites.			
L111	Polyamine chemically bonded to porous spherical silica particles, 5 µm in diameter.			
L112	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 2000 Å 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.			
L113	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 2000 Å 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.			
L114	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.			
L115	Ethylvinylbenzene/divinylbenzene substrate (55% cross-linked) agglomerated with quaternary amine functionalized 275 nm latex microbeads (6% cross-linked), about 8.5 µm in diameter.			
L116	Sulfonated ethylvinylbenzene/divinylbenzene substrate agglomerated with hydrophilic quaternary amine functionalized glycidyl-derivative methacrylate microbeads, approximately 2 to 50 µm in diameter.			
L117	A crown ether coated on a 5 µm particle size silica gel substrate. The active site is (R)-18-crown-6-ether.			
L118	Aqueous polymerized C18 groups on silica particles, 1.2 to 5 µm in diameter.	Kinetex PAH	Core-Shell	227
L119	Cellulose tris-(3,5-dichlorophenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 µm in diameter.	Lux i-Cellulose-5	Spherical	282
L120	A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 µm microporous particles having a pore size of < 10 Å and consisting of ethlyvinylbenzene 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).			

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 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
Silica gel ∏-acceptor / ∏-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 µm.	1181000	Chirex 3012	Inquire
Silica gel AD for chiral separation coated with Amylose tris (3,5-dimethylphenylcarbamate); 5 µm.	1171700	Lux Amylose-1	282
Silica gel for chiral separation, cellulose derivative coated with tris (3,5-dimethylphenylcarbamate), 5 µm.	1110300	Lux Cellulose-1	282
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)	227 257
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	271 271 324 324 215 215 227 227 227 227 227
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	271 271 324 324 215 215 227 227 227 227 227
Silica gel for chromatography, alkysilyl, solid core, endcapped. Spherical silica particles containing a non-porous solid silica core surrounded by a thinner outer porous silica coating with alkysilyl 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	227 227 227 227 227
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_2 (Amino) PhenoSphere NH_2 (Amino)	322 Inquire
Silica gel for chromatography, aminopropylsilyl.	1077000	SphereClone NH_2 (Amino) PhenoSphere NH_2 (Amino)	322 Inquire
Silica gel for chromatography, aminopropylsilyl R1 particle size of ~55 µm.	1077001	Strata NH_2	70
Silica gel for chromatography, Amylose derivative of.	1109800	Lux Amylose-1 Lux Amylose-2	282 282
Silica gel for chromatography, butylsilyl. Spheroidal 300 Å; pore volume: 0.6 cm^3/g; area: 80 m^2/g.	1076200	bioZen Intact C4 Aeris WIDEPORE C4	200 194

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, butylsilyl, endcapped.	1170500	bioZen Intact C4 Aeris WIDEPORE C4 Jupiter 300 C4	200 194 225
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	271 324 324 227 227
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	271 271 324 324 227 227 227
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.	1194200	Luna CN (Cyano)	257
Silica gel for chromatography, cyanosilyl.	1109900	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	257 222 Inquire
Silica gel for chromatography, cyanopropylsilyl, endcapped.	1195000	Luna CN (Cyano)	257
Silica gel for chromatography, di-isobutyloctadecylsilyl.	1140000	Kinetex XB-C18	227
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^2/g.	1115100	Bondclone C18	212
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	324
Silica gel for chromatography, hexadecylamidylsilyl with hexadecylcarboxamidopropyldimethylsilyl groups; 5 µm.	1162500		
Silica gel for chromatography, hexadecylamidylsilyl, endcapped with hexadecylcarboxamidopropyldimethylsilyl groups; 5 µm.	1172400		
Silica gel for chromatography, hexylsilyl.	1077100	SphereClone C6 PhenoSphere C6	322 Inquire
Silica gel for chromatography, hexylsilyl, endcapped.	1174400	SphereClone C6 PhenoSphere C6	322 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 (Luna Omega PS C18)	227 (271)
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	227 215
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	215
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	257 227
Silica gel for chromatography, nitrile cyanopropylsilyl.	1077300	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	257 222 Inquire
Silica gel for chromatography, nitrile R1 chemically bonded nitrile groups.	1077400	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	257 222 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)	257 222 Inquire
Silica gel for chromatography, nitrile, endcapped with cyanopropylsilyl groups.	1174500	Luna CN (Cyano)	257
Silica gel for chromatography, 4-nitrophenylcarbamidesilyl. A very finely divided silica gel, chemically modified at the surface by bonding with 4-nitrophenylcarbamide groups.	1185200		

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, octadecanoylaminopropylsilyl aminopropylsilyl 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)	257 271 271 271 324 324 215 215 222 227 227 227 227 227 322
Silica gel for chromatography, octadecylsilyl R1 ultrapure silica (<20 ppm metals), pore size and C-load are indicated in the method.	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	257 271 271 271 324 324 215 215 225 227 227 227 227 227
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 304
Silica gel for chromatography, octadecylsilyl, base-deactivated pretreated before the bonding by careful washing and hydrolyzing most of the superficial siloxane bridges to minimize the interaction with basic components.	1077600	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	257 271 271 271 215 215 227 227 227 227 227
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	227
Silica gel for chromatography, octadecylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully end-capped 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	257 271 271 271 215 215 227 227 227 227 227
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	257
Silica gel for chromatography, octadecylsilyl, endcapped, base-deactivated; pore size 100 Å; 16 % C-load, 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.	1108600	Luna C18(2) Prodigy ODS-3 Gemini C18 Gemini NX-C18	257 304 215 215
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	257 271 271 271 215 215 227 227 227 227 227

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
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	227
Silica gel for chromatography, octadecylsilyl, monolithic.	1154500	Onyx C18	294
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	257 271 271 271 215 215 227 227 227 227 227
Silica gel for chromatography, octadecylsilyl, polar endcapped.	1205500	Synergi Hydro RP Luna Omega Polar C18	324 271
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 WIDEPORE XB-C18	227 227 227 227 227 194 194
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 WIDEPORE XB-C18	200 227 227 227 227 227 194 194
Silica gel for chromatography, octadecylsilyl, with polar embedded groups, endcapped; the particles are based on a mixture of silica chemically modified at the surface by the bonding of octadecylsilyl groups and silica chemically modified with a reagent providing a surface with chains having embedded polar groups.	1177900	Synergi Fusion-RP	324
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	215 215 227
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	324
Silica gel for chromatography, octylsilyl.	1077700	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (MOS) SphereClone C8	227 257 304 222 322
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	227 257 304 222 322
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	200
Silica gel for chromatography, octylsilyl, base-deactivated pretreated before the bonding by careful washing and hydrolyzing most of the superficial siloxane bridges to minimize the interaction with basic components.	1131600	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (BDS)	227 257 304 222
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)	227 257 304 222
Silica gel for chromatography, octylsilyl, endcapped, base-deactivated pretreated before the bonding by careful washing and hydrolyzing most of the superficial siloxane bridges to minimize the interaction with basic components. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanols.	1148800	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (BDS)	227 257 304 222
Silica gel for chromatography, octylsilyl, with polar incorporated groups, endcapped; chains having polar incorporated groups and terminating octyl groups.	1152600		
Silica gel for chromatography, octylsilyl, extra-dense bonded, endcapped.	1200900	Luna C8(2) Kinetex C8	257 227
Silica gel for chromatography, oxypropionitrilsilyl	1184700		
Silica gel for chromatography, palmitamidopropylsilyl, endcapped bonding with palmitamidopropyl groups and endcapped with acetamidopropyl groups.	1161900		

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, pentafluorophenylpropylsilyl, solid core, endcapped.	1207600	Kinetex F5 Kinetex PFP	227 227
Silica gel for chromatography, phenylhexylsilyl.	1153900	Kinetex Phenyl-Hexyl Luna Phenyl-Hexyl Gemini C6-Phenyl	227 257 215
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	227 257 215
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	227
Silica gel for chromatography, phenylsilyl.	1110200	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	324 257 215 304 227 227
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	324 257 215 304 227 227
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	324 257 215 304 227 227
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	324 257 215 304 227 227
Silica gel for chromatography, propoxybenzene, endcapped.	1174600	Synergi Polar-RP	324
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	257
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 10^3 to 3 x 10^5; 10 µm.	1077900	BioSep-SEC-S3000 Yarra SEC-3000	199 336
Silica gel OC for chiral separations. Coated with cellulose tris (phenylcarbamate); 5 µm.	1146800		
Silica gel OD for chiral separations.	1110300	Lux Cellulose-1	282
Silica gel OJ for chiral separations. Coated with cellulose tris (4-methylbenzoate).	1179800	Lux Cellulose-3	282
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	227 215 215
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	227 215 215
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	227 215 215
Organosilica polymer compatible with 100 % aqueous mobile phases, octadecylsilyl, solid core, endcapped.	1201700	Kinetex EVO C18	227
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	227 215 215

HPLC Column Selection by Ph. Eur. Listing

Description According to Pharm. Eur. 10 4.1.1. Reagents 2020	Number	Recommended Phenomenex Column	Page
Vinyl polymer for chromatography, amino alkyl. Spherical particles (5 µm) of a vinyl alcohol copolymer, bonding of amino alkyl groups.	1191500	Asahipak NH_2-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	305 305
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	305 305
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	305 305
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 propylensulfonic 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	305 305
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	305
Cation-exchange resin, weak. Weak cation exchange resin in pronated form with carboxylate functional groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1203200	bioZen WCX	200
Anion-exchange resin. Resin in chlorinated form containing quaternary ammonium groups [$CH_2N+(CH_3)3$] 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 [$CH_2N+(CH_3)3$] 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		

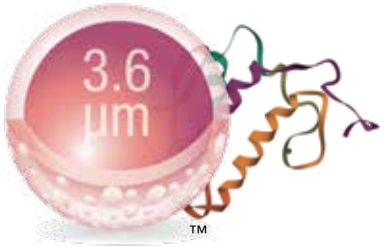
Core-Shell HPLC / UHPLC Columns for Proteins and Peptides

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.

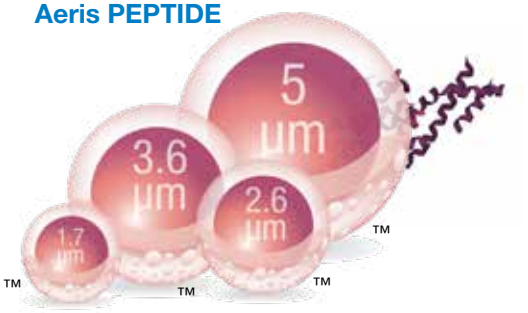
These columns can provide improved resolving power, selectivity, throughput, sensitivity, column lifetime, and method flexibility compared to other fully porous and core-shell columns typically used for bioseparations.

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 homogenuous bed structure leads to performance loss**
- **Ultra-high performance limited to sub-2µm particles on UHPLC systems**
- **Diffusion path limits efficiencies**

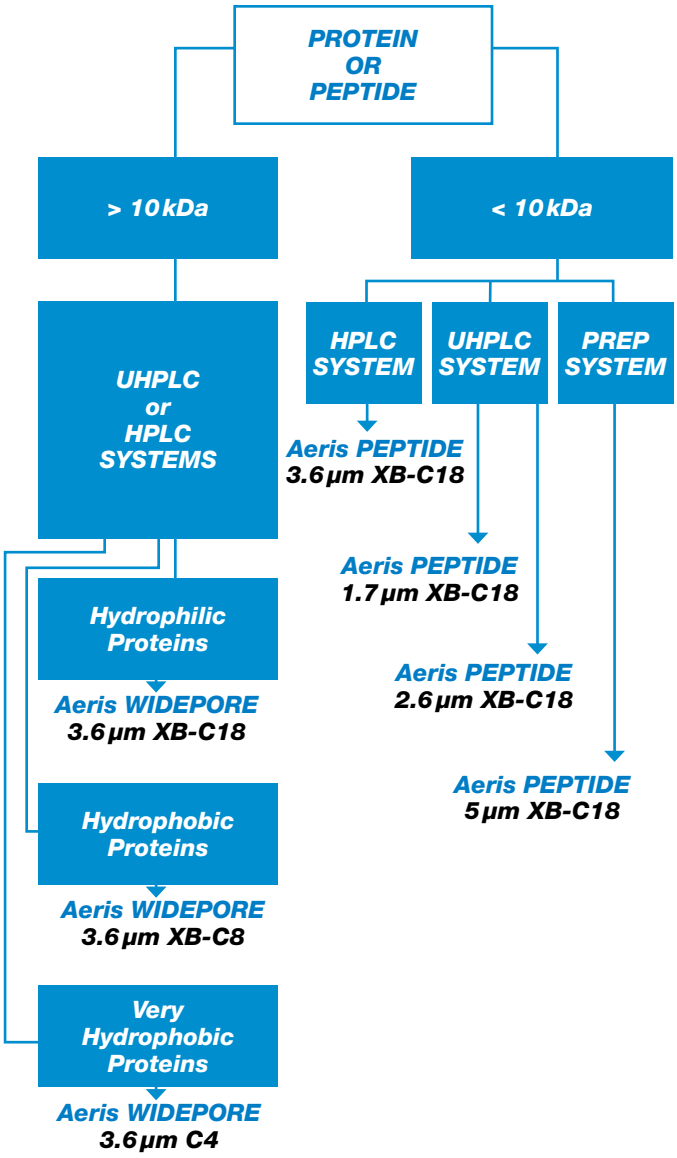
The result is:

- **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

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 250 mm (or 150 mm for the Aeris 1.7 µm XB-C18). Due to the lower backpressure of Aeris 3.6 µm, one can easily run 250 mm columns on both HPLC and UHPLC systems, AND one can couple multiple 250 mm columns together and run them inline for even better results. For maximum UHPLC resolution, the 150 mm length Aeris 1.7 µm or 250 mm 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 300 Å 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

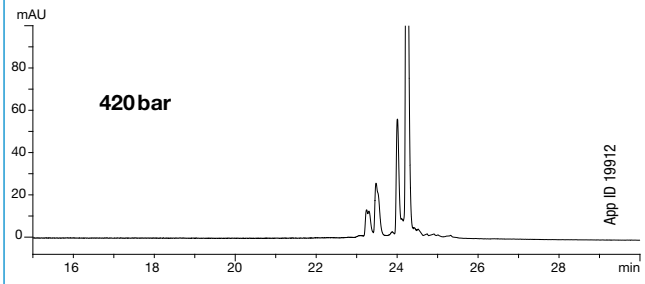
Packing Material	Total Particle Size (µm)	Porous Shell (µm)	Core Size (µm)	pH Stability	Temp Stability °C	Pressure Stability bar
Aeris WIDEPORE	3.6	0.2	3.2	1.5 - 9	90	600
Aeris PEPTIDE	1.7	0.22	1.25	1.5 - 9	90	1000
Aeris PEPTIDE	2.6	0.35	1.9	1.5 - 9	90	1000
Aeris PEPTIDE	3.6	0.5	2.6	1.5 - 9	90	600
Aeris PEPTIDE	5	0.6	3.8	1.5 - 9	90	600

Maximize Resolving Power with Unique Wide-Pore 3.6 µm Core-Shell Particle

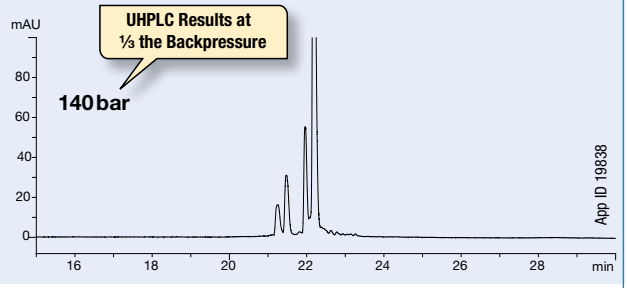
3.6 µm core-shell technology combined with inert surface chemistries and tight packing specifications results in Aeris WIDEPORE columns delivering exceptional resolving power at significantly lower backpressures. Chromatographers now have the ability to generate higher quality data than typically produced 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

Waters® ACQUITY® BEH300 1.7 µm C4



Aeris WIDEPORE 3.6 µm C4



Conditions for both columns:

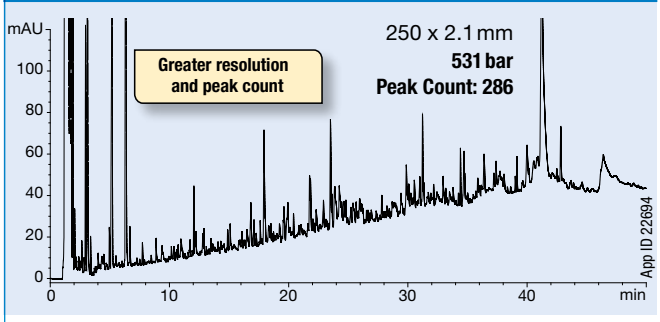
Column: ACQUITY® BEH300 1.7 µm C4
Aeris WIDEPORE 3.6 µm C4
Dimensions: 150 x 2.1 mm
Mobile Phase: A: Water with 0.1 % TFA
B: Acetonitrile with 0.1 % TFA
Gradient: A/B (97:3) to A/B (35:65) over 45 min
Flow Rate: 0.3 mL/min
Temperature: 40 °C
Injection Volume: 10 µL
Instrument: Agilent® 1200
Detection: UV @ 214 nm (ambient)
Sample: Human Epidermal Growth Factor (EGF)

Ultra-High Resolving Power on UHPLC Systems with Aeris PEPTIDE 2.6 µm Columns of 250 mm Length

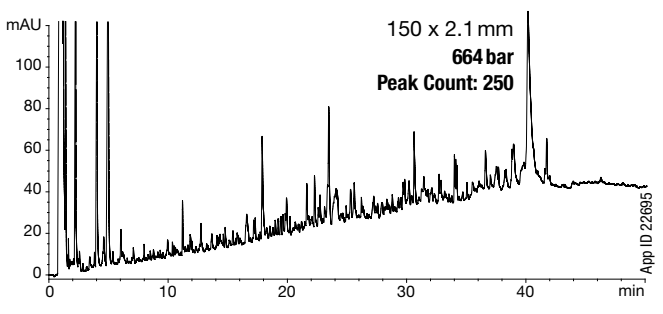
The Aeris PEPTIDE 2.6 µm core-shell particle was designed with one purpose in mind: to enhance the separation and maximize the peak count of complex peptide maps on UHPLC systems. Because the 2.6 µm core-shell particle reduces backpressure on UHPLC systems while maintaining similar efficiencies to sub-2 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 PEPTIDE 2.6 µm XB-C18



Waters® ACQUITY® BEH130 1.7 µm C18



Conditions for both columns:

Column: Aeris PEPTIDE 2.6 µm XB-C18
ACQUITY® BEH130 1.7 µm C18
Dimensions: as noted
Mobile Phase: A: 20 mM Ammonium formate, pH 3.2 in 2 % Acetonitrile
B: 20 mM Ammonium formate, pH 3.2 in 90 % Acetonitrile

Gradient:	**Time (min)**	**% B**
	0	3
	2	3
	49	50
	54	95

Flow Rate: 0.4 mL/min
Temperature: 40 °C
Detection: UV @ 240 nm (ambient)
Sample: IgG1 (Ascites Fluid) R+A Tryptic Digest

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	00B-4506-AN	00D-4506-AN	00F-4506-AN	AJ0-8948
				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	00B-4505-AN	00D-4505-AN	00F-4505-AN	00G-4505-AN	AJ0-8948
					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	00F-4505-Y0	00F-4505-E0	00G-4505-E0	AJ0-8947	AJ0-8946
				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	00B-4507-AN	00D-4507-AN	00F-4507-AN	00G-4507-AN	AJ0-8948
					for 2.1 mm ID

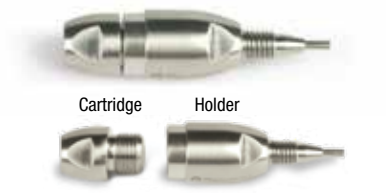
Aeris PEPTIDE 3.6 µm Analytical Columns (mm)					SecurityGuard ULTRA Cartridges*
Phase	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
XB-C18	00B-4507-E0	00D-4507-E0	00F-4507-E0	00G-4507-E0	AJ0-8946
					for 4.6 mm ID

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
						3/pk
XB-C18	00F-4632-E0	00G-4632-E0	00F-4632-N0	00G-4632-N0	AJ0-8946	AJ0-9317
					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	00F-4632-P0-AX	00G-4632-P0-AX	AJ0-9318
			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	00B-4482-AN	00D-4482-AN	00F-4482-AN	00G-4482-AN	AJ0-8783
XB-C8	00B-4481-AN	00D-4481-AN	00F-4481-AN	00G-4481-AN	AJ0-8785
C4	00B-4486-AN	00D-4486-AN	00F-4486-AN	00G-4486-AN	AJ0-8899
					for 2.1 mm ID

SecurityGuard ULTRA Holder with cartridge



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	00D-4482-E0	00F-4482-E0	00G-4482-E0	AJ0-8769
XB-C8	00D-4481-E0	00F-4481-E0	00G-4481-E0	AJ0-8771
C4	00D-4486-E0	00F-4486-E0	00G-4486-E0	AJ0-8901
				for 4.6 mm ID

*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. 398-399

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 391 - 392
For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 317-318
For more about SecurityGuard ULTRA, see p. 316
For Core-Shell Performance Enhancement Kit, see p. 395

Aqua™

A C18 Column with Polar Endcapping

Use Synergi Hydro-RP, an Improved Alternative to Aqua 125 Å
See p. 324

Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m^2)	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*
						/10pk	/10pk
C18 125Å	00B-4311-B0	00C-4311-B0	00F-4311-B0	00D-4311-E0	00F-4311-E0	AJ0-7510	AJ0-7511
						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*
						/10pk
C18 125Å	00B-4299-B0	00F-4299-B0	00G-4299-B0	00F-4299-Y0	00G-4299-Y0	AJ0-7510
C18 200Å	—	00F-4331-B0	—	—	—	AJ0-7510
						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‡
				/10pk	/3pk
C18 125Å	00F-4299-E0	00G-4299-E0	00G-4299-N0	AJ0-7511	AJ0-7512
C18 200Å	00F-4331-E0	00G-4331-E0	—	AJ0-7511	AJ0-7512
				for ID: 3.2–8.0 mm	9–16 mm

For SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315

*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282
‡SemiPrep SecurityGuard Cartridges require holder, Part No.: AJ0-9281

Aqueous Size Exclusion (SEC)/Gel Filtration (GFC) for Protein and Peptide Analysis

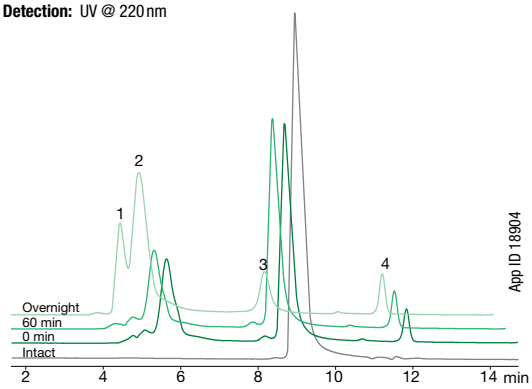
Gel Filtration Chromatography is used to analyze and/or characterize proteins, peptides, and other biomolecules; including antibodies, immunoglobulins, protein complexes, protein aggregates, and desalting. BioSep GFC columns offer many important benefits for your separation needs.

Low MW Proteins and Peptides on BioSep-SEC-s2000

PEGylated β-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 β-Lactoglobulin
3. β-Lactoglobulin
4. PEG Reagent

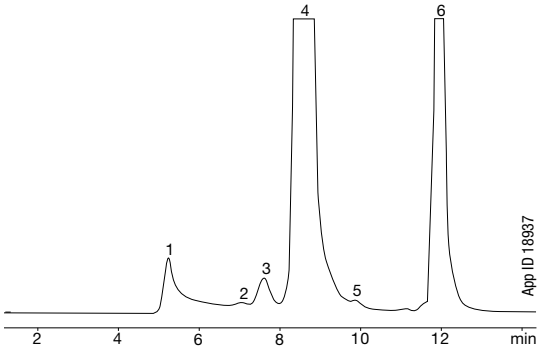


Medium MW Proteins on BioSep-SEC-s3000

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

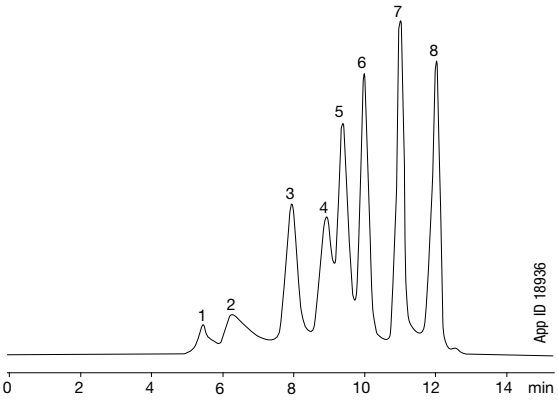


Large MW Proteins on BioSep-SEC-s4000

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. β-Amylase 200 kDa
6. BSA 66 kDa
7. Ribonuclease A 13.7 kDa
8. Uridine 244 Da



Ordering Information

Columns (mm)	Narrow Bore	Analytical		SecurityGuard™ Cartridges (mm)
Phases	300 x 4.6	300 x 7.8	600 x 7.8	4 x 3.0*
				/10pk
BioSep-SEC-s2000	00H-2145-E0	00H-2145-K0	00K-2145-K0	AJ0-4487
BioSep-SEC-s3000	00H-2146-E0	00H-2146-K0	00K-2146-K0	AJ0-4488
BioSep-SEC-s4000	00H-2147-E0	00H-2147-K0	00K-2147-K0	AJ0-4489

*SecurityGuard Analytical cartridges require holder, Part No.: KJ0-4282

for ID: 4.6-7.8 mm

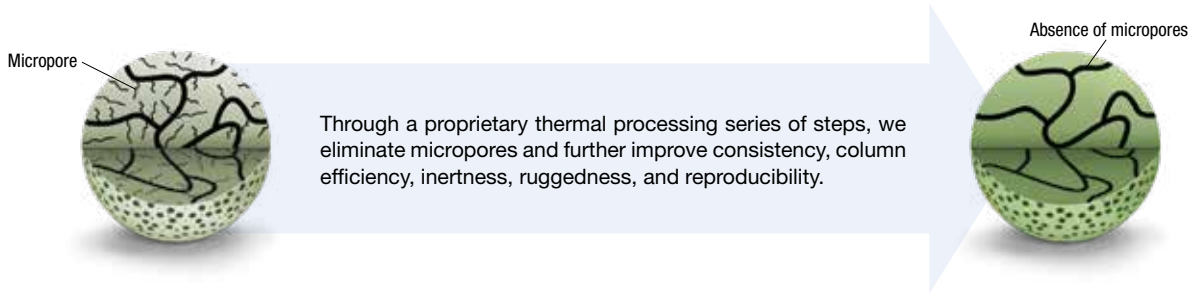
Guard Columns (mm)	Narrow Bore	Express	Analytical
Phases	30 x 4.6	35 x 7.8	75 x 7.8
BioSep-SEC-s2000	03A-2145-E0	03Q-2145-K0	03C-2145-K0
BioSep-SEC-s3000	03A-2146-E0	03Q-2146-K0	03C-2146-K0
BioSep-SEC-s4000	—	03Q-2147-K0	03C-2147-K0

For Aqueous SEC1 Column Check Standard, see p. 398

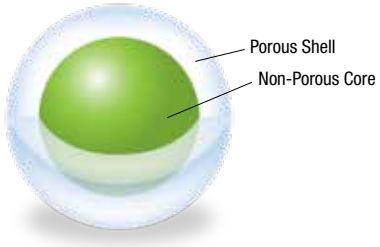
3 Advanced Particle Platforms

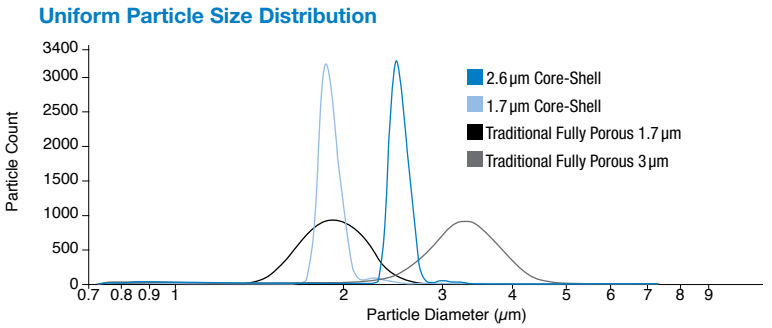
All three of the new bioZen particle platforms were individually designed and built by Phenomenex to take advantage of integral levels of performance, ruggedness, and reproducibility for protein characterization applications. Individually, each platform differs in the proprietary processing techniques used to control particle size and morphology.

Thermally Modified Fully Porous



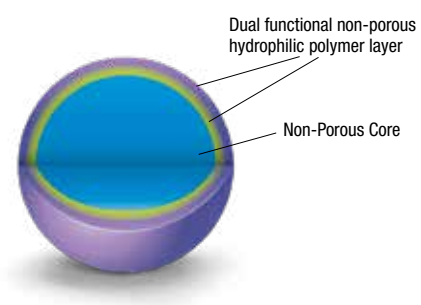
Core-Shell Technology

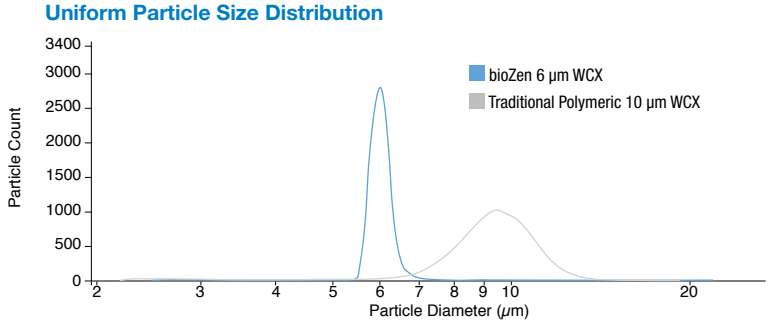




Using sol-gel processing techniques that incorporate nano structuring technology, a durable, homogeneous porous shell is grown on a solid silica core. This highly optimized process combined with industry leading column packing technology produces highly reproducible columns that generate extremely high efficiencies and sensitivity.

Monosized Polymeric Non-Porous





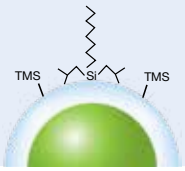
Meticulously controlled monosized particle technology secures incredible particle consistency that leads to improved and reliable efficiency. This innovative non-porous particle serves as the perfect backbone for complex ion-exchange chemistries.

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.

Intact

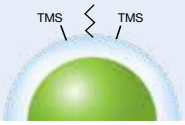
bioZen Intact XB-C8



3.6 µm

Large pore core-shell particle for fast intact biologic entry. C8 provides highly useful moderate hydrophobic selectivity.

bioZen Intact C4



3.6 µm

Large pore core-shell particle for fast intact biologic entry. C4 stationary phase provides highly sought after low hydrophobic retention, especially important for highly retentive biologics.

Size Exclusion (SEC)

bioZen SEC-2

1.8 µm

Extremely inert, high density fully porous particle with high efficiency and low molecular weight (LMW) separation range of 1 k – 450 kDa.

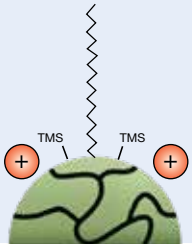
bioZen SEC-3

1.8 µm

Extremely inert, high density fully porous particle with high efficiency and high molecular weight (HMW) separation range of 10 k – 700 kDa.

Peptide

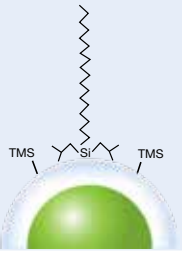
bioZen Peptide PS-C18



1.6 µm and 3 µm

Excellent retention by combined positively charged surface ligand and C18 ligand.

bioZen Peptide XB-C18

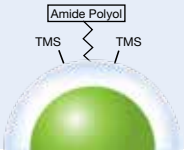


1.7 µm and 2.6 µm

Overall retention of both acidic and basic peptides through C18 stationary phase with di-isobutyl side chains.

Glycan

bioZen Glycan

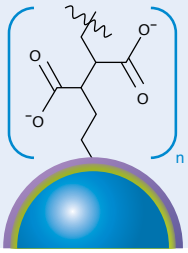


2.6 µm

Provides optimal combination of high efficiency and selectivity for released glycans.

Ion-Exchange

bioZen WCX



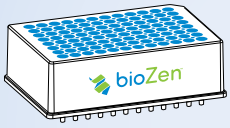
6 µm

Monosized particles grafted with linear polycarboxylate chains to envelop and separate proteins from acidic/basic variants.

Learn More:
www.phenomenex.com/bioZen

New 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.

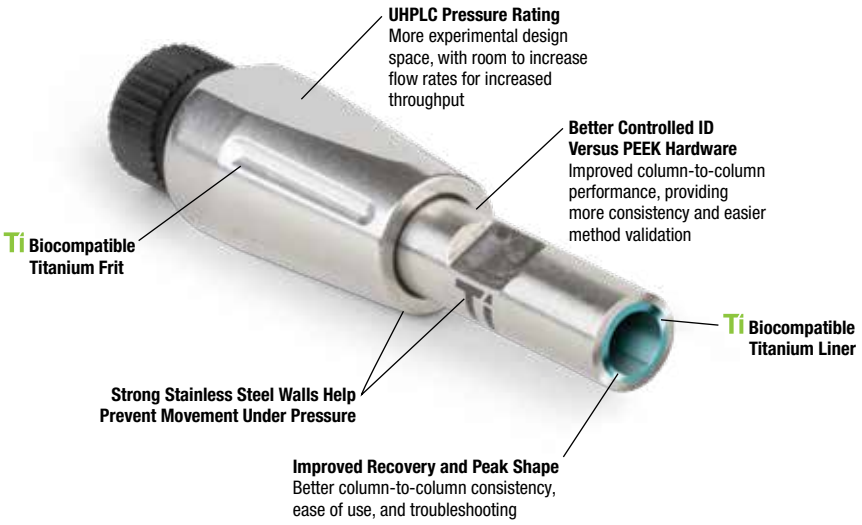
To learn more, see p. 78

MagBeads

Streptavidin Coated
Higher binding capacity magnetic particles result in faster and reliable purification, clean-up, and isolation of proteins and peptide molecules.

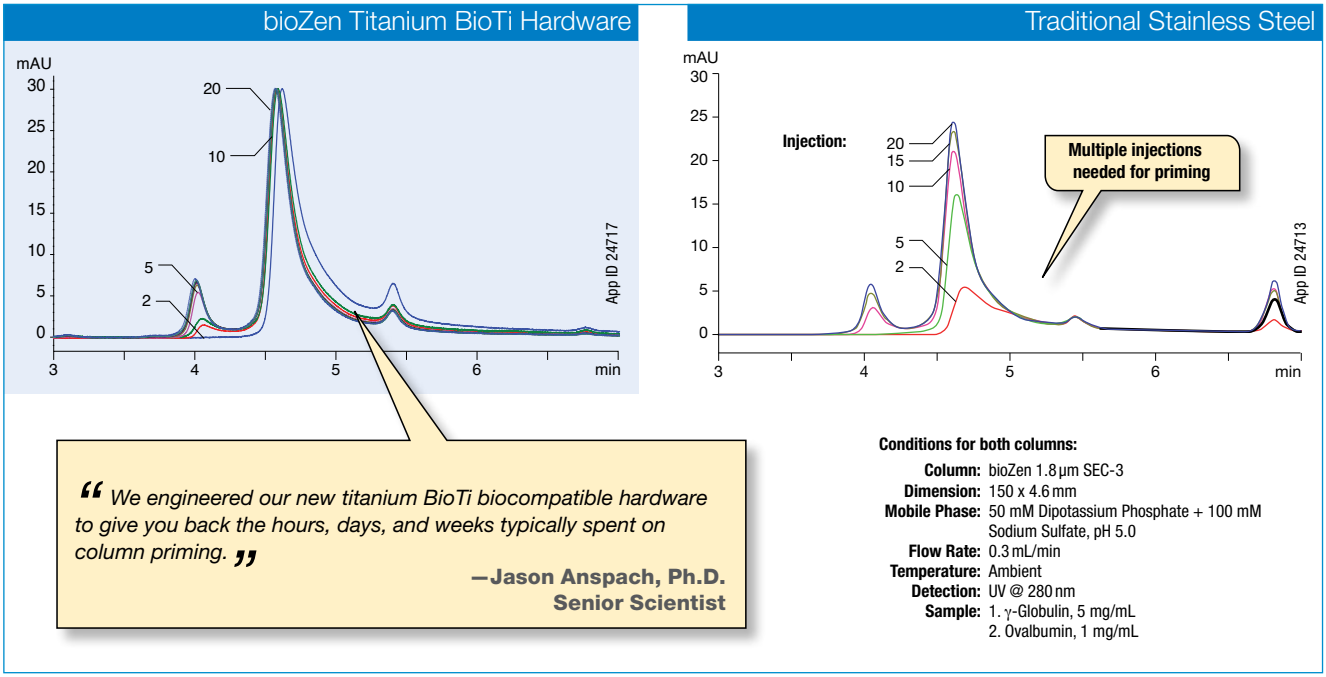
Biocompatible Flow Path with BioTi™ Hardware

Keep your mind at ease knowing that we've minimized the need for priming with a new titanium infused biocompatible hardware and frit that doesn't interfere with protein or peptide integrity!



BioTi Questions, ask a ZenMaster:
www.phenomenex.com/bioZenChat

Overlaid Succesive Injections - Protein Priming Comparison



"We engineered our new titanium BioTi biocompatible hardware to give you back the hours, days, and weeks typically spent on column priming."

—Jason Anspach, Ph.D.
Senior Scientist

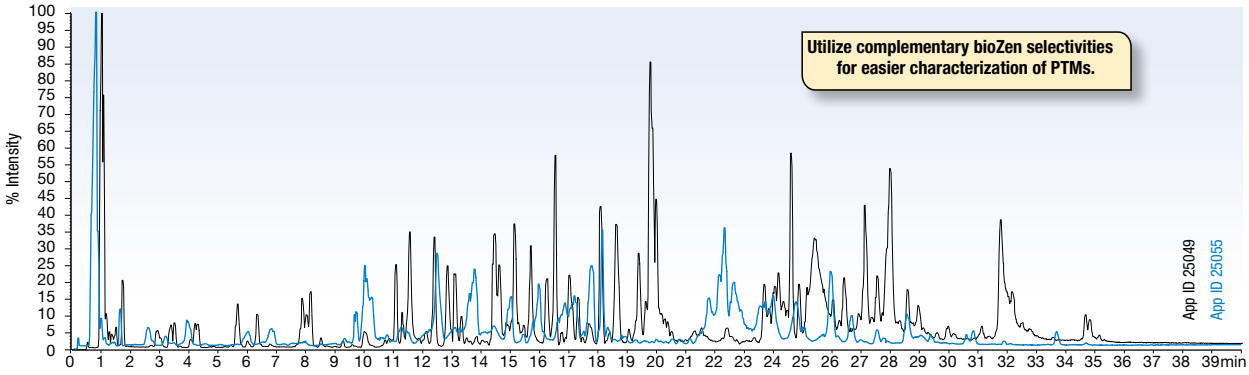
Conditions for both columns:

Column: bioZen 1.8 µm SEC-3
Dimension: 150 x 4.6 mm
Mobile Phase: 50 mM Dipotassium Phosphate + 100 mM Sodium Sulfate, pH 5.0
Flow Rate: 0.3 mL/min
Temperature: Ambient
Detection: UV @ 280 nm
Sample: 1. γ-Globulin, 5 mg/mL
2. Ovalbumin, 1 mg/mL

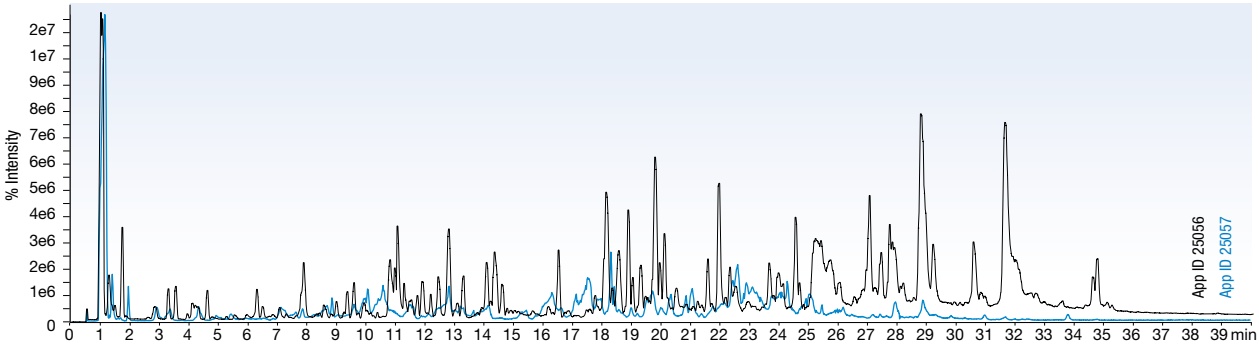
Peptide Mapping

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:

Columns: bioZen 1.6 µm Peptide PS-C18
bioZen 2.6 µm Peptide XB-C18
Dimension: 150 x 2.1 mm
Part No.: 00F-4770-AN
00F-4768-AN
Mobile Phase: A: 0.1 % Formic Acid in Water
B: 0.1 % Formic Acid in Acetonitrile

Gradient:	Time (min)	% B
	0	1
	0.5	1
	50	50
	55	50
	56	95

Flow Rate: 0.3 mL/min
Temperature: 40 °C
Detection: QTOF (SCIEX® X500B)

bioZen Products - Powered by BioTi™ Biocompatible Hardware

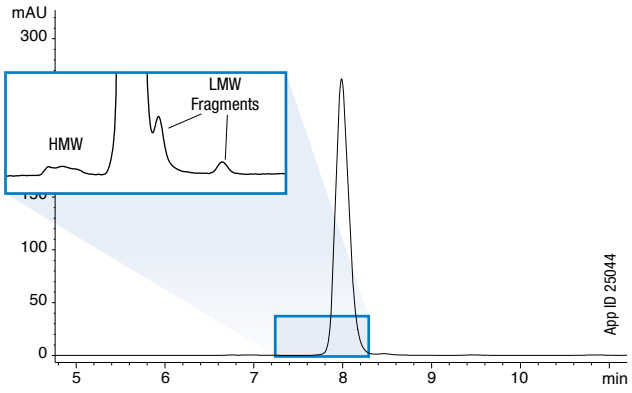
Ordering Information

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
						/3pk	—	ea
bioZen 1.6 µm Peptide PS-C18	00B-4770-AN	00D-4770-AN	00F-4770-AN	—	—	AJ0-9803	—	AJ0-9000
						/10pk	/10pk	ea
bioZen 3 µm Peptide PS-C18	00B-4771-AN	—	00F-4771-AN	00B-4771-E0	00F-4771-E0	AJ0-7605	AJ0-7606	KJ0-4282
						/3pk	—	ea
bioZen 1.7 µm Peptide XB-C18	00B-4774-AN	00D-4774-AN	00F-4774-AN	—	—	AJ0-9806	—	AJ0-9000
						/3pk	/3pk	ea
bioZen 2.6 µm Peptide XB-C18	00B-4768-AN	00D-4768-AN	00F-4768-AN	00B-4768-E0	00F-4768-E0	AJ0-9806	AJ0-9808	AJ0-9000

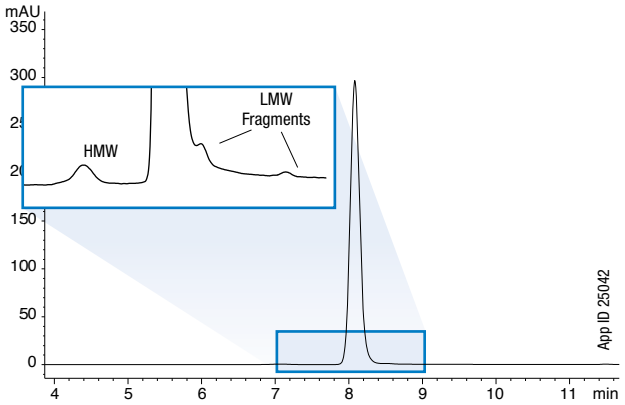
Aggregate Analysis

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.

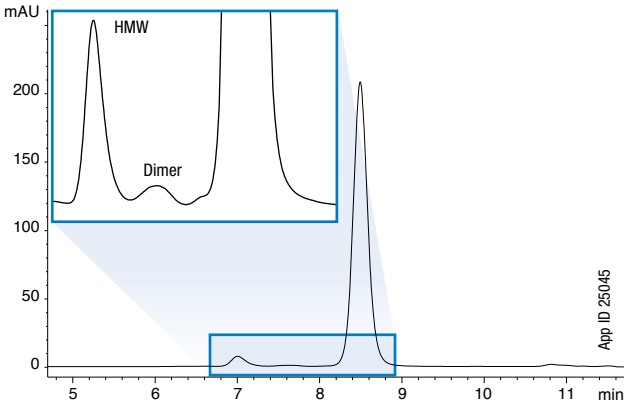
Cetuximab



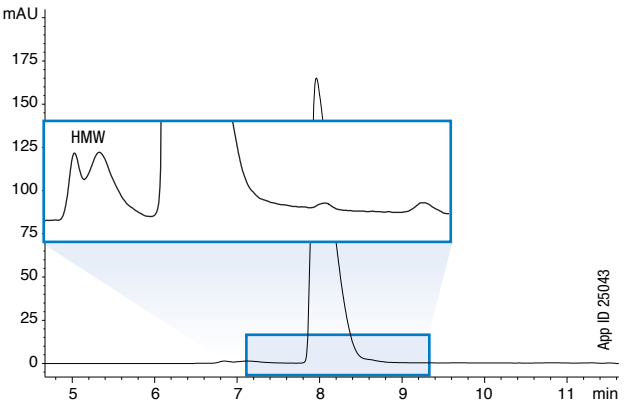
Trastuzumab



Rituximab



Infliximab—abda



Conditions same for all samples:

Column: bioZen 1.8 µm SEC-3
Dimension: 300 x 4.6 mm
Part No.: 00H-4772-E0
Mobile Phase: 50 mM Potassium Phosphate + 250 mM Potassium Chloride (pH 6.8)
Flow Rate: 0.35 mL/min
Temperature: 30 °C
Detection: UV @ 280 nm
Sample: As noted

bioZen Products - Powered by BioTi™ Biocompatible Hardware

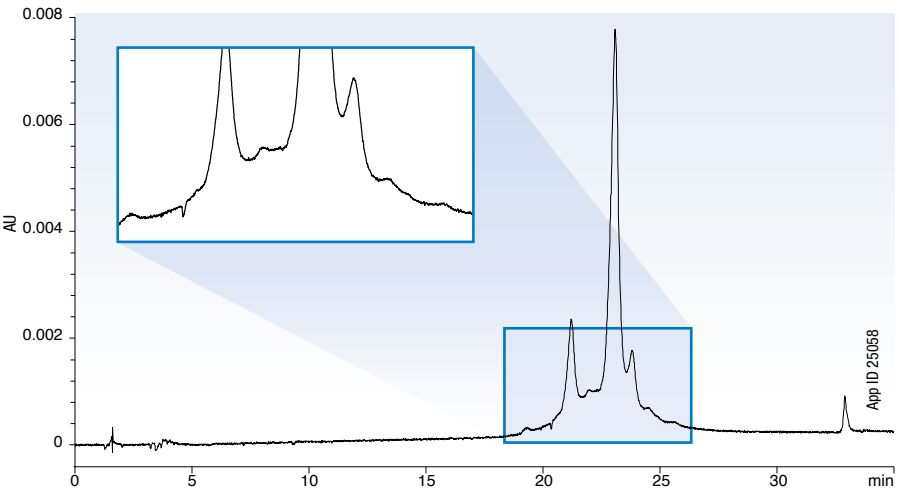
Ordering Information

bioZen Columns (mm)					Biocompatible Guard Cartridges	
	50 x 2.1	100 x 4.6	150 x 4.6	300 x 4.6	for 4.6 mm	Holder
					/3pk	ea
bioZen 1.8 µm SEC-2	00B-4769-AN	—	00F-4769-E0	00H-4769-E0	AJ0-9850	AJ0-9000
bioZen 1.8 µm SEC-3	00B-4772-AN	00D-4772-E0	00F-4772-E0	00H-4772-E0	AJ0-9851	AJ0-9000

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)

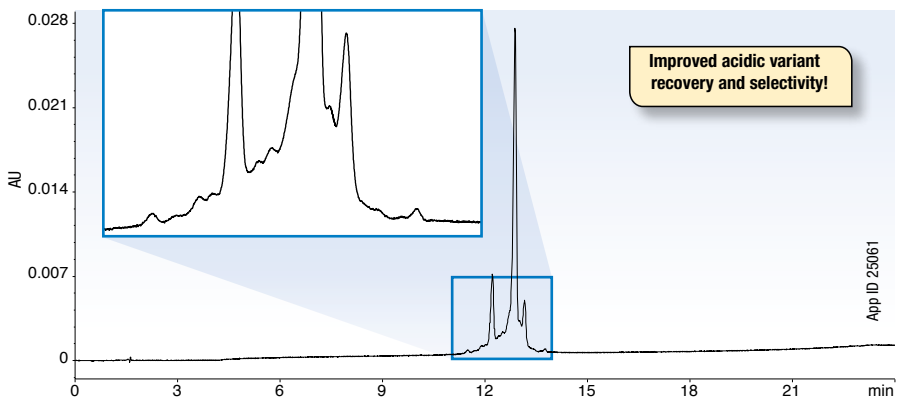


Column: bioZen 6 µm WCX
Dimension: 250 x 4.6 mm
Part No.: 00G-4777-E0
Mobile Phase: A: 20 mM MES (pH 5.6)
B: 20 mM MES + 300 mM NaCl (pH 5.6)

Gradient: Time (min)	% B
0	15
1	15
31	45
31.1	100
34	100
35	15

Flow Rate: 1 mL/min
Temperature: 30 °C
Detection: UV @ 280 nm
Sample: Trastuzumab

Trastuzumab (pH Gradient Buffer)



Column: bioZen 6 µm WCX
Dimension: 250 x 4.6 mm
Part No.: 00G-4777-E0
Mobile Phase: A: CX -1 (pH 5.6) pH Gradient Buffer*
B: CX -1 (pH 10.2) pH Gradient Buffer*

Gradient: Time (min)	% B
0	0
1	0
21	100
23	100
24	0

Flow Rate: 1 mL/min
Temperature: 30 °C
Detection: UV @ 280 nm
Sample: Trastuzumab
* From Thermo Fisher Scientific® Inc.

bioZen Products - Powered by BioTi™ Biocompatible Hardware

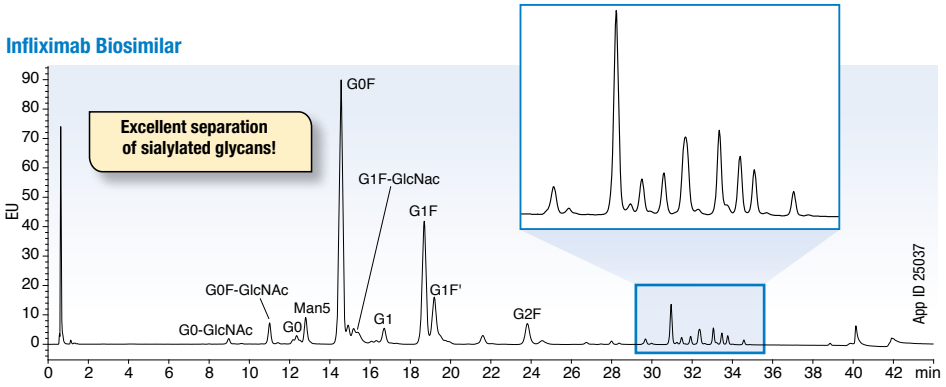
Ordering Information

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
					/10pk	ea
bioZen 6 µm WCX	00B-4777-AN	00D-4777-AN	00F-4777-AN	00G-4777-AN	AJ0-9401	KJ0-4282
	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	AJ0-9400	KJ0-4282

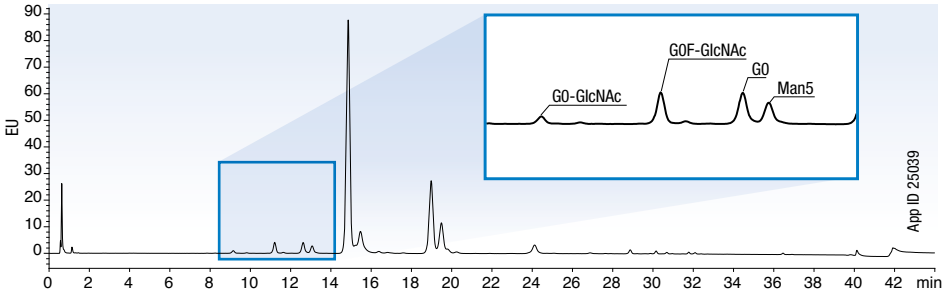
Glycan Analysis

The unique selectivity of the bioZen Glycan was designed to provide higher order separations of released and labeled glycans. With a 2.6 µm 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



Trastuzumab



Conditions for both columns:

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

bioZen Products - Powered by BioTi™ Biocompatible Hardware

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
				/3pk	ea
bioZen 2.6 µm Glycan	00B-4773-AN	00D-4773-AN	00F-4773-AN	AJ0-9800	AJ0-9000

Sample Preparation

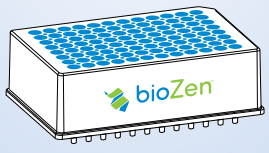
Ordering Information

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.

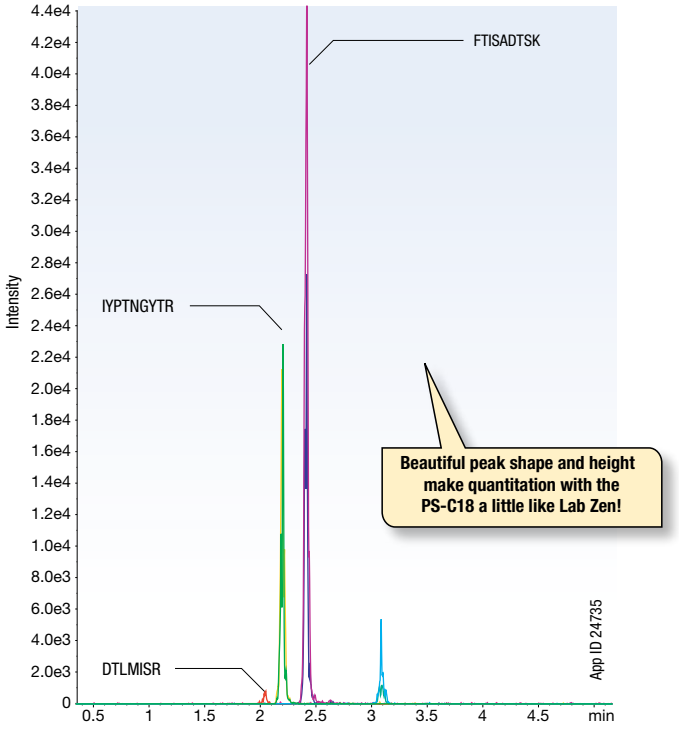
www.phenomenex.com/GlycanSPE



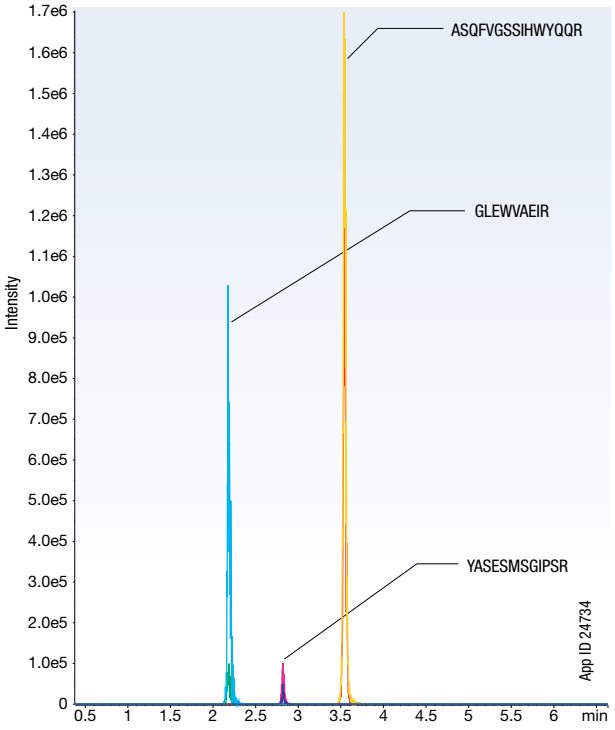
Peptide Quantitation

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 3 µm 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

bioZen Products - Powered by BioTi™ Biocompatible Hardware

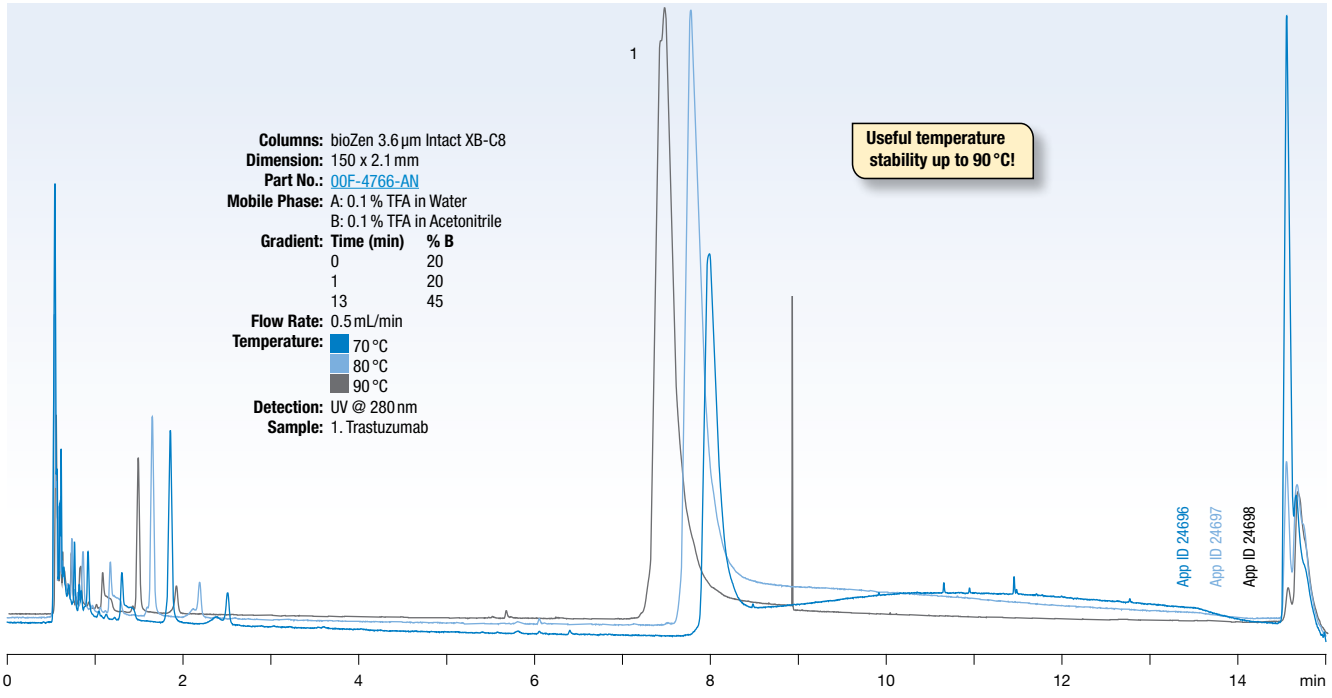
Ordering Information

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
						/3pk	—	ea
bioZen 1.6 µm Peptide PS-C18	00B-4770-AN	00D-4770-AN	00F-4770-AN	—	—	AJ0-9803	—	AJ0-9000
						/10pk	/10pk	ea
bioZen 3 µm Peptide PS-C18	00B-4771-AN	—	00F-4771-AN	00B-4771-E0	00F-4771-E0	AJ0-7605	AJ0-7606	KJ0-4282
						/3pk	—	ea
bioZen 1.7 µm Peptide XB-C18	00B-4774-AN	00D-4774-AN	00F-4774-AN	—	—	AJ0-9806	—	AJ0-9000
						/3pk	/3pk	ea
bioZen 2.6 µm Peptide XB-C18	00B-4768-AN	00D-4768-AN	00F-4768-AN	00B-4768-E0	00F-4768-E0	AJ0-9806	AJ0-9808	AJ0-9000

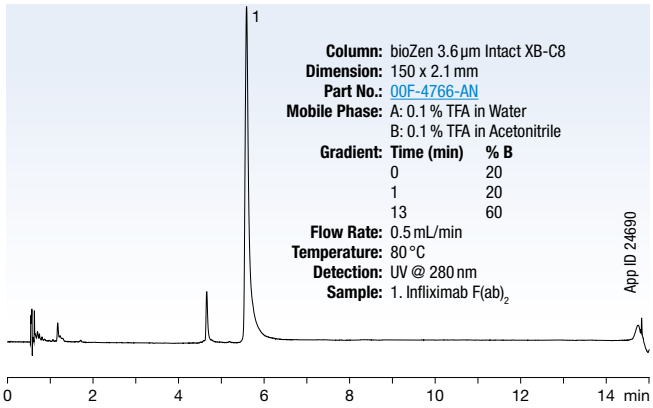
Intact & Fragment Analysis

Impurity profiling and characterization of intact biologic fragments is a challenging undertaking because of the need to identify very small differences between variants. Both bioZen Intact 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.

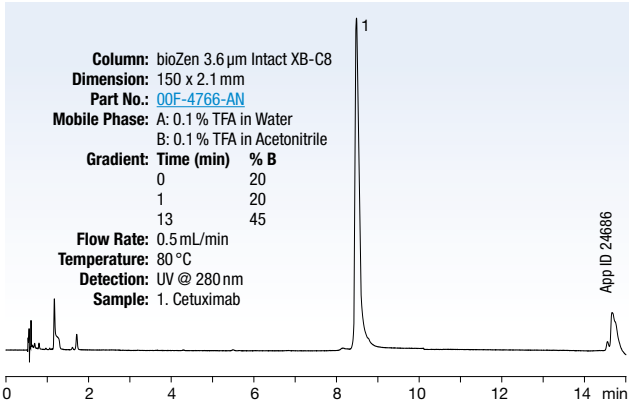
Intact Trastuzumab at 70, 80, and 90 °C



Infliximab F(ab)$_2$



Cetuximab



bioZen Products - Powered by BioTi™ Biocompatible Hardware

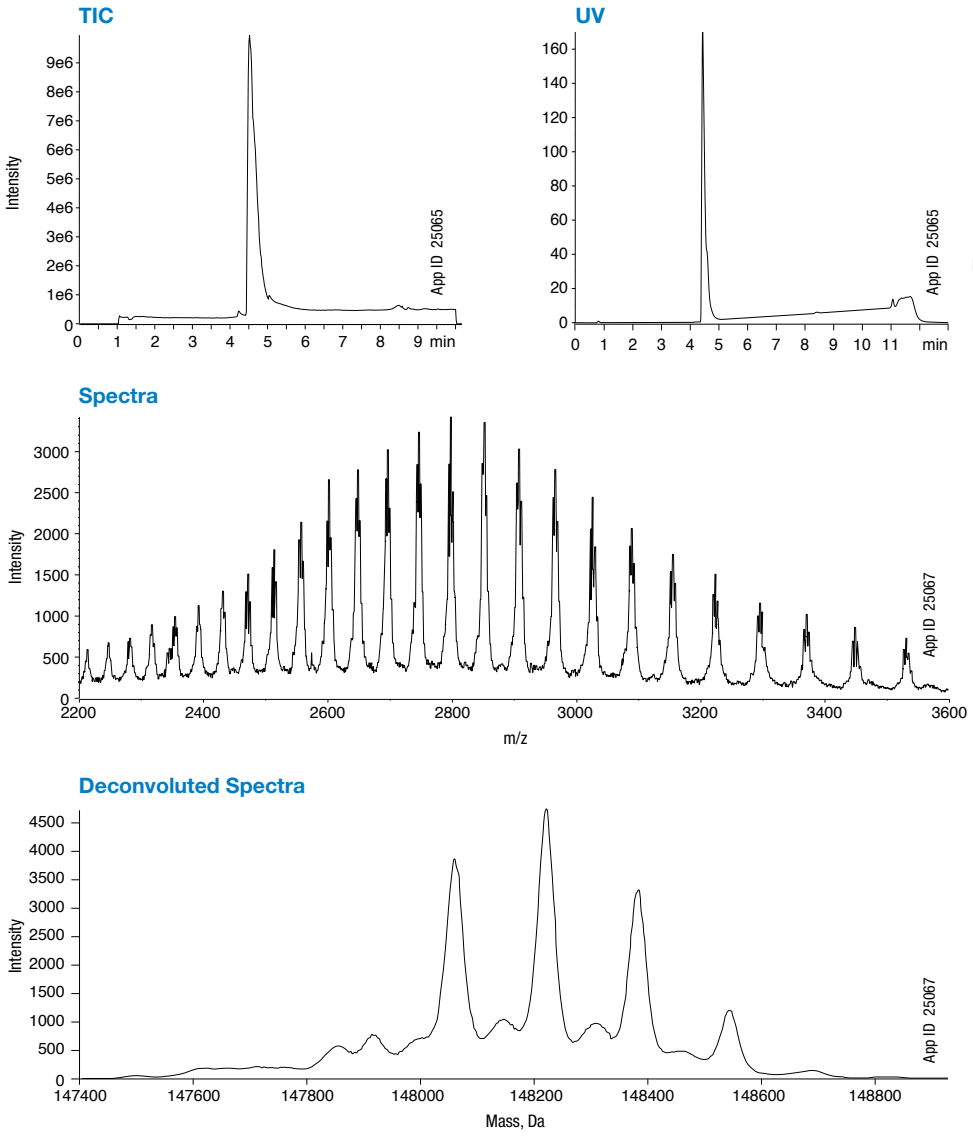
Ordering Information

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
						/3pk	/3pk	ea
bioZen 3.6 µm Intact C4	00B-4767-AN	00D-4767-AN	00F-4767-AN	00B-4767-E0	00F-4767-E0	AJ0-9809	AJ0-9811	AJ0-9000
bioZen 3.6 µm Intact XB-C8	00B-4766-AN	00D-4766-AN	00F-4766-AN	00B-4766-E0	00F-4766-E0	AJ0-9812	AJ0-9814	AJ0-9000

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 C4 and XB-C8.

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

bioZen Products - Powered by BioTi™ Biocompatible Hardware

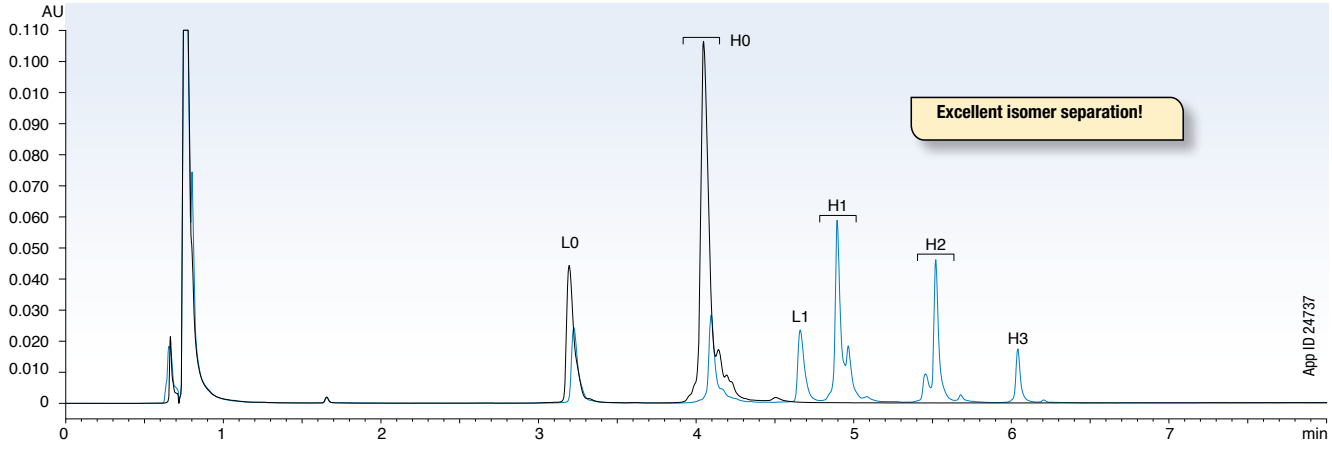
Ordering Information

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
						/3pk	/3pk	ea
bioZen 3.6 µm Intact C4	00B-4767-AN	00D-4767-AN	00F-4767-AN	00B-4767-E0	00F-4767-E0	AJ0-9809	AJ0-9811	AJ0-9000
bioZen 3.6 µm Intact XB-C8	00B-4766-AN	00D-4766-AN	00F-4766-AN	00B-4766-E0	00F-4766-E0	AJ0-9812	AJ0-9814	AJ0-9000

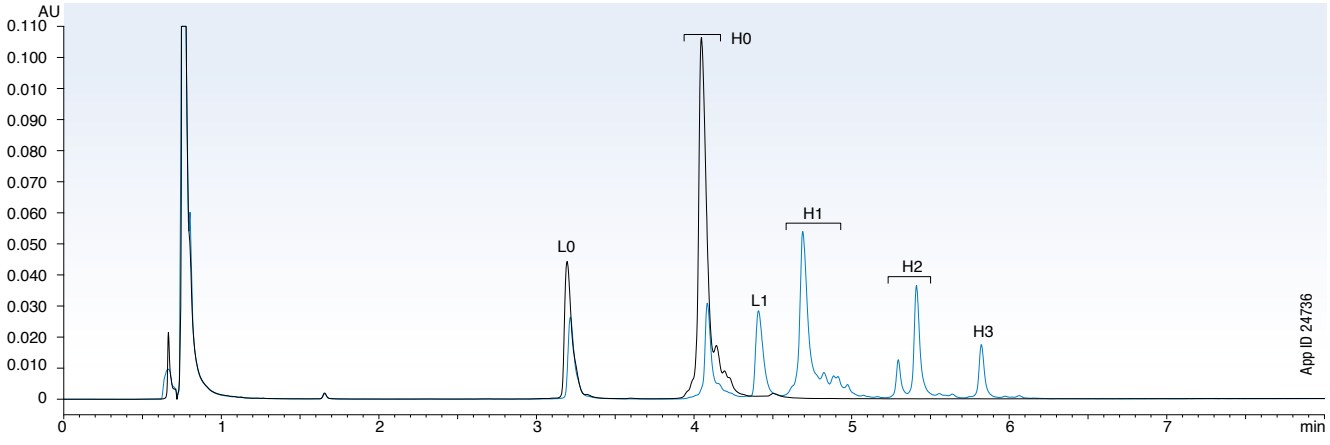
Drug Antibody Ratio (DAR)

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



Herceptin—mcMMAF using bioZen 3.6 µm Intact XB-C8



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

bioZen Products - Powered by BioTi™ Biocompatible Hardware

Ordering Information

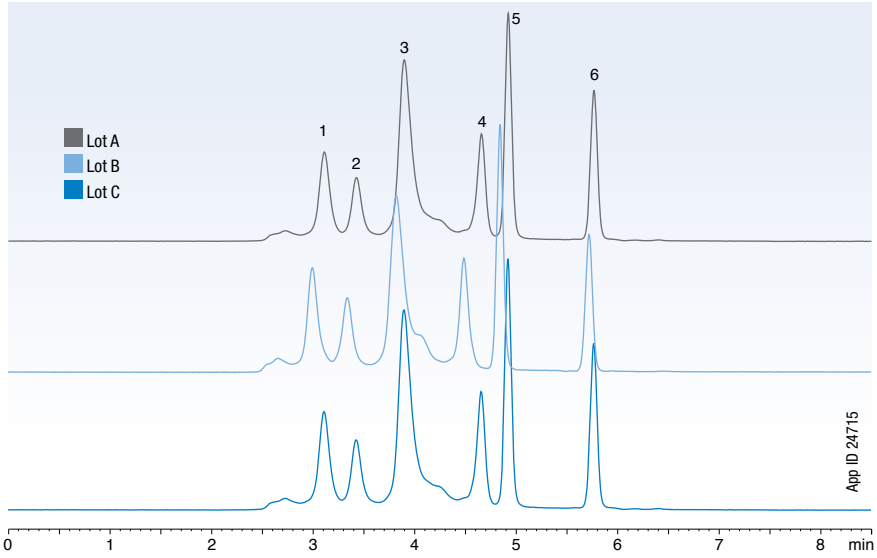
bioZen Columns (mm)						Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
						/3pk	/3pk	ea
bioZen 3.6 µm Intact C4	00B-4767-AN	00D-4767-AN	00F-4767-AN	00B-4767-E0	00F-4767-E0	AJ0-9809	AJ0-9811	AJ0-9000
bioZen 3.6 µm Intact XB-C8	00B-4766-AN	00D-4766-AN	00F-4766-AN	00B-4766-E0	00F-4766-E0	AJ0-9812	AJ0-9814	AJ0-9000

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.

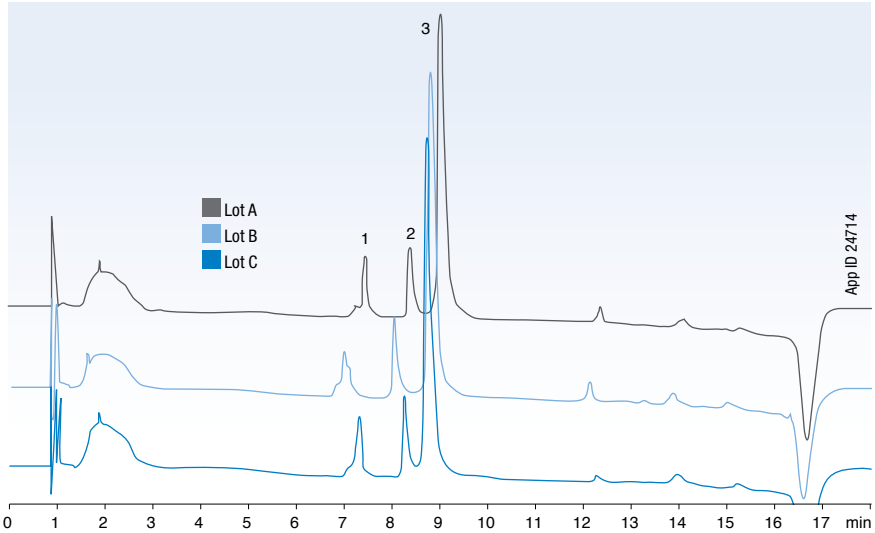
Each batch of media and each column goes through a gambit of testing to ensure that you're getting our highest level of science, so that you can kick down the door of progress.

Batch-to-Batch Results—bioZen 1.8 µm SEC-3



Column: bioZen 1.8 µm SEC-3
Dimensions: 150 x 4.6 mm
Part No.: 00F-4772-E0
Mobile Phase: 100 mM Sodium Phosphate in Water pH 6.8
Flow Rate: 0.3 mL/min
Temperature: Ambient
Detection: UV @ 280 nm
Sample: 1. Thyroglobulin (669 kDa)
2. IgA (300 kDa)
3. IgG (150 kDa)
4. Ovalbumin (44 kDa)
5. Myoglobin (17 kDa)
6. Uridine

Batch-to-Batch Results—bioZen 3.6 µm Intact C4



Columns: bioZen 3.6 µm Intact C4
Dimension: 150 x 2.1 mm
Part No.: 00F-4767-AN
Mobile Phase: A: 0.1 % TFA in Water
B: 0.1 % TFA in Acetonitrile

Gradient:	**Time (min)**	**% B**
	0	10
	1	30
	20	50
	20.1	10

Flow Rate: 1.5 mL/min
Temperature: 40 °C
Detection: UV @ 280 nm
Sample: 1. Light Chain
2. Heavy Chain
3. Intact mAb

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^2/g	1.1 cc/g	148.7Å

*Single point total pore volume.
**Average pore diameter (4V/A by BET).
Data provided by an independent laboratory.

Ordering Information and Cross-Reference Chart

Waters		Phenomenex		SecurityGuard™ Cartridges (mm)
				4 x 3.0
Description (mm)	Part No.	Part No.	Description (mm)	/ 10pk
µBondapak C18 300 x 3.9	WAT027324	00H-2117-C0	Bondclone C18 300 x 3.9	AJ0-4287
µBondapak C18 150 x 3.9	WAT086684	00F-2117-C0	Bondclone C18 150 x 3.9	AJ0-4287
—	—	00G-2117-E0	Bondclone C18 250 x 4.6	AJ0-4287
µBondapak C18 Radial-Pak Cartridge 100 x 8	WAT085721	00D-2117-L0	Bondclone C18 100 x 8 (S.S. Column)	AJ0-4287
µBondapak Phenyl 300 x 3.9	WAT027198	00H-3129-C0	Bondclone Phenyl† 300 x 3.9	AJ0-4351
—	—	00H-3127-C0	Bondclone CN 300 x 3.9	AJ0-4305
µBondapak NH_2 300 x 3.9	WAT084040	00H-3128-C0	Bondclone NH_2 300 x 3.9	AJ0-4302
µPorasil Silica 300 x 3.9	WAT02 7477	00H-2119-C0	Bondclone Silica 300 x 3.9	AJ0-4348

†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	03A-2117-C0

- **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 phamaceutical 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 10 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 α-amino acids, α-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 α-amino acids, α-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. 282

Ordering Information

5 µm Starter Columns (mm)				
Phase	Chirex Phase Description	Bond Type	Linkage Type	50 x 4.6
3014	(S)-VAL and (R)-NEA	Covalent	Urea	00B-3014-E0
3020	(S)-LEU and (R)-NEA	Covalent	Urea	00B-3020-E0
3126	(D)-Penicillamine	Ion-Metal	Lig Exchange	00B-3126-E0

Preparative Columns and Bulk Media are available in 15 and 30 µm 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. 399

5 µm 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	00F-3001-E0	—	—
3011	(S)-LEU and DNAn	Covalent	Urea	—	00G-3011-E0	—
3014	(S)-VAL and (R)-NEA	Covalent	Urea	—	00G-3014-E0	—
3019	(S)-LEU and (S)-NEA	Covalent	Urea	—	00G-3019-E0	—
3022	(S)-ICA and (R)-NEA	Covalent	Urea	00F-3022-E0	00G-3022-E0	—
3126	(D)-Penicillamine	Ion-Metal	Lig Ex	00F-3126-E0	00G-3126-E0	03A-3126-E0

For more information on Chirex chiral stationary phase descriptions, contact your Phenomenex technical consultant.

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 (α)	App ID No.
N-FMOC Derivatives (*9-Fluorenylmethyloxycarbonyl*)			
N-FMOC-Leucine	3011	1.20	13800
N-FMOC-Phenylalanine	3011	1.10	13796
N-FMOC-Valine	3011	1.12	13798
Z-Derivatives (*Benzyloxycarbonyl*)			
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
N-Acetyl Derivatives			
N-Acetylalanine	3126	1.17	14052
N-Acetylleucine	3126	1.39	14058
N-Acetylmethionine	3126	1.27	13728
N-Acetylvaline	3126	1.50	14055
N-Formyl Derivatives			
N-Formylvaline	3126	1.37	13721
N-Formylmethionine	3126	1.25	13722
N-Dansyl Derivatives (*5-5-Dimethyl-aminonaphthalene-1-sulfonyl derivative*)			
N-Dansylnorvaline	3011	1.24	13766
N-Dansylphenylalanine	3011	1.27	13771
N-Dansylvaline	3011	1.28	13763
PTH Derivatives (*Phenylthiohydantoin*)			
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)

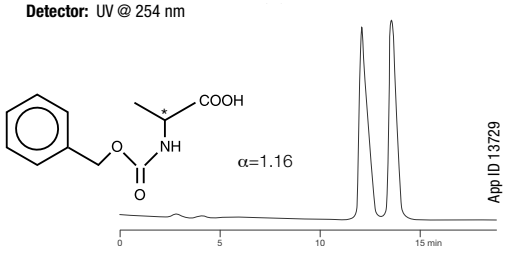
Separations of Underivatized "Free" Amino Acids

Compound	Chirex Phase	Separation Factor (α)	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
α-Methyl Leucine	3126	1.59	14457
α-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 (α)= Separation Factor = k_2/k_1

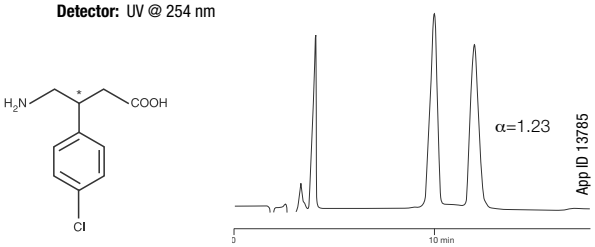
Z-Alanine

Column: Chirex 3011
Dimensions: 250 x 4.0 mm
Part No.: 00G-3011-D0
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™ 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

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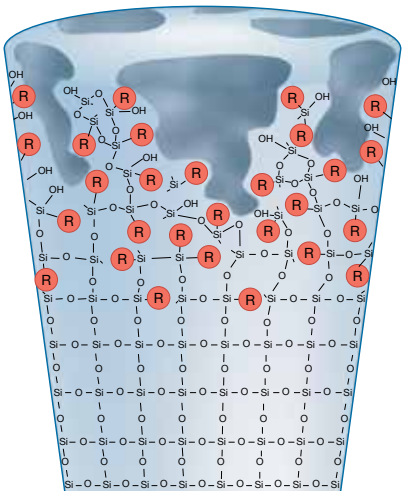
TWIN™ (Two-In-One) Technology

Gemini C18 and C6-Phenyl

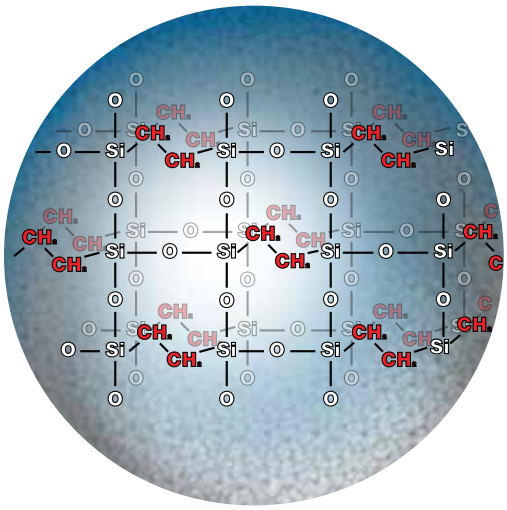
During the final stage of silica manufacturing a unique silica-organic layer is grafted to create a completely new composite particle. Since the internal base silica is unaltered by this manufacturing process, the particle retains its mechanical strength and rigidity along with excellent efficiency, 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**

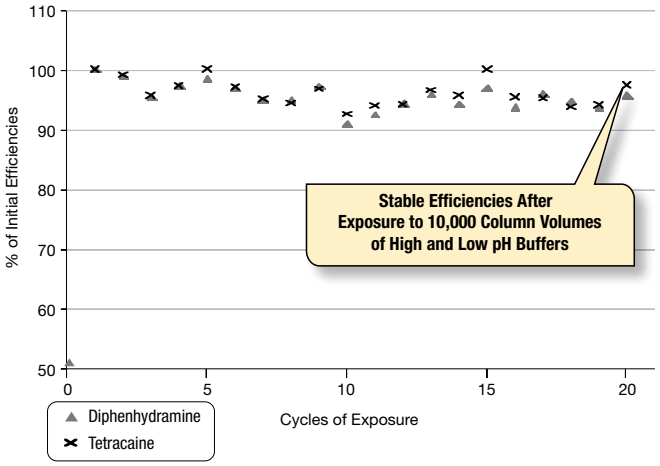
Gemini NX-C18

USP: L1 | LC-MS Certified

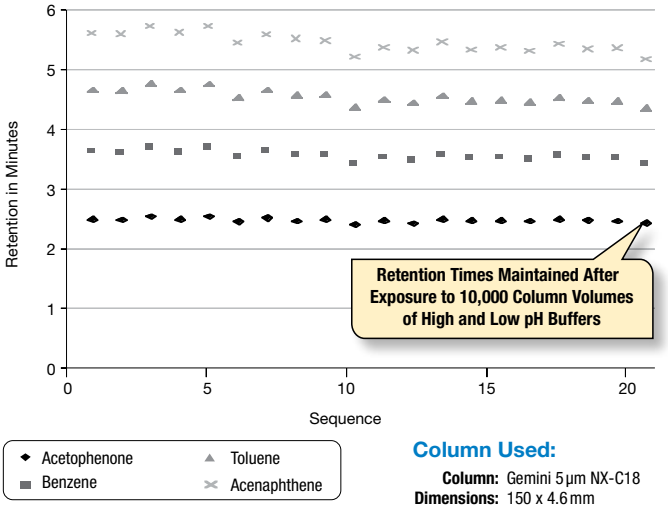
pH Stability:	**1.0 – 12.0**
Particle Size:	3 µm, 5 µm, and 10 µm
Phase:	C18
Application:	Small molecules, basic compounds
Strength:	Extremely durable pH stable particle
Pore Size (Å):	110
Surface Area (m^2/g):	375
Carbon Load %:	14
End Capping:	TMS

Gemini NX-C18 Tested for Extreme Durability in Changing Mobile Phase pH

Column Efficiencies Maintained in High pH 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

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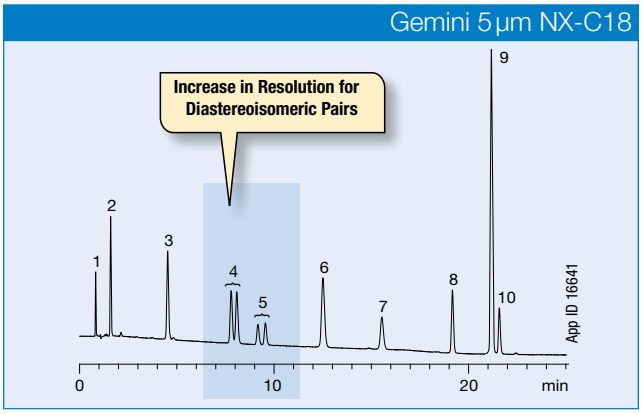
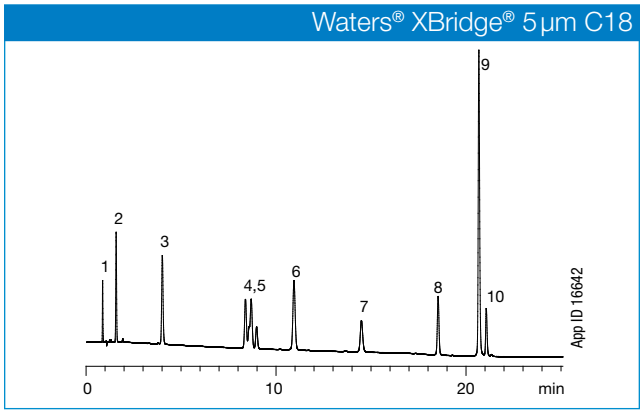
U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

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

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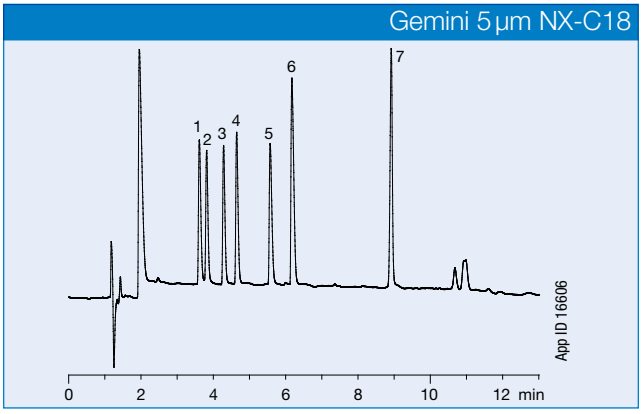
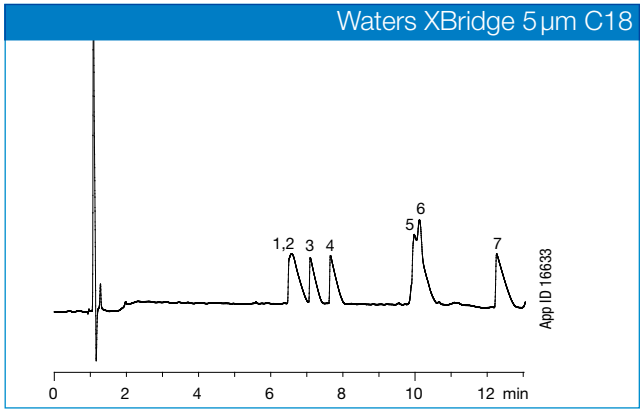
Polar Bases at Low pH (pH 2.7)





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. Tripelennamine
3. Chlorpheniramine
4. Brompheniramine
5. Chloropyramine
6. Diphenhydramine
7. Loratadine

Comparative chromatograms may not be representative of all applications.

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini C18

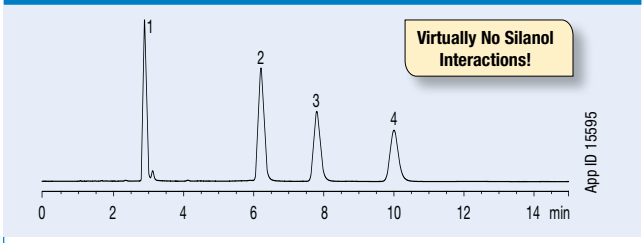
- **Increased loading and retention of basic compounds**
- **Silica efficiency and mechanical strength**
- **pH stable 1-12 for durability**

Gemini C18 USP: L1 LC-MS Certified

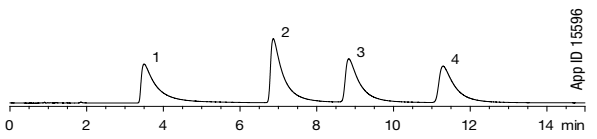
pH Stability:	**1.0 – 12.0**
Particle Size:	3 µm, 5 µm, and 10 µm
Phase:	C18
Application:	Small molecules, basic compounds
Strength:	Wide pH stability, high efficiency
Pore Size (Å):	110
Surface Area (m^2/g):	375
Carbon Load %:	14
End Capping:	TMS

Chromatographic Comparisons

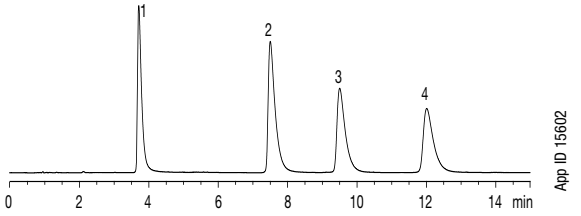
Gemini 5 µm C18 110Å



Agilent Technologies® ZORBAX® 5 µm Extend-C18 80Å



Advanced Chromotography Technologies ACE® 5 µm C18 100Å



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

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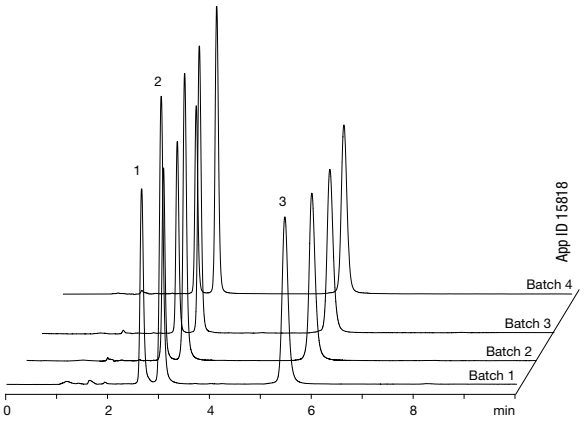
Batch-to-Batch Reproducibility



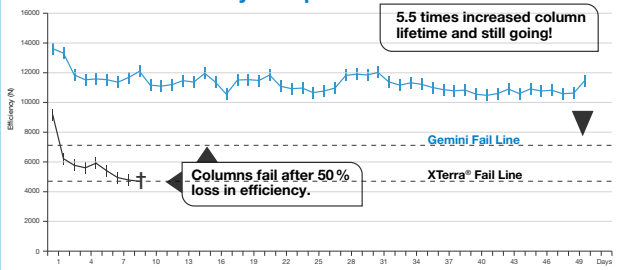
Conditions for all separations:

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® XTerra® 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

Gemini C18
Waters® XTerra® MS C18

The comparative data presented here may not be representative for all applications.

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini C6-Phenyl

- **pH stabe 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^2/g):	375
Carbon Load %:	12
End Capping:	TMS

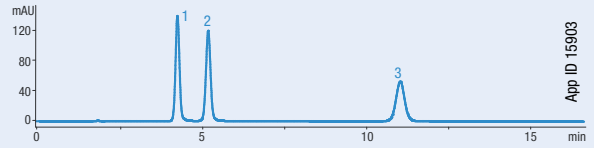
Enhanced Performance for Aromatic Compounds

Sulfa Drug Application

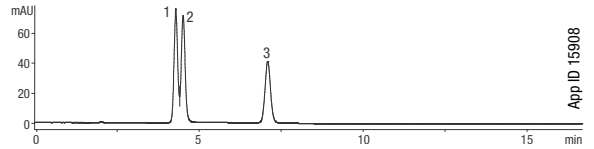
Resolution	Pursuit 5 µm DiPhenyl	Gemini 5 µm C6-Phenyl
$Rs_{1,2}$	1.0	4.0
$Rs_{2,3}$	9.8	16.0

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



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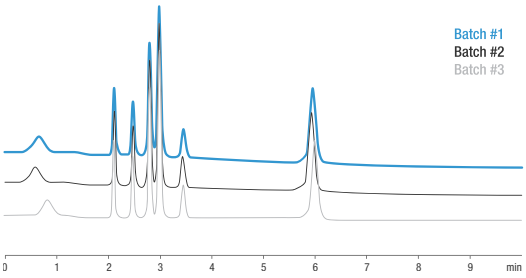
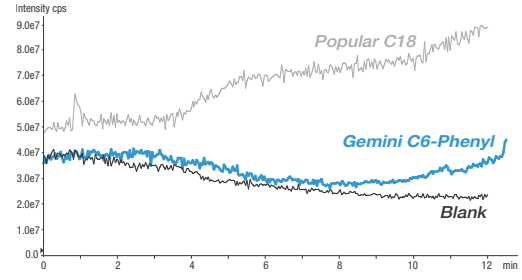
Reproducible Phenyl Phase

Aliphatic Acid Application



Conditions for all columns:
Column: Gemini 5 µm C6-Phenyl
Dimensions: 150 x 4.6 mm
Part No.: 00F-4444-E0
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
2. Malic Acid
3. Lactic Acid
4. Acetic Acid
5. Citric 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.

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Gemini C8(3)

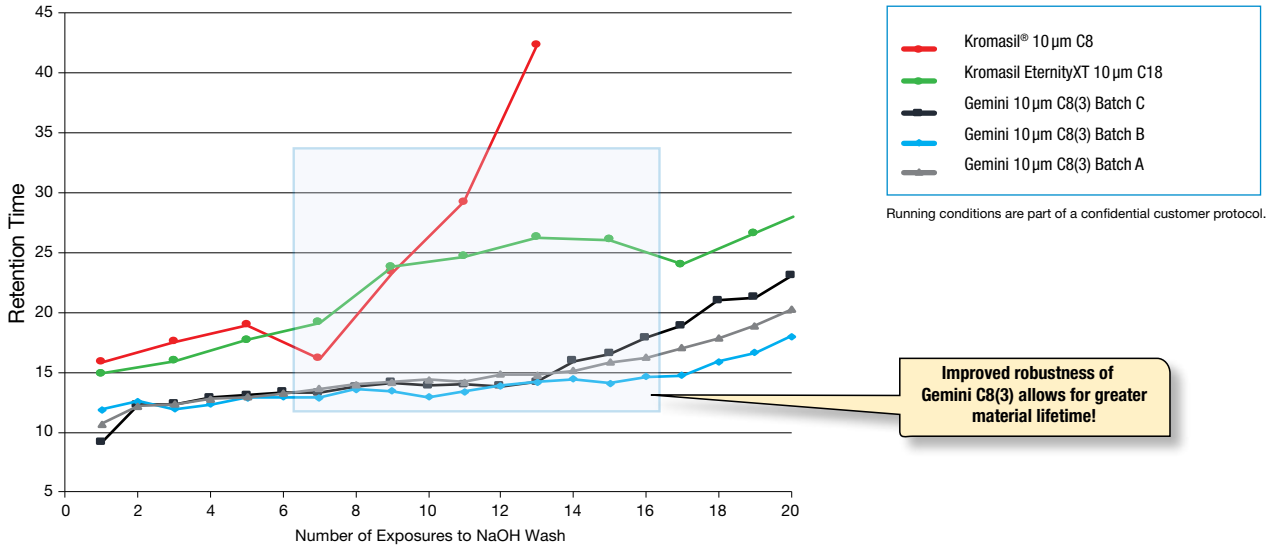
The Material Developed for High pH Insulin Purification

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 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)

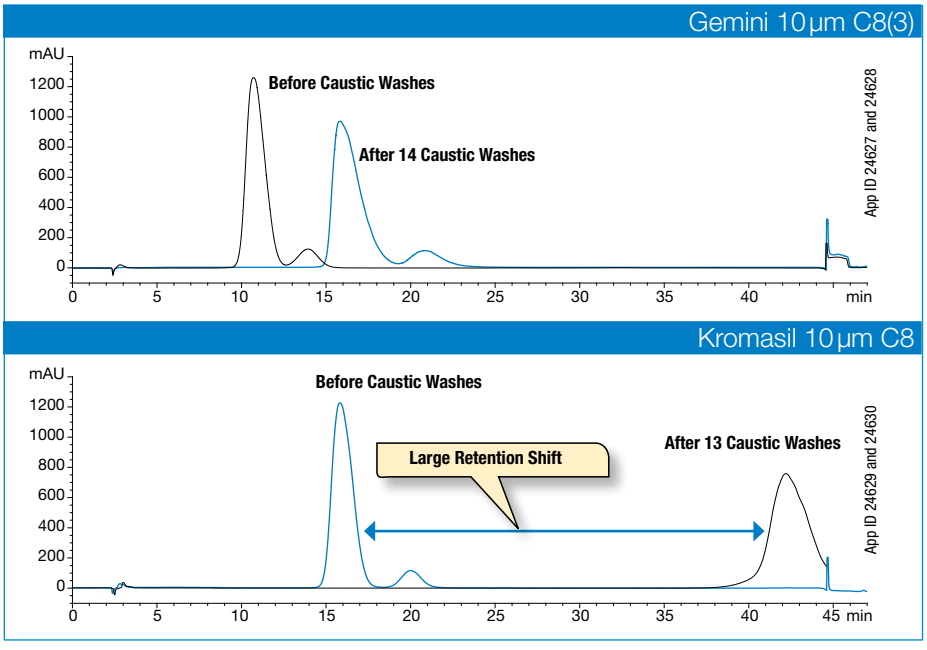
pH Stability:	**1.0 – 12.0**
Particle Size:	10 µm
Phase:	C8
Application:	Small molecules, peptides, proteins, oligonucleotides
Strength:	Elevated pH stability; Increased reproducibility; Enhanced robustness
Pore Size (Å):	100
Surface Area (m^2/g):	400
Carbon Load %:	13
End Capping:	TMS

Insulin Retention vs. Exposures to NaOH Wash



Running conditions are part of a confidential customer protocol.

Insulin Retention Comparison



Comparative separations may not be representative of all applications.

Gemini® pH Flexible LC Columns

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

Ordering Information

3 µm Capillary 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

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	AJ0-7596
C6-Phenyl	—	—	—	00B-4443-B0	00D-4443-B0	00F-4443-B0	00B-4443-Y0	00D-4443-Y0	00F-4443-Y0	AJ0-7914
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	AJ0-8367

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	AJ0-7597
C6-Phenyl	00A-4443-E0	00B-4443-E0	00D-4443-E0	00F-4443-E0	00G-4443-E0	AJ0-7915
NX-C18	—	00B-4453-E0	00D-4453-E0	00F-4453-E0	00G-4453-E0	AJ0-8368

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	AJ0-7596
C6-Phenyl	—	00B-4444-B0	00F-4444-B0	—	—	—	—	00G-4444-Y0	AJ0-7914
NX-C18	00A-4454-B0	00B-4454-B0	00F-4454-B0	—	00B-4454-Y0	00D-4454-Y0	00F-4454-Y0	00G-4454-Y0	AJ0-8367

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	AJ0-7597
C6-Phenyl	—	00B-4444-E0	00D-4444-E0	00F-4444-E0	00G-4444-E0	AJ0-7915
NX-C18	—	00B-4454-E0	00D-4454-E0	00F-4454-E0	00G-4454-E0	AJ0-8368

for ID: 3.2-8.0 mm

For Gemini Capillary HPLC Columns and Guards, contact your Phenomenex technical consultant or local distributor.

5 µm Semi-Prep Columns (mm)			SecurityGuard™ Cartridges (mm)
Phases	**150 x 10**	**250 x 10**	**10 x 10‡ /3pk**
C18	00F-4435-N0	00G-4435-N0	AJ0-7598
C6-Phenyl	—	00G-4444-N0	AJ0-9156
NX-C18	00F-4454-N0	00G-4454-N0	AJ0-8369

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•**
5 µm							/ea	/ea
C18	00B-4435-P0-AX	00D-4435-P0-AX	00F-4435-P0-AX	00G-4435-P0-AX	00B-4435-U0-AX	—	AJ0-7846	AJ0-8308
C6-Phenyl	—	00D-4444-P0-AX	00F-4444-P0-AX	00G-4444-P0-AX	—	—	AJ0-9157	AJ0-9158
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	AJ0-8370	AJ0-8371
10 µm							/ea	/ea
C18	—	00D-4436-P0-AX	00F-4436-P0-AX	00G-4436-P0-AX	—	—	AJ0-7846	AJ0-8308
NX-C18	00B-4455-P0-AX	00D-4455-P0-AX	00F-4455-P0-AX	00G-4455-P0-AX	—	—	AJ0-8370	AJ0-8371
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•**
5 µm							/ea
C18	00D-4435-U0-AX	00F-4435-U0-AX	00G-4435-U0-AX	—	—	—	AJ0-8308
NX-C18	00D-4454-U0-AX	00F-4454-U0-AX	00G-4454-U0-AX	—	—	—	AJ0-8371
10 µm							/ea
C18	00D-4436-U0-AX	00F-4436-U0-AX	00G-4436-U0-AX	—	00F-4436-V0-AX	00G-4436-V0-AX	AJ0-8308
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	AJ0-8371
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. 317-318

For PREP Columns & Bulk Media, see pp. 351-369

For SecurityGuard Holders and Cartridges, see pp. 311-316

For MercuryMS LC-MS Columns, Cartridges, and Cartridge Holders, Inquire.

*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

SFC APPROVED

Guaranteed Replacement to Hypersil®

- **Highly reproducible**
- **Long column life**
- **Mimics performance of Thermo Hypersil-Keystone Hypersil**
- **Economically priced**

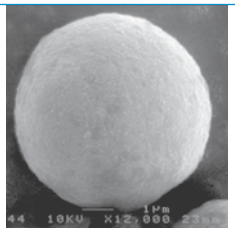
Phenomenex HyperClone columns have been developed to provide chromatographic behavior that mimics that of Thermo Hypersil columns. For comparative applications, please contact your local Phenomenex representative.

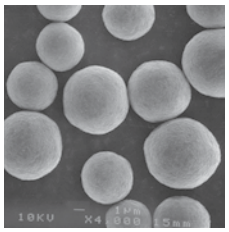
Comparisons of physical and chemical characteristics of HyperClone and Hypersil are listed below. As you can see, HyperClone and Hypersil compare very well for important specifications such as particle size, pore size, and carbon load.

HyperClone VS. Hypersil

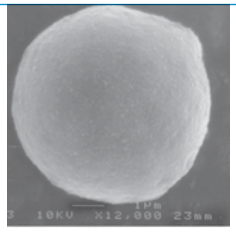
Material Characteristics

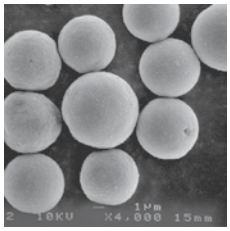
SEM of Base Silica





SEM of Base Silica





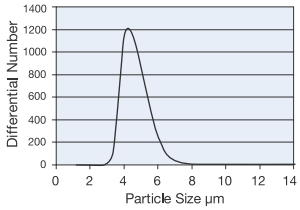
HyperClone (BDS silica)		Hypersil (BDS silica)‡
3, 5	Particle Size (µm)	3, 5
130	Pore Size (Å)	130
155	Surface Area (m^2/g)	170
0.6	Pore Volume (mL/g)	0.6

HyperClone (regular silica)		Hypersil† (regular silica)‡
3, 5	Particle Size (µm)	3, 5
120	Pore Size (Å)	120
155	Surface Area (m^2/g)	170
0.6	Pore Volume (mL/g)	0.6

HyperClone	Carbon Load %	Hypersil‡
7	BDS C8	7
11	BDS C18	11
6.5	MOS (C8)	6.5
10	ODS (C18)	10
4	CN (CPS)	4

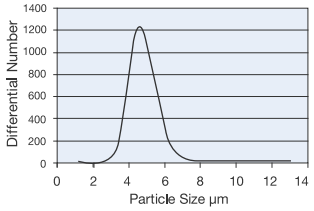
Particle Size Distribution‡

HyperClone

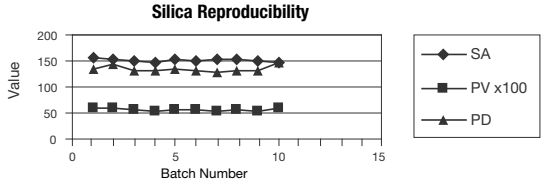


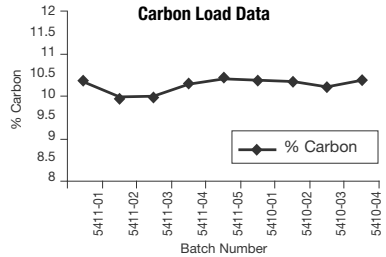
VS.

Hypersil



HyperClone Reproducibility



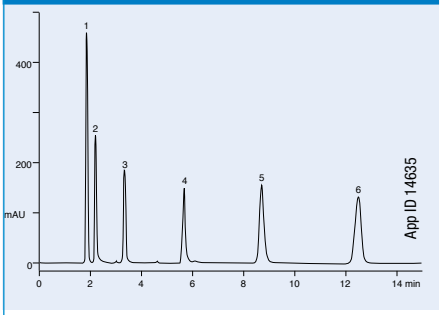


‡ All Hypersil information obtained from (then) Thermo Electron Corporaton 2006-2007 catalog and 2012-2013 Thermo Scientific Chromatography Columns catalog.

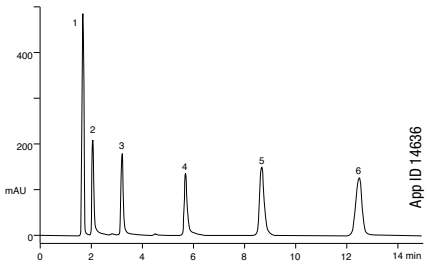
HyperClone™ Guaranteed Replacement to Hypersil

VS.

HyperClone™ 5 µm BDS C18



Hypersil® 5 µm BDS C18



Non-Polar Basic Compounds

Conditions for Both Columns

Dimensions: 150 x 4.6 mm
Mobile Phase: Methanol/50 mM KH_2PO_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)	
Phases	**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***
						/10pk	/10pk
ODS (C18)	—	00F-4356-B0	00D-4356-E0	00E-4356-D0	00F-4356-E0	AJ0-4286	AJ0-4287
						/10pk	/10pk
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)	
Phases	**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***
									/10pk	/10pk
Silica	—	—	—	—	—	—	00F-4358-E0	00G-4358-E0	AJ0-4347	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
									/10pk	/10pk
BDS C8	—	—	—	—	—	—	00F-4418-E0	00G-4418-E0	AJ0-4289	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. 311-315.

Comparative separations may not be representative of all applications.

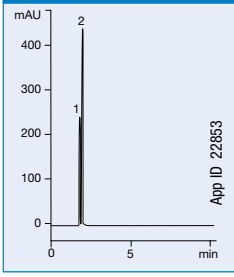
Guaranteed Replacement to Inertsil®

InertClone VS. Inertsil

Material Characteristics

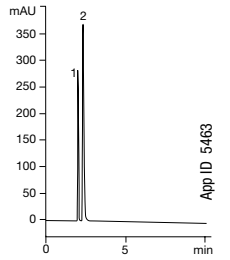
InertClone		Inertsil
Particle Size (µm) and Shape		
3, Spherical		3, Spherical
5, Spherical		5, Spherical
Pore Size (Å)		
150	Ph (Phenyl), C8, ODS-2	150
100	ODS-3	100
Surface Area (m^2/g)		
310	Ph (Phenyl), C8, ODS-2	320
450	ODS-3	450
Carbon Load %		
12.6	C8	10.5
18.5	ODS-2	18.5
15.5	ODS-3	15.0
10.0	Ph (Phenyl)	10.0

InertClone 5 µm C8



VS.

Inertsil 5 µm C8

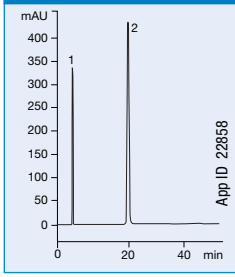


Inert Test 1

Conditions for both columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: Hexane
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Sample: 1.Benzene
2.o-Nitroanisole

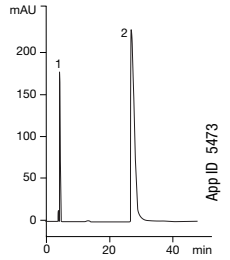
Note: Inertsil columns were manufactured by GL Sciences, Inc., Japan

InertClone 5 µm C8



VS.

Inertsil 5 µm C8



Amitriptyline

Conditions for both columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate, pH 7.0/ Acetonitrile (35:65)
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Sample: 1.Uracil
2.Amitriptyline

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***
				/10 pk
ODS-3	100Å	00D-4340-E0	00F-4340-E0	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***
					/10pk
ODS-2	150Å	00D-4342-E0	00F-4342-E0	00G-4342-E0	AJ0-4287
C8	150Å	—	00F-4391-E0	—	AJ0-4290
Ph (Phenyl)	150Å	—	00F-4352-E0	00G-4352-E0	AJ0-4351
					/10pk
ODS-3	100Å	—	00F-4341-E0	00G-4341-E0	AJ0-4287
					for ID: 3.2-8.0 mm

*SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJ0-4282

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^2/g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m^2)	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.

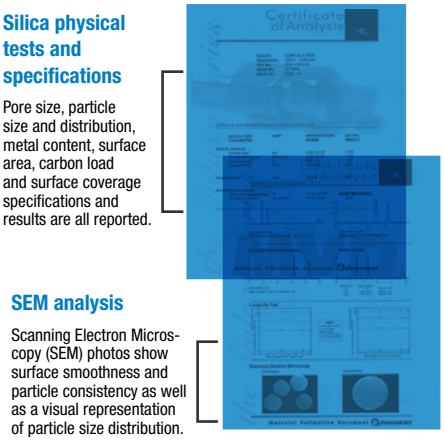
- **pH 1.5-10 stability gives robust, method development opportunities**
- **Over 25 individual quality control tests performed on every batch of Jupiter material**
- **Every column reproducibility aspect is specified, tested, and reported in Materials Validation Document (MVD)**

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

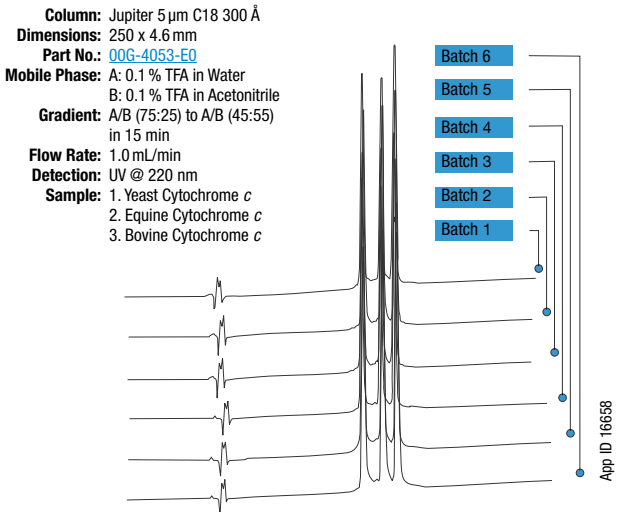
Monitoring chromatographic specifications for silanol activity, hydrogen bonding capacity, hydrophobicity and peptide standards.

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.



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	00B-4167-AC	—	00B-4167-AF	—	05M-4167-AC	05M-4167-AF
5 µm C18 300 Å	00B-4053-AC	—	00B-4053-AF	—	—	—
4 µm Proteo 90 Å	00B-4396-AC	00F-4396-AC	—	00F-4396-AF	—	—

3 µm, 4 µm & 5 µm Microbore and Minibore Columns (mm)						SecurityGuard™ 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*
							/10pk
5 µm C4 300 Å	00B-4167-A0	00F-4167-A0	00G-4167-A0	00B-4167-B0	00F-4167-B0	00G-4167-B0	AJ0-4329
5 µm C5 300 Å	—	—	—	—	00F-4052-B0	—	AJ0-4326
5 µm C18 300 Å	—	—	—	00B-4053-B0	00F-4053-B0	00G-4053-B0	AJ0-4320
4 µm Proteo 90 Å	00B-4396-A0	00F-4396-A0	—	00B-4396-B0	00F-4396-B0	00G-4396-B0	AJ0-6073
							/10pk
3 µm C18 300 Å	—	—	—	00B-4263-B0	00F-4263-B0	—	AJ0-4320
							for ID: 2.0-3.0 mm

3 µm, 4 µm & 5 µm Analytical, Semi-Prep, and Preparative Columns (mm)						SecurityGuard™ 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‡	15 x 21.2**
						/10pk	/3pk	/ea
5 µm C4 300 Å	00B-4167-E0	00F-4167-E0	00G-4167-E0	00G-4167-N0	00G-4167-P0	AJ0-4330	AJ0-7225	AJ0-7231
5 µm C5 300 Å	00B-4052-E0	00F-4052-E0	00G-4052-E0	00G-4052-N0	00G-4052-P0	AJ0-4327	AJ0-7371	—
5 µm C18 300 Å	00B-4053-E0	00F-4053-E0	00G-4053-E0	00G-4053-N0	00G-4053-P0	AJ0-4321	AJ0-7224	AJ0-7230
4 µm Proteo 90 Å	00B-4396-E0	00F-4396-E0	00G-4396-E0	00G-4396-N0	—	AJ0-6074	AJ0-7275	—
						/10pk	—	—
3 µm C18 300 Å	—	00F-4263-E0	00G-4263-E0	—	—	AJ0-4321	—	—
						for ID: 3.2-8.0 mm	9-16 mm	18-29 mm

10 µm Analytical, Semi-Prep, and Preparative Columns (mm)				SecurityGuard™ Cartridges (mm)		
Phases	250 x 4.6	250 x 10	250 x 21.2	4 x 3.0*	10 x 10 ‡	15 x 21.2**
				/10pk	/3pk	/ea
C4 300 Å	00G-4168-E0	00G-4168-N0	00G-4168-P0	AJ0-4330	AJ0-7225	AJ0-7231
C18 300 Å	00G-4055-E0	00G-4055-N0	00G-4055-P0	AJ0-4321	AJ0-7224	AJ0-7230
Proteo 90 Å	00G-4397-E0	00G-4397-N0	—	AJ0-6074	AJ0-7275	—
				for ID: 3.2-8.0 mm	9-16 mm	18-29 mm

15 µm Analytical, Semi-Prep, and Preparative Columns (mm)						SecurityGuard™ 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‡	15 x 21.2**	15 x 30.0♦
						/10pk	/3pk	/ea	/ea
C4 300 Å	00G-4169-E0	00G-4169-N0	00G-4169-P0	—	00G-4169-V0	AJ0-4330	AJ0-7225	AJ0-7231	—
C18 300 Å	00G-4057-E0	—	00G-4057-P0	00G-4057-U0	00G-4057-V0	AJ0-4321	AJ0-7224	AJ0-7230	AJ0-8313
						for ID: 3.2-8.0 mm	9-16 mm	18-29 mm	30-49 mm

For Jupiter Proteo Axia™ Packed Preparative columns, see p. 361

*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

Ordering Information

Bulk Material

10 µm Bulk Packings			
Phases	100 g	1 kg	10 kg
C4 300 Å	04G-4168	04K-4168	04M-4168
C5 300 Å	—	04K-4054	—
C18 300 Å	04G-4055	04K-4055	04M-4055
Proteo 90 Å	04G-4397	04K-4397	—

15 µm Bulk Packings				
Phases	100 g	1 kg	5 kg	10 kg
C4 300 Å	04G-4169	04K-4169	04L-4169	04M-4169
C18 300 Å	04G-4057	04K-4057	—	04M-4057

Effectively desalt acidic, basic, and neutral peptides with Strata®-X. See p. 61 for more information.

For SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315

For Column Heater (25-90 °C), see p. 390

2010 R&D 100 Award Recipient

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	
1.3 µm	■			Incredible UHPLC efficiency and performance gains
1.7 µm	■			20 % higher efficiency than fully porous 1.7 µm columns
2.6 µm	■	■		Achieve sub-2 µm performance on HPLC and UHPLC systems
3.5 µm		■		Instantly improve your pharmacopoeia (Ph. Eur. & USP) monographs that require 3.5 µm particle size
5 µm		■	■	3 µm or better efficiencies at 5 µm pressures for HPLC and PREP LC methods

For more information on Kinetex PREP LC applications, see p. 359

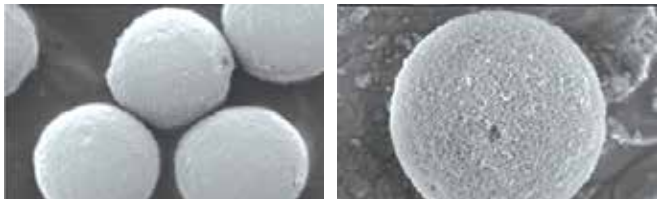
SelectScience® 2017 GOLD Seal of Quality

Kinetex has earned the Gold Seal of Quality!
Learn more at:
www.phenomenex.com/Gold

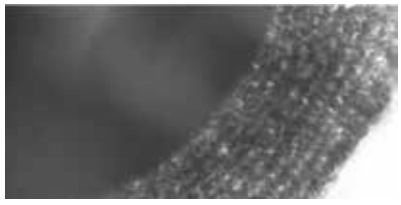
Innovation in Particle Technology

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

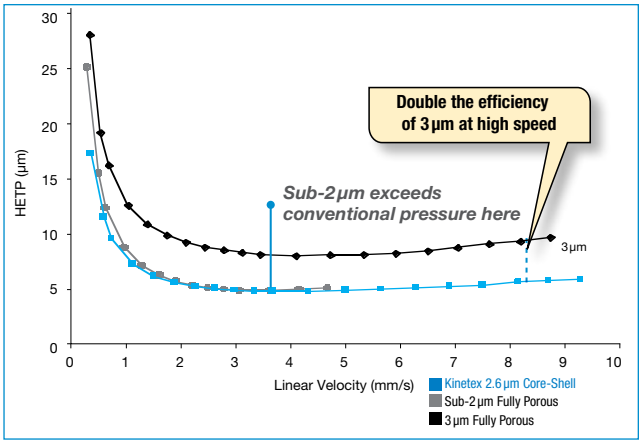


Illustration of Eddy Diffusion Effects

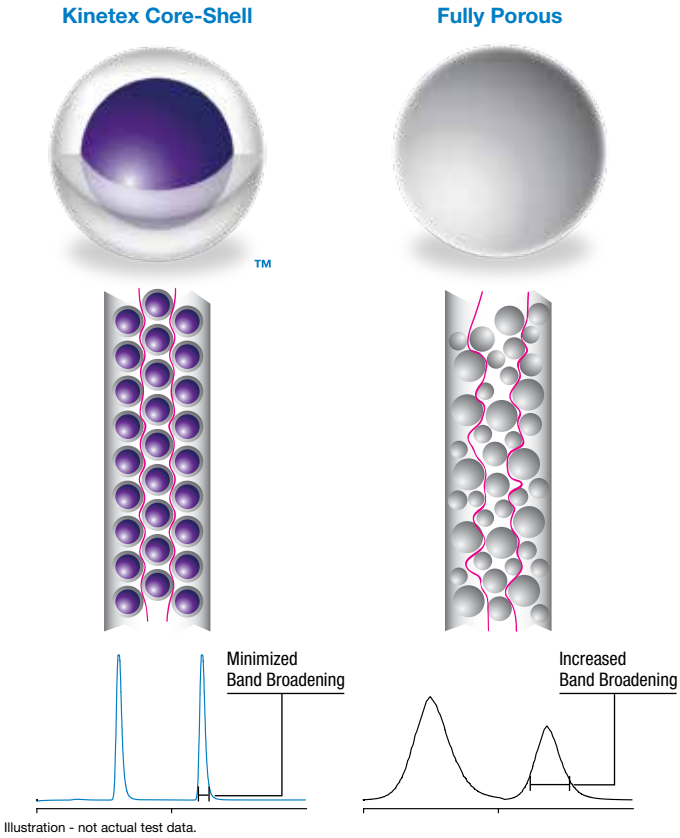
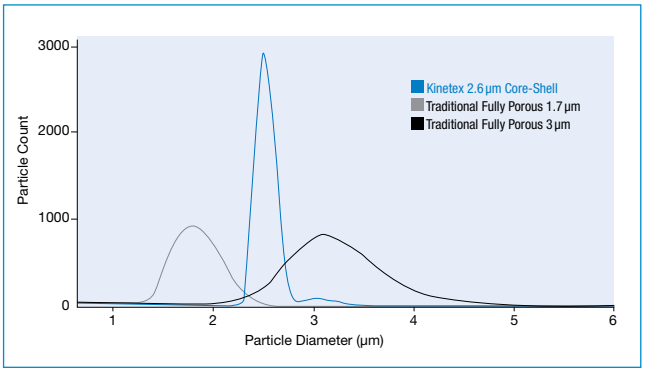


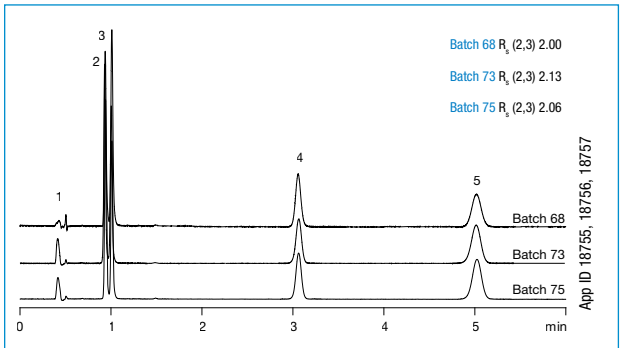
Illustration - not actual test data.

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

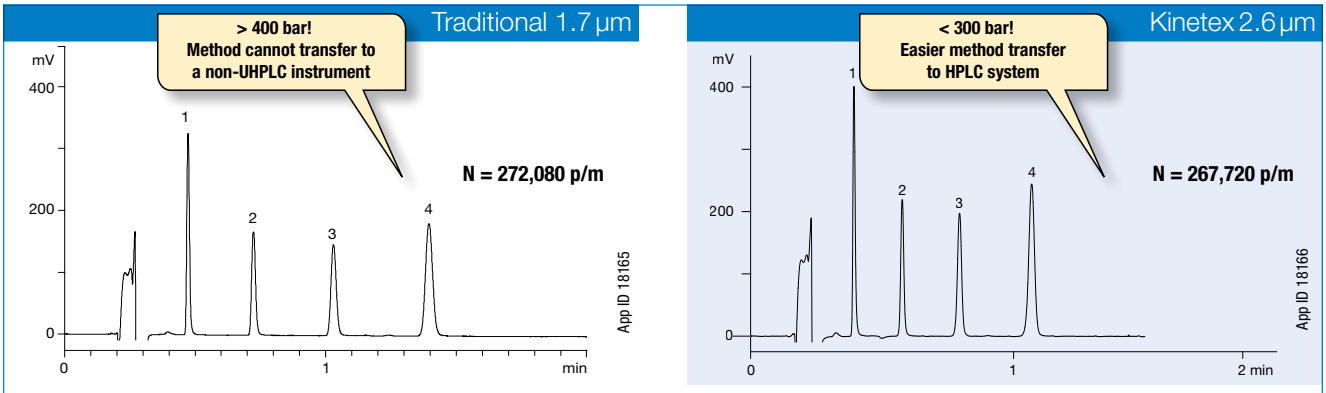


Conditions same for all batches:

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: 1. Uracil
2. Hydroxycortisone
3. Cortisone
4. Cortisone acetate
5. 17-Hydroxyprogesterone

Achieve Sub-2 µm Performance within HPLC Backpressure Limitations

With the efficiency of a sub-2 µm column and typical operating backpressure less than 400 bar†, you can achieve the promise of ultra-high performance on **any LC system**.



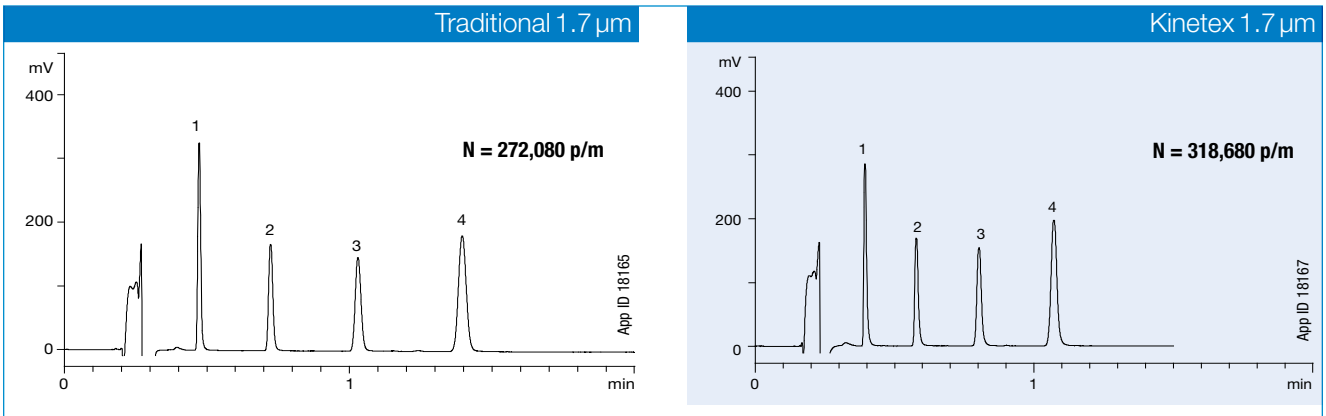
Conditions for both columns:

Column: Kinetex 2.6 µm C18
Traditional 1.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.6 mL/min
Temperature: 25 °C
Detection: UV @ 254 nm
Instrument: Waters® ACQUITY® UPLC®
Sample: 0.5 µL test mixture

1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene

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 µm column—the first sub-2 µm core-shell particle to be available on the market.



Conditions for both columns:

Column: Kinetex 1.7 µm C18
Traditional 1.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.6 mL/min
Temperature: 25 °C
Detection: UV @ 254 nm
Instrument: Waters® ACQUITY® UPLC®
Sample:

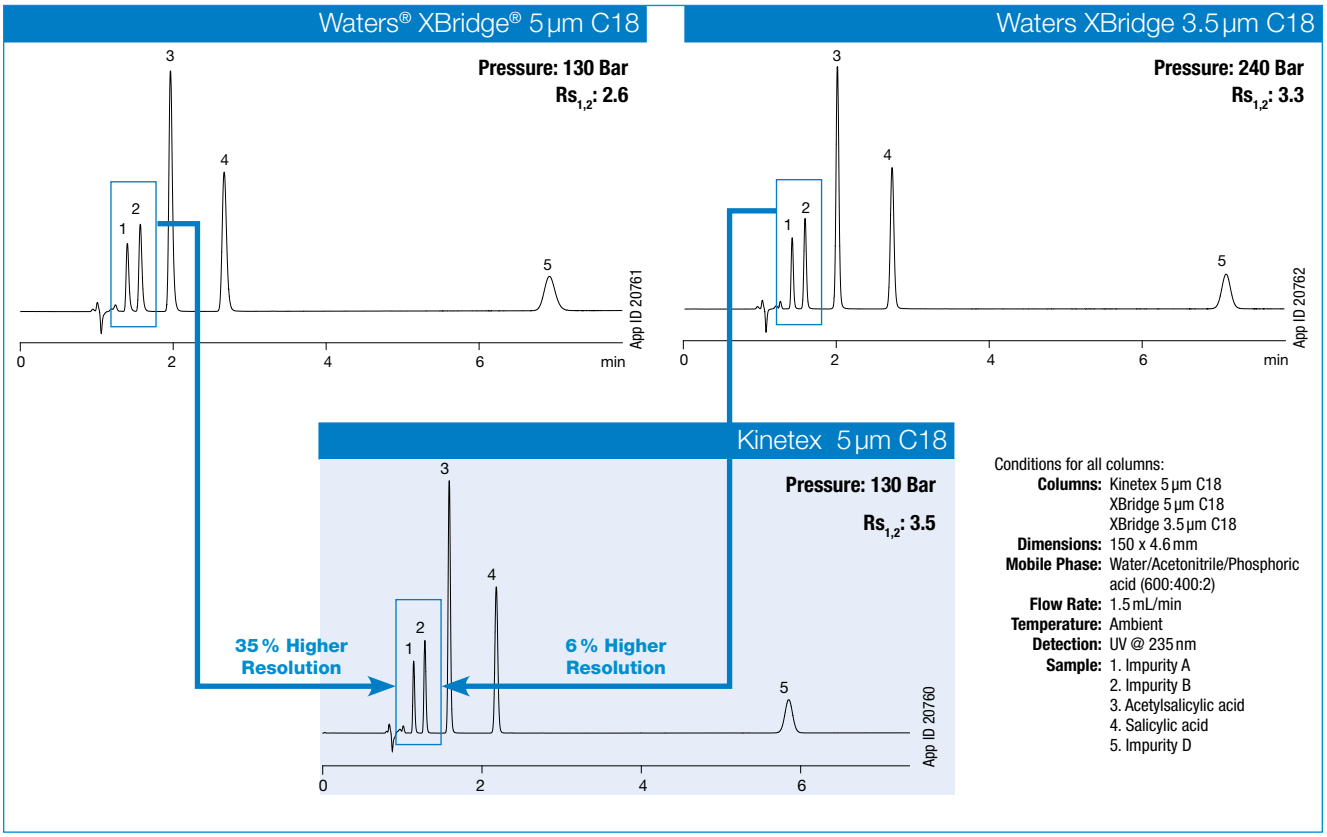
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene

† Kinetex 2.6 µm 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 µm columns with Kinetex 5 µm core-shell columns for immediate improvements in resolution, productivity, and sensitivity.

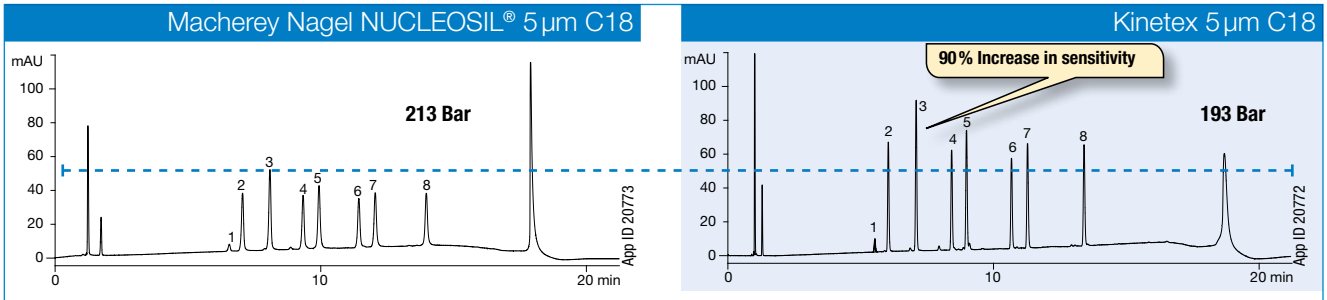


Conditions for all columns:

Columns: Kinetex 5 µm C18
XBridge 5 µm C18
XBridge 3.5 µm C18
Dimensions: 150 x 4.6 mm
Mobile Phase: Water/Acetonitrile/Phosphoric acid (600:400:2)
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV @ 235 nm
Sample: 1. Impurity A
2. Impurity B
3. Acetylsalicylic acid
4. Salicylic acid
5. Impurity D

Enhanced Sensitivity at 5 µm Pressure

Kinetex 5 µm core-shell columns easily provide enhanced sensitivity on any HPLC system without an increase in backpressure.



Conditions for both columns:

Columns: Kinetex 5 µm C18
NUCLEOSIL 5 µm C18
Dimension: 150 x 4.6 mm
Mobile Phase: A: Milli-Q® Water
B: Acetonitrile
Gradient:

Time (min)	% B
0	30
15	95
16	95
17	30
20	30

Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV @ 205 nm
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

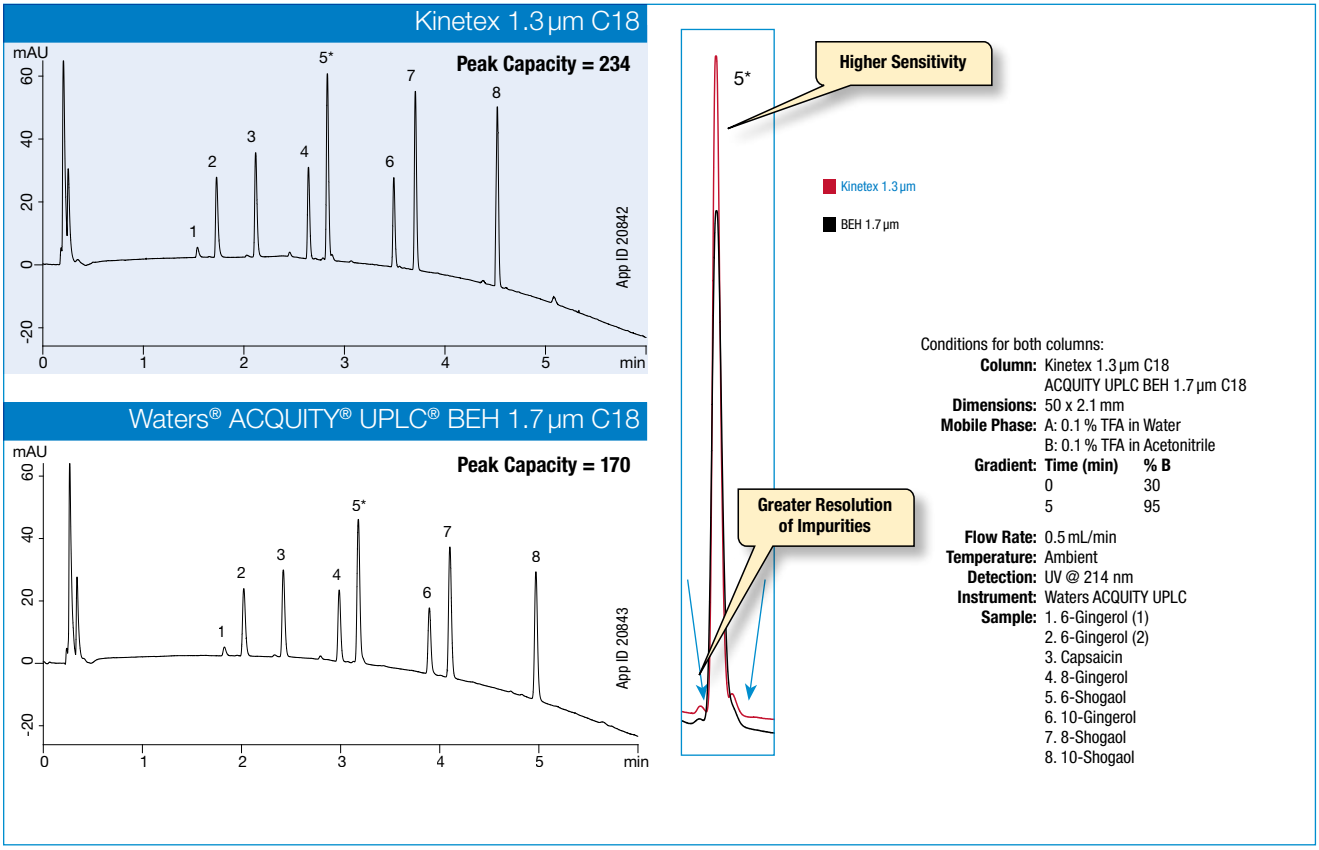
Comparative separations may not be representative of all applications.

Get the Most Performance Out of Your UHPLC System

Kinetex 1.3 µm, 1.7 µm, and 2.6 µm core-shell particles were engineered to provide incredible efficiency gains and improved performance compared to traditional fully porous sub-2 µm particles on UHPLC systems.

- **Increase resolution, throughput, and sensitivity**
- **Save time and money**
- **1.3 µm, 1.7 µm and 2.6 µm 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 µm available in C18)**

1.3 µm and 1.7 µm Kinetex core-shell columns are scalable sub-2 µm core-shell particles, and produce up to 50 % and 20 % higher efficiencies respectively than sub-2 µm fully porous particles, taking UHPLC to the next level.

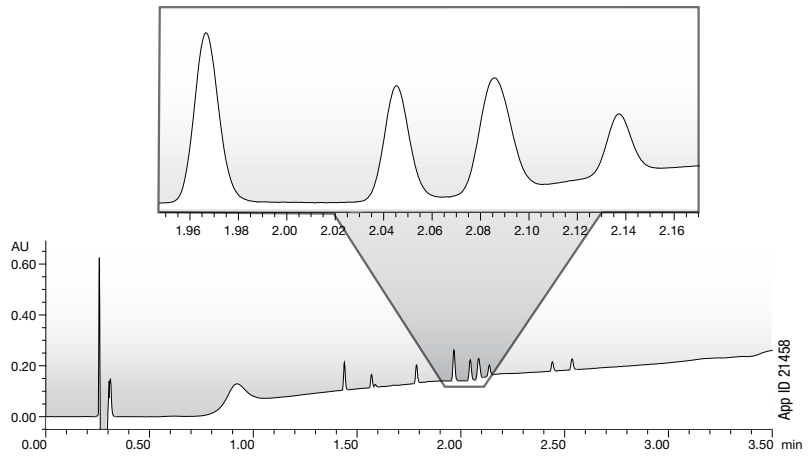


Comparative separations may not be representative of all applications.

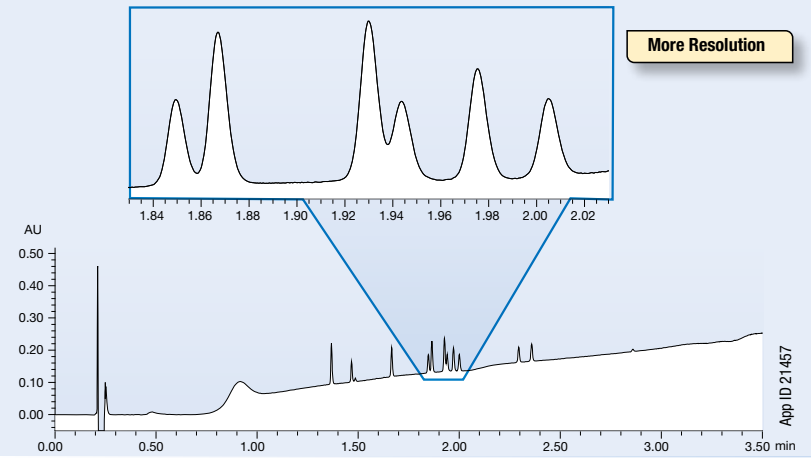
Our New Standard for UHPLC

Bring your UHPLC analyses to the next level with the resolving power of Kinetex 1.3 µm Core-Shell Technology. It's time you were able to see MORE!

Waters® ACQUITY® BEH 1.7 µm C18



Kinetex 1.3 µm C18



Conditions for all columns same except where noted:

Columns: Waters ACQUITY UPLC® BEH 1.7 µm C18
Kinetex 1.3 µm 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

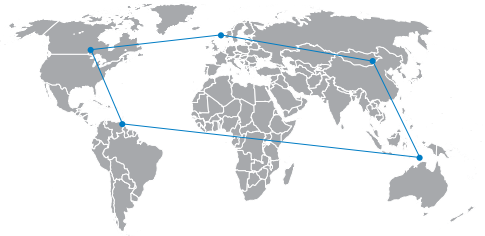
Flow Rate: 0.5 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Instrument: Waters ACQUITY UPLC

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-ethynylestradiol
9. Estrone
10. Deoxycorticosterone acetate
11. Progesterone

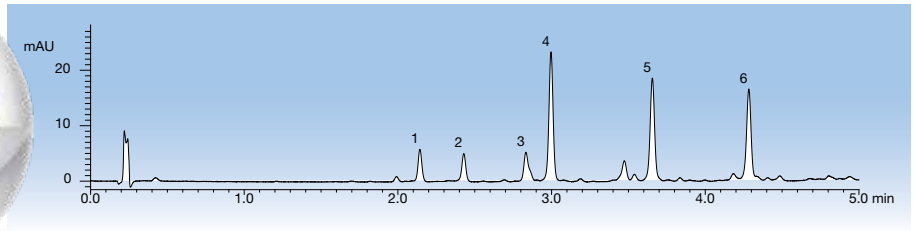
Comparative separations may not be representative of all applications.

Analytical Scalability and Portability HPLC to UHPLC

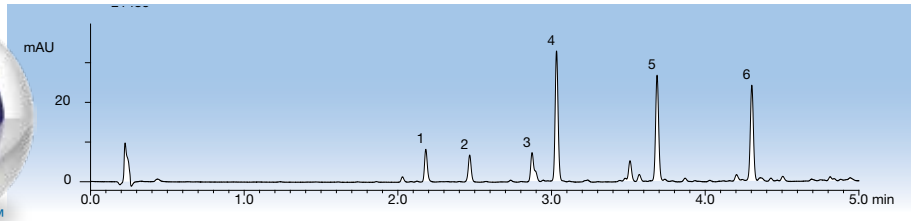
UHPLC methods developed with fully porous sub-2 µm columns often generate backpressure higher than HPLC system limitations. With Kinetex 5 µm, 2.6 µm, 1.7 µm, and 1.3 µm core-shell technology, you are no longer restricted from developing high performance LC methods and transferring them anywhere. These four scalable Kinetex particle sizes offer you the ability to develop and transfer your method effortlessly from system to system.



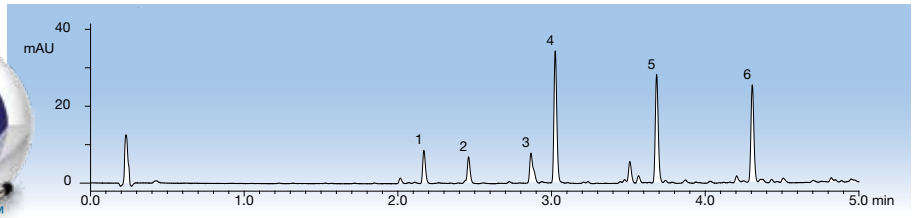
4 Kinetex particles give you full scalability HPLC ⟷ UHPLC



Kinetex 5 µm: 3 µm or better efficiencies at 5 µm pressures for HPLC and PREP LC methods

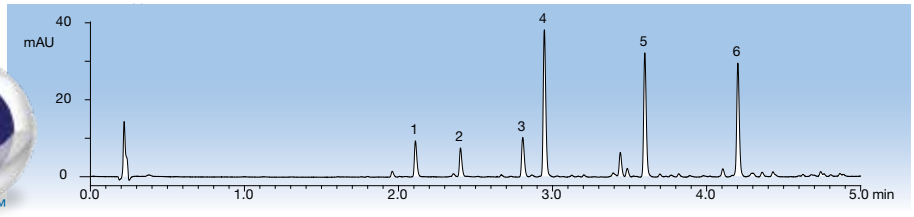


Kinetex 2.6 µm: Achieve sub-2 µm performance on HPLC and UHPLC systems



Kinetex 1.7 µm: 20 % higher efficiency than fully porous 1.7 µm columns

for Kinetex 1.3 µm UHPLC columns



Kinetex 1.3 µm: Incredible UHPLC efficiency and performance gains

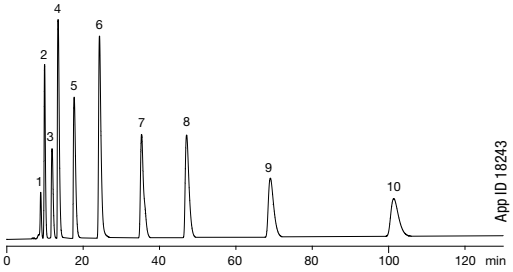
[1]Gingerols analyzed on 50 x 2.1 mm columns

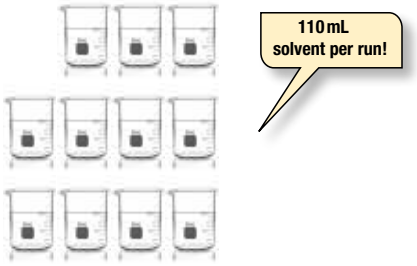
Improve Performance, Save Solvent

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

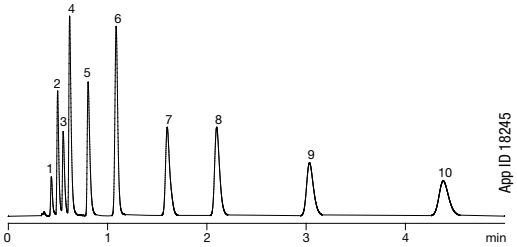
Example Method Consumption

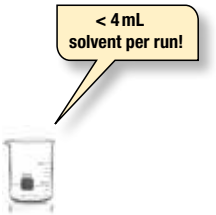




Column: Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4462-AN
Flow Rate: 0.6 mL/min

Less Solvent Consumption with Kinetex Column





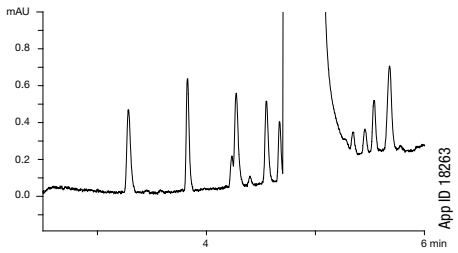
Conditions for both columns:
Mobile Phase: A: 20 mM Potassium phosphate pH 7
B: Methanol / Acetonitrile (50:50)
A/B (48:52)
Temperature: 40 °C
Detection: UV @ 254 nm

Sample:
1. Tianeptine
2. Desmethyldoxepin
3. Protriptyline
4. Desipramine
5. Imipramine
6. Amoxapine
7. Doxepin
8. Nortriptyline
9. Amitriptyline
10. Clomipramine

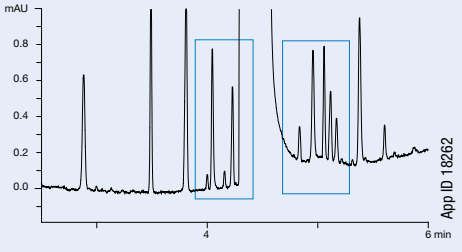
Reach Lower Levels of Detection and Quantitation

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® ZORBAX® 3.5 µm SB-C18



Kinetex 2.6 µm C18



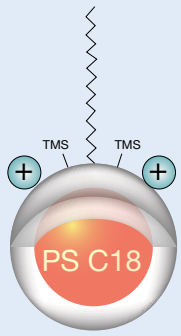
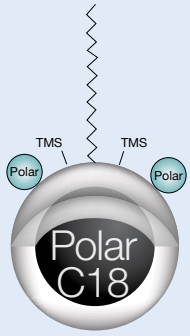
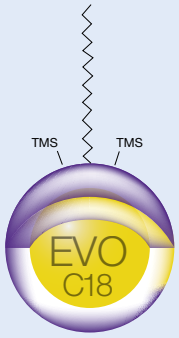
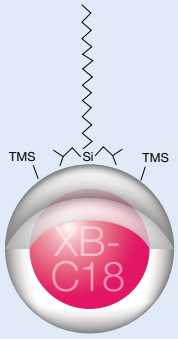
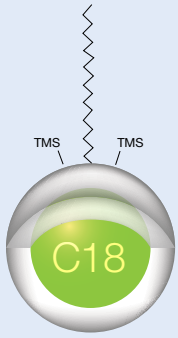
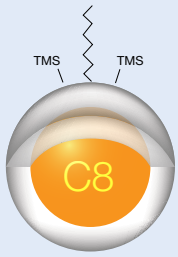
Conditions for both columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: A: Water
B: Acetonitrile
Gradient: (95:5) A/B for 1.16 min, then to (5:95) A/B
Flow Rate: 1.5 mL/min
Temperature: 45 °C
Detection: UV @ 254 nm
Instrument: Agilent 1200

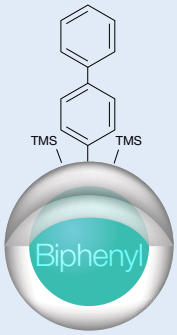
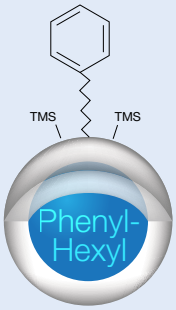
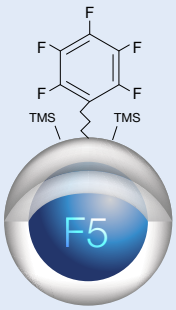
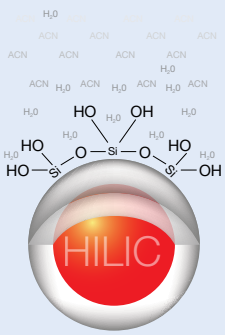
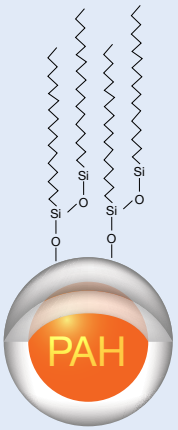
Sample:
1. Pyridine
2. Acetaminophen
3. Pindolol
4. Quinine
5. Acebutolol
6. Chlorpheniramine
7. Triprolidine
8. Prednisolone
9. Nortriptyline
10. 4-Chlorobenzoic acid
11. 5-Methyl-2-hydroxy benzaldehyde
12. 4-Chlorocinnamic acid
13. Diazepam
14. Diflunisal
15. Niflumic acid
16. Hexanophenone

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
pH Range: 1.5 – 8.5* **USP Classification:** L1 **Effective Carbon Load:** 9 %	**pH Range:** 1.5 – 8.5* **USP Classification:** L1 **Effective Carbon Load:** 9 %	**pH Range:** 1 – 12 **USP Classification:** L1 **Effective Carbon Load:** 11 %	**pH Range:** 1.5 – 8.5* **USP Classification:** L1 **Effective Carbon Load:** 10 %	**pH Range:** 1.5 – 8.5* **USP Classification:** L1 **Effective Carbon Load:** 12 %	**pH Range:** 1.5 – 8.5* **USP Classification:** L7 **Effective Carbon Load:** 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
pH Range: 1.5 – 8.5* **USP Classification:** L11 **Effective Carbon Load:** 11 %	**pH Range:** 1.5 – 8.5* **USP Classification:** L11 **Effective Carbon Load:** 11 %	**pH Range:** 1.5 – 8.5 **USP Classification:** L43 **Effective Carbon Load:** 9 %	**pH Range:** 2.0 – 7.5 **USP Classification:** L3 **Carbon Load:** –	**pH Range:** 1.5 – 8.5* **USP Classification:** L118 **Carbon Load:** 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/C8	Biphenyl	EVO C18	Polar C18	EVO C18	F5
F5	XB-C18	Biphenyl	Phenyl-Hexyl	Polar C18	F5		
HILIC			F5	PS C18	Biphenyl		
				XB-C18	HILIC		

Column Characteristics

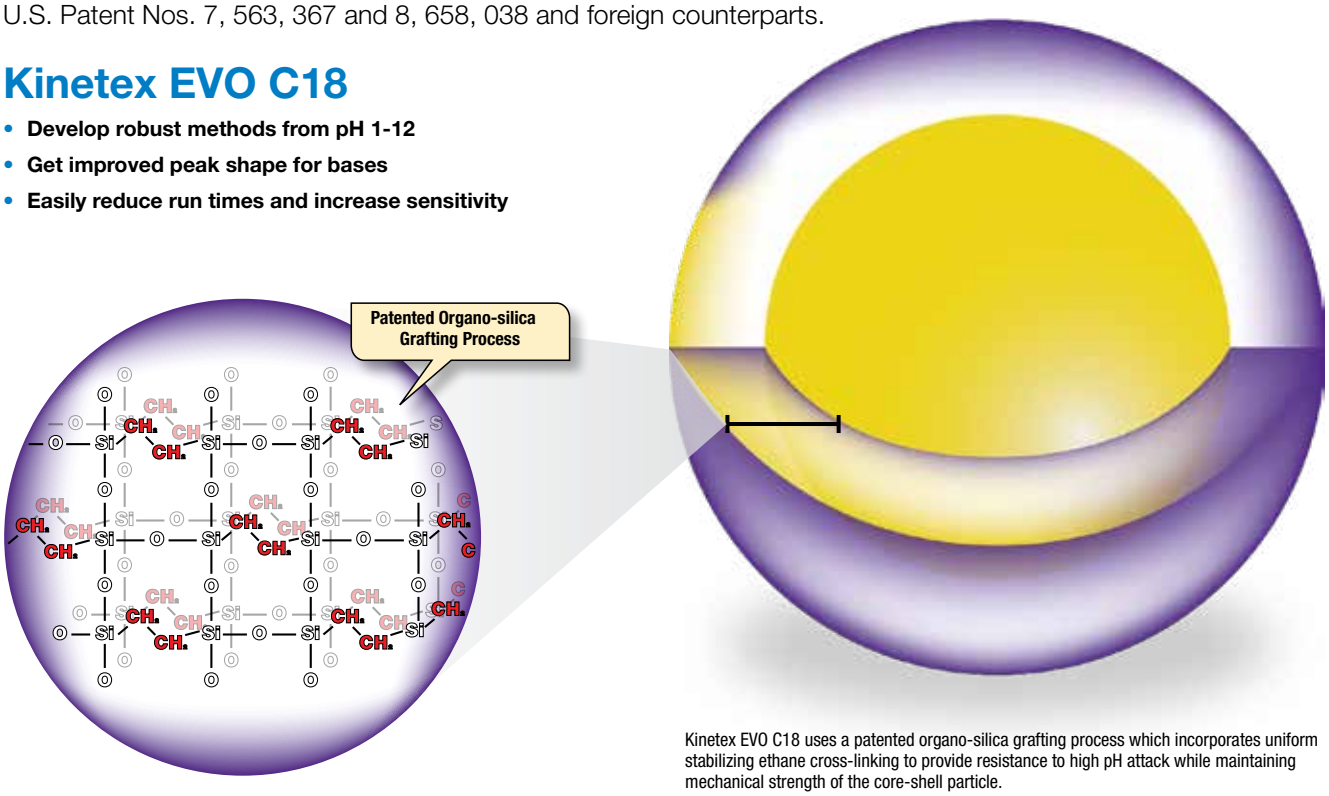
Kinetex Phases	Shipping Solvent†	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	pH Stability	Reversed Phase	Normal Phase	HILIC	100% Aqueous Stable
Polar C18	Acetonitrile / Water (50:50)	2.6	100	200	9	1.5-8.5*	●			●
PS C18	Acetonitrile / Water (50:50)	2.6	100	200	9	1.5-8.5*	●			●
C18	Acetonitrile / Water (50:50)	1.3, 1.7, 2.6, 5	100	200	12	1.5-8.5*	●			
EVO C18	Acetonitrile / Water (45:55)	1.7, 2.6, 5	100	200	11	1-12	●			●
XB-C18	Acetonitrile / Water (50:50)	1.7, 2.6, 3.5, 5	100	200	10	1.5-8.5*	●			
C8	Acetonitrile / Water (45:55)	1.7, 2.6, 5	100	200	8	1.5-8.5*	●			
Biphenyl	Acetonitrile/Water w/ 0.1 % Formic Acid (50:50)	1.7, 2.6, 5	100	200	11	1.5-8.5*	●			●
Phenyl-Hexyl	Acetonitrile / Water (45:55)	1.7, 2.6, 5	100	200	11	1.5-8.5*	●			
F5	Acetonitrile / Water (40:60)	1.7, 2.6, 5	100	200	9	1.5-8.5*	●		●	●
HILIC	Acetonitrile / 100 mM Ammonium Formate (93:7)	1.7, 2.6, 5	100	200	0	2.0-7.5		●	●	
PAH	Acetonitrile / Water (65:35)	3.5	—	—	12	1.5-8.5*	●			

† 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.

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**

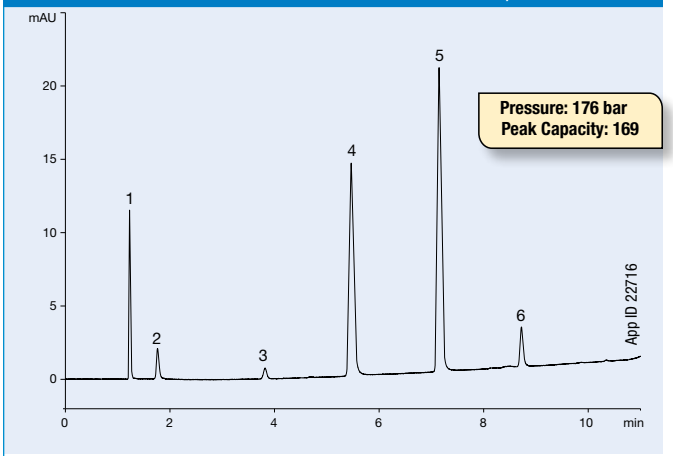


Kinetex EVO C18 uses a patented organo-silica grafting process which incorporates uniform stabilizing ethane cross-linking to provide resistance to high pH attack while maintaining mechanical strength of the core-shell particle.

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.

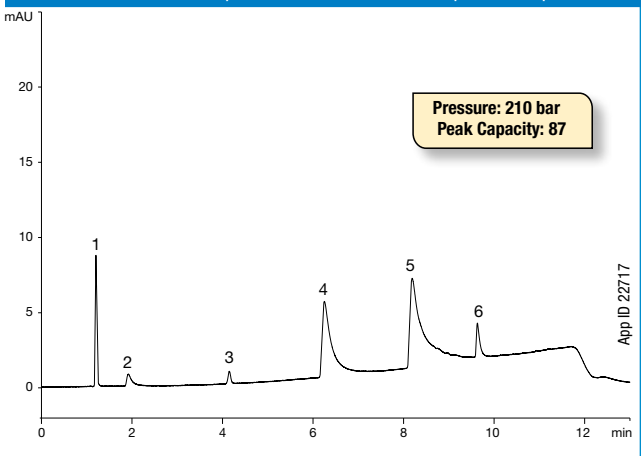
Kinetex 5 µm EVO C18



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

Supelco® Ascentis® Express 5 µm C18



Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Maleate
2. Pseudoephedrine
3. Scopolamine
4. Doxylamine
5. Chlorpheniramine
6. Diphenhydramine

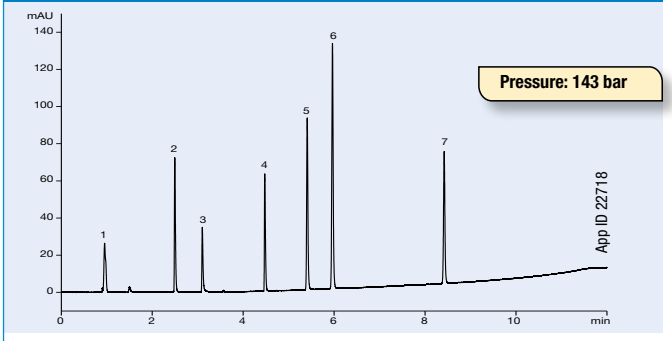
Comparative separations may not be representative of all applications.

U.S. Patent Nos. 7, 563, 367 and 8, 658, 038 and foreign counterparts.

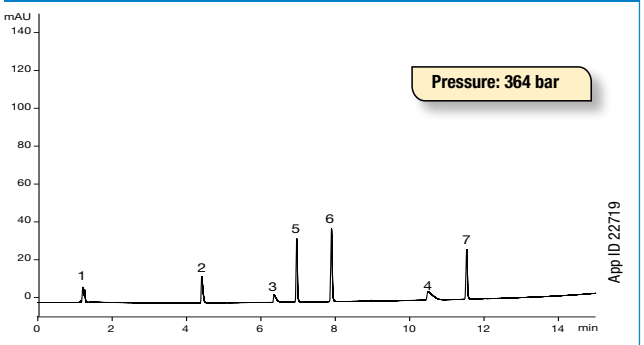
Drop in a Kinetex EVO 5µm Column to Start Smiling

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.

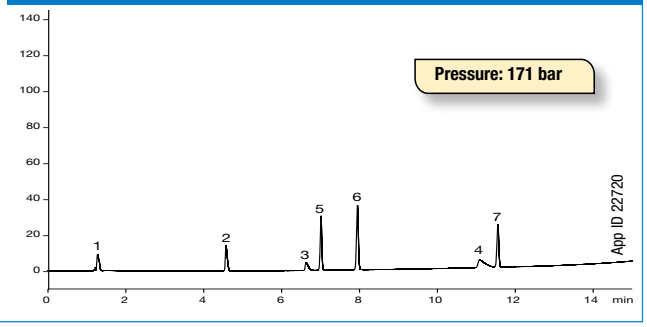
Kinetex 5µm EVO C18



Waters® XBridge® 3.5µm C18



Waters XBridge 5µm C18



Conditions for both columns:

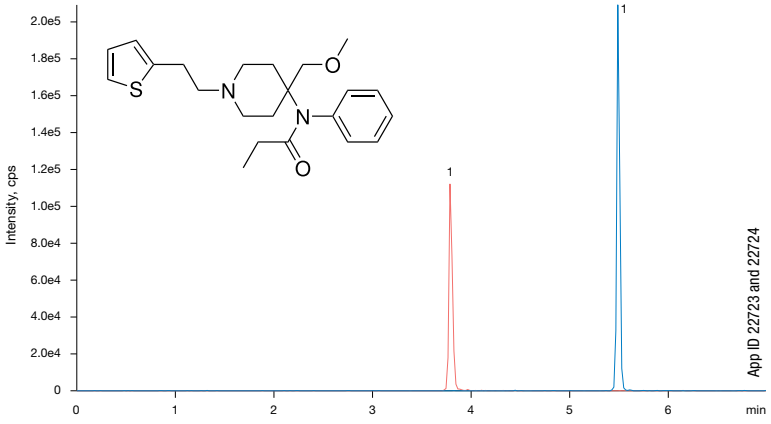
Column: Kinetex 5µm EVO C18
XBridge 5µm C18
XBridge 3.5µm C18
Dimensions: 150 x 4.6mm
Mobile Phase: A: 0.1% Formic acid in Water
B: 0.1% Formic acid in Acetonitrile
Gradient: 5% to 95% **B** over 10 minutes
Flow Rate: 1.5mL/min
Temperature: Ambient
Detection: UV @ 254nm

Sample: 1. Uracil
2. Pindolol
3. Chloropheniramine
4. Nortriptyline
5. 3-Methyl-4-Nitrobenzoic acid
6. 5-Methyl Salicyl Aldehyde
7. Hexaphenone

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: 10mM Ammonium Bicarbonate (pH 8.2)
B: Methanol

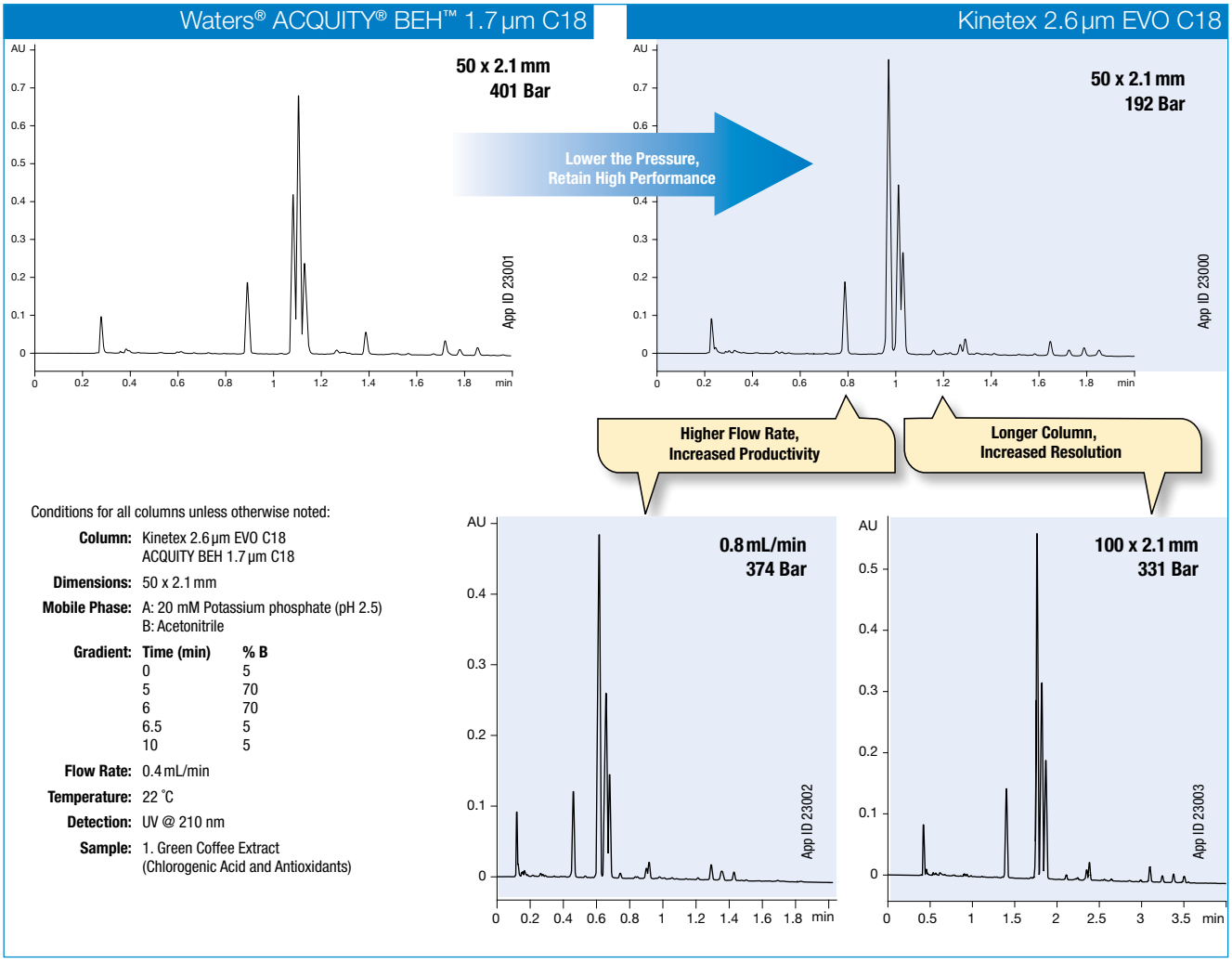
Gradient:	**Time (min)**	**% B**
	0	10
	0.5	10
	2	25
	4.5	80
	4.51	85
	5.5	85
	5.51	10
	7	10

Flow Rate: 0.5mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX®API 4000™)
Sample: 1. Sufentanil

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 µm Kinetex EVO C18 columns are an amazing UHPLC solution. Start by matching a Kinetex 2.6 µm column to the sub-2 µm 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.



Conditions for all columns unless otherwise noted:

Column: Kinetex 2.6 µm EVO C18
ACQUITY BEH 1.7 µm C18

Dimensions: 50 x 2.1 mm

Mobile Phase: A: 20 mM Potassium phosphate (pH 2.5)
B: Acetonitrile

Gradient:

Time (min)	% B
0	5
5	70
6	70
6.5	5
10	5

Flow Rate: 0.4 mL/min

Temperature: 22 °C

Detection: UV @ 210 nm

Sample: 1. Green Coffee Extract
(Chlorogenic Acid and Antioxidants)

Comparative separations may not be representative of all applications.

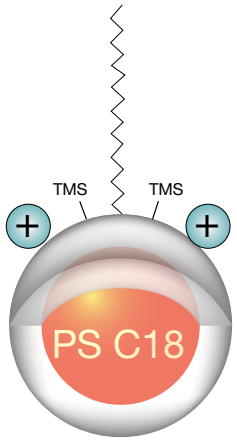
Kinetex PS C18

- **Enhanced polar retention**
- **Improved peak shape for bases**
- **Multi-modal interaction selectivity**

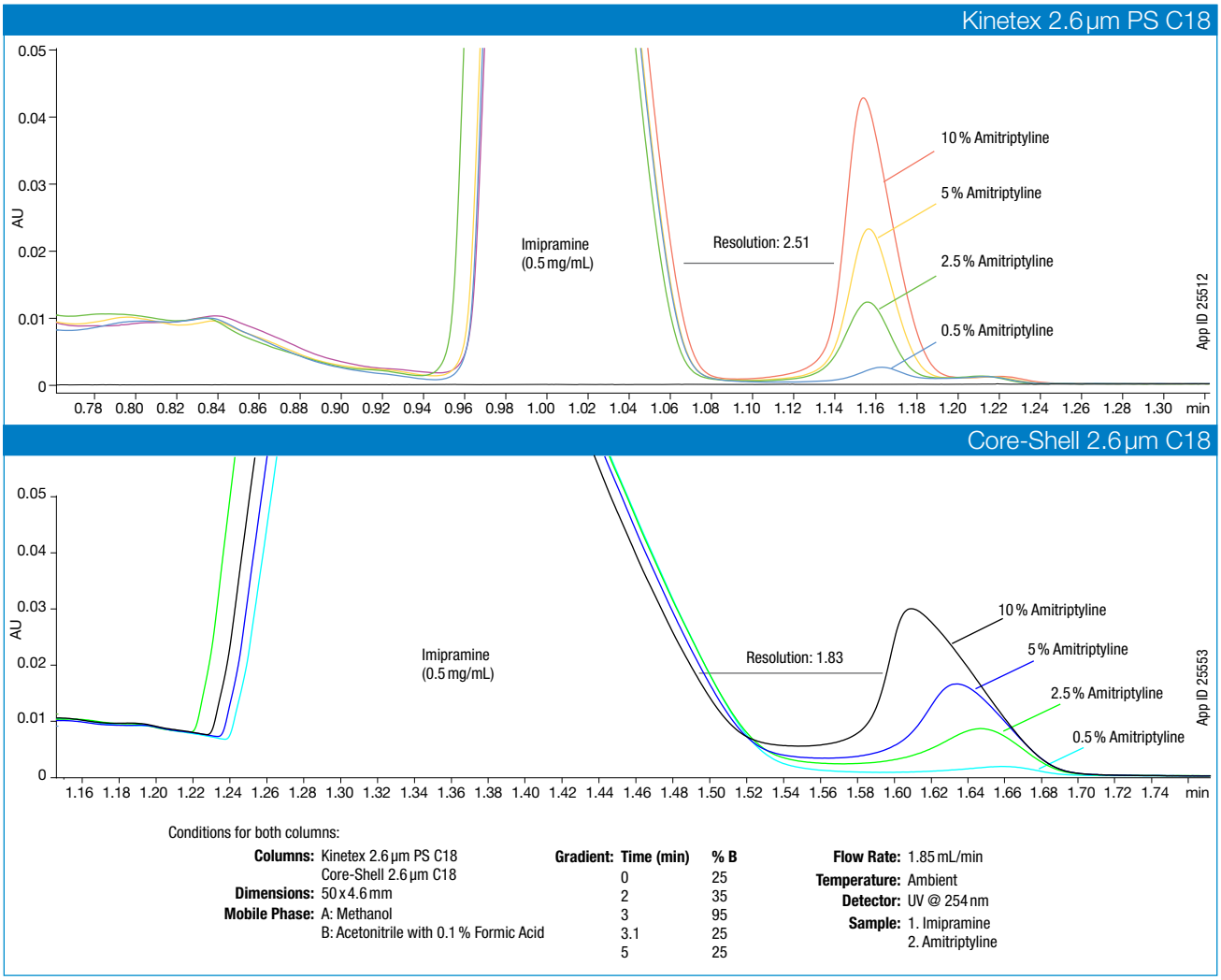
A Versatile C18

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



Conditions for both columns:

Columns: Kinetex 2.6 µm PS C18
Core-Shell 2.6 µm C18
Dimensions: 50 x 4.6 mm
Mobile Phase: A: Methanol
B: Acetonitrile with 0.1 % Formic Acid

Gradient: Time (min)	% B
0	25
2	35
3	95
3.1	25
5	25

Flow Rate: 1.85 mL/min
Temperature: Ambient
Detector: UV @ 254 nm
Sample: 1. Imipramine
2. Amitriptyline

Comparative separations may not be representative of all applications.

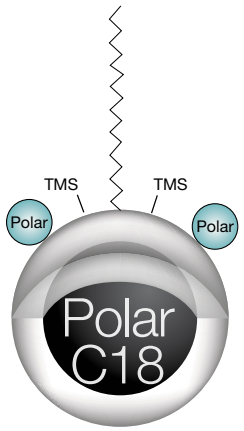
Kinetex Polar C18

- **100 % aqueous stable**
- **Enhanced selectivity for polar analytes**
- **Orthogonal selectivity to traditional C18 phases**

A Versatile C18

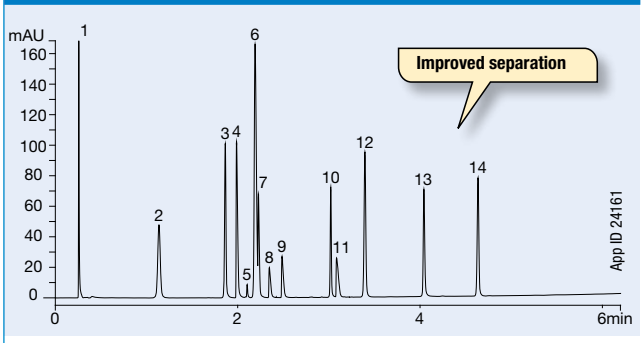
Who said all C18's are the same? By combining C18 ligands with a polar-modified surface, you can now achieve greater retention of polar and nonpolar compounds while ensuring 100 % aqueous stability.

Kinetex Polar C18

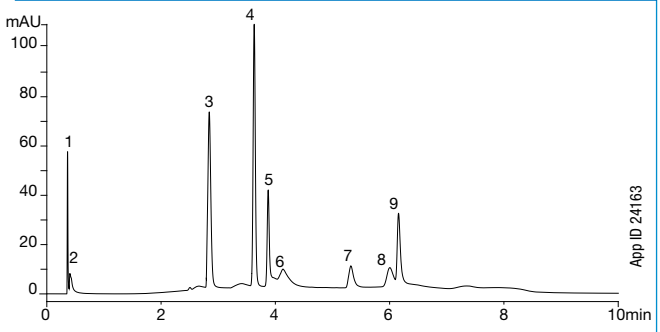


Acids, Bases, and Neutrals

Kinetex 2.6 µm Polar C18



Thermo Scientific® 3 µm Hypercarb®



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 Acentonitrile

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:

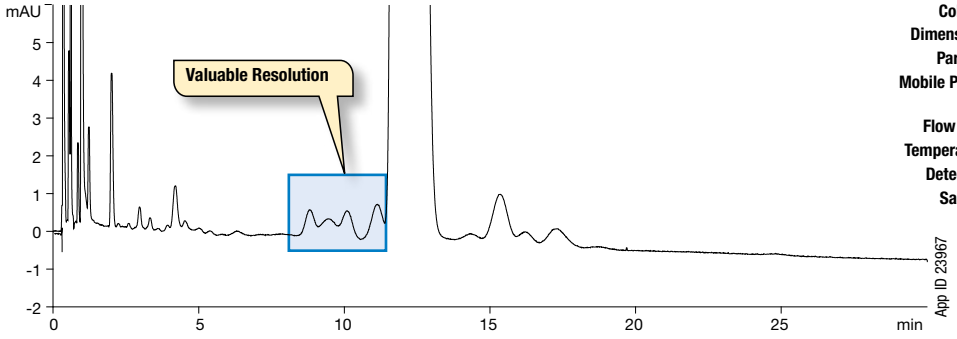
1. Pyridine
2. Acetaminophen
3. Sulfathiozole
4. Quinidine
5. Quinidine Impurity
6. Phenol
7. Acebutolol
8. Chlorpheniramine
9. Triprolidine
10. Prednisolone
11. Nortriptyline
12. 5-Methyl Salicyl Aldehyde
13. Diflunisal
14. Hexanophenone

Comparative separations may not be representative of all applications.

Enhanced Polar Selectivity

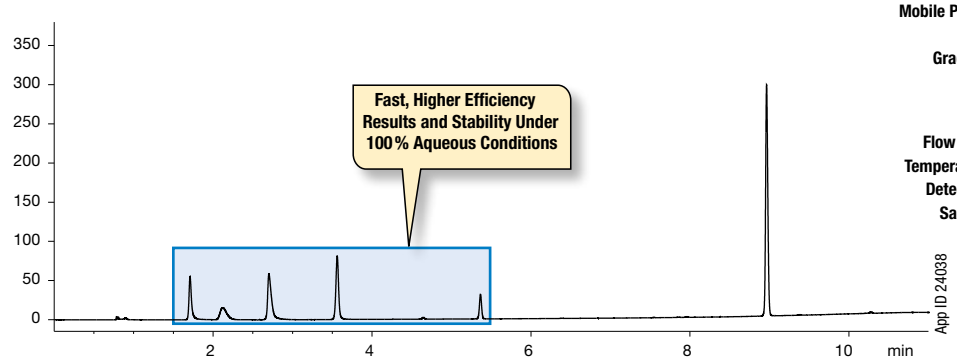
The Kinetex Polar C18 contains a C18 ligand alongside a polar modified surface that increases polar compound retention and improves resolution values. Additionally, the advanced proprietary bonding technology used with this phase ensures 100 % aqueous stability as well as balanced retention on non-polar 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

Water Soluble Vitamins



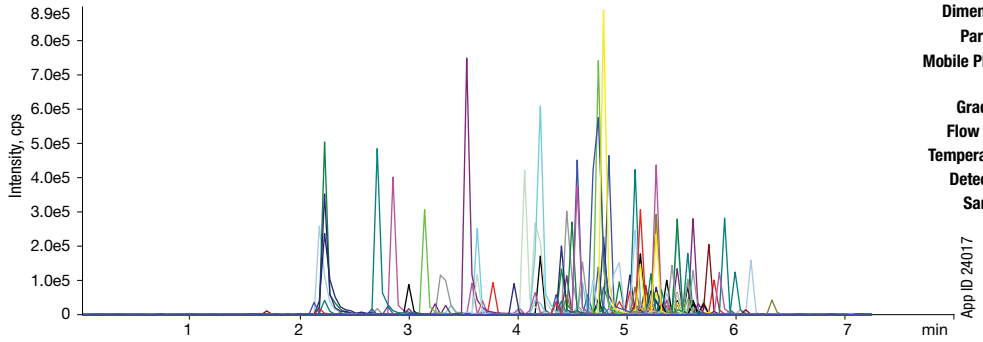
Column: Kinetex 2.6 µm Polar C18
Dimensions: 100 x 4.6 mm
Part No.: 00D-4759-E0
Mobile Phase: A: 20 mM Potassium Phosphate
B: Methanol

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

Multi-Class 206 Pesticide Panel Screen



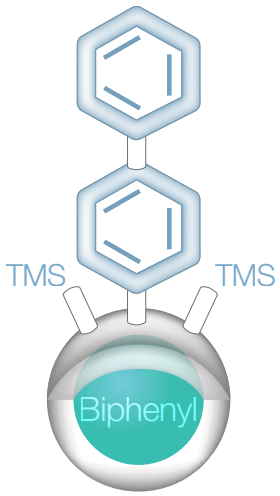
Column: Kinetex 2.6 µm Polar C18
Dimension: 50 x 4.6 mm
Part No.: 00B-4759-E0
Mobile Phase: A: Water
B: 0.1 % Formic acid in Methanol
Gradient: 5-100 % B in 5 min, hold 1 min
Flow Rate: 0.7 mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX®API 4000™)
Sample: 206 Pesticides.
Find the full compound list online at www.phenomenex.com/Application/Detail/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.

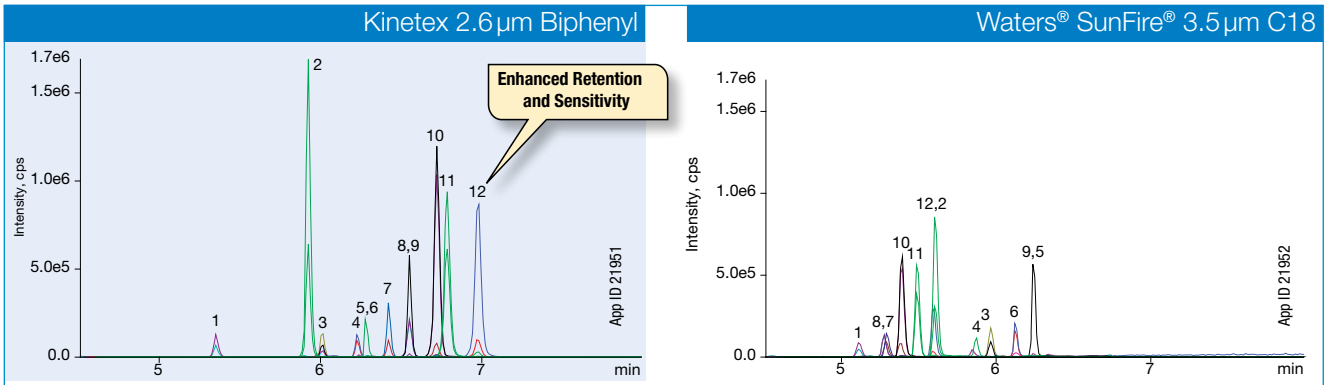


Aromatic Pi-Pi Interactions
Between aromatic rings and pi electrons of target molecule and the double aromatic rings of the Biphenyl ligand

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



Conditions for both columns:

Column: Kinetex 2.6 µm Biphenyl
Waters SunFire 3.5 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 5 mM Ammonium acetate with 0.1 % Acetic acid
B: Methanol with 5 mM Ammonium acetate with 0.1 % Acetic acid

Gradient:

Time (min)	% B
0	2
2	2
5	80
5.2	98
8	98
8.01	2
11	2

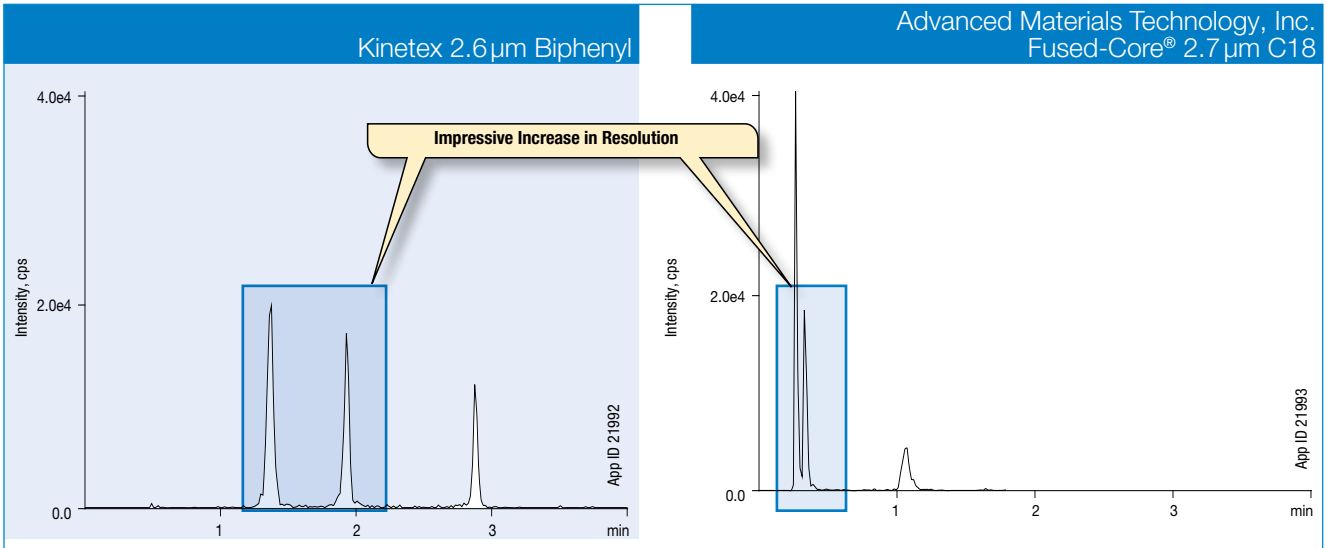
Flow Rate: 0.45 mL/min
Temperature: 40 °C
Detection: MS/MS (SCIEX® API 4000™)
Sample:
1. 15-Acetyldeoxynivalenol
2. DAS
3. FB1
4. HT2 Toxin
5. FB2
6. T2 Toxin
7. Aflatoxin M1
8. Aflatoxin G2
9. Ochratoxin A
10. Aflatoxin G1
11. Aflatoxin B2
12. Aflatoxin B1

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



Conditions for both columns:

Column: Kinetex 2.6 µm Biphenyl
Fused-Core 2.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Methanol

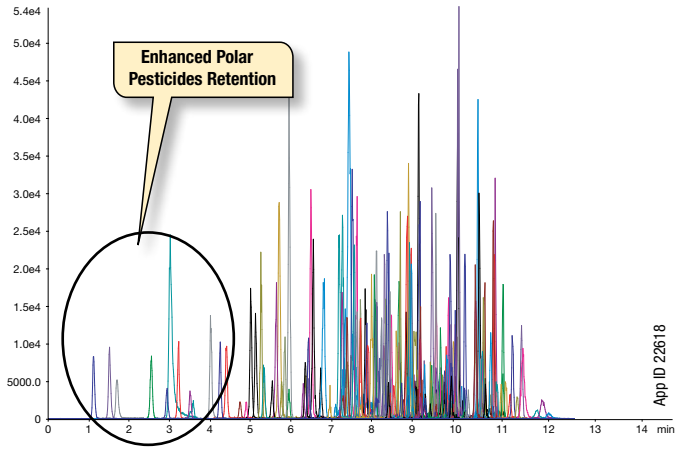
Gradient:	Time (min)	% B
	0	10
	0.5	10
	2	25
	4.5	80
	4.51	85
	5.5	85
	5.51	10
	7	10

Flow Rate: 0.6 mL/min
Temperature: 40 °C
Detection: MS/MS (SCIEX® API 4000™)
Sample: 1. Morphine
2. Hydromorphone
3. Norhydrocodone

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

Gradient:	Time (min)	% 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® 4500 QTRAP®
Sample: 175+ Pesticide Mix

Kinetex F5

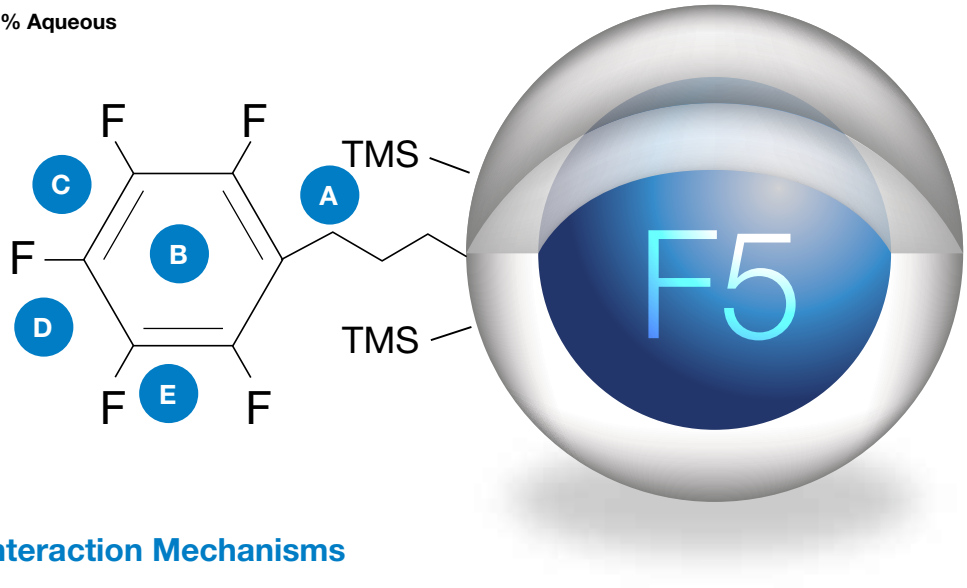
- **Reduce method development time by days**
- **Greater reproducibility than other PFPs**
- **5 glorious interaction mechanisms**
- **5 valuable LC separation modes**

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, π- π electrons of the carbon ring interact with analyte π- π electrons and result in positive retention increase

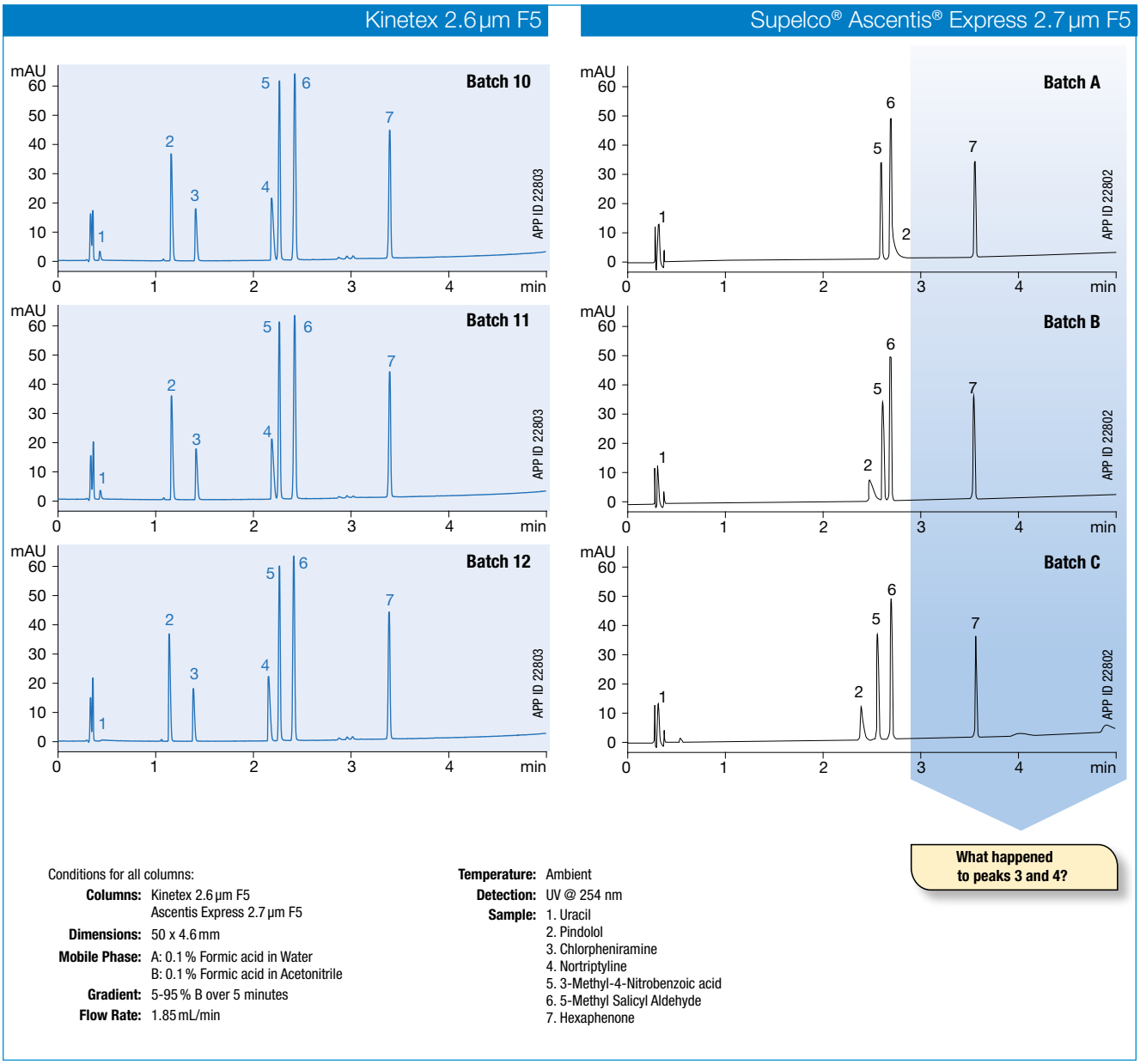
C **Electrostatic**
High electronegativity of the fluorine groups create dipole moments, aiding in polar compound retention.
Induced dipole moments can also aid neutral compound retention.

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.



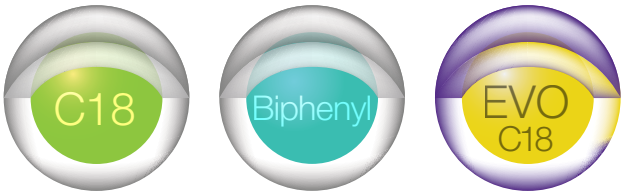
Conditions for all columns:

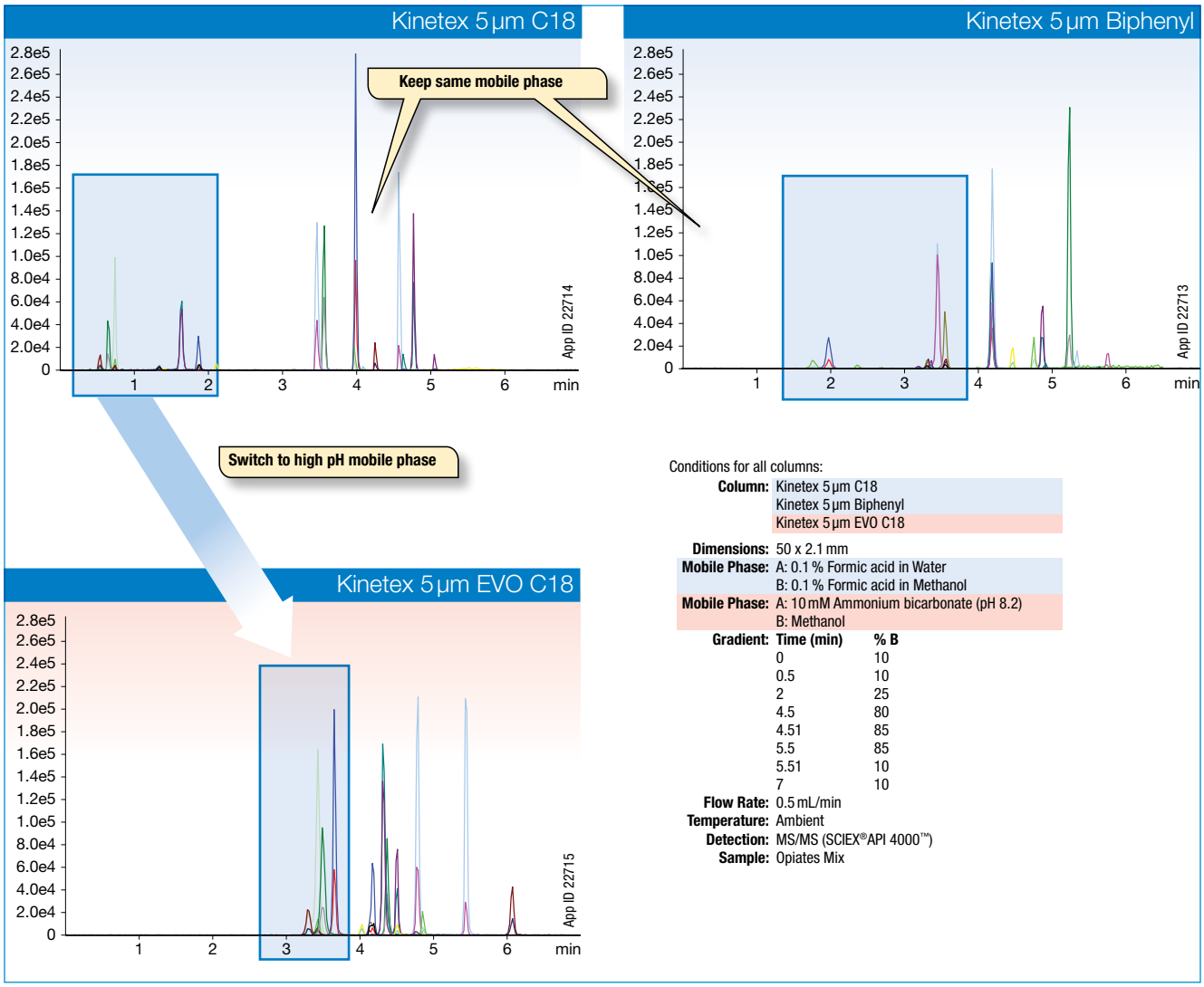
Columns: Kinetex 2.6 µm F5
Ascentis Express 2.7 µm F5
Dimensions: 50 x 4.6 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile
Gradient: 5-95 % B over 5 minutes
Flow Rate: 1.85 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
Sample: 1. Uracil
2. Pindolol
3. Chlorpheniramine
4. Nortriptyline
5. 3-Methyl-4-Nitrobenzoic acid
6. 5-Methyl Salicyl Aldehyde
7. Hexaphenone

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.





Conditions for all columns:

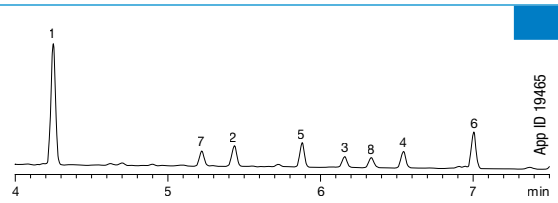
Column:	Kinetex 5 µm C18 Kinetex 5 µm Biphenyl Kinetex 5 µm EVO C18
Dimensions:	50 x 2.1 mm
Mobile Phase:	A: 0.1 % Formic acid in Water B: 0.1 % Formic acid in Methanol
Mobile Phase:	A: 10 mM Ammonium bicarbonate (pH 8.2) B: Methanol

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

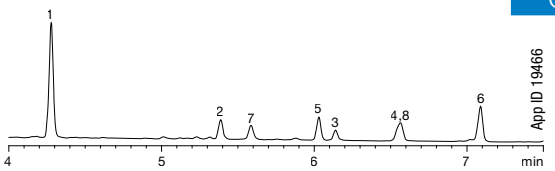
Flow Rate:	0.5 mL/min
Temperature:	Ambient
Detection:	MS/MS (SCIEX®API 4000™)
Sample:	Opiates Mix

Veterinary Drugs

C8



C18



Conditions for both columns:

Column: Kinetex 2.6 µm C8
Kinetex 2.6 µm C18
Dimensions: 100 x 4.6 mm
Mobile Phase: A: 0.1 % Phosphoric acid in Water
B: 0.1 % Phosphoric acid in Acetonitrile

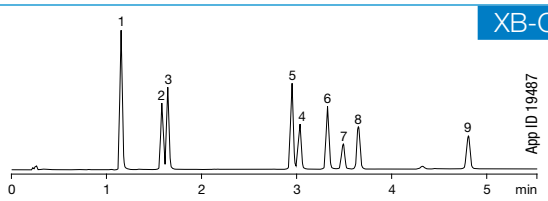
Gradient:

Time (min)	% B	Time (min)	% B
0	30	9	95
4	50	10	30
7.5	70		

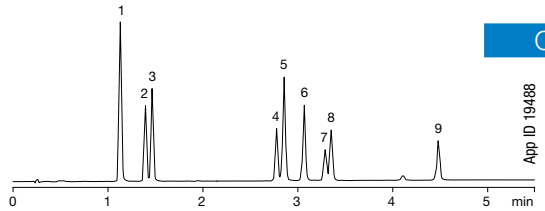
Flow Rate: 1.5 mL/min
Temperature: 25 °C
Detection: UV @ 230 nm
Sample:
1. Naproxen
2. Fenoprofen
3. Ibuprofen
4. Phenylbutazone
5. Indomethacin
6. Meclofenamic acid
7. Matrix impurity
8. Matrix impurity

Steroids

XB-C18



C18



Conditions for both columns:

Column: Kinetex 2.6 µm XB-C18
Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: Water
B: Acetonitrile

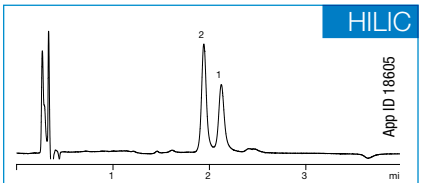
Gradient:

Time (min)	% B	Time (min)	% B
0	20	6.01	20
6	60	8	20

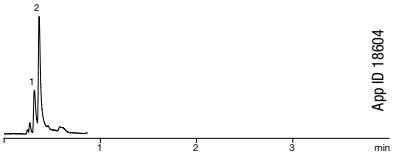
Flow Rate: 0.5 mL/min
Temperature: 30 °C
Detection: UV @ 220 nm
Sample:
1. Estriol
2. Hydrocortisone
3. Cortisone
4. Estradiol
5. Cortisone-21-acetate
6. 21-Hydroxyprogesterone
7. Estrone
8. 17-Hydroxyprogesterone
9. Deoxycorticosterone acetate

Norepinephrine and Epinephrine

HILIC



C18



Conditions for both columns:

Column: Kinetex 2.6 µm HILIC
Kinetex 2.6 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase (HILIC): Acetonitrile / 100 mM Ammonium formate pH 3.2 (92:8)
Mobile Phase (C18): 5 mM Ammonium formate pH 3.2 / Methanol (97:3)
Flow Rate: 0.4 mL/min
Temperature: 30 °C
Detection: UV @ 210 nm
Sample:
1. Norepinephrine
2. Epinephrine

Acids, Bases, and Neutrals Mix

Conditions for both columns:

Column: Kinetex 2.6 µm C18
Kinetex 2.6 µm Phenyl-Hexyl
Dimensions: 50 x 2.1 mm
Mobile Phase: A: 0.1 % Formic acid in Water
B: 0.1 % Formic acid in Acetonitrile

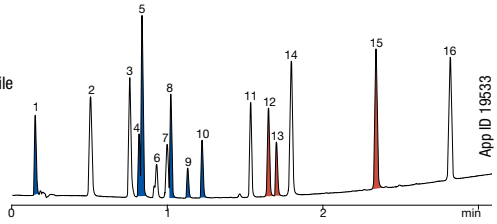
Gradient:

Time (min)	% B
0	5
0.2	5
4.2	95
4.21	5
5.5	5

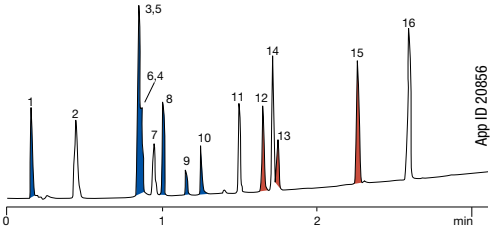
Flow Rate: 0.8 mL/min
Temperature: 30 °C
Detection: UV @ 254 nm (ambient)
Sample:
1. Pyridine
2. Acetaminophen
3. Pindolol
4. Quinidine
5. Sulfathiazole
6. Acebutolol
7. Benzyl alcohol
8. Chlorpheniramine
9. Phenol
10. Triprolidine
11. Nortriptyline
12. Prednisolone
13. 3-Methyl-4-nitrobenzoic acid
14. 2-Hydroxy-5-methylbenzaldehyde
15. Diflunisal
16. Hexanophenone

red-acids
blue-bases
white-neutrals

C18



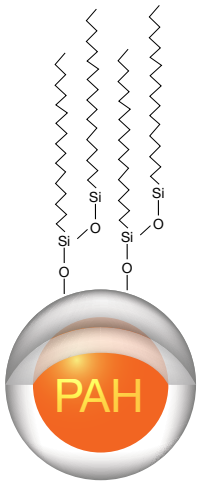
Phenyl-Hexyl



Comparative separations may not be representative of all applications.

Kinetex PAH

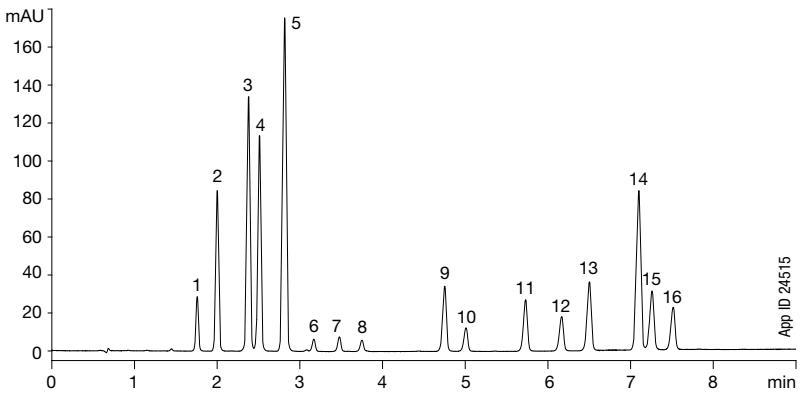
- **Expanded resolution with chemical selectivity specifically for PAHs**
- **Increased throughput and sensitivity with core-shell technology for HPLC/UHPLC**



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



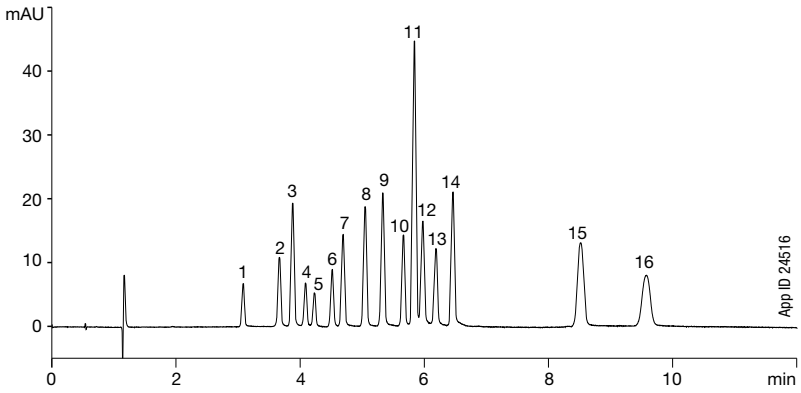
Column: Kinetex 3.5 µm PAH
Dimensions: 100 x 4.6 mm
Part No.: 00D-4764-E0
Mobile Phase: A: Water
B: Acetonitrile

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
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Dibenz[a,h]anthracene
15. Benzo[g,h,i]perylene
16. Indeno[1,2,3-cd]pyrene

EU 15+1 PAH Analysis



Column: Kinetex 3.5 µm 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

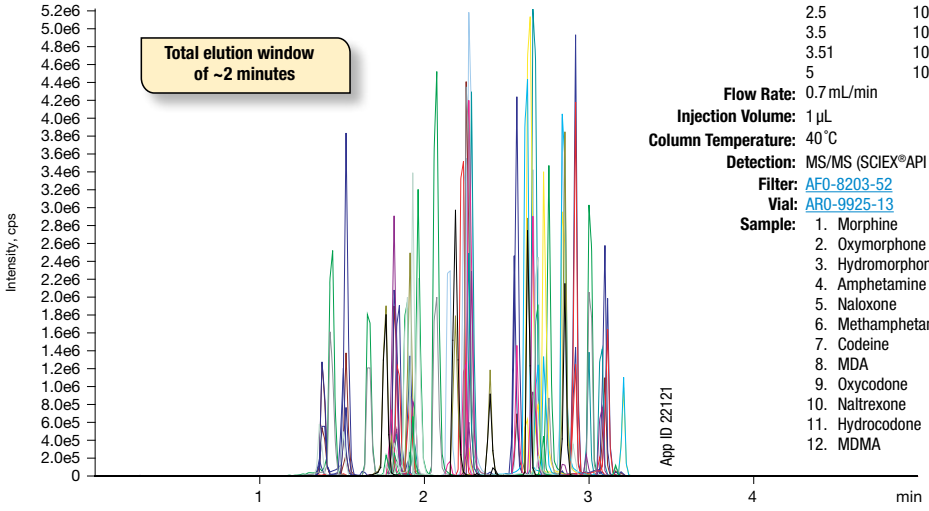
Flow Rate: 1.5 mL/min
Backpressure: 136 Bar
Temperature: 35 °C
Detection: UV @ 292 nm

Sample:
1. Benzo[c]fluorene
2. Cyclopenta[cd]pyrene
3. Benz[a]anthracene
4. Chrysene
5. 5-Methylchrysene
6. Benzo[j]fluoranthene
7. Benzo[b]fluoranthene
8. Benzo[k]fluoranthene
9. Benzo[a]pyrene
10. Dibenzo[a,l]pyrene
11. Dibenz[a,h]anthracene
12. Benzo[g,h,i]perylene
13. Indeno[1,2,3-cd]pyrene
14. Dibenzo[a,e]pyrene
15. Dibenzo[a,i]pyrene
16. Dibenzo[a,h]pyrene

Applications

Clinical Research and Toxicology

Comprehensive Drug Research Panel



Column: Kinetex 2.6 µm Biphenyl
Dimensions: 50 x 3.0 mm
Part No.: 00B-4622-Y0
Guard Cartridge: AJ0-9208
Guard Holder: AJ0-9000
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®API 5000™)
Filter: AF0-8203-52
Vial: AR0-9925-13
Sample:

1. Morphine
2. Oxymorphone
3. Hydromorphone
4. Amphetamine
5. Naloxone
6. Methamphetamine
7. Codeine
8. MDA
9. Oxycodone
10. Naltrexone
11. Hydrocodone
12. MDMA
13. MDEA
14. Norfentanyl
15. Tramadol
16. Benzoylecgonine
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. Hydroxyalprazolam
37. Nordiazepam
38. Flunitrazepam
39. Temazepam
40. Alprazolam
41. Diazepam

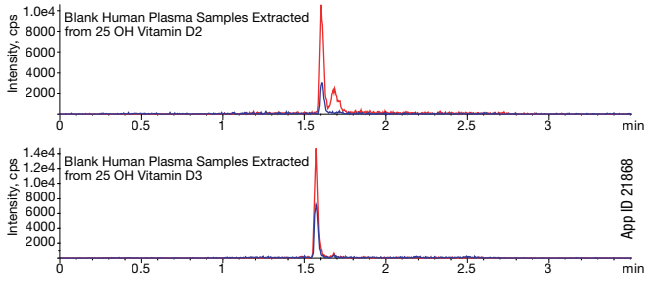
Vitamin D

Column: Kinetex 2.6 µm C18
Dimensions: 30 x 3.0 mm
Guard Cartridge: AJ0-8775
Guard Holder: AJ0-9000
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: AF0-8203-52
Vial: AR0-9925-13
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)



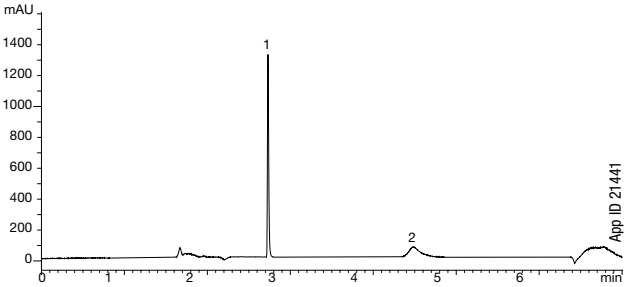
Human Plasma Vitamin C

Column: Kinetex 5 µm XB-C18
Dimensions: 150 x 4.6 mm
Guard Cartridge: AJ0-8768
Guard Holder: AJ0-9000
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: AF0-8103-52
Vial: AR0-9925-13
Sample :

1. Vitamin C (ascorbic acid)
2. Uric acid



Applications

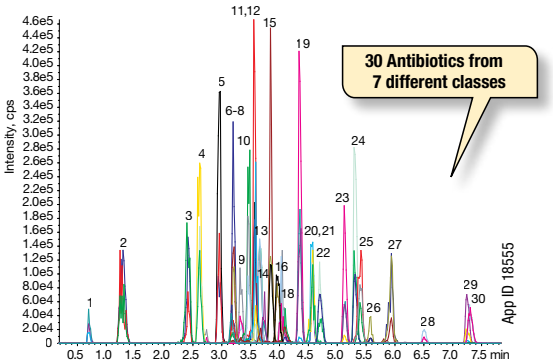
Food Testing

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® API 4000™ System
Note: Analytes spiked at 100 ng/mL
Sample: See full list of analytes at www.phenomenex.com



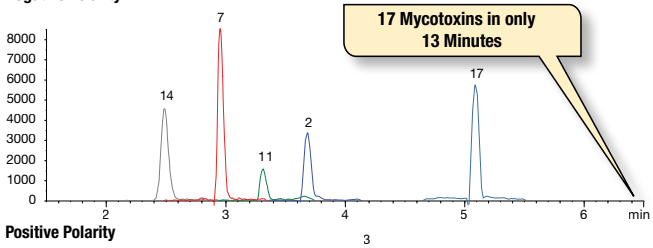
Multi-Toxin Screen

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

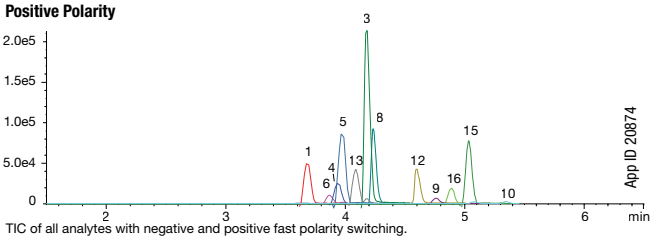
Gradient:	Time (min)	% B	Time (min)	% B
	0	2	5.2	98
	2	2	8	98
	5	80		

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
2. 3-Acetyldeoxynivalenol
3. Aflatoxin B1
4. Aflatoxin B2
5. Aflatoxin G1
6. Aflatoxin G2
7. Deoxynivalenol
8. Diacetoxyscirpenol
9. Fumonisin B1
10. Fumonisin B2
11. Fusarenon X
12. HT-2 toxin
13. Monoacetoxyscirpenol
14. Nivalenol
15. Ochratoxin
16. T-2 toxin
17. Zearalenon

Negative Polarity



Positive Polarity



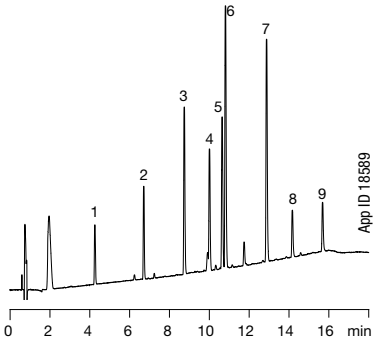
TIC of all analytes with negative and positive fast polarity switching.

Azo Dyes

Column: Kinetex 2.6 µm C18
Dimensions: 150 x 4.6 mm
Part No.: 00F-4462-E0
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
2. Sudan Orange G
3. Fast Garnet GBC
4. Dimethyl yellow
5. Sudan Red G
6. Sudan I
7. Sudan II
8. Sudan III
9. Sudan IV



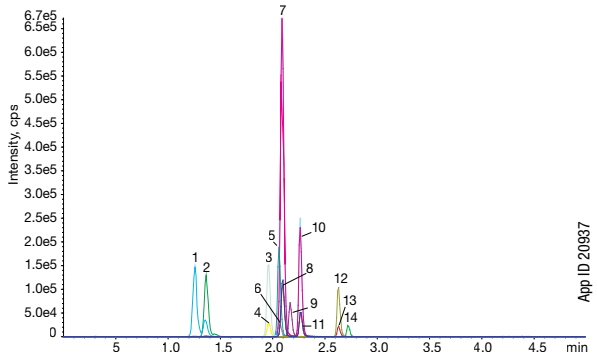
Pharmaceutical

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® API 4000™ System
Sample :
1. Doxepin
2. DM-Doxepin
3. Imipramine-D3 (IS)
4. Imipramine
5. Desipramine-D3 (IS)
6. Desipramine
7. Nortriptyline-D3 (IS)
8. Nortriptyline
9. Amitriptyline
10. Protriptyline-D3 (IS)
11. Protriptyline
12. Clomipramine-D3 (IS)
13. Clomipramine
14. DM-Clomipramine

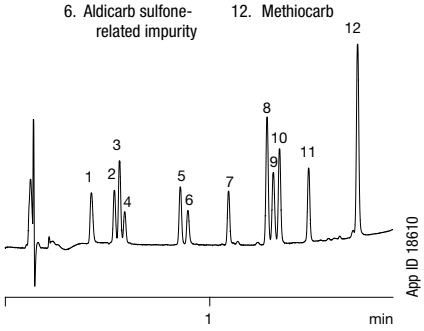


Applications

Environmental

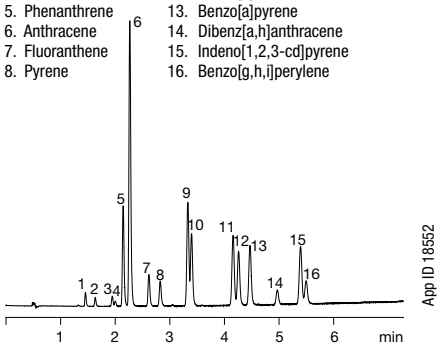
Carbamate Pesticides: EPA Method 531.1

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 ºC
Detection: UV @ 210 nm
Filter: AF0-8203-52
Vial: AR0-9925-13
Sample :
1. Aldicarb sulfoxide
2. Oxamyl
3. Aldicarb sulfone
4. Methomyl
5. 3-OH-Carbofuran
6. Aldicarb sulfone-related impurity
7. Aldicarb
8. Baygon® (Propoxur)
9. Carbofuran
10. Carbaryl
11. 1-Naphthol
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: AR0-9925-13
Sample:
1. Naphthalene
2. Acenaphthylene
3. Fluorene
4. Acenaphthene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Chrysene
10. Benz[a]anthracene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Dibenz[a,h]anthracene
15. Indeno[1,2,3-cd]pyrene
16. Benzo[g,h,i]perylene

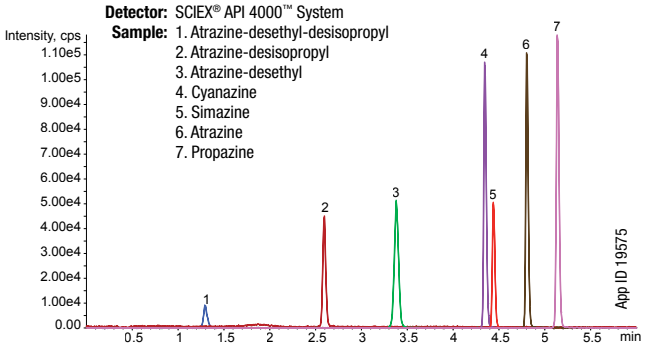


Triazine Pesticides: EPA Method 536

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: AR0-9925-13
Detector: SCIEX® API 4000™ System
Sample:
1. Atrazine-desethyl-desisopropyl
2. Atrazine-desisopropyl
3. Atrazine-desethyl
4. Cyanazine
5. Simazine
6. Atrazine
7. Propazine

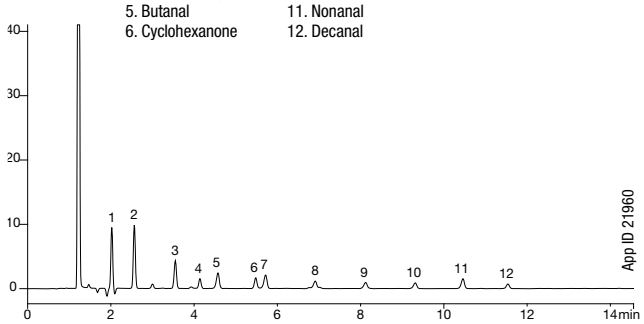


Carbonyl Compounds in Drinking Water

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: AR0-9925-13
Sample:
1. Formaldehyde
2. Acetaldehyde
3. Propanal
4. Crotonaldehyde
5. Butanal
6. Cyclohexanone
7. Pentanal
8. Hexanal
9. Heptanal
10. Octanal
11. Nonanal
12. Decanal



Material Characteristics

Packing Material	pH Stability	Particle Sizes (µm)	Pore Size (Å)	Effective Surface Area (m^2/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.

2010 R&D 100
Award Recipient

Ordering Information

5 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
EVO C18	00A-4633-AN	00B-4633-AN	00D-4633-AN	00F-4633-AN	AJ0-9298
F5	—	00B-4724-AN	00D-4724-AN	00F-4724-AN	AJ0-9322
Biphenyl	00A-4627-AN	00B-4627-AN	00D-4627-AN	—	AJ0-9209
XB-C18	—	00B-4605-AN	00D-4605-AN	—	AJ0-8782
C18	00A-4601-AN	00B-4601-AN	00D-4601-AN	00F-4601-AN	AJ0-8782
C8	—	00B-4608-AN	00D-4608-AN	—	AJ0-8784
Phenyl-Hexyl	—	00B-4603-AN	—	—	AJ0-8788

for 2.1 mm ID

5 µm MidBore™ Columns (mm)				SecurityGuard ULTRA Cartridges‡
Phases	50 x 3.0	100 x 3.0	150 x 3.0	3/pk
EVO C18	00B-4633-Y0	00D-4633-Y0	00F-4633-Y0	AJ0-9297
F5	—	00D-4724-Y0	00F-4724-Y0	AJ0-9321
Biphenyl	00B-4627-Y0	00D-4627-Y0	00F-4627-Y0	AJ0-9208
XB-C18	00B-4605-Y0	00D-4605-Y0	00F-4605-Y0	AJ0-8775
C18	00B-4601-Y0	00D-4601-Y0	00F-4601-Y0	AJ0-8775
C8	00B-4608-Y0	00D-4608-Y0	—	AJ0-8777
Phenyl-Hexyl	00B-4603-Y0	00D-4603-Y0	—	AJ0-8781

for 3.0 mm ID

5 µm Semi-Preparative Columns (mm)			SecurityGuard SemiPrep Cartridges***
Phases	150 x 10	250 x 10	10 x 10
			3/pk
EVO C18	00F-4633-N0	00G-4633-N0	AJ0-9306
F5	—	00G-4724-N0	AJ0-9323
C18	00F-4601-N0	00G-4601-N0	AJ0-9278
Biphenyl	00F-4627-N0	00G-4627-N0	AJ0-9280

for ID: 9-16 mm

5 µm Analytical Columns (mm)					SecurityGuard ULTRA Cartridges‡
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
EVO C18	00B-4633-E0	00D-4633-E0	00F-4633-E0	00G-4633-E0	AJ0-9296
F5	00B-4724-E0	00D-4724-E0	00F-4724-E0	00G-4724-E0	AJ0-9320
Biphenyl	00B-4627-E0	00D-4627-E0	00F-4627-E0	00G-4627-E0	AJ0-9207
XB-C18	00B-4605-E0	00D-4605-E0	00F-4605-E0	00G-4605-E0	AJ0-8768
C18	00B-4601-E0	00D-4601-E0	00F-4601-E0	00G-4601-E0	AJ0-8768
C8	00B-4608-E0	00D-4608-E0	00F-4608-E0	00G-4608-E0	AJ0-8770
Phenyl-Hexyl	00B-4603-E0	00D-4603-E0	00F-4603-E0	00G-4603-E0	AJ0-8774

for 4.6 mm ID

5 µm Axia™ Packed Preparative Columns (mm)					SecurityGuard™ 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	00B-4633-P0-AX	00D-4633-P0-AX	00F-4633-P0-AX	00G-4633-P0-AX	AJ0-9304
F5	—	—	00F-4724-P0-AX	00G-4724-P0-AX	AJ0-9324
Biphenyl	00B-4627-P0-AX	00D-4627-P0-AX	00F-4627-P0-AX	00G-4627-P0-AX	AJ0-9272
XB-C18	00B-4605-P0-AX	00D-4605-P0-AX	00F-4605-P0-AX	00G-4605-P0-AX	AJ0-9145
C18	00B-4601-P0-AX	00D-4601-P0-AX	00F-4601-P0-AX	00G-4601-P0-AX	AJ0-9145
C8	00B-4608-P0-AX	00D-4608-P0-AX	00F-4608-P0-AX	00G-4608-P0-AX	AJ0-9205
Phenyl-Hexyl	00B-4603-P0-AX	00D-4603-P0-AX	00F-4603-P0-AX	00G-4603-P0-AX	AJ0-9147
HILIC	—	00D-4606-P0-AX	00F-4606-P0-AX	00G-4606-P0-AX	AJ0-9277

for ID: 18-29 mm

‡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

Ordering Information *(continued)*

5 µm Axia Packed Preparative Columns (mm)					SecurityGuard™ PREP Cartridges**
Phases	50 x 30	100 x 30	150 x 30	250 x 30	15 x 30
					/ea
EVO C18	00B-4633-U0-AX	00D-4633-U0-AX	00F-4633-U0-AX	00G-4633-U0-AX	AJ0-9305
F5	00B-4724-U0-AX	00D-4724-U0-AX	00F-4724-U0-AX	00G-4724-U0-AX	AJ0-9325
Biphenyl	—	—	00F-4627-U0-AX	—	AJ0-9273
XB-C18	00B-4605-U0-AX	00D-4605-U0-AX	00F-4605-U0-AX	00G-4605-U0-AX	AJ0-9204
C18	00B-4601-U0-AX	00D-4601-U0-AX	00F-4601-U0-AX	00G-4601-U0-AX	AJ0-9204
C8	00B-4608-U0-AX	00D-4608-U0-AX	00F-4608-U0-AX	00G-4608-U0-AX	AJ0-9217
Phenyl-Hexyl	00B-4603-U0-AX	00D-4603-U0-AX	00F-4603-U0-AX	00G-4603-U0-AX	AJ0-9216
					for ID: 30-49 mm

3.5 µm Minibore and MidBore™ Columns (mm)					SecurityGuard ULTRA Cartridges‡	
Phases	50 x 2.1	100 x 2.1	150 x 2.1	100 x 3.0	3/pk	3/pk
PAH	00B-4764-AN	00D-4764-AN	00F-4764-AN	00D-4764-Y0	AJ0-9535	AJ0-9534
					for 2.1 mm ID	for 3.0 mm ID

3.5 µm Analytical Columns (mm)				SecurityGuard™ ULTRA Cartridges‡
Phases	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
XB-C18	00D-4744-E0	00F-4744-E0	—	AJ0-8768
PAH	00D-4764-E0	00F-4764-E0	00G-4764-E0	AJ0-9533
				for 4.6 mm ID

2.6 µm Microbore Columns (mm)			
Phases	50 x 1.0	100 x 1.0	150 x 1.0
XB-C18	00B-4496-A0	00D-4496-A0	00F-4496-A0

2.6 µm Capillary Columns (mm)					
Phases	50 x 0.30	100 x 0.30	150 x 0.30	50 x 0.50	150 x 0.50
XB-C18	00B-4496-AC	00D-4496-AC	00F-4496-AC	00B-4496-AF	00F-4496-AF

2.6 µm MercuryMS™ LC-MS Cartridges (mm)		
Phases	20 x 2.0	20 x 4.0
Biphenyl	00M-4622-B0-CE	00M-4622-D0-CE

MercuryMS Cartridge Holders		
Part No.	Description	Unit
CH0-7188	Direct-Connect Cartridge Holder, 20 mm	ea
CH0-5845	Standard Cartridge Holder, 20 mm	ea

2.6 µm Minibore Columns (mm)						SecurityGuard ULTRA Cartridges‡
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	00A-4725-AN	00B-4725-AN	—	00D-4725-AN	00F-4725-AN	AJ0-9298
PS C18	00A-4780-AN	00B-4780-AN	—	00D-4780-AN	00F-4780-AN	AJ0-8951
Polar C18	00A-4759-AN	00B-4759-AN	—	00D-4759-AN	00F-4759-AN	AJ0-9532
Biphenyl	00A-4622-AN	00B-4622-AN	—	00D-4622-AN	00F-4622-AN	AJ0-9209
XB-C18	00A-4496-AN	00B-4496-AN	00C-4496-AN	00D-4496-AN	00F-4496-AN	AJ0-8782
C18	00A-4462-AN	00B-4462-AN	00C-4462-AN	00D-4462-AN	00F-4462-AN	AJ0-8782
C8	00A-4497-AN	00B-4497-AN	00C-4497-AN	00D-4497-AN	00F-4497-AN	AJ0-8784
HILIC	00A-4461-AN	00B-4461-AN	00C-4461-AN	00D-4461-AN	00F-4461-AN	AJ0-8786
Phenyl-Hexyl	00A-4495-AN	00B-4495-AN	00C-4495-AN	00D-4495-AN	00F-4495-AN	AJ0-8788
F5	00A-4723-AN	00B-4723-AN	—	00D-4723-AN	00F-4723-AN	AJ0-9322
						for 2.1 mm ID

2.6 µm MidBore™ Columns (mm)						SecurityGuard ULTRA Cartridges‡
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	—	00B-4725-Y0	—	00D-4725-Y0	00F-4725-Y0	AJ0-9297
PS C18	00A-4780-Y0	00B-4780-Y0	—	00D-4780-Y0	00F-4780-Y0	AJ0-8950
Polar C18	—	00B-4759-Y0	—	00D-4759-Y0	00F-4759-Y0	AJ0-9531
Biphenyl	—	00B-4622-Y0	—	00D-4622-Y0	00F-4622-Y0	AJ0-9208
XB-C18	00A-4496-Y0	00B-4496-Y0	00C-4496-Y0	00D-4496-Y0	00F-4496-Y0	AJ0-8775
C18	00A-4462-Y0	00B-4462-Y0	00C-4462-Y0	00D-4462-Y0	00F-4462-Y0	AJ0-8775
C8	00A-4497-Y0	00B-4497-Y0	00C-4497-Y0	00D-4497-Y0	00F-4497-Y0	AJ0-8777
HILIC	00A-4461-Y0	—	—	—	00F-4461-Y0	AJ0-8779
Phenyl-Hexyl	—	00B-4495-Y0	—	00D-4495-Y0	00F-4495-Y0	AJ0-8781
F5	—	00B-4723-Y0	—	00D-4723-Y0	00F-4723-Y0	AJ0-9321
						for 3.0 mm ID

‡SecurityGuard ULTRA Cartridges require holder, Part No.: AJ0-9000
*PREP SecurityGuard Cartridges require holder, Part No. AJ0-8223
**PREP SecurityGuard Cartridges require holder, Part No. AJ0-8277

Ordering Information *(continued)*

2.6 µm Analytical Columns (mm)							SecurityGuard™ ULTRA Cartridges‡
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	—	00B-4725-E0	—	00D-4725-E0	00F-4725-E0	00G-4725-E0	AJ0-9296
PS C18	—	00B-4780-E0	—	00D-4780-E0	00F-4780-E0	00G-4780-E0	AJ0-8949
Polar C18	—	00B-4759-E0	—	00D-4759-E0	00F-4759-E0	00G-4759-E0	AJ0-9530
Biphenyl	—	00B-4622-E0	—	00D-4622-E0	00F-4622-E0	00G-4622-E0	AJ0-9207
XB-C18	—	00B-4496-E0	00C-4496-E0	00D-4496-E0	00F-4496-E0	00G-4496-E0	AJ0-8768
C18	00A-4462-E0	00B-4462-E0	00C-4462-E0	00D-4462-E0	00F-4462-E0	00G-4462-E0	AJ0-8768
C8	—	00B-4497-E0	00C-4497-E0	00D-4497-E0	00F-4497-E0	00G-4497-E0	AJ0-8770
HILIC	—	00B-4461-E0	00C-4461-E0	00D-4461-E0	00F-4461-E0	00G-4461-E0	AJ0-8772
Phenyl-Hexyl	—	00B-4495-E0	00C-4495-E0	00D-4495-E0	00F-4495-E0	00G-4495-E0	AJ0-8774
F5	—	00B-4723-E0	—	00D-4723-E0	00F-4723-E0	00G-4723-E0	AJ0-9320

for 4.6 mm ID

1.7 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**
EVO C18	—	00B-4726-AN	00D-4726-AN	00F-4726-AN	AJ0-9298
Biphenyl	—	00B-4628-AN	00D-4628-AN	00F-4628-AN	AJ0-9209
XB-C18	00A-4498-AN	00B-4498-AN	00D-4498-AN	00F-4498-AN	AJ0-8782
C18	00A-4475-AN	00B-4475-AN	00D-4475-AN	00F-4475-AN	AJ0-8782
C8	00A-4499-AN	00B-4499-AN	00D-4499-AN	00F-4499-AN	AJ0-8784
HILIC	00A-4474-AN	00B-4474-AN	00D-4474-AN	—	AJ0-8786
Phenyl-Hexyl	—	00B-4500-AN	00D-4500-AN	00F-4500-AN	AJ0-8788
F5	—	00B-4722-AN	00D-4722-AN	00F-4722-AN	AJ0-9322

for 2.1 mm ID

For Column Heater, see p. 390

1.7 µm MidBore™ Columns (mm)				SecurityGuard ULTRA Cartridges‡
Phases	**30 x 3.0**	**50 x 3.0**	**100 x 3.0**	**3/pk**
XB-C18	00A-4498-Y0	00B-4498-Y0	00D-4498-Y0	AJ0-8775
C18	—	00B-4475-Y0	00D-4475-Y0	AJ0-8775
C8	00A-4499-Y0	00B-4499-Y0	00D-4499-Y0	AJ0-8777
HILIC	—	00B-4474-Y0	—	AJ0-8779

for 3.0 mm ID

1.7 µm Microbore Columns (mm)			
Phases	**50 x 1.0**	**100 x 1.0**	**150 x 1.0**
EVO C18	00B-4726-A0	00D-4726-A0	00F-4726-A0
Biphenyl	00B-4628-A0	00D-4628-A0	00F-4628-A0

1.3 µm Minibore Columns (mm)		
Phases	**30 x 2.1**	**50 x 2.1**
C18	00A-4515-AN	00B-4515-AN

‡SecurityGuard ULTRA Cartridges require holder, Part No.: AJ0-9000

Core-Shell Performance Enhancement Kit

Ordering Information

Part No.	Unit
AQ0-8892	ea

For Core-Shell Performance Enhancement Kit description, see p. 395

SecurityGuard™ 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

For more information on the SecurityGuard ULTRA Cartridge System, see p. 316

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 317-318

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 391-392

SecurityGuard ULTRA Cartridge Holder

Ordering Information

Part No.	Description	Unit
AJ0-9000	SecurityGuard ULTRA Cartridge Holder	ea

UHPLC / HPLC Sure-Lok™ High Pressure PEEK Male Nut Fittings

Ordering Information

Part No.	Description	Unit
AQ0-8503	Sure-Lok High Pressure PEEK 1-Pc Nut 10-32, for 1/16 in. Tubing, 12000 psi (827 bar)	10/pk
AQ0-8530	Sure-Lok Fitting Tightening Tool, Aluminum	ea

See p. 394 for more information.

For Ultra-High Performance Stainless Steel Nut and Ferrule Set, see p. 394

LiChrosorb®

- **Quality-packed columns by Phenomenex**

LiChrosorb® is a well-established, rugged, irregular silica material, with high surface area (60 Å, 500 m^2/g).

Ordering Information

SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJ0-4282

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	00E-0233-D0	00G-0233-D0	00F-0233-E0	00G-0233-E0	AJ0-4290
					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.: KJ0-4282

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	00E-3042-D0	00G-3042-D0	AJ0-4289	AJ0-4290
RP-18	00E-3043-D0	00G-3043-D0	AJ0-4286	AJ0-4287
			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	00E-3049-D0	00G-3049-D0	00F-3049-E0	00G-3049-E0	AJ0-4289	AJ0-4290
RP-18	00E-3050-D0	00G-3050-D0	00F-3050-E0	00G-3050-E0	AJ0-4286	AJ0-4287
RP-8 endcapped	00E-3051-D0	00G-3051-D0	—	00G-3051-E0	AJ0-4289	AJ0-4290
RP-18 endcapped	00E-3052-D0	00G-3052-D0	00F-3052-E0	00G-3052-E0	AJ0-4286	AJ0-4287
CN	00E-3053-D0	00G-3053-D0	—	00G-3053-E0	AJ0-4304	AJ0-4305
RP-Select B	00E-3156-D0	00G-3156-D0	—	00G-3156-E0	—	—
					for ID: 2.0-3.0 mm	3.2-8.0 mm

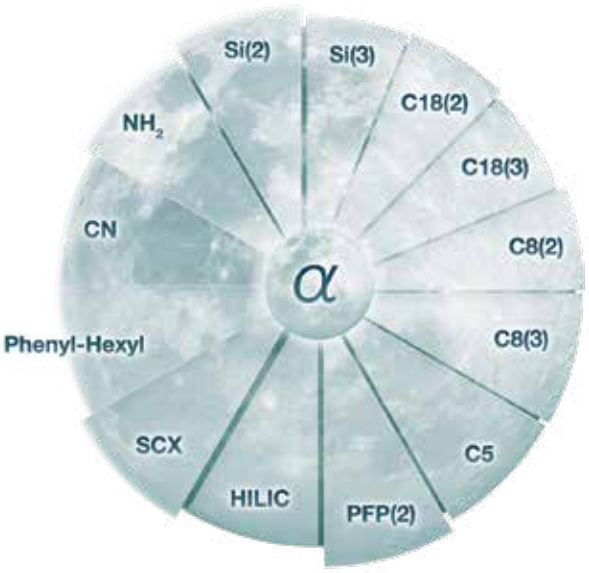
Other column dimensions available upon request.

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^2/g)	Carbon Load (%)	pH Stability	Reversed Phase	Normal Phase	HILIC	IEX	USP Column Classification
Silica(2)	Unbonded silica	3, 5, 10, 10-*PREP*, 15	100	400	—	2.0 - 7.5		☾	☾		L3
Silica(3)	Unbonded silica	10-*PREP*	100	400	—	2.0 - 7.5		☾	☾		L3
C5	5 Carbon ligand	5, 10	100	440	12.5	1.5 - 9.0*	☾				—
C8(2)	C8 ligand optimized for improved peak shape	3, 5, 10, 10-*PREP*, 15	100	400	13.5	1.5 - 9.0*	☾				L7
C8(3)	C8 ligand optimized for improved peak shape	10-*PREP*	100	400	13	1.5 - 9.0*	☾				L7
C18(2)	C18 ligand optimized for improved peak shape	2.5, 3, 5, 10, 10-*PREP*, 15	100	400	17.5	1.5 - 9.0*	☾				L1
C18(3)	C18 ligand optimized for improved peak shape	10-*PREP*	100	400	17	1.5 - 9.0*	☾				L1
CN	Versatile CN phase	3, 5, 10	100	400	7.0	1.5 - 7.0	☾	☾			L10
NH_2	Rugged and reproducible NH_2	3, 5, 10	100	400	9.5	1.5 - 11	☾	☾	☾	☾	L8
Phenyl-Hexyl	Phenyl phase attached to C6 (hexyl) ligand	3, 5, 10, 10-*PREP*, 15	100	400	17.5	1.5 - 9.0*	☾				L11
SCX	Benzene sulfonic acid	5, 10	100	400	Binding Capacity: 0.15 meq/g	2.0 - 7.0				☾	L9
HILIC	Reproducible, cross-linked diol	3, 5	200	200	5.7	1.5 - 8.0			☾		L20
PFP(2)	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.

Luna Omega UHPLC Columns will boost your UHPLC instrumentation (see page 271).

Try Gemini for 1.0 - 12.0 pH stability. (see page 215).

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 391-392

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**

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

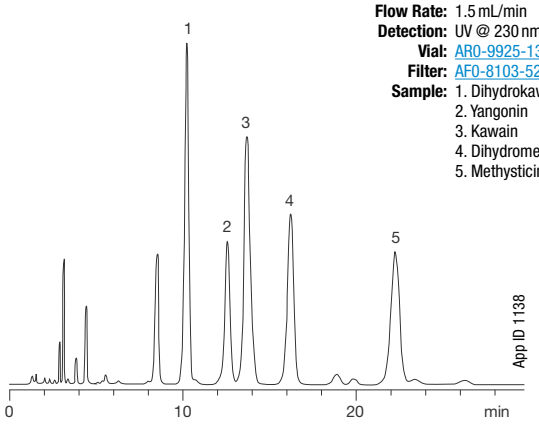
Incredible Silica Smoothness

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 363 for more information**

Natural Products (Kava Kava)

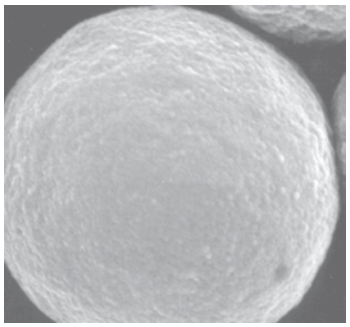
Column: Luna 5 µm Silica(2)
Dimensions: 150 x 4.6 mm
Part No.: 00F-4274-E0
Guard Cartridge: AJ0-4348
Guard Holder: KJ0-4282
Mobile Phase: Hexane/Dioxane (85:15)
Flow Rate: 1.5 mL/min
Detection: UV @ 230 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample: 1. Dihydrokawain
2. Yangonin
3. Kawain
4. Dihydromethysticin
5. Methysticin



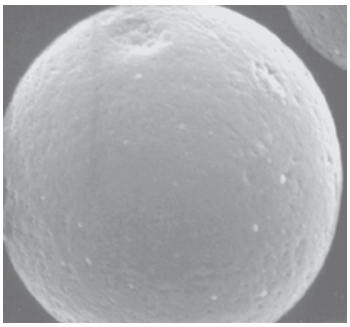
Long Column Lifetimes and Excellent Performance

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.

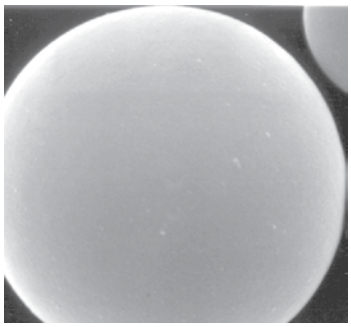
Superior Particle Smoothness



Agilent Technologies®
ZORBAX® 5 µm SB-C18



Waters®
Symmetry® 5 µm C18



Phenomenex
Luna 5 µm C18

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.

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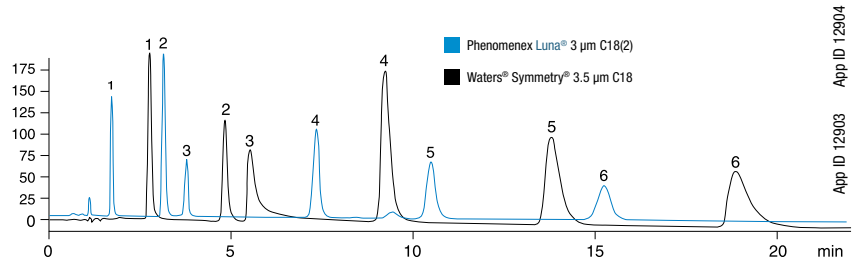
Applications

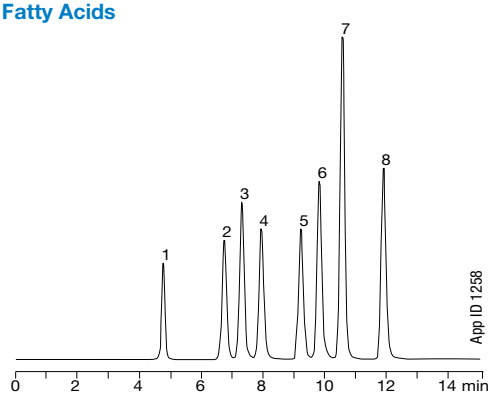
Polar, Acidic Drugs



Conditions same for both columns:

Dimensions: 75 x 4.6 mm
Mobile Phase: 20 mM KH_2PO_4/ 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



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

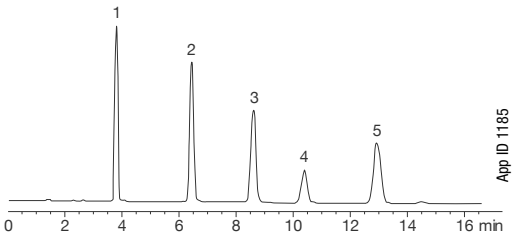
Sample: 1. Lauric acid
2. Myristic acid
3. Palmitoleic acid
4. Linoleic acid
5. Palmitic acid
6. Oleic acid
7. Heptadecanoic acid
8. Stearic acid

The comparative data presented here may not be representative for all applications.

Luna C18(2), C18(3), C8(2), C8(3), C5 *(cont'd)*

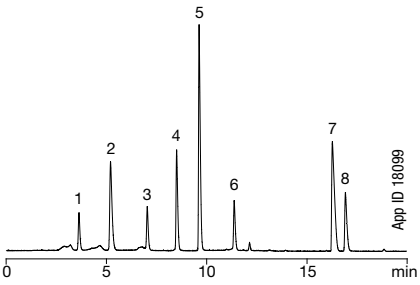
Steroids

Column: Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Part No.: 00F-4252-E0
Mobile Phase: 0.1 % H_3PO_4 /Acetonitrile/Methanol (54:35:11)
Flow Rate: 0.75 mL/min
Detection: UV @ 254 nm
Sample: 1. Hydrocortisone
2. Corticosterone
3. 11-α-Hydroxyprogesterone
4. Cortisone Acetate
5. 11-Ketoprogesterone



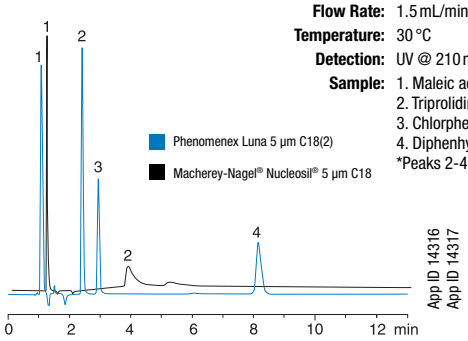
Narcotics

Columns: Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Part No.: 00F-4252-E0
Mobile Phase: A: 10 mM NH_4OAc, pH 5.5
B: Acetonitrile
Gradient: A/B (95:5) for 3 minutes, then A/B (95:5) to A/B (60:40) in 23 minutes
Flow Rate: 1.0 mL/min
Temperature: 45 °C
Detection: UV @ 254 nm (ambient)
Sample: 1. Normorphine
2. Morphine
3. Hydromorphone
4. Norcodeine
5. Codeine
6. Hydrocodone
7. Cocaine
8. Norcocaine



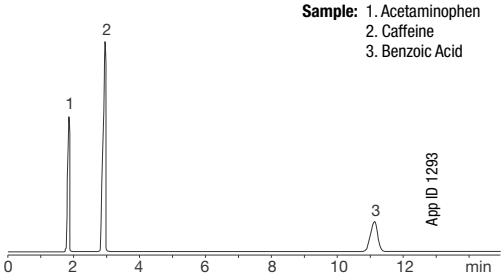
Basic Compounds

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



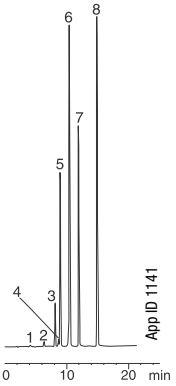
Acetaminophen, USP Method

Column: Luna 5 µm 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



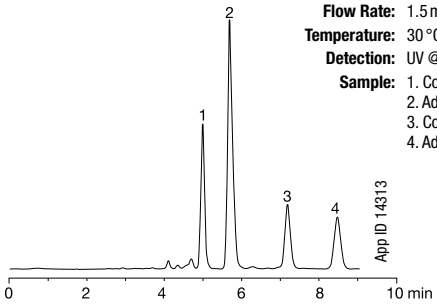
Pharmaceutical Preservatives

Column: Luna 5 µm 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



α- and β-acids in Hop Extract

Column: Luna 5 µm C18(2)
Dimensions: 250 x 4.6 mm
Part No.: 00G-4252-E0
Mobile Phase: Methanol with 0.1 % H_3PO_4 / Water with 0.1 % H_3PO_4 (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:

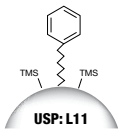
- **Highly reproducible and stable phenyl phase**
- **Dual selectivity of both phenyl phase and a short alkyl phase (C5 or C8)**
- **Excellent retention of aromatic and polar, amine compounds**
- **Recommended for US EPA Method 8330B for explosives analysis**
- **1.5 to 10 pH stability for over 10000 hours**

Luna Phenyl-Hexyl

USP: L11 | LC-MS Certified

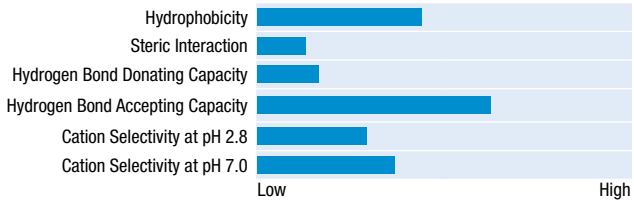
pH Stability:	**1.5-9.0***
Particle Size:	3 µm, 5 µm, 10 µm, 10 µm-*PREP*, and 15 µm
Phase:	Phenyl with Hexyl (C6) linker, endcapped
Application:	Non-polar compounds
Strength:	Aromatic selectivity enhanced by higher hydrophobicity due to hexyl linker

* pH range is 1.5-10 under isocratic conditions.
pH range is 1.5-9 under gradient conditions.



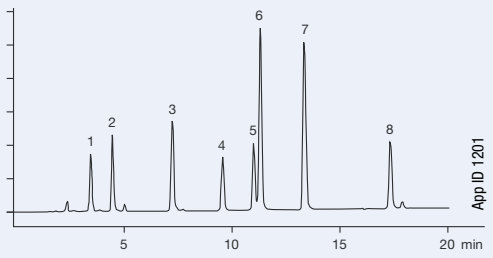
Luna Phenyl-Hexyl

Our most hydrophobic phenyl column and it will also provide good hydrogen accepting functionality for acidic retention.

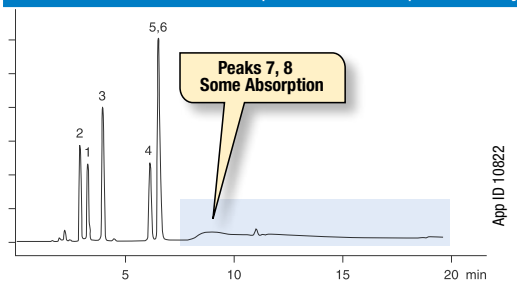


Chromatographic Comparisons of Phenyl Columns**

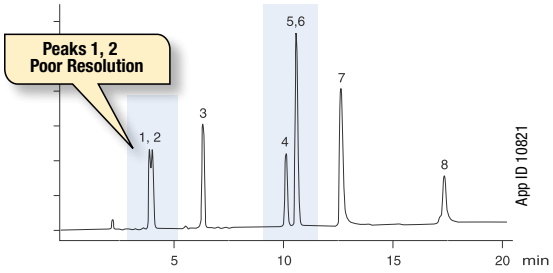
Luna 5 µm Phenyl-Hexyl



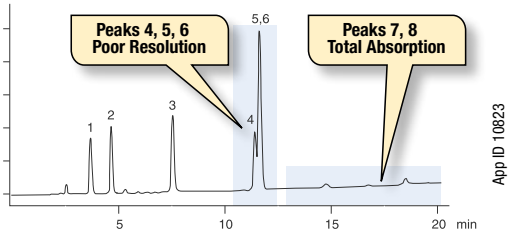
Waters® Spherisorb® 5 µm Phenyl



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_2PO_4, 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
2. Thiamphenicol
3. Furazolidone
4. Oxolinic Acid
5. Sulfadimethoxine
6. Sulfaquinoxaline
7. Nalidixic Acid
8. Piromidic Acid

**The comparative data presented here may not be representative for all applications.

SFC APPROVED

Luna CN (cyano)

Proven Reproducibility

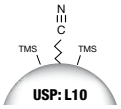
For carboxyl, carbonyl, and amine containing compounds, Luna CN columns offer a unique polar selectivity in reversed phase and normal phase modes. Luna CN columns provide sharp peaks and great reproducibility run-to-run, column-to-column and batch-to-batch. State of the art modification of the silca 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**

Luna CN

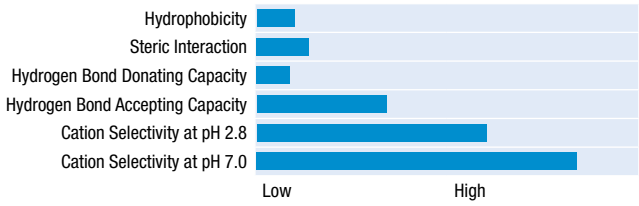
USP: L10

pH Stability:	**1.5-7.0**
Particle Size:	3 µm, 5 µm, and 10 µm
Phase:	Cyano, endcapped
Application:	Compounds with COOH, CO, NH_2, NHR_2, or NR_2
Strength:	Improved reproducibility for more consistent results run-to-run, column-to column, batch-to-batch



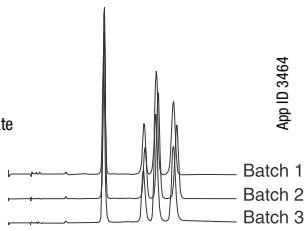
Luna CN

Nitrile groups bound to the silica surface offer a unique polar selectivity under reversed phase or normal phase conditions.



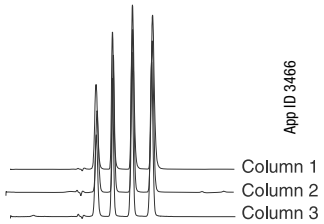
Batch-to-Batch Reproducibility

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



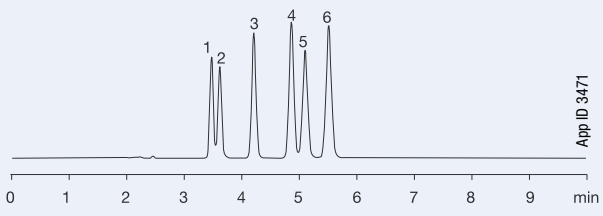
Column-to-Column Reproducibility

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

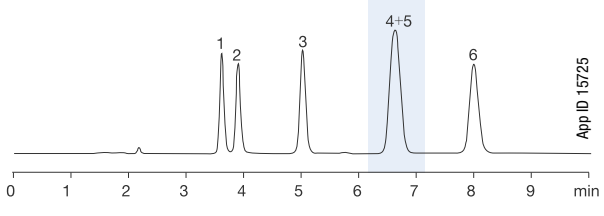


Chromatographic Comparisons of CN Columns**

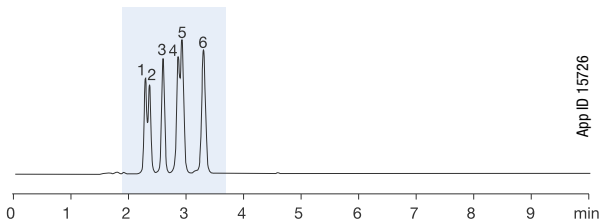
Luna 5 µm CN



Waters® Spherisorb® 5 µm CN



Agilent Technologies® ZORBAX® 5 µm SB-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

**The comparative data presented here may not be representative for all applications.

SFC APPROVED

Luna NH_2 (amino)

Developed for Ruggedness

Luna NH_2 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_2 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**

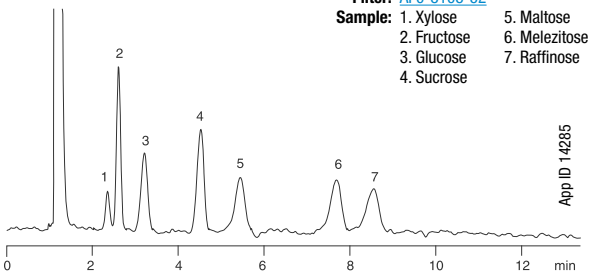
Luna NH_2

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_2, NHR_2, or NR_2
Strength:	Sugars by reversed phase, steroids by normal phase, oligonucleotides by ion exchange

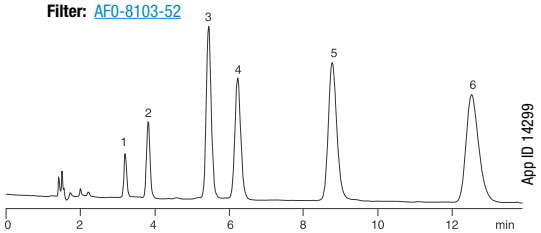
Simple Sugars

Column: Luna 5 µm NH_2
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 2. Fructose 3. Glucose 4. Sucrose 5. Maltose 6. Melezitose 7. Raffinose



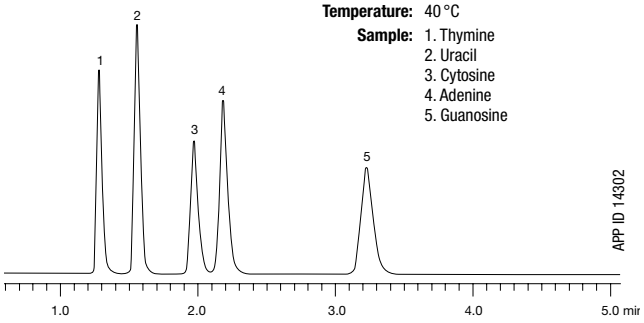
Steroids

Column: Luna 5 µm NH_2
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



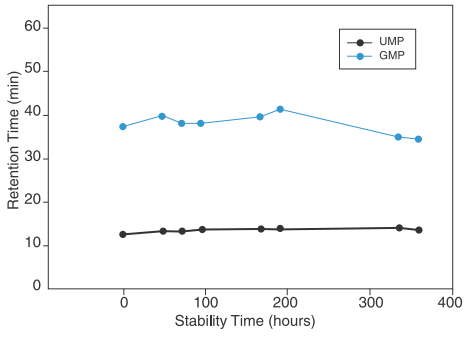
Nucleic Acid Bases

Column: Luna 5 µm NH_2
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



Stability in 100 % Aqueous Mobile Phase

Column: Luna 5 µm NH_2
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



SFC APPROVED

Luna SCX (strong cation exchange)

Develop Robust Methods

Luna SCX columns provide excellent resolution and peak sh ape 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 µm columns and bulk media for analytical through preparative separations**
- **Benzene sulfonic acid ligand provides mixed-mode interaction improving separation for 2D peptide applications**

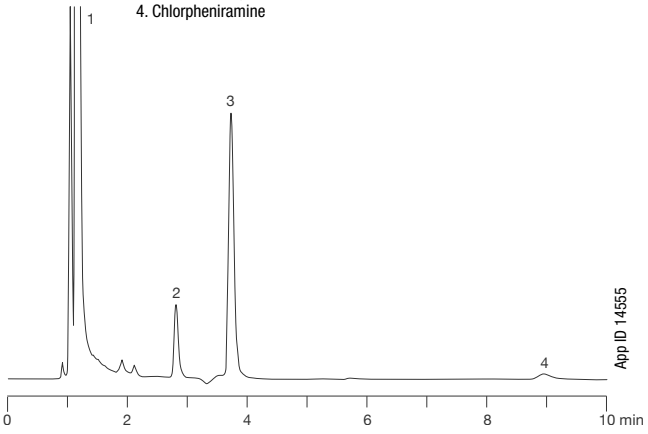
Luna SCX

USP: L9

pH Stability:	**2.0-7.0**
Particle Size:	5 µm and 10 µm
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

Childrens Tylenol Cold Syrup

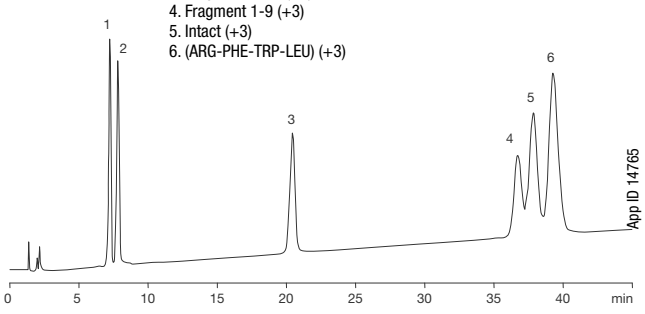
Column: Luna 5 µm SCX
Dimensions: 150 x 4.6 mm
Part No.: 00F-4398-E0
Guard Cartridge: AJ0-4308
Guard Holder: KJ0-4282
Mobile Phase: 50 mM KH_2PO_4, pH 2.5/Acetonitrile (35:65)
Injection Volume: 1 µL
Flow Rate: 1.5 mL/min
Detection: UV @ 210 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample Prep: Dissolve 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.

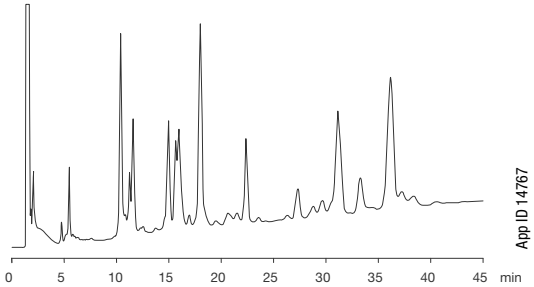
Peptides

Column: Luna 5 µm 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 °C
Detection: UV @ 215 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection Volume: 2 µL (5 µg 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 µm 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 °C
Detection: UV @ 215 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection Volume: 50 µL (20 µg on column)
Sample: Bovine Cytochrome *c* trypsin digest



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Luna HILIC

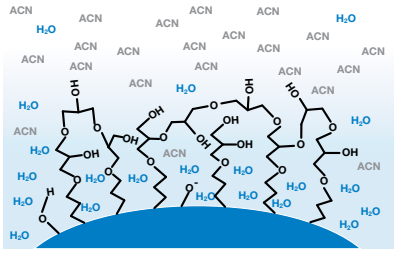
Increase MS Sensitivity and Retention for Polar Compounds

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.

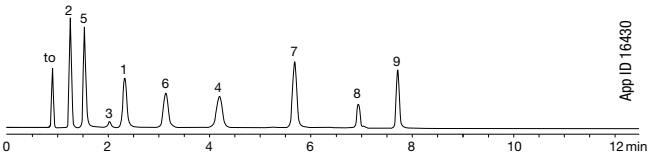
Finally, reproducible, robust HILIC separations!

- **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_a 4.7, H^+pK_a 2.7 logP 0.83
2. Nicotinamide H^+pK_a 3.35 logP –0.37
3. Riboflavin pK_a 10.2 logP –1.46
4. Nicotinic Acid pK_a 4.7, $H+pK_a$3.0 logP 0.36
5. Pyridoxine H^+pK_a 5.6, pK_a 8.6 logP –0.77
6. Thiamine H^+pK_a 5.5 logP –4.6
7. Ascorbic Acid pK_a 4.1, 11.2 logP –1.85
8. Cyanocobalamin pK_a 1.59 logP –0.90
9. Folic Acid pK_a 2.7, 4.1, 8.9 logP –0.02

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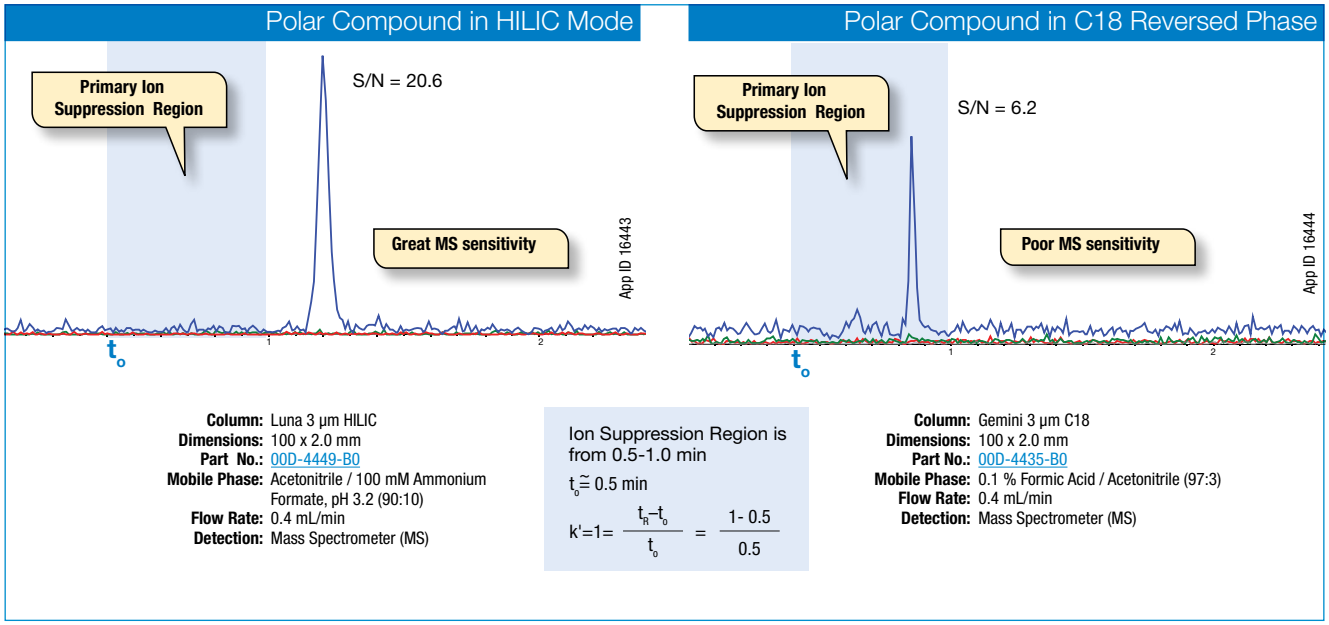
Improved Mass Spec Sensitivity

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



Column: Luna 3 µm HILIC
Dimensions: 100 x 2.0 mm
Part No.: 00D-4449-B0
Mobile Phase: Acetonitrile / 100 mM Ammonium Formate, pH 3.2 (90:10)
Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS)

Ion Suppression Region is from 0.5-1.0 min

$t_o \cong 0.5$ min

$$k' = 1 = \frac{t_R - t_o}{t_o} = \frac{1 - 0.5}{0.5}$$

Column: Gemini 3 µm C18
Dimensions: 100 x 2.0 mm
Part No.: 00D-4435-B0
Mobile Phase: 0.1 % Formic Acid / Acetonitrile (97:3)
Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS)

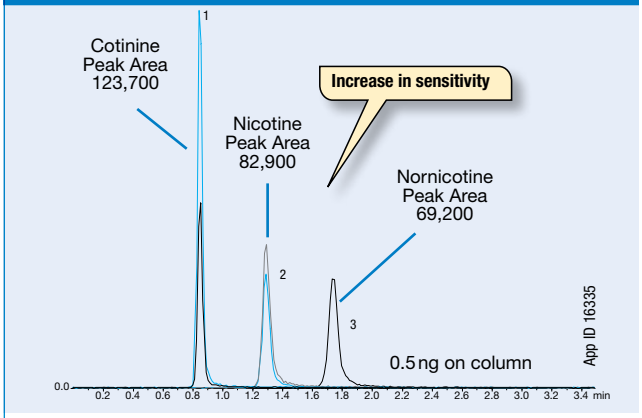
Luna HILIC *(cont'd)*

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.

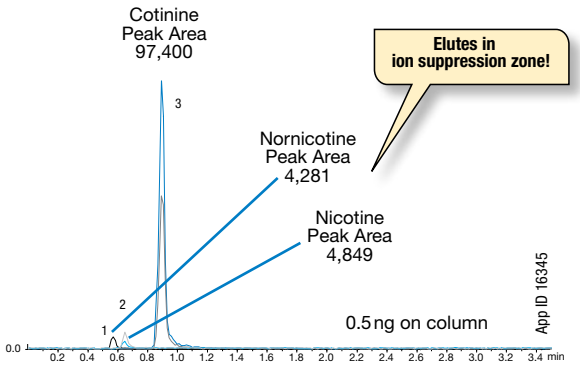
Nicotine and Metabolites

Luna HILIC



Column: Luna 5 µm HILIC
Dimensions: 100 x 2.0 mm
Part No.: 00D-4450-B0
Mobile Phase: Acetonitrile/100 mM Ammonium Formate, pH 3.2 (90:10)
Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS)
Sample: 1. Cotinine (MRM: 177/80)
2. Nicotine (MRM: 163/80)
3. Nornicotine (MRM: 149/80)

C18



Column: Gemini 5 µm C18
Dimensions: 100 x 2.0 mm
Part No.: 00D-4435-B0
Mobile Phase: A: Water with 0.1 % v/v Formic Acid
B: Acetonitrile with 0.1 % v/v Formic Acid
Gradient: A/B (97:3) hold 1 min, to (70:30) in 2 min, to (97:3) in 0.01 min, hold for 2.5 min
Flow Rate: 0.4 mL/min
Detection: Mass Spectrometer (MS)
Sample: 1. Nornicotine (MRM: 149.1/80.1)
2. Nicotine (MRM: 163.3/105.9)
3. Cotinine (MRM: 177.3/80.1)

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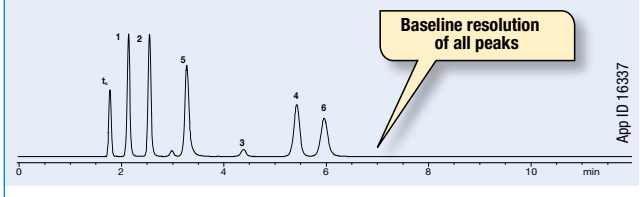
Unique HILIC Selectivity

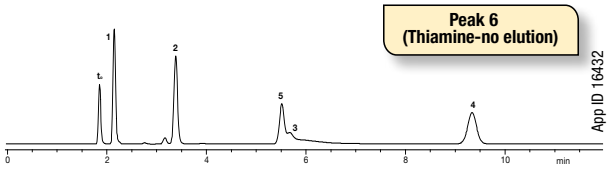
Not all HILIC columns are alike, Luna HILIC columns deliver on the exacting standards you have come to trust from the Luna product line.

Chromatographic Comparisons of HILIC Columns**

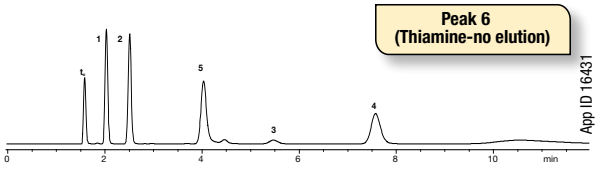
Luna 5 µm HILIC



Waters® Atlantis® 5 µm HILIC



SeQuant 5 µm ZIC®-HILIC



Water Soluble Vitamins

Conditions for all columns:
Column: As noted
Dimensions: 150 x 4.6 mm
Mobile Phase: Acetonitrile/100 mM Ammonium Formate, pH 3.2 (90:10)
Flow Rate: 1.0 mL/min
Detection: UV @ 260 nm
Sample: 1. PABA
2. Nicotinamide
3. Riboflavin
4. Nicotinic Acid
5. Pyridoxine
6. Thiamine

** The comparative data presented here may not be representative for all applications.

Luna PFP(2)

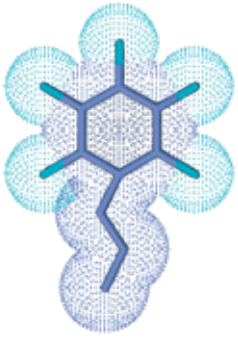
Powerful Selectivity for Reversed Phase Methods

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.

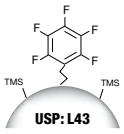
- **Achieve excellent selectivity using four mechanisms of solute/stationary phase interactions**
- **Extremely discerning for halogenated, aromatic and conjugated compounds**
- **Provides orthogonal selectivity even using traditional reversed phase mobile phase systems**

Luna PFP(2) selectivity is achieved through 4 mechanisms of interaction

- Hydrogen Bonding
- Dipole-Dipole Interactions
- Aromatic and π-π Interactions
- Hydrophobic



A typical alkyl phase (C18, C8) achieves selectivity through only 1 mechanism of interaction.

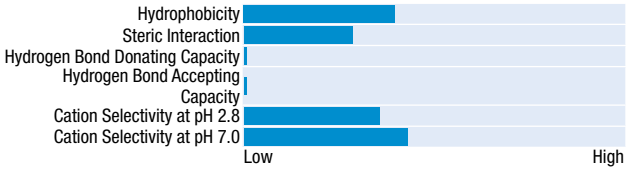


Luna PFP(2)

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.



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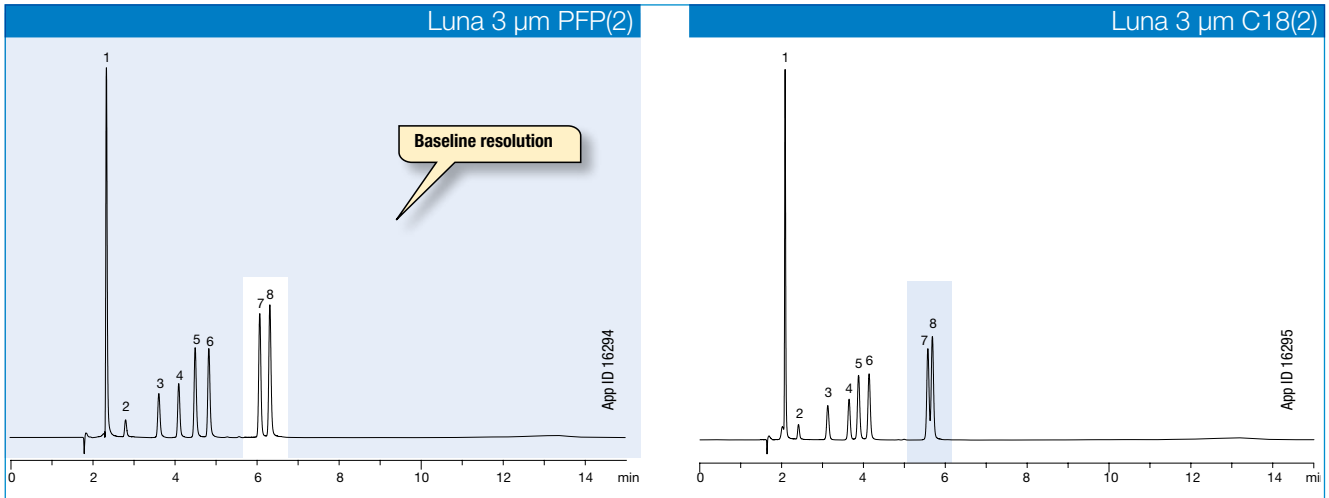
Catechins



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. Gallocatechin 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	00A-4446-B0	00B-4446-B0	00D-4446-B0	00B-4446-Y0	00D-4446-Y0

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)	00N-4251-B0-CE	00N-4251-D0-CE	00M-4251-B0-CE	00M-4251-D0-CE	00M-4251-B0	00M-4251-D0
Luna	C8(2)	00N-4248-B0-CE	—	00M-4248-B0-CE	—	00M-4248-B0	—
5 µm	Phase	10 x 2.0	10 x 4.0	20 x 2.0	20 x 4.0		
Luna	C18(2)	00N-4252-B0-CE	00N-4252-D0-CE	00M-4252-B0-CE	00M-4252-D0-CE	—	—
Luna	C8(2)	00N-4249-B0-CE	—	00M-4249-B0-CE	—	—	—

MercuryMS™ Cartridge Holders

Ordering Information

Direct-Connect Cartridge Holders	
Part No.	Description
CH0-7187	10 mm direct-connect holder
CH0-7188	20 mm direct-connect holder

Standard Cartridge Holders	
Part No.	Description
CH0-5846	10 mm standard holder
CH0-5845	20 mm standard holder

Direct-Connect Holder

Standard Holder

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Capillary Columns

Ordering Information

3 µm and 5 µm Capillary 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)	00B-4248-AC	—	—	00B-4248-AF	—	—	—	—	—
3 µm C18(2)	00B-4251-AC	00D-4251-AC	00F-4251-AC	00B-4251-AF	00D-4251-AF	00F-4251-AF	—	—	—
3 µm Phenyl-Hexyl	—	00D-4256-AC	—	—	00D-4256-AF	—	—	—	—
3 µm NH_2	—	—	00F-4377-AC	—	—	—	—	—	—
3 µm HILIC	—	—	—	00B-4449-AF	—	—	—	—	—
5 µm C8(2)	—	—	00F-4249-AC	—	—	—	—	05M-4249-AC	05M-4249-AF
5 µm C18(2)	—	—	00F-4252-AC	—	—	00F-4252-AF	00G-4252-AF	05M-4252-AC	05M-4252-AF
5 µm Phenyl-Hexyl	00B-4257-AC	—	—	00B-4257-AF	—	—	—	—	—

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*
							/10pk
Silica(2)	—	00F-4162-A0	—	00B-4162-B0	00D-4162-B0	00F-4162-B0	AJ0-4347
C8(2)	—	—	00A-4248-B0	00B-4248-B0	00D-4248-B0	00F-4248-B0	AJ0-4289
C18(2)	00B-4251-A0	00F-4251-A0	00A-4251-B0	00B-4251-B0	00D-4251-B0	00F-4251-B0	AJ0-4286
CN	—	—	—	00B-4254-B0	00D-4254-B0	00F-4254-B0	AJ0-4304
Phenyl-Hexyl	—	—	—	00B-4256-B0	00D-4256-B0	00F-4256-B0	AJ0-4350
NH_2	—	00F-4377-A0	00A-4377-B0	00B-4377-B0	00D-4377-B0	00F-4377-B0	AJ0-4301
HILIC	—	—	—	00B-4449-B0	00D-4449-B0	00F-4449-B0	AJ0-8328
PFP(2)	—	00F-4447-A0	00A-4447-B0	00B-4447-B0	00D-4447-B0	00F-4447-B0	AJ0-8326

for ID: 2.0-3.0 mm

HPLC Columns *(cont'd)*

Ordering Information *(continued)*

3 µm 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	AJ0-4347	AJ0-4348
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	AJ0-4289	AJ0-4290
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	AJ0-4286	AJ0-4287
CN	—	00B-4254-Y0	00F-4254-Y0	00A-4254-E0	00B-4254-E0	00C-4254-E0	00D-4254-E0	00F-4254-E0	AJ0-4304	AJ0-4305
Phenyl-Hexyl	—	00B-4256-Y0	00F-4256-Y0	—	00B-4256-E0	00C-4256-E0	00D-4256-E0	00F-4256-E0	AJ0-4350	AJ0-4351
NH_2	—	00B-4377-Y0	00F-4377-Y0	—	00B-4377-E0	—	00D-4377-E0	00F-4377-E0	AJ0-4301	AJ0-4302
HILIC	—	00B-4449-Y0	00F-4449-Y0	—	—	—	00D-4449-E0	00F-4449-E0	AJ0-8328	AJ0-8329
PFP(2)	—	00B-4447-Y0	00F-4447-Y0	—	00B-4447-E0	—	00D-4447-E0	00F-4447-E0	AJ0-8326	AJ0-8327
									for ID: 2.0-3.0 mm	3.2-8.0 mm

5 µm 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	AJ0-4347
C5	—	00A-4043-B0	00B-4043-B0	00F-4043-B0	—	AJ0-4292
C8(2)	—	00A-4249-B0	00B-4249-B0	00F-4249-B0	00G-4249-B0	AJ0-4289
C18(2)	00F-4252-A0	00A-4252-B0	00B-4252-B0	00F-4252-B0	00G-4252-B0	AJ0-4286
CN	—	—	00B-4255-B0	00F-4255-B0	—	AJ0-4304
Phenyl-Hexyl	—	00A-4257-B0	00B-4257-B0	00F-4257-B0	00G-4257-B0	AJ0-4350
NH_2	—	00A-4378-B0	00B-4378-B0	00F-4378-B0	00G-4378-B0	AJ0-4301
PFP(2)	—	00A-4448-B0	00B-4448-B0	00F-4448-B0	—	AJ0-8326
						for ID: 2.0-3.0 mm

5 µm 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	—	AJ0-4347	AJ0-4348
C5	—	—	00F-4043-Y0	—	—	00B-4043-E0	—	AJ0-4292	AJ0-4293
C8(2)	—	00B-4249-Y0	00F-4249-Y0	00G-4249-Y0	00A-4249-E0	00B-4249-E0	00C-4249-E0	AJ0-4289	AJ0-4290
C18(2)	00A-4252-Y0	00B-4252-Y0	00F-4252-Y0	00G-4252-Y0	00A-4252-E0	00B-4252-E0	00C-4252-E0	AJ0-4286	AJ0-4287
CN	—	—	00F-4255-Y0	00G-4255-Y0	00A-4255-E0	00B-4255-E0	00C-4255-E0	AJ0-4304	AJ0-4305
Phenyl-Hexyl	—	00B-4257-Y0	00F-4257-Y0	00G-4257-Y0	00A-4257-E0	00B-4257-E0	—	AJ0-4350	AJ0-4351
NH_2	—	00B-4378-Y0	00F-4378-Y0	00G-4378-Y0	—	00B-4378-E0	—	AJ0-4301	AJ0-4302
SCX	—	—	00F-4398-Y0	—	—	00B-4398-E0	—	AJ0-4307	AJ0-4308
HILIC	—	—	00F-4450-Y0	—	—	—	—	AJ0-8328	AJ0-8329
PFP(2)	—	—	00F-4448-Y0	—	—	00B-4448-E0	—	AJ0-8326	AJ0-8327
								for ID: 2.0-3.0 mm	3.2-8.0 mm

5 µm 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‡**
					/10pk	/3pk
Silica(2)	00D-4274-E0	00F-4274-E0	00G-4274-E0	00G-4274-N0	AJ0-4348	AJ0-7223
C5	00D-4043-E0	00F-4043-E0	00G-4043-E0	00G-4043-N0	AJ0-4293	AJ0-7372
C8(2)	00D-4249-E0	00F-4249-E0	00G-4249-E0	00G-4249-N0	AJ0-4290	AJ0-7222
C18(2)	00D-4252-E0	00F-4252-E0	00G-4252-E0	00G-4252-N0	AJ0-4287	AJ0-7221
CN	00D-4255-E0	00F-4255-E0	00G-4255-E0	00G-4255-N0	AJ0-4305	AJ0-7313
Phenyl-Hexyl	00D-4257-E0	00F-4257-E0	00G-4257-E0	00G-4257-N0	AJ0-4351	AJ0-7314
NH_2	00D-4378-E0	00F-4378-E0	00G-4378-E0	00G-4378-N0	AJ0-4302	AJ0-7364
SCX	00D-4398-E0	00F-4398-E0	00G-4398-E0	00G-4398-N0	AJ0-4308	AJ0-7369
HILIC	00D-4450-E0	00F-4450-E0	00G-4450-E0	00G-4450-N0	AJ0-8329	AJ0-8902
PFP(2)	00D-4448-E0	00F-4448-E0	00G-4448-E0	00G-4448-N0	AJ0-8327	AJ0-8376
					for ID: 3.2-8.0 mm	9-16 mm

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 317-318

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282
‡SemiPrep SecurityGuard™ Cartridges require holder, Part No.: AJ0-9281

SFC APPROVED

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)	—	00D-4274-P0-AX	00F-4274-P0-AX	00G-4274-P0-AX	—	—	00G-4274-U0-AX	AJ0-7229	AJ0-8312
C5	—	—	—	00G-4043-P0-AX	—	—	—	—	—
C8(2)	—	—	00F-4249-P0-AX	00G-4249-P0-AX	—	00D-4249-U0-AX	—	AJ0-7840	AJ0-8302
C18(2)	00B-4252-P0-AX	00D-4252-P0-AX	00F-4252-P0-AX	00G-4252-P0-AX	00B-4252-U0-AX	00D-4252-U0-AX	00G-4252-U0-AX	AJ0-7839	AJ0-8301
CN	—	—	—	00G-4255-P0-AX	—	—	00G-4255-U0-AX	AJ0-8220	AJ0-8311
Phenyl-Hexyl	—	—	00F-4257-P0-AX	00G-4257-P0-AX	—	—	00G-4257-U0-AX	AJ0-7841	AJ0-8303
NH_2	—	—	00F-4378-P0-AX	00G-4378-P0-AX	—	—	—	AJ0-8162	AJ0-8309
PFP(2)	—	00D-4448-P0-AX	00F-4448-P0-AX	00G-4448-P0-AX	—	00D-4448-U0-AX	—	AJ0-8377	AJ0-8378
HILIC	—	00D-4450-P0-AX	00F-4450-P0-AX	00G-4450-P0-AX	—	—	00G-4450-U0-AX	AJ0-8829	AJ0-8830
								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)	—	—	00G-4091-P0-AX	00G-4091-U0-AX	00G-4091-V0-AX	AJ0-7229	AJ0-8312
C5	—	00D-4092-P0-AX	00G-4092-P0-AX	—	00G-4092-V0-AX	—	—
C8(2)	—	—	00G-4250-P0-AX	—	00G-4250-V0-AX	AJ0-7840	AJ0-8302
C18(2)	00B-4253-P0-AX	00D-4253-P0-AX	00G-4253-P0-AX	00G-4253-U0-AX	00G-4253-V0-AX	AJ0-7839	AJ0-8301
CN	—	—	00G-4300-P0-AX	—	—	AJ0-8220	AJ0-8311
Phenyl-Hexyl	—	—	00G-4285-P0-AX	00G-4285-U0-AX	—	AJ0-7841	AJ0-8303
NH_2	—	—	00G-4379-P0-AX	—	—	AJ0-8162	AJ0-8309
						for ID: 18-29 mm	30-49 mm

SFC APPROVED

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)	00G-4091-E0	00G-4091-N0	AJ0-4348	AJ0-7223
C8(2)	00G-4250-E0	00G-4250-N0	AJ0-4290	AJ0-7222
C18(2)	00G-4253-E0	00G-4253-N0	AJ0-4287	AJ0-7221
CN	00G-4300-E0	—	AJ0-4305	AJ0-7313
Phenyl-Hexyl	00G-4285-E0	00G-4285-N0	AJ0-4351	AJ0-7314
NH_2	00G-4379-E0	00G-4379-N0	AJ0-4302	AJ0-7364
SCX	00G-4401-E0	00G-4401-N0	AJ0-4308	AJ0-7369
			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)	00G-4617-E0	00G-4617-N0
C8(3)	00G-4623-E0	00G-4623-N0
C18(3)	00G-4616-E0	00G-4616-N0

15 µm Pilot Scale Columns (mm)	
Phases	**250 x 4.6**
C18(2)	00G-4273-E0
Phenyl-Hexyl	00G-4286-E0

*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-throughout Purifications starting on page 352
For more dimensions and phases of Axia packed preparative columns, see p. 362
For SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315
For additional Luna 10 µm-*PREP* Scout/Pilot Scale columns, see p. 367
For Bulk Media, see p. 368

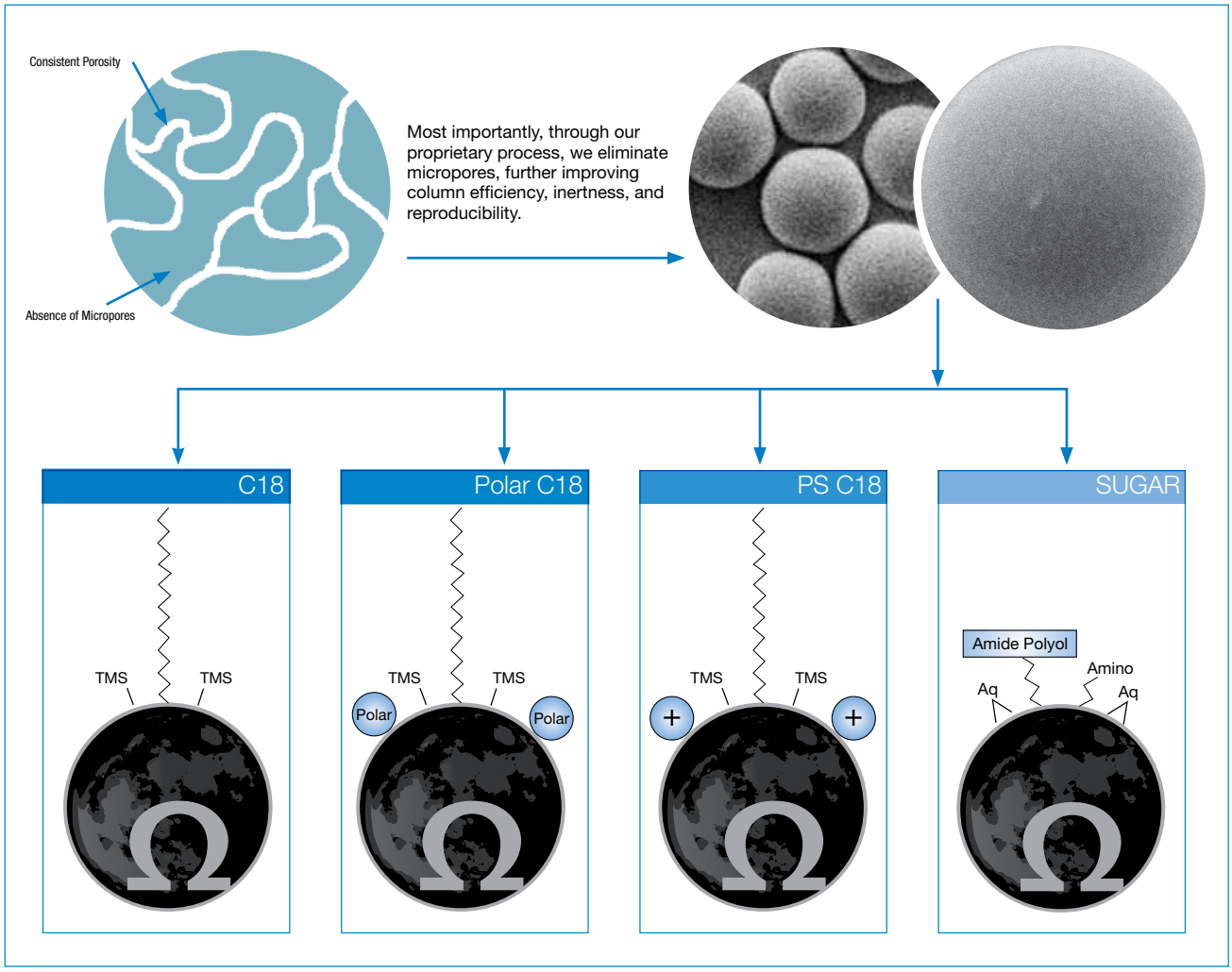
Method development column kits and method validation column kits are available. Contact Phenomenex for details.

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.

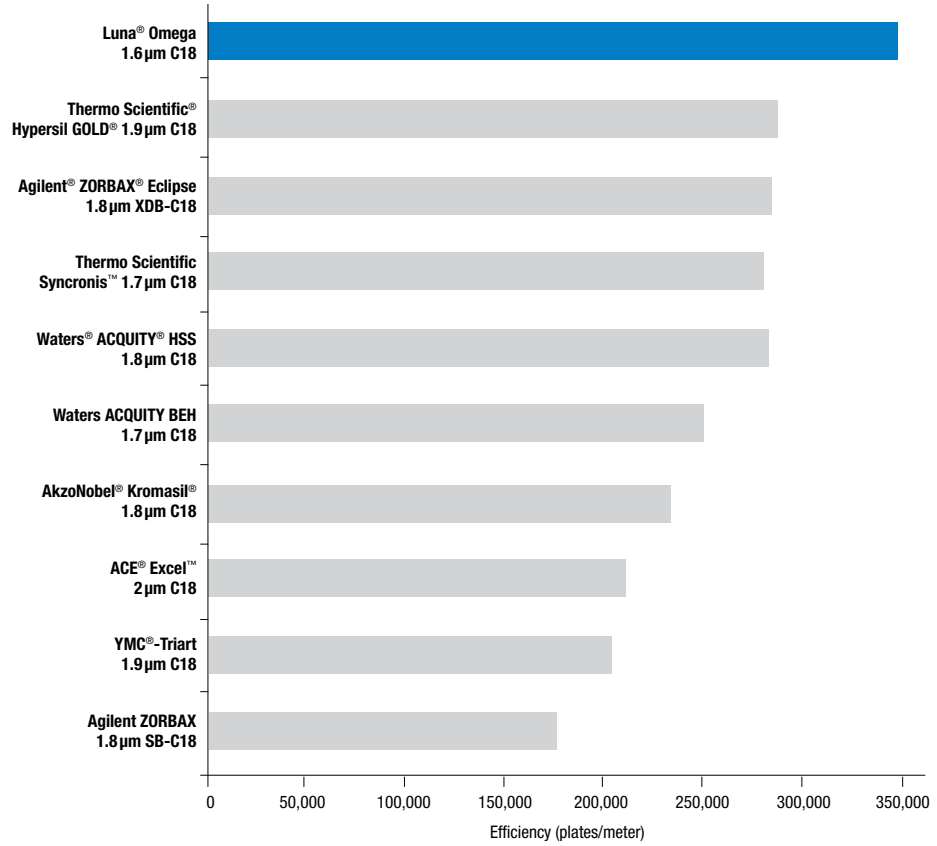
Thermal Modified Pore Structure



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 1.6µm, they drastically fall short and prevent UHPLC scientists from reaching their UHPLC potential

UHPLC Efficiency Comparison



Conditions for all columns:

Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile/Water (65:35)
Flow Rate: 0.5 mL/min
Temperature: Ambient
Detection: UV @ 254 nm
System: ACQUITY UPLC®
Sample: Naphthalene*

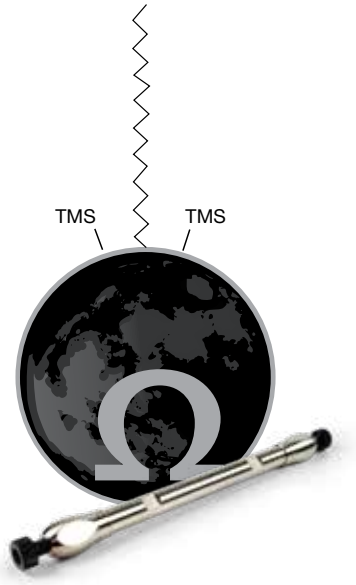
Comparative separations may not be representative of all applications.

*Efficiency (plates/meter) comparison is based on peak performance associated with the compound naphthalene for all columns.

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 391-392

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 solution for industries all over the world.



Materials Characteristics

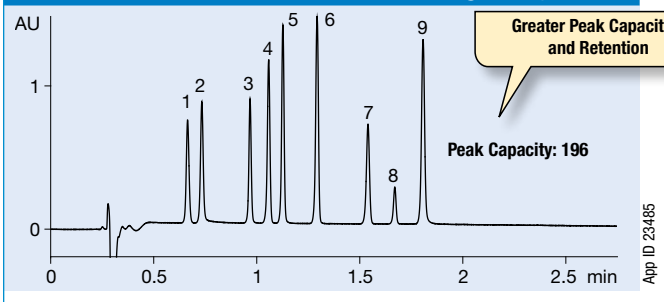
Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
C18	1.6	100	260	11	1.5 - 8.5*	1034	L1

*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

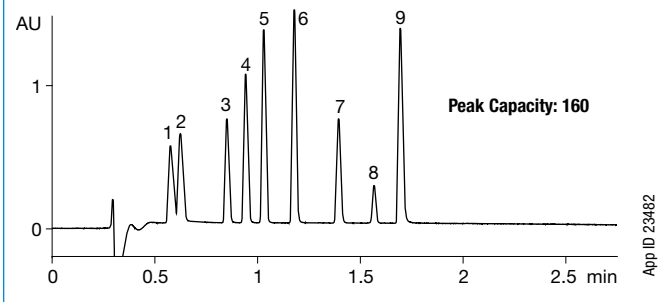
Greater Retention and Better Results

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.

Luna Omega 1.6 µm C18



Waters® ACQUITY® BEH 1.7 µm C18



Conditions for all columns:

Columns: Luna Omega 1.6 µm C18
ACQUITY BEH 1.7 µm 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	10
3	55
3.5	55
3.51	10
5	10

Flow Rate: 0.4 mL/min

Temperature: Ambient

Detection: UV @ 205 nm

Sample:
1. Acetaminophen
2. 4-Aminobenzoic Acid
3. 4-Hydroxybenzoic Acid
4. 2-Acetaminophenol
5. 3-Hydroxybenzoic Acid
6. Salicylicamide
7. Phenol
8. Benzoic Acid
9. Salicylic Acid

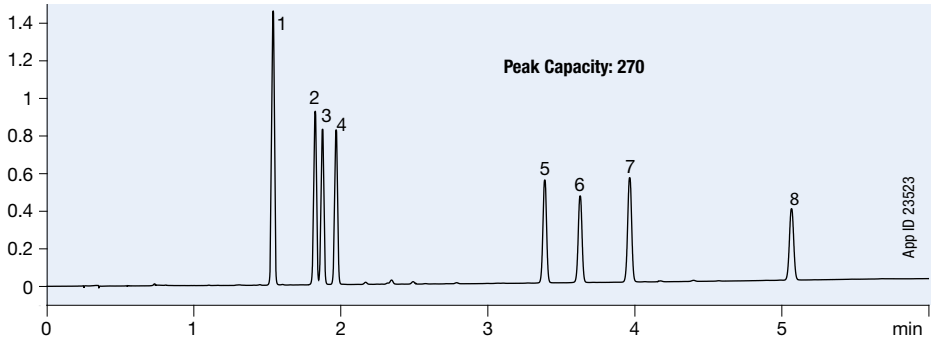
Comparative separations may not be representative of all applications.

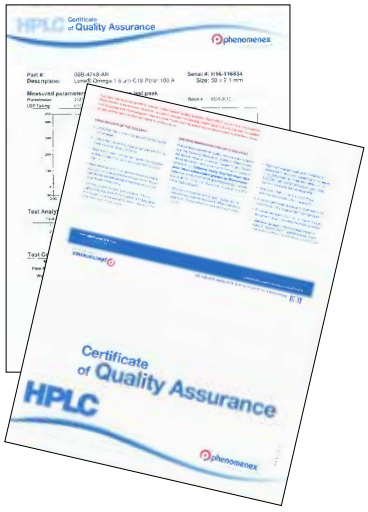
Luna Omega C18 *(cont'd)*

Consistent Batch-to-Batch Reproducibility

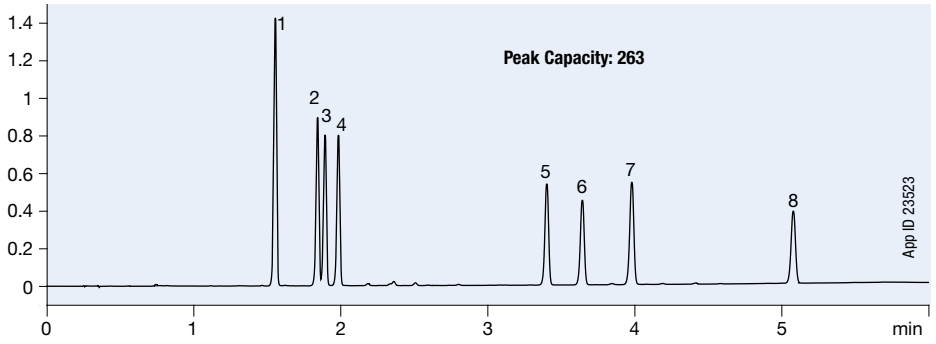
Batch-to-batch and column-to-column, Luna Omega media and columns are designed to be consistent and incredibly accurate tools for your analysis. Each batch and column are quality tested to ensure dependability and reproducibility.

Luna Omega C18 – Batch A

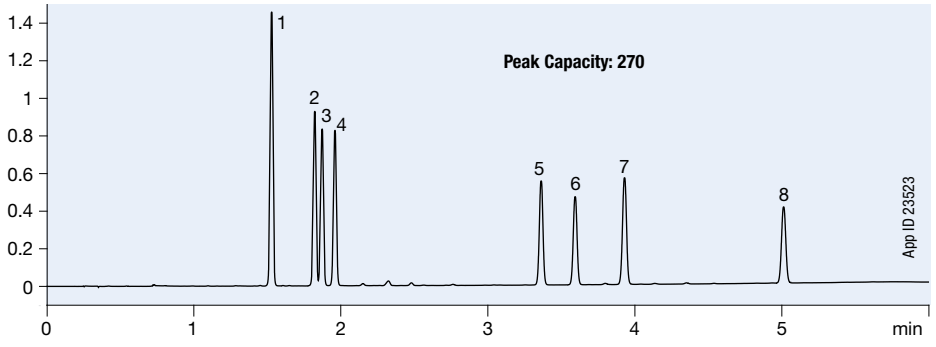




Luna Omega C18 – Batch B



Luna Omega C18 – Batch C



Conditions for all columns:

Columns: Luna Omega 1.6 µm C18
Dimensions: 50 x 2.1 mm
Part No.: 00B-4742-AN
Mobile Phase: A: Water
B: Acetonitrile

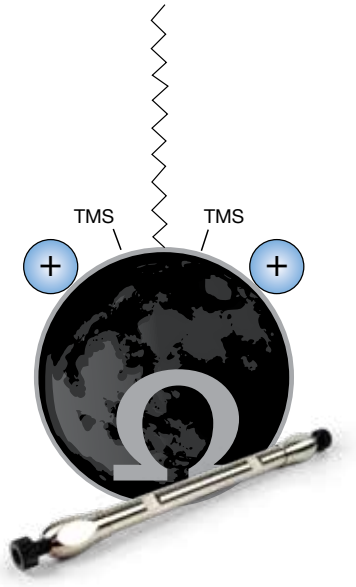
Gradient:

Time (min)	% B
0	20
6	60
6.01	20
8	20

Flow Rate: 0.4 mL/min
Temperature: Ambient
Detection: UV @ 220 nm
Sample: 1. Estriol
2. Prednisolone
3. Hydrocortisone
4. Cortisone
5. Cortisone Acetate
6. 21-Hydroxycortisone
7. 17-Hydroxycortisone
8. Deoxycorticosterone

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^2/g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
PS C18	1.6, 3, 5	100	260	9	1.5 - 8.5*	1034/345**	L1

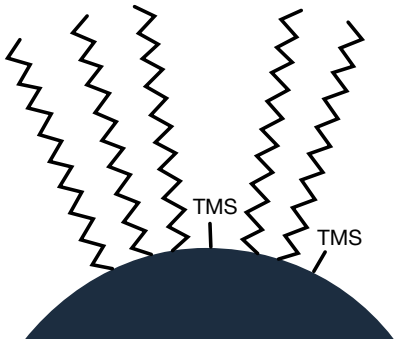
*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

**1.6 µm Luna Omega columns are pressure stable up to 1034 bar and 3 or 5 µm are stable up to 345 bar.

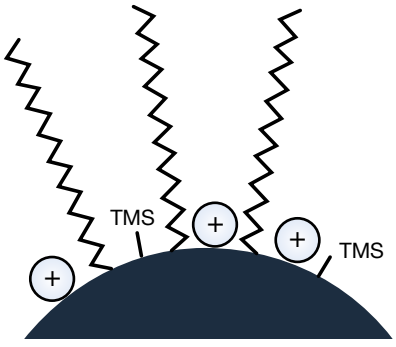
A C18, But More Positive

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

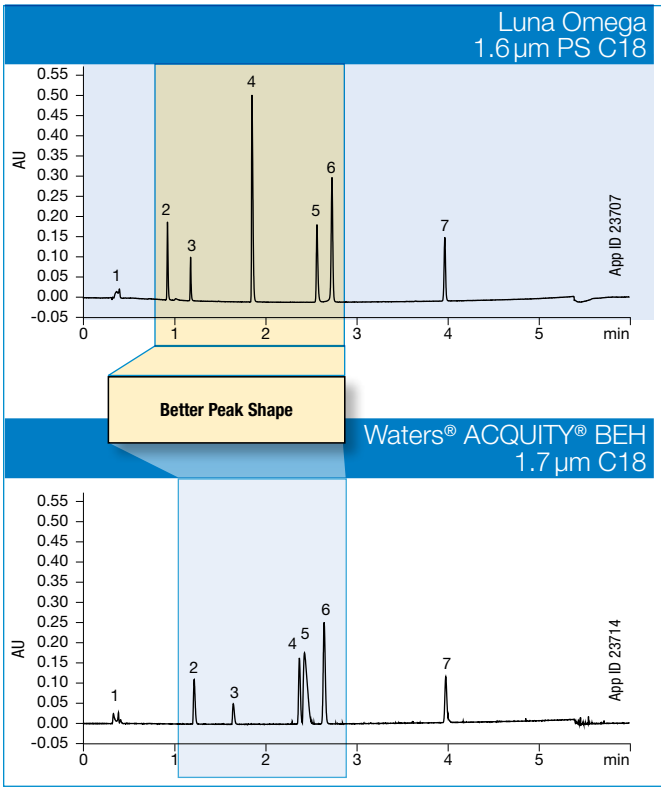


Luna Omega PS C18 *(cont'd)*

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



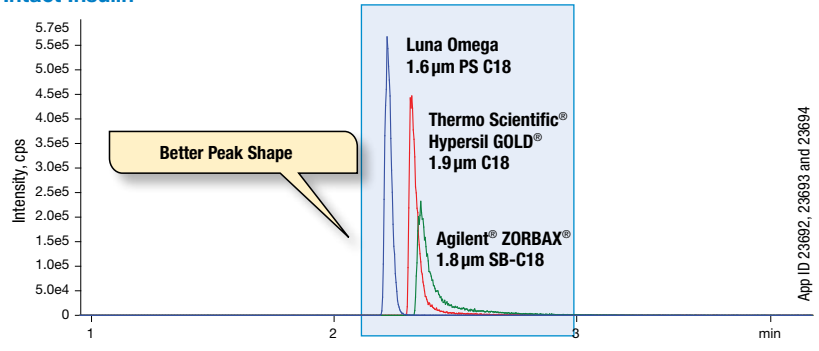
Conditions for all columns:

Columns: Luna Omega 1.6 µm PS C18
ACQUITY BEH 1.7 µm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: Water with 0.1% Formic Acid
B: Acetonitrile with 0.1% Formic Acid

Gradient:	**Time (min)**	**% B**
	0	5
	5	95
	5.1	5
	8	5

Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: MS/MS (SCIEX® API 4000™)
Sample: 1. Uracil
2. Pindolol
3. Chlorpheniramine
4. Nortriptyline
5. 3-Methyl-4-nitrobenzoic acid
6. 5-Methyl salicylaldehyde
7. Hexanophenone

Intact Insulin



Conditions for all columns:

Columns: Luna Omega 1.6 µm PS C18
Hypersil GOLD 1.9 µm C18
ZORBAX 1.8 µm SB-C18
Dimensions: 50 x 2.1 mm
Mobile Phase: A: Water with 0.1 % Formic Acid
B: Acetonitrile with 0.1 % Formic Acid

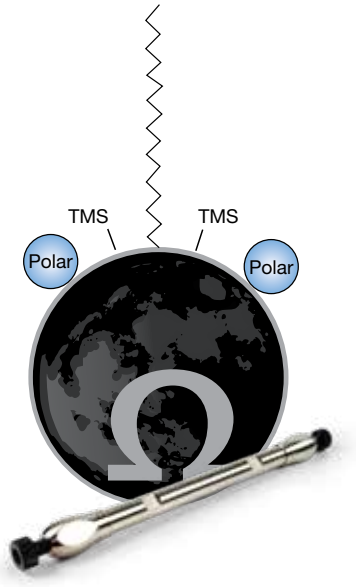
Gradient:	**Time (min)**	**% B**
	0	3
	3	80
	3.1	3
	5	3

Flow Rate: 0.5 mL/min
Temperature: 22 °C
Detection: MS/MS (SCIEX API 4000)
Sample: 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^2/g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
Polar C18	1.6, 3, 5	100	260	9	1.5 - 8.5*	1034/345**	L1

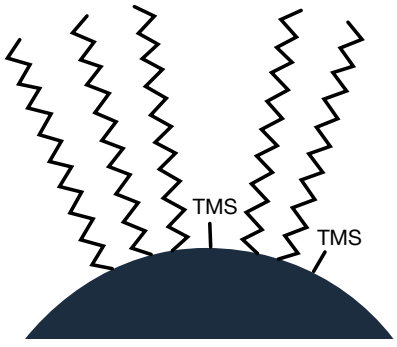
*pH stability under gradient conditions. pH stability is 1.5-10 under isocratic conditions.

**1.6 µm Luna Omega columns are pressure stable up to 1034 bar and 3 or 5 µm are stable up to 345 bar.

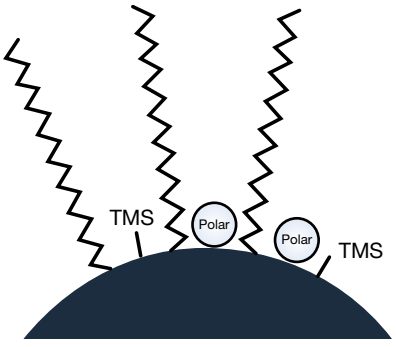
A C18, But Different

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

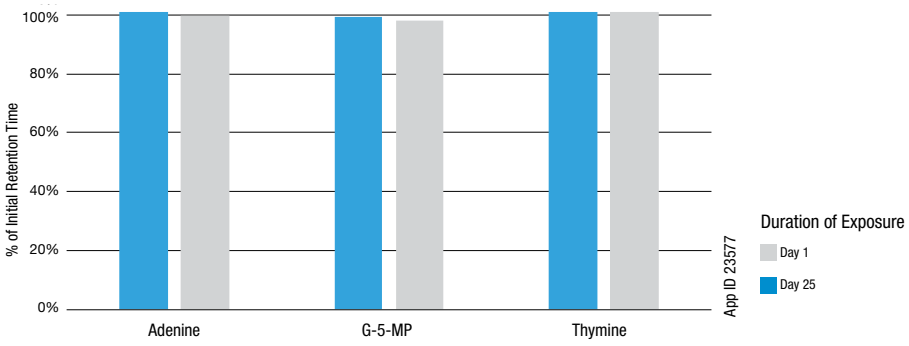


Luna Omega Polar C18 *(cont'd)*

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.

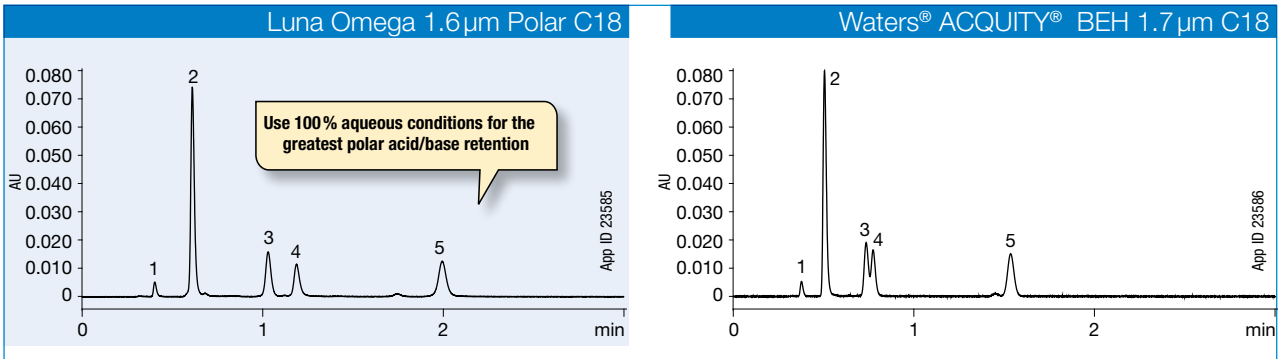
Aqueous Stability of Luna Omega Polar C18



Conditions for all columns:

Columns: Luna Omega 1.6 µm Polar C18
Dimension: 50 x 2.1 mm
Part No.: 00B-4748-AN
Mobile Phase: 10 mM Ammonium Formate with 0.1 % Formic Acid
Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: UV @ 254 nm
Sample: 1. Adenine
2. Guanosine-5-Monophosphate
3. Thymine

Nucleosides in 100 % Aqueous Conditions



Conditions for all columns:

Columns: Luna Omega 1.6 µm Polar C18
ACQUITY BEH 1.7 µm C18
Dimension: 50 x 2.1 mm
Mobile Phase: 20 mM Ammonium Formate pH 3.0
Flow Rate: 0.4 mL/min
Temperature: 22 °C
Detection: UV @ 285 nm
Sample: 1. Thiourea
2. 5-Fluorocytosine
3. Guanosine-5-Monophosphate
4. Adenine
5. Thymine

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**

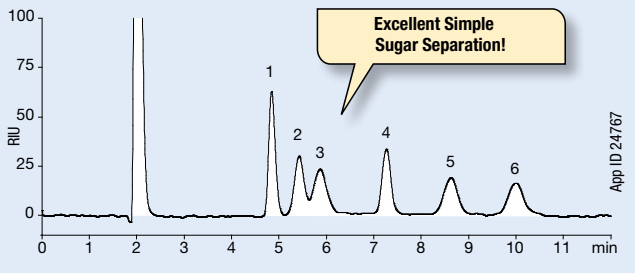
Materials Characteristics

Phase	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m^2/g)	Carbon Load (%)	pH Stability	Pressure Limit (bar)	USP Column Classification
Luna Omega SUGAR	3	100	260	<2	2.0-7.0	345	L8

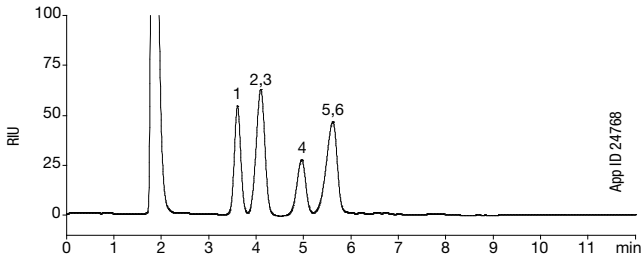
Exceptional Retention and Separation

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.

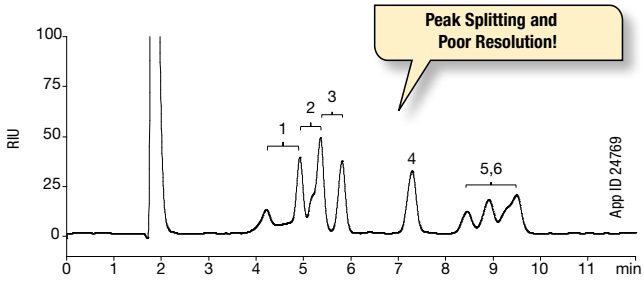
Luna Omega 3 µm SUGAR



Fully Porous 3 µm NH_2



Hybrid Fully Porous 3.5 µm Amide



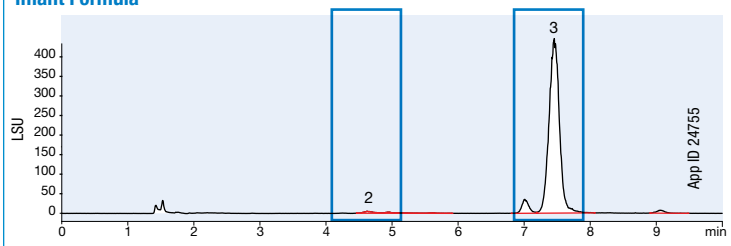
Conditions for all columns:

Columns: Luna Omega 3 µm SUGAR
Fully Porous 3 µm NH_2
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

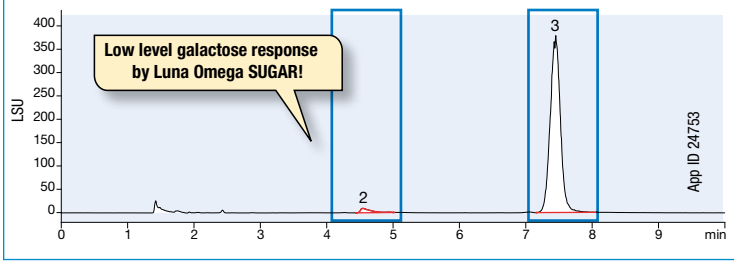
Comparative separations may not be representative of all applications.

Luna Omega SUGAR *(cont'd)*

Infant Formula



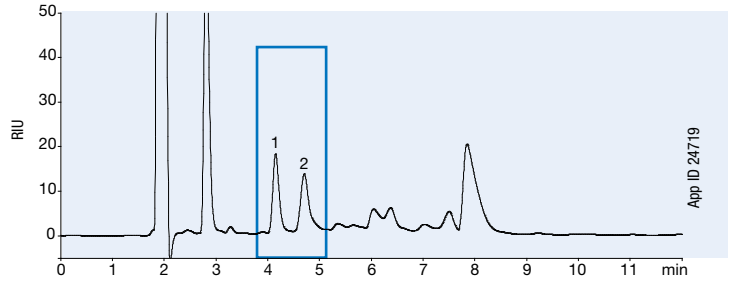
2% Fat Milk



Conditions for both samples:

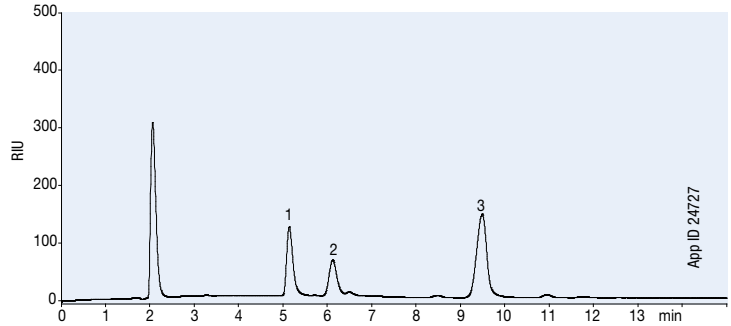
Column: Luna Omega 3 µm SUGAR
Dimension: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: Acetonitrile/Water (75:25)
Flow Rate: 1 mL/min
Temperature: 35 °C
Detection: ELSD
Sample: 1. Glucose
2. Galactose
3. Lactose

Merlot



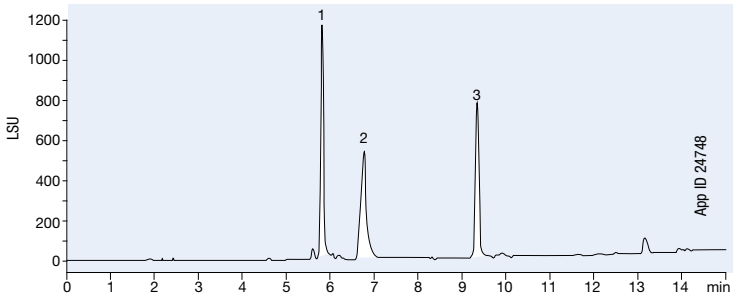
Column: Luna Omega 3 µm SUGAR
Dimension: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: Acetonitrile/Water (75:25)
Flow Rate: 1 mL/min
Temperature: 40 °C
Detection: RI
Sample: 1. Fructose
2. Glucose

Orange Juice



Column: Luna Omega 3 µm SUGAR
Dimension: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: Acetonitrile/Water (80:20)
Flow Rate: 1 mL/min
Temperature: 40 °C
Detection: RI
Sample: 1. Fructose
2. Glucose
3. Sucrose

Animal Feed and Molasses



Column: Luna Omega 3 µm SUGAR
Dimension: 150 x 4.6 mm
Part No.: 00F-4775-E0
Mobile Phase: A: Water
B: Acetonitrile/Isopropanol/Water (90:5:5)

Gradient:

Time (min)	% B
0	90
0.5	90
15.5	70
17	70
18	90
20	90

Flow Rate: 1 mL/min
Temperature: 35 °C
Injection Volume: 5 µL
Detection: ELSD
Sample: 1. Fructose
2. Glucose
3. Sucrose

Luna® Omega

Ordering Information

1.6 µm Microbore Columns (mm)			
Phases	**50 x 1.0**	**100 x 1.0**	**150 x 1.0**
Polar C18	00B-4748-A0	00D-4748-A0	00F-4748-A0
PS C18	00B-4752-A0	00D-4752-A0	—
C18	—	00D-4742-A0	00F-4742-A0

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	00A-4748-AN	00B-4748-AN	00D-4748-AN	00F-4748-AN	AJ0-9505
PS C18	00A-4752-AN	00B-4752-AN	00D-4752-AN	00F-4752-AN	AJ0-9508
C18	00A-4742-AN	00B-4742-AN	00D-4742-AN	00F-4742-AN	AJ0-9502
					for 2.1 mm ID

3 µm Capillary 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	00B-4760-AC	00D-4760-AC	00F-4760-AC	00B-4760-AF	00D-4760-AF	00F-4760-AF	—
PS C18	00B-4758-AC	00D-4758-AC	00F-4758-AC	00B-4758-AF	00D-4758-AF	00F-4758-AF	05M-4758-AC

3 µm Minibore and MidBore™ Columns (mm)								SecurityGuard Cartridges (mm)
Phases	**30 x 2.1**	**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	00A-4760-AN	00B-4760-AN	00D-4760-AN	00F-4760-AN	00B-4760-Y0	00D-4760-Y0	00F-4760-Y0	AJ0-7600
PS C18	00A-4758-AN	00B-4758-AN	00D-4758-AN	00F-4758-AN	00B-4758-Y0	00D-4758-Y0	00F-4758-Y0	AJ0-7605
SUGAR	—	00B-4775-AN	00D-4775-AN	00F-4775-AN	—	—	00F-4775-Y0	AJ0-4496
								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	00B-4760-E0	00D-4760-E0	00F-4760-E0	00G-4760-E0	AJ0-7601
PS C18	00B-4758-E0	00D-4758-E0	00F-4758-E0	00G-4758-E0	AJ0-7606
SUGAR	—	00D-4775-E0	00F-4775-E0	00G-4775-E0	AJ0-4495
					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	00B-4754-AN	00D-4754-AN	00F-4754-AN	00B-4754-Y0	00D-4754-Y0	00F-4754-Y0	AJ0-7600
PS C18	00B-4753-AN	00D-4753-AN	00F-4753-AN	00B-4753-Y0	00D-4753-Y0	00F-4753-Y0	AJ0-7605
							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	00B-4754-E0	00D-4754-E0	00F-4754-E0	00G-4754-E0	AJ0-7601
PS C18	00B-4753-E0	00D-4753-E0	00F-4753-E0	00G-4753-E0	AJ0-7606
					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	00G-4754-N0	AJ0-9519
PS C18	00G-4753-N0	AJ0-9520
		for ID: 9-16 mm

5 µm Axia™ Packed Preparative Columns (mm)						SecurityGuard Cartridges (mm)	
Phases	**150 x 21.2**	**250 x 21.2**	**150 x 30**	**250 x 30**	**250 x 50**	**15 x 21.2****	**15 x 30.0***
						/ea	/ea
Polar C18	00F-4754-P0-AX	00G-4754-P0-AX	00F-4754-U0-AX	00G-4754-U0-AX	00G-4754-V0-AX	AJ0-7603	AJ0-7604
PS C18	00F-4753-P0-AX	00G-4753-P0-AX	00F-4753-U0-AX	00G-4753-U0-AX	00G-4753-V0-AX	AJ0-7608	AJ0-7609
						for ID: 18-29 mm	for ID: 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
**PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8223
♦ PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8277

Replace CHIRALCEL® and CHIRALPAK® Columns at a Fraction of the Cost!

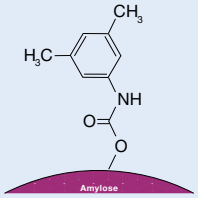
Lux coated and immobilized chiral columns are guaranteed to perform similar to or better than the equivalent DAICEL Chiral Technologies column of matching polysaccharide backbone and chiral selector at considerable cost savings. Lux phases can also provide alternative selectivity to other chiral selectors when separation is not achieved or when higher resolution is required.

Technical Specifications

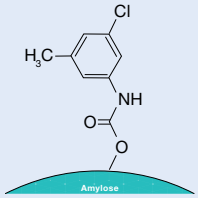
Particle Size	3, 5, 10†, 20† µm
pH Stability	2-9
Stability	Normal phase, polar organic, SFC, and reversed phase conditions
Maximum Pressure	300 bar
Temperature Range	0-50 °C
Shipping Solvent	n-Hexane/2-propanol (9:1, v/v)
Switching Solvent	Methanol/Ethanol (9:1, v/v)

†Please inquire for availability

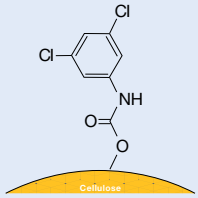
Resolve Over 92% of Your Enantiomers with Our Nine Coated and Immobilized Phases!



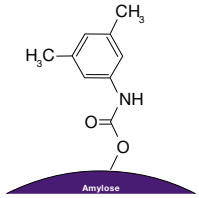
Lux i-Amylose-1
Amylose tris
(3,5-dimethylphenylcarbamate)



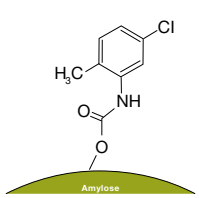
Lux i-Amylose-3
Amylose tris
(3-chloro-5-methylphenylcarbamate)



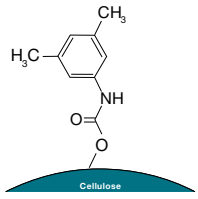
Lux i-Cellulose-5
Cellulose tris
(3,5-dichlorophenylcarbamate)



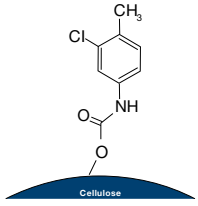
Lux Amylose-1
Amylose tris
(3,5-dimethylphenylcarbamate)



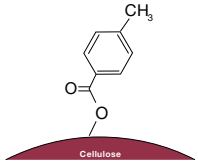
Lux Amylose-2
Amylose tris
(5-chloro-2-methylphenylcarbamate)



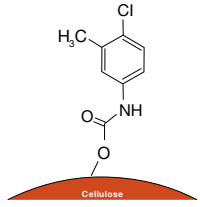
Lux Cellulose-1
Cellulose tris
(3,5-dimethylphenylcarbamate)



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)

SFC APPROVED

CHIRAL LC | LUX | HPLC/UHPLC

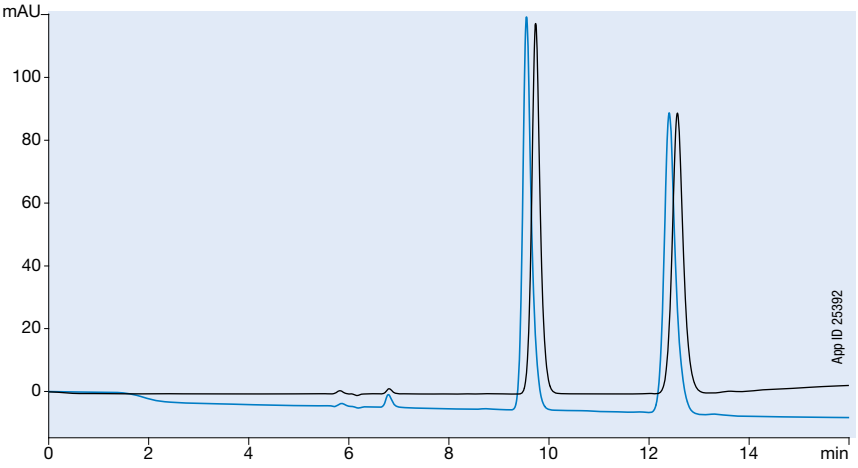
Easily upgrade from your existing chiral columns to Lux LC/SFC columns!

If you are using one of the DAICEL® columns below:	Guaranteed alternative:	Phase description:
CHIRALPAK® IA® and IA-3	Lux i-Amylose-1	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK IG® and IG-3	Lux i-Amylose-3	Amylose tris(3-chloro-5-methylphenylcarbamate)
CHIRALPAK IC® and IC-3	Lux i-Cellulose-5	Cellulose tris(3,5-dichlorophenylcarbamate)
CHIRALPAK AD®, AD-H®, AD-3, AD-RH®, and AD-3R	Lux Amylose-1	Amylose tris(3,5-dimethylphenylcarbamate)
CHIRALPAK AY®, AY-H®, AY-3, AY-RH, and AY-3R	Lux Amylose-2	Amylose tris(5-chloro-2-methylphenylcarbamate)
CHIRALCEL® OD®, OD-H®, OD-3, OD-RH®, and OD-3R	Lux Cellulose-1	Cellulose tris(3,5-dimethylphenylcarbamate)
CHIRALCEL OZ, OZ-H®, OZ-3, OZ-RH, and OZ-3R	Lux Cellulose-2	Cellulose tris(3-chloro-4-methylphenylcarbamate)
CHIRALCEL OJ®, OJ-H®, OJ-3, OJ-RH®, and OJ-3R	Lux Cellulose-3	Cellulose tris(4-methylbenzoate)
CHIRALCEL OX-H, OX-3, OX-RH, and OX-3R	Lux Cellulose-4	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 columns:

Columns: Lux 5 µm i-Amylose-3
Lux 3 µm i-Amylose-3
Dimensions: 250 x 4.6 mm
Part No.: 00G-4779-E0
00G-4778-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

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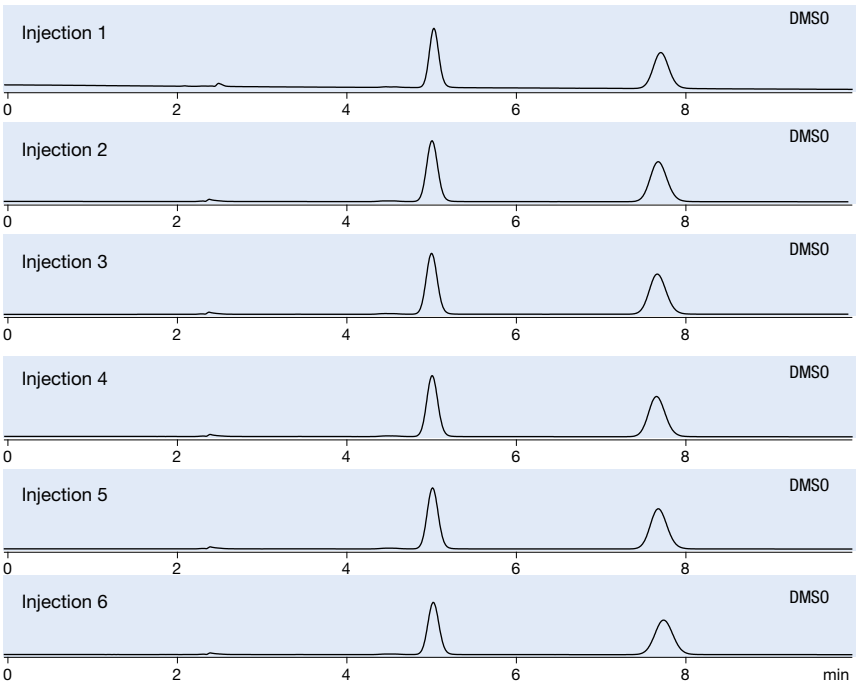
Load Samples in Desired Strong Solvents

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 columns:

Column: Lux 5 µm i-Celluose-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.

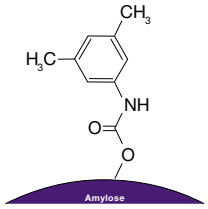
Lux Chiral Stationary Phases

The Lux line of coated and immobilized cellulose-based and amylose-based chiral stationary phases includes eight complementary selectivities.

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

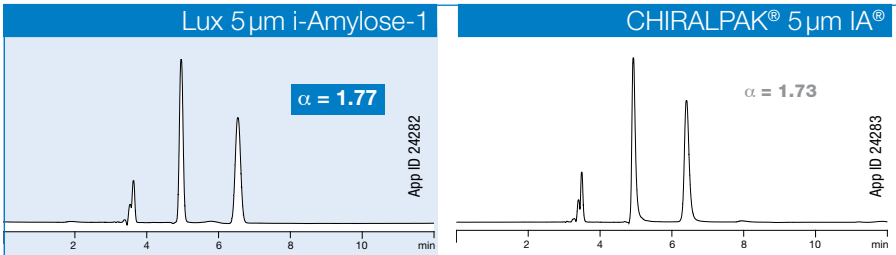
Lux i-Amylose-1: Immobilized 3,5-Dimethyl Phenylcarbamate Selector

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.



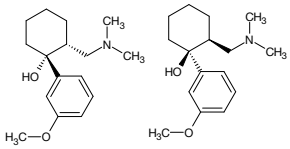
Amylose tris(3,5-dimethylphenylcarbamate)

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



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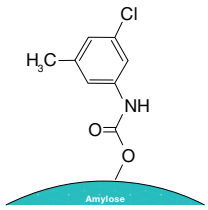
Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

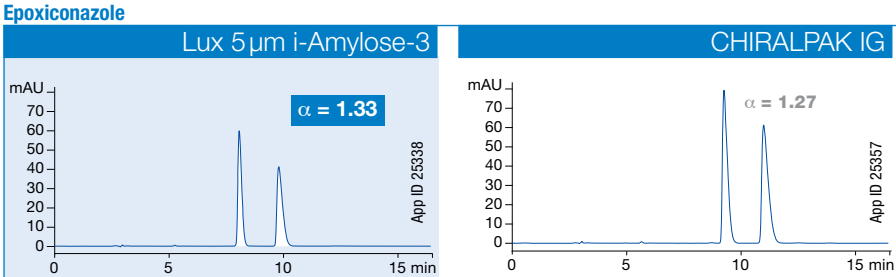
Lux i-Amylose-3: Immobilized 3-Chloro, 5-Methyl Phenylcarbamate Selector

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.



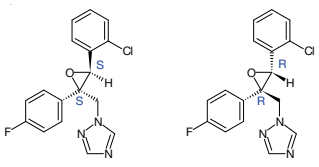
Amylose tris(3-chloro-5-methylphenylcarbamate)

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

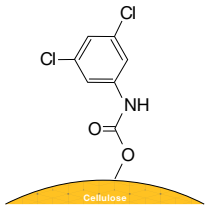


Columns used for comparison were manufactured by DAICEL Corporation. Phenomenex is in no way affiliated with DAICEL Corporation.
Comparative separations may not be representative of all applications.

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

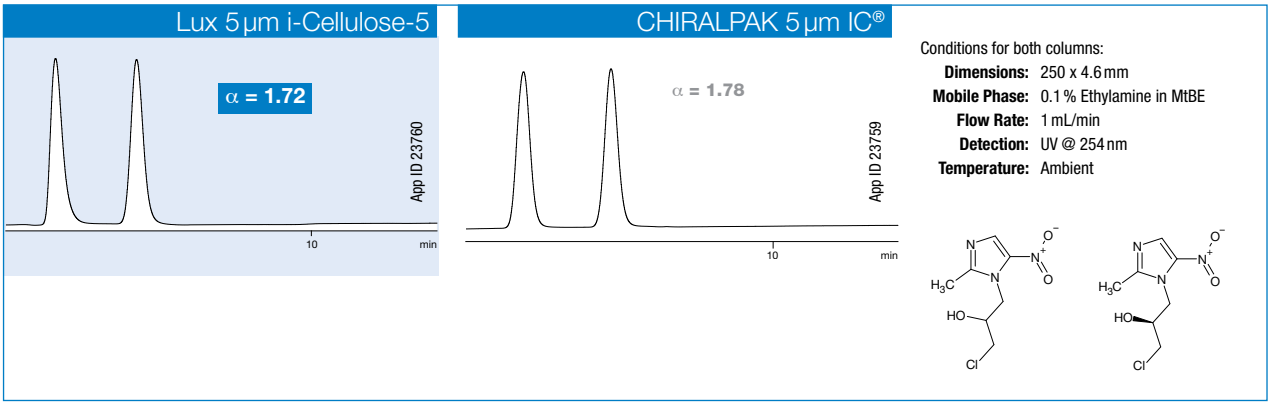
Lux i-Cellulose-5:
Immobilized 3,5-Dichloro Phenylcarbamate Selector

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)

Ornidazole

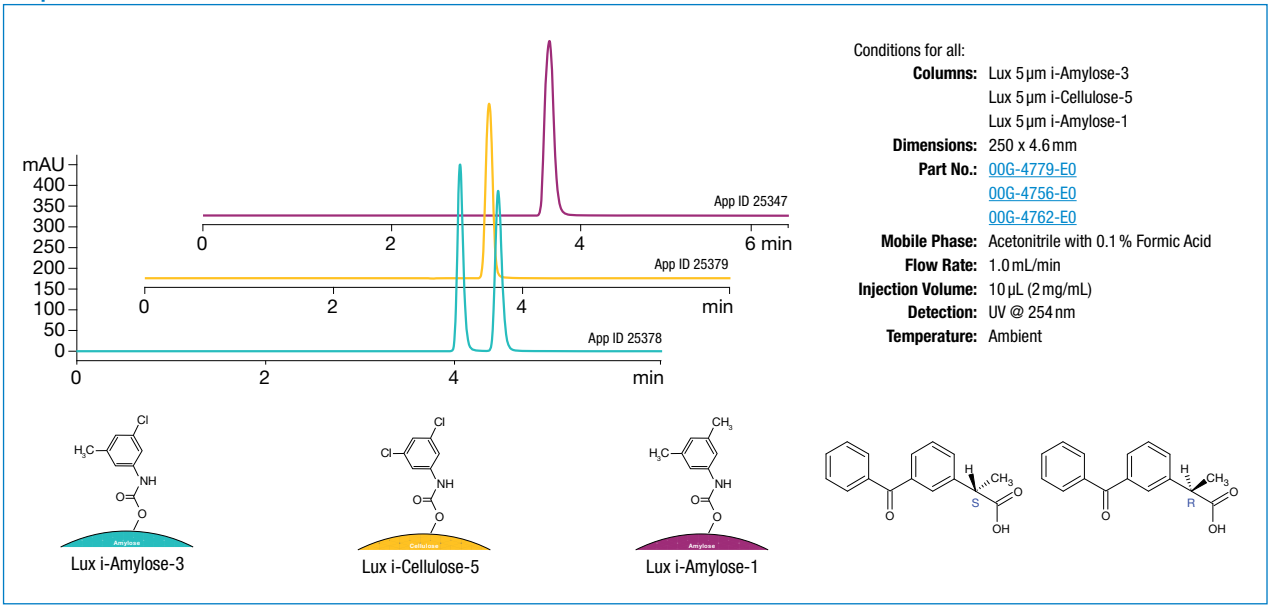


Columns used for comparison were manufactured by DAICEL Corporation. Phenomenex is in no way affiliated with DAICEL Corporation.
Comparative separations may not be representative of all applications.

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



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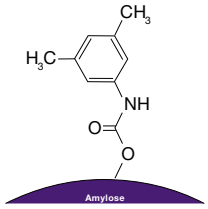
Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

Lux Amylose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector

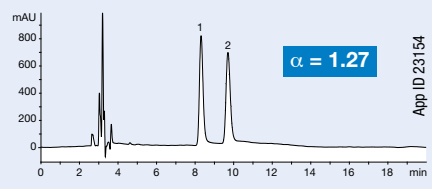
This universally trusted amylose phenylcarbamate derivative is absolutely essential to any chiral screen. Lux Amylose-1 is a guaranteed alternative to CHIRALPAK® AD®. Expect equivalent or better performance when using this Lux phase.



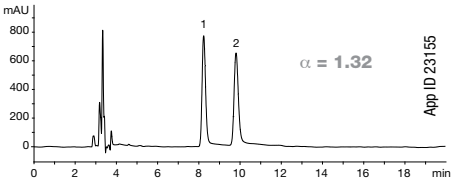
Amylose tris(3,5-dimethylphenylcarbamate)

Ketoprofen

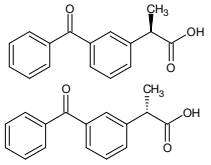
Lux 5 µm Amylose-1



CHIRALPAK® 5 µm AD-H®



Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Formic acid in Hexane / 0.1 % Formic acid in Isopropanol (80:20)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

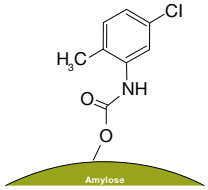


SFC APPROVED

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

Lux Amylose-2: Coated 5-Chloro, 2-Methyl Phenylcarbamate Selector

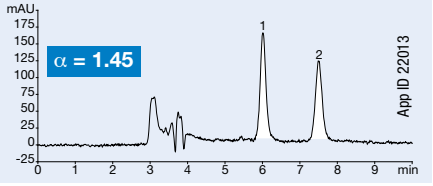
This first-to-market chlorinated amylose phenylcarbamate derivative offers complex chiral recognition components that greatly increase the chances of achieving chiral resolution.



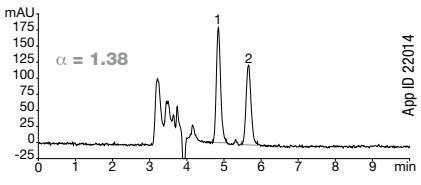
Amylose tris(5-chloro-2-methylphenylcarbamate)

Ifenprodil

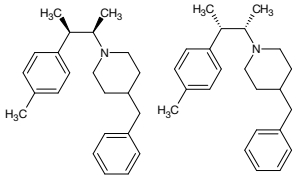
Lux 5 µm Amylose-2



CHIRALPAK® 5 µm AY-H®



Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Hexane / 0.1 % Diethylamine in Ethanol (80:20)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

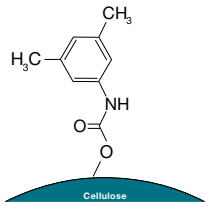


Comparative separations may not be representative of all applications.

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

Lux Cellulose-1: Coated 3,5-Dimethyl Phenylcarbamate Selector

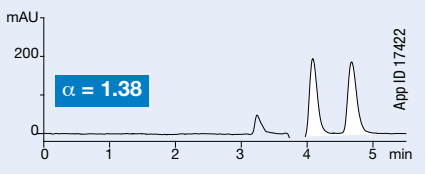
This universally trusted cellulose phenylcarbamate derivative is absolutely essential to any chiral screen. Guaranteed alternative to CHIRALCEL® OD-H®. Expect equivalent or better performance.



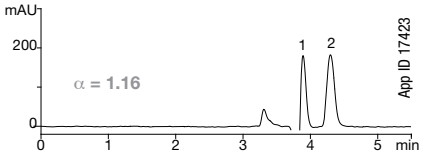
Cellulose tris(3,5-dimethylphenylcarbamate)

Metoprolol

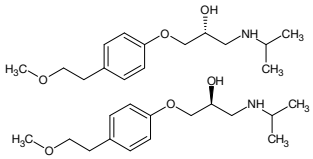
Lux 5 µm Cellulose-1



CHIRALCEL® 5 µm OD-H®



Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Acetonitrile / 0.1 % Diethylamine in Isopropanol (95:5)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient



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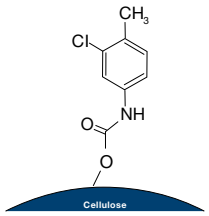
Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

Lux Cellulose-2: Coated 3-Chloro, 4-Methyl Phenylcarbamate Selector

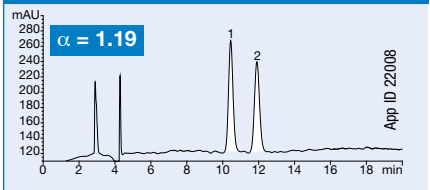
This first-to-market halogenated cellulose phenylcarbamate derivative offers unique chiral recognition abilities that complement the rest of the Lux family of columns.



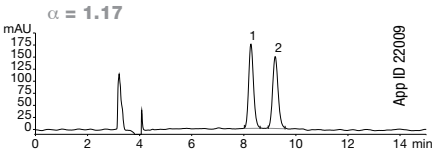
Cellulose tris(3-chloro-4-methylphenylcarbamate)

Alprenolol

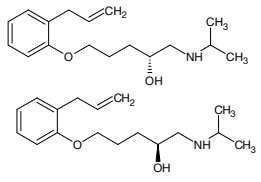
Lux 5 µm Cellulose-2



CHIRALCEL® 5 µm OZ-H®



Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Hexane / 0.1 % Diethylamine in Ethanol (90:10)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

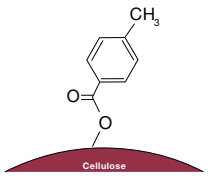


Comparative separations may not be representative of all applications.

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

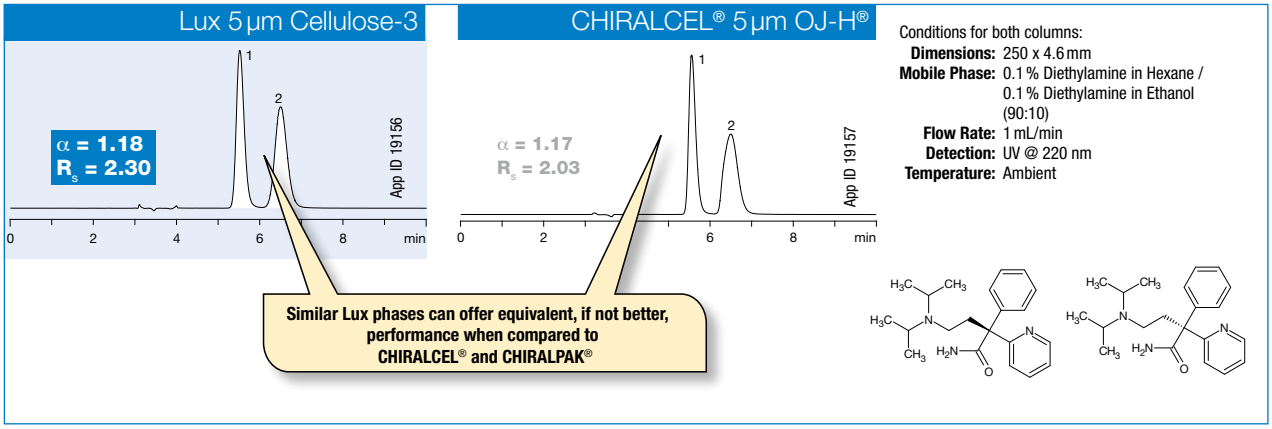
Lux Cellulose-3: Coated 4-Methyl Phenylacetate Selector

This cellulose methylbenzoate derivative offers distinct and complementary chiral recognition abilities.



Cellulose tris(4-methylbenzoate)

Disopyramide



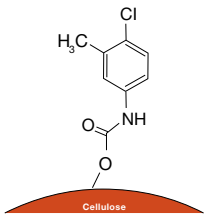
Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Hexane / 0.1 % Diethylamine in Ethanol (90:10)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

SFC APPROVED

Excellent separation at a fraction of the cost of DAICEL/Chiral Technologies.

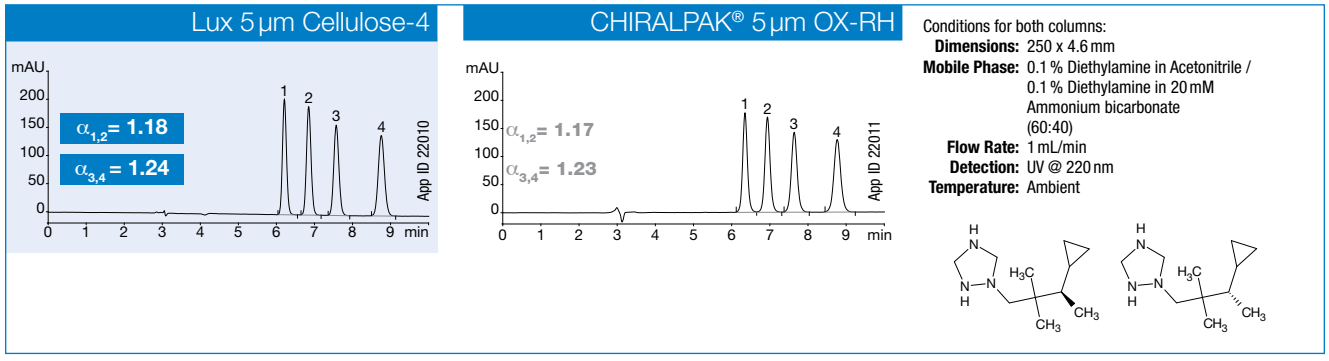
Lux Cellulose-4: Coated 4-Chloro, 3-Methyl Phenylcarbamate Selector

This chlorinated cellulose phenylcarbamate derivative offers unique chiral recognition abilities.



Cellulose tris(4-chloro-3-methylphenylcarbamate)

Cyproconazole

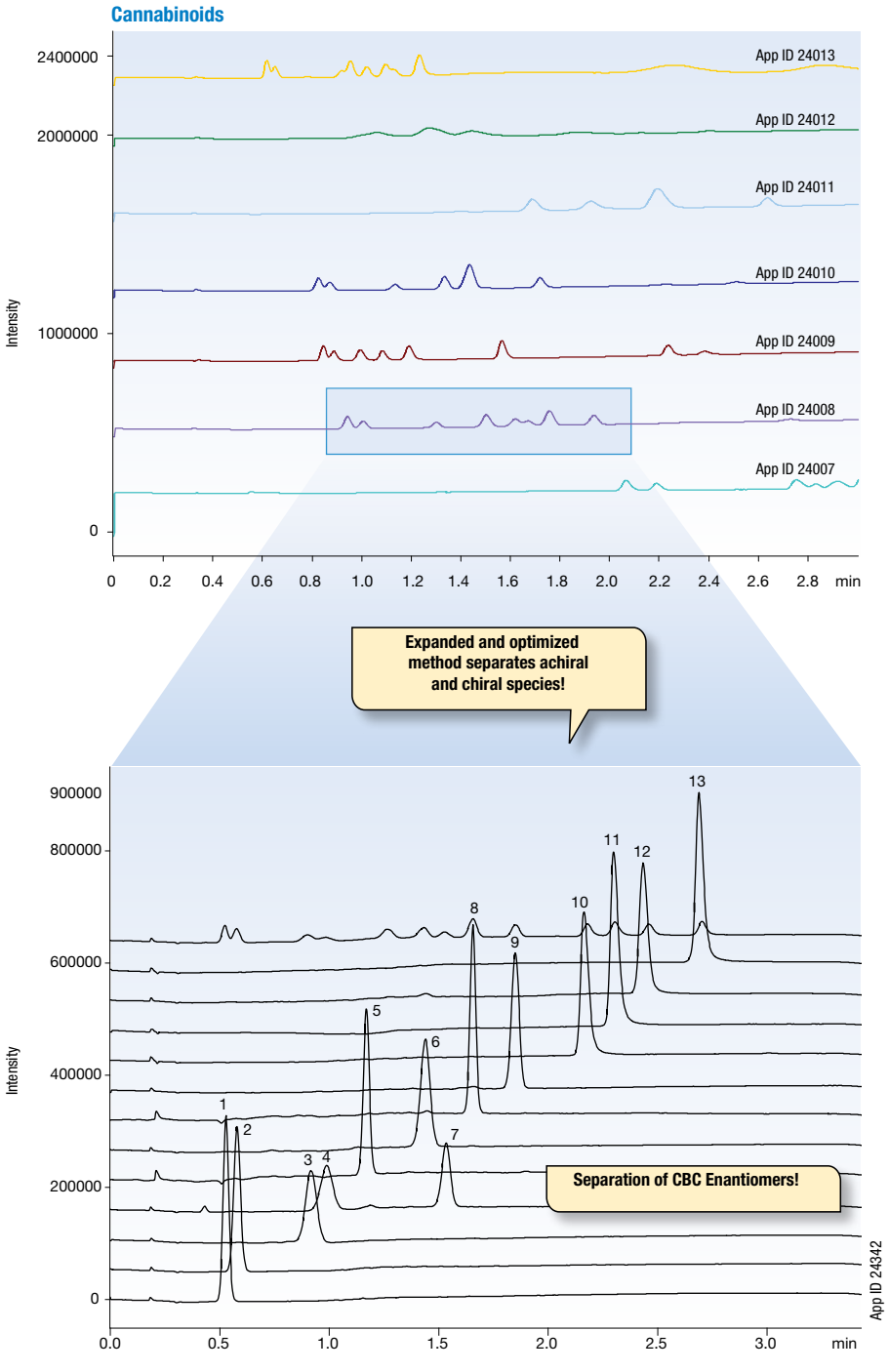


Conditions for both columns:
Dimensions: 250 x 4.6 mm
Mobile Phase: 0.1 % Diethylamine in Acetonitrile / 0.1 % Diethylamine in 20 mM Ammonium bicarbonate (60:40)
Flow Rate: 1 mL/min
Detection: UV @ 220 nm
Temperature: Ambient

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

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
2. CBN
3. Delta-8-THC
4. CBC (Enantiomer 1)
5. CBD
6. Delta-9-THC
7. CBC (Enantiomer 2)
8. THCV
9. CBG
10. CBDA
11. CBDVA
12. THCA
13. CBGA

SFC APPROVED

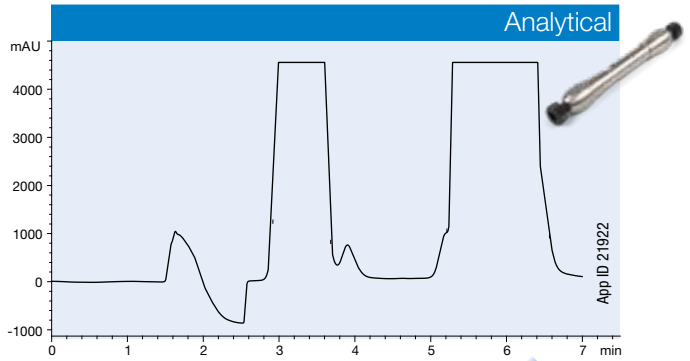
Axia™ Chiral Columns Out Perform Other Prep Columns

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.

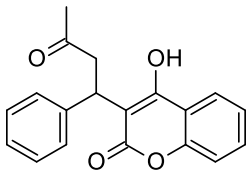
To better understand how much Axia technology improves column performance over traditionally slurry packed preparative columns we scaled-up a 5 µm Lux Cellulose-1 chiral media analytical column and packed the same media into two different 150 x 21.2 mm ID columns. One column was packed using Axia technology 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



Warfarin

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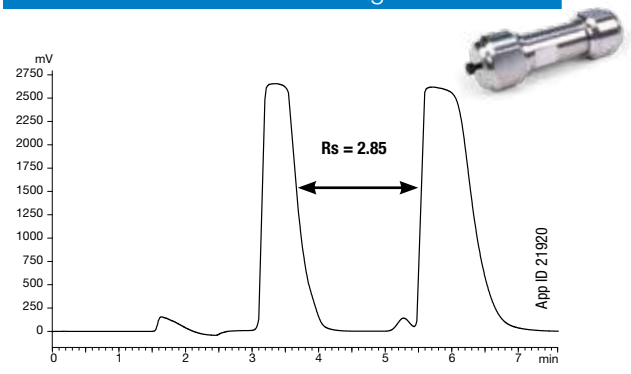
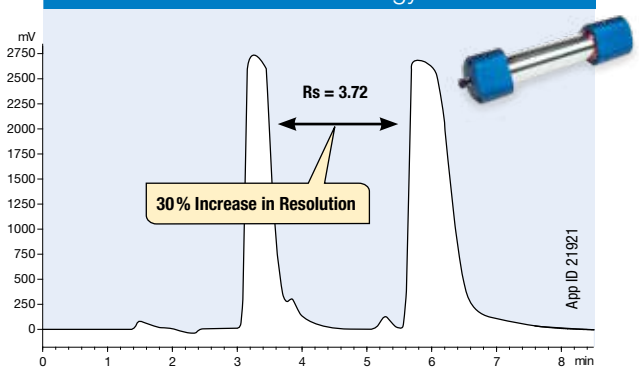
Standard Packing and Hardware



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.

Ordering Information

3µm Minibore, MidBore™, and Analytical Columns (mm)									SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	150 x 2.0	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	00B-4778-B0	00F-4778-B0	—	—	00B-4778-E0	00D-4778-E0	00F-4778-E0	00G-4778-E0	AJ0-8651	AJ0-8650
i-Cellulose-5	00B-4755-B0	00F-4755-B0	00D-4755-Y0	00F-4755-Y0	00B-4755-E0	00D-4755-E0	00F-4755-E0	00G-4755-E0	AJ0-8631	AJ0-8632
Cellulose-1	00B-4458-B0	00F-4458-B0	00D-4458-Y0	00F-4458-Y0	00B-4458-E0	00D-4458-E0	00F-4458-E0	00G-4458-E0	AJ0-8402	AJ0-8403
Cellulose-2	00B-4456-B0	00F-4456-B0	00D-4456-Y0	00F-4456-Y0	00B-4456-E0	00D-4456-E0	00F-4456-E0	00G-4456-E0	AJ0-8398	AJ0-8366
Cellulose-3	00B-4492-B0	00F-4492-B0	00D-4492-Y0	00F-4492-Y0	00B-4492-E0	00D-4492-E0	00F-4492-E0	00G-4492-E0	AJ0-8621	AJ0-8622
Cellulose-4	00B-4490-B0	00F-4490-B0	00D-4490-Y0	00F-4490-Y0	00B-4490-E0	00D-4490-E0	00F-4490-E0	00G-4490-E0	AJ0-8626	AJ0-8627
Amylose-1	00B-4729-B0	00F-4729-B0	00D-4729-Y0	00F-4729-Y0	00B-4729-E0	00D-4729-E0	00F-4729-E0	00G-4729-E0	AJ0-9337	AJ0-9336
Amylose-2	00B-4471-B0	00F-4471-B0	00D-4471-Y0	00F-4471-Y0	00B-4471-E0	00D-4471-E0	00F-4471-E0	00G-4471-E0	AJ0-8471	AJ0-8470
									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	—	00B-4762-E0	00D-4762-E0	00F-4762-E0	00G-4762-E0	AJ0-8640	AJ0-8641
i-Amylose-3	—	00B-4779-E0	00D-4779-E0	00F-4779-E0	00G-4779-E0	AJ0-8651	AJ0-8650
i-Cellulose-5	—	00B-4756-E0	00D-4756-E0	00F-4756-E0	00G-4756-E0	AJ0-8631	AJ0-8632
Cellulose-1	—	00B-4459-E0	00D-4459-E0	00F-4459-E0	00G-4459-E0	AJ0-8402	AJ0-8403
Cellulose-2	00B-4457-B0	00B-4457-E0	00D-4457-E0	00F-4457-E0	00G-4457-E0	AJ0-8398	AJ0-8366
Cellulose-3	—	00B-4493-E0	00D-4493-E0	00F-4493-E0	00G-4493-E0	AJ0-8621	AJ0-8622
Cellulose-4	—	—	00D-4491-E0	00F-4491-E0	00G-4491-E0	AJ0-8626	AJ0-8627
Amylose-1	00B-4732-B0	—	00D-4732-E0	00F-4732-E0	00G-4732-E0	AJ0-9337	AJ0-9336
Amylose-2	00B-4472-B0	00B-4472-E0	00D-4472-E0	00F-4472-E0	00G-4472-E0	AJ0-8471	AJ0-8470
						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‡
			/3pk
i-Amylose-1	—	00G-4762-N0	AJ0-8642
i-Amylose-3	—	00G-4779-N0	AJ0-8652
i-Cellulose-5	—	00G-4756-N0	AJ0-8633
Cellulose-1†	00F-4459-N0	00G-4459-N0	AJ0-8404
Cellulose-2†	—	00G-4457-N0	AJ0-8399
Cellulose-3	—	00G-4493-N0	AJ0-8623
Cellulose-4	—	00G-4491-N0	AJ0-8628
Amylose-1	—	00G-4732-N0	AJ0-9344
Amylose-2	00F-4472-N0	00G-4472-N0	AJ0-8472
			for ID: 9–16 mm

†Inquire for Lux 10µm Cellulose-1 and Cellulose-2 columns.

Column Performance Check Standard

Part No.	Description	Unit
AL0-8412	Chiral Test Mix No. 5 (Lux)	ea

Lux Chiral Method Screening Kits are available. Please contact your Phenomenex representative for more information.

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	00F-4762-P0-AX	00G-4762-P0-AX	00G-4762-U0-AX	00G-4762-V0-AX	AJ0-8643	AJ0-8644
i-Amylose-3	00F-4779-P0-AX	00G-4779-P0-AX	00G-4779-U0-AX	00G-4779-V0-AX	AJ0-8653	AJ0-8654
i-Cellulose-5	00F-4756-P0-AX	00G-4756-P0-AX	00G-4756-U0-AX	00G-4756-V0-AX	AJ0-8634	AJ0-8635
Cellulose-1†	00F-4459-P0-AX	00G-4459-P0-AX	00G-4459-U0-AX	00G-4459-V0-AX	AJ0-8405	AJ0-8406
Cellulose-2†	00F-4457-P0-AX	00G-4457-P0-AX	00G-4457-U0-AX	00G-4457-V0-AX	AJ0-8400	AJ0-8401
Cellulose-3	00F-4493-P0-AX	00G-4493-P0-AX	00G-4493-U0-AX	00G-4493-V0-AX	AJ0-8624	AJ0-8625
Cellulose-4	00F-4491-P0-AX	00G-4491-P0-AX	00G-4491-U0-AX	00G-4491-V0-AX	AJ0-8629	AJ0-8630
Amylose-1	00F-4732-P0-AX	00G-4732-P0-AX	00G-4732-U0-AX	00G-4732-V0-AX	AJ0-9338	AJ0-9339
Amylose-2	00F-4472-P0-AX	00G-4472-P0-AX	00G-4472-U0-AX	—	AJ0-8473	AJ0-8474
					for ID: 18–29 mm	30–49 mm

Bulk Media		
Phases	100 g	1 kg
10µm		
Cellulose-1	04G-4501	04K-4501
Cellulose-2	04G-4502	04K-4502
Cellulose-3	04G-4624	04K-4624
Cellulose-4	04G-4625	04K-4625

*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

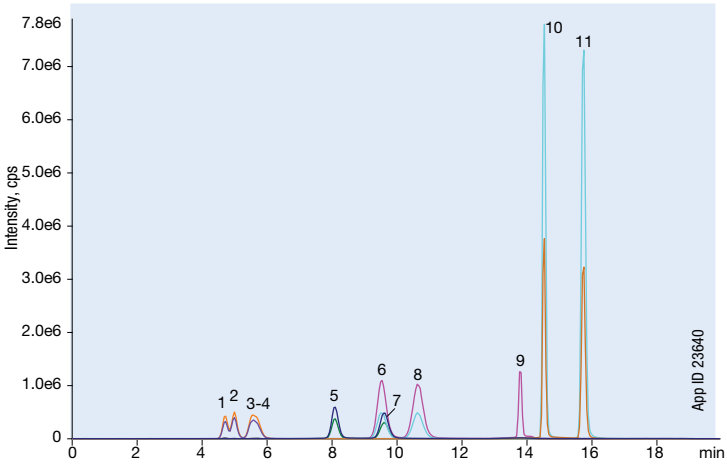
SFC APPROVED

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 methamphtetamine. 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:

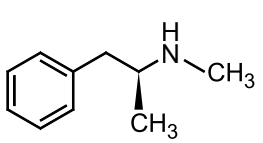
Time (min)	% B
0	60
10	60
11	95
16	95
16.3	60

Flow Rate: 0.42 mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX 4500 QTRAP®)

1. 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

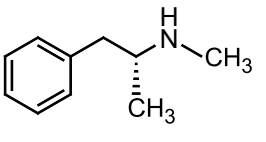
Compounds included in this interference study but not illustrated chromatographically:
acetaminophen
aspirin
(±)-chlorpheniramine
caffeine
diphenhydramine
dextromethorphan
ibuprofen
(±)-MDA
(±)-MDEA
phenylephrine
norephedrine

D-Methamphetamine



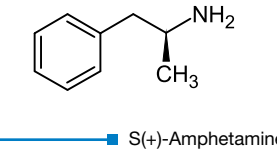
S(+)-Methamphetamine

L-Methamphetamine



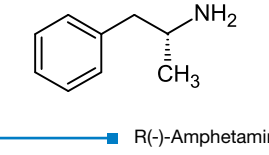
R(-)-Methamphetamine

D-Amphetamine



S(+)-Amphetamine

L-Amphetamine



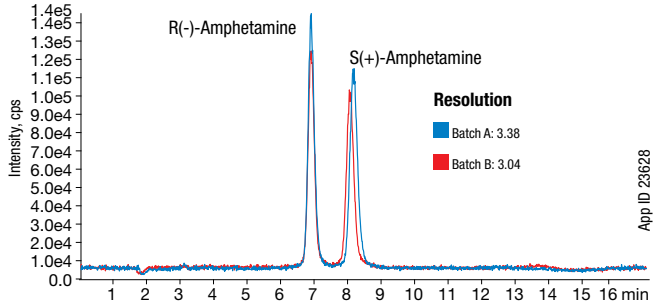
R(-)-Amphetamine

SFC APPROVED

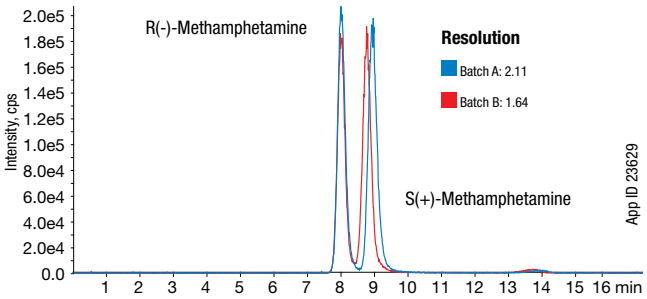
Exceptional Reliability

Lux 3 µm 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.

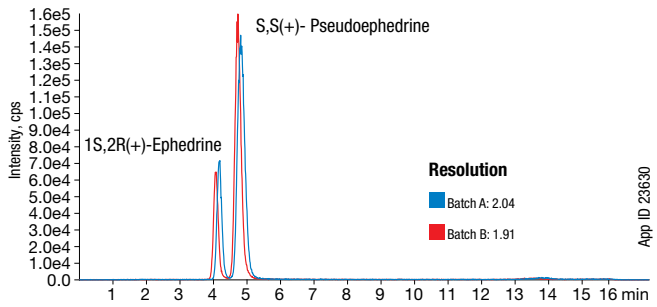
Amphetamine Enantiomers



Methamphetamine Enantiomers



Ephedrine and Pseudoephedrine



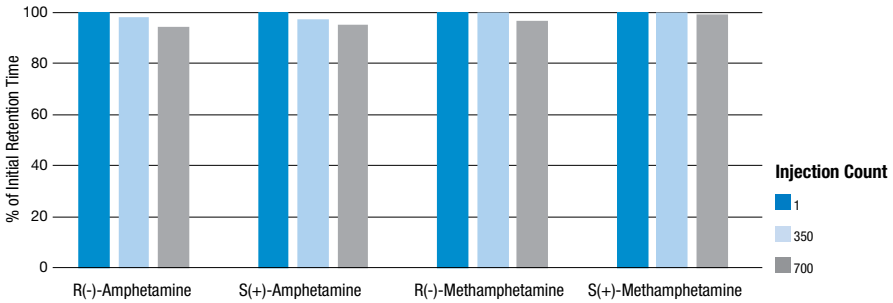
Column: Lux 3 µm AMP
Dimension: 150 x 3.0 mm
Part No.: 00F-4751-Y0
Mobile Phase: A: 5 mM Ammonium Bicarbonate, adjusted to pH 11 with Ammonium Hydroxide
B: Methanol

Gradient:

Time (min)	% B
0	60
10	60
11	95
13	95
13.1	60

Flow Rate: 0.42 mL/min
Temperature: 22 °C
Sample:
1. Ephedrine
2. Pseudoephedrine
3. R(-)-Amphetamine
4. S(+)-Amphetamine
5. R(-)-Methamphetamine
6. S(+)-Methamphetamine

Excellent Lifetime



Ordering Information

3 µm Analytical Columns (mm)			SecurityGuard™ Cartridges (mm)	
Phase	150 x 3.0	150 x 4.6	4 x 2.0*	4 x 3.0*
			10/pk	10/pk
AMP	00F-4751-Y0	00F-4751-E0	AJ0-8475	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^2/g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m^2)	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 macropre 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 21.2 mm 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)
Capillary Columns		
CH0-7646	Onyx Monolithic C18	150 x 0.1
Analytical Columns		
CH0-8373	Onyx Monolithic C18	50 x 2.0
CH0-8464	Onyx Monolithic C18	25 x 3.0
CH0-8158	Onyx Monolithic C18	100 x 3.0
CH0-7643	Onyx Monolithic C18	100 x 4.6
CH0-7644	Onyx Monolithic C18	50 x 4.6
CH0-7645	Onyx Monolithic C18	25 x 4.6
CH0-8611	Onyx Monolithic HD-C18	100 x 4.6
CH0-7647	Onyx Monolithic C8	100 x 4.6
SemiPrep Columns		
CH0-7878	Onyx Monolithic C18	100 x 10.0
Guard Cartridge System		
KJ0-8465	Onyx Monolithic C18 Guard Cartridge Kit (3/pk cartridges + holder)	5 x 3.0
CH0-8466	Onyx Monolithic C18 Guard Cartridges (3/pk)	5 x 3.0
CH0-7649	Onyx Monolithic C18 Guard Cartridges (3/pk)	5 x 4.6
KJ0-7652	Onyx Monolithic C18 Guard Cartridge Kit (3/pk cartridges + holder + wrench)	10 x 4.6
CH0-7650	Onyx Monolithic C18 Guard Cartridges (3/pk)	10 x 4.6
Column Coupler		
AQ0-7654	Onyx Column Coupler, 0.020 in. ID	

For Onyx Reversed Phase Column Check Standard, see p. 398

Product based on monolithic technology under license from Merck KGaA, Darmstadt, Germany

Organic Size Exclusion/Gel Permeation for Polymer Analysis

- **5 and 10 µm particle sizes**
- **Narrow bore (4.6 mm ID) solvent-saver to preparative columns available**
- **Alternative to Agilent® (Polymer Labs) PLgel™, Waters® Styragel® and Ultrastyragel™, and other columns (see p. 301)**
- **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 10^6 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.

Technical Specifications

Material:	SDVB
Particle Size:	5, 10 µm
Porosities:	50 Å to 10^6 Å†, and mixed beds
Maximum Pressure:	1500 psi
Maximum Temperature:	140 °C
Minimum Efficiency*:	5 µm: 45,000 p/m** 10 µm: 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

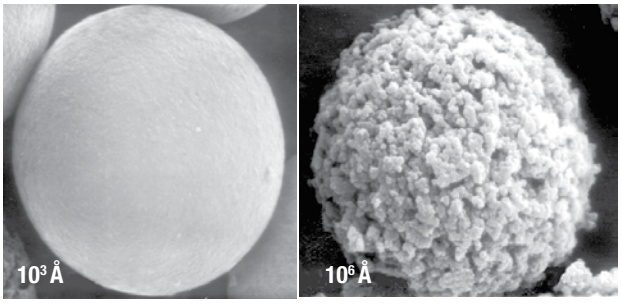
* Tested in THF ** For 300 x 7.8 mm ID columns

† See note on p. 418 regarding pore sizes and exclusion limits

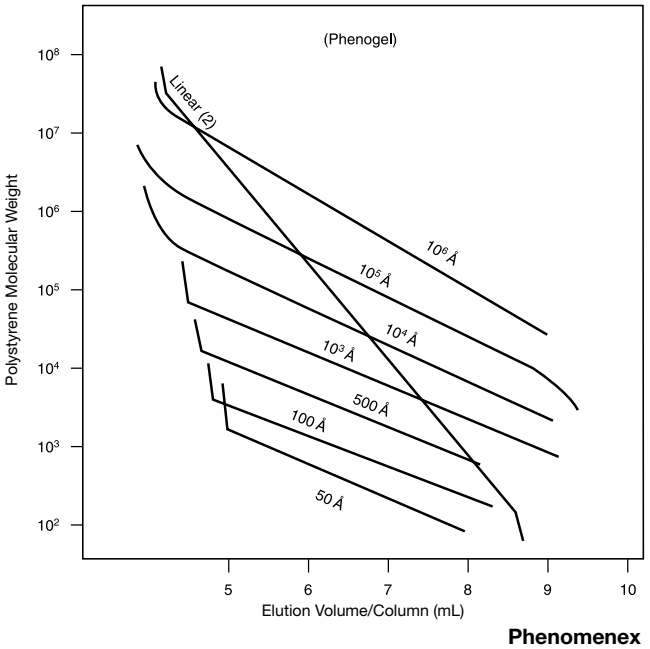
Column Selection by Molecular Weight

Sample Type	Molecular Weight	Phenogel Column
Small Organics	100 - 3 K 500 - 6 K 1 K - 15 K	50 Å 100 Å 500 Å
Resins	1 K - 75 K 5 K - 500 K 10 K - 1,000 K	10^3 Å 10^4 Å 10^5 Å
High MW Polymers	60 K - 10,000 K 100 - 10,000 K	10^6 Å Linear(2)

SEM Photos of Phenogel Polymer Beads



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) 50	100	500	10^3	10^4	10^5	10^6	Linear & Mixed	Suggested Operating Temp.
Acetone	Y	Y	Y	Y	Y	Y	Y	Y	
Benzene	Y	Y	Y	Y	Y	Y	Y	Y	
Carbon Tetrachloride	Y	Y	Y	Y	Y	Y	Y	Y	
Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	
30 % HFIP/Chloroform	Y	Y	Y	Y	Y	Y	Y	Y	
Diethyl Ether	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	
DMSO	Y*	Y	Y	Y	Y	Y	Y	Y	60 °C
Ethyl Acetate	Y	Y	Y	Y	Y	Y	Y	Y	
Hexafluoroisopropanol (HFIP)	Y	Y	Y	Y	Y	Y	Y	Y	
Hexane	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	
Methylene Chloride	Y	Y	Y	Y	Y	Y	Y	Y	
0-Chlorophenol	Y*	Y	Y	Y	Y	Y	Y	Y	100 °C
0-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	
Toluene	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	

Not recommended on 5 µm 50 Å columns.

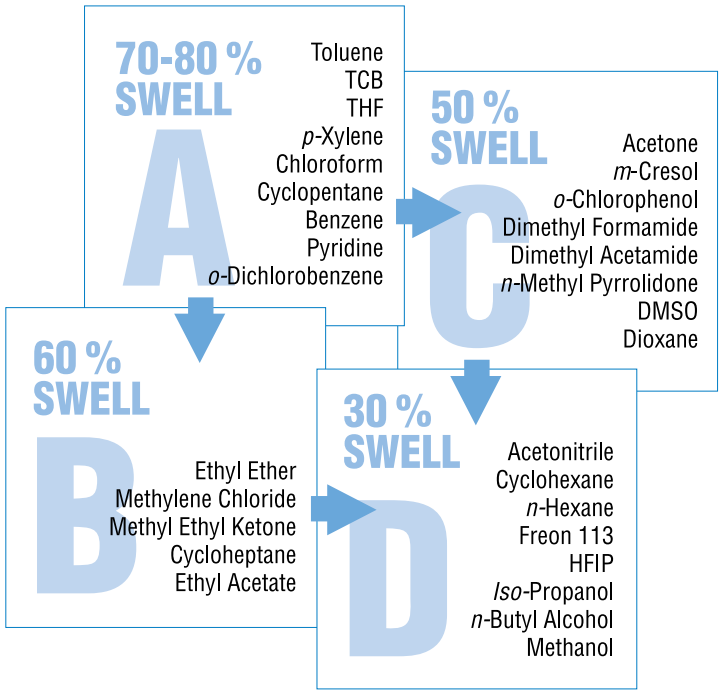
N = Not Compatible
Y = Compatible

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 416 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.

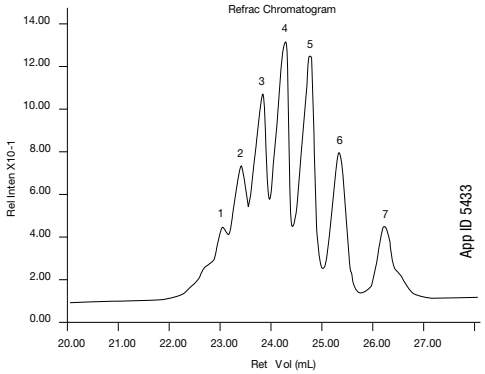


Pharmaceutical Excipients Analysis

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.

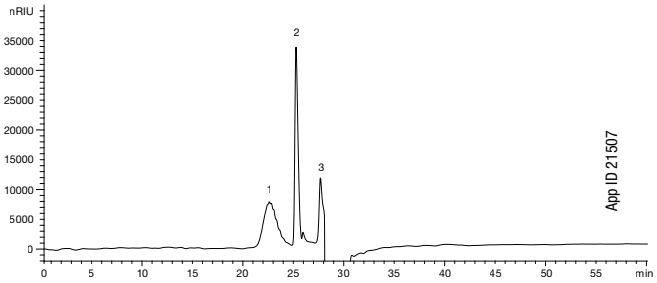
Polyethylene Glycol 330

Column: Phenogel 5 µm 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 µL 0.25 % w/v
Temperature: Ambient
Vial: AR0-9925-13
Filter: AF0-1102-52
Sample:
1. dp7 546 MW
2. dp6 458 MW
3. dp5 370 MW
4. dp4 282 MW
5. dp3 194 MW
6. dp2 106 MW
7. dp1 62 MW



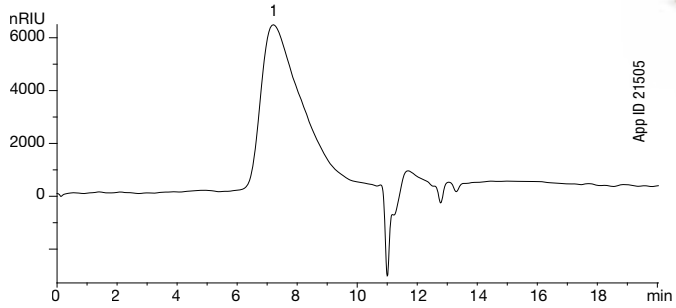
Polyethylene Glycol 106

Column: Phenogel 5 µm 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: AR0-9925-13
Filter: AF0-1102-52
Sample:
1. PEG 106
2. API peak A (unknown)
3. API peak B (unknown)



Polyvinylpyrrolidone

Column: Phenogel 5 µm 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: AR0-9925-13
Filter: AF0-1102-52
Sample: 1. Polyvinylpyrrolidone (PVP)

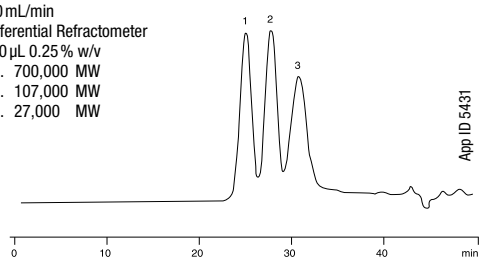


50 Å - 10^6 Å Columns

- **High resolution at low cost**
- **Customize your analysis by coupling different pore-size columns**
- **Wide range of solvent compatibility**

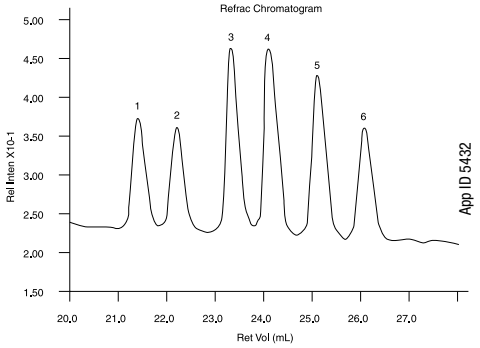
Polymethyl Methacrylates (Wide MW Range)

Column: Phenogel 5 µm 10^5 Å, 10^4 Å, 10^3 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



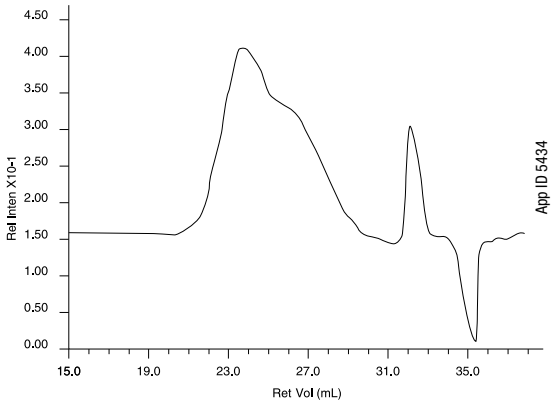
Closely Related Hydrocarbons

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
2. C32 450 MW
3. C24 338 MW
4. C20 282 MW
5. C16 226 MW
6. C13 184 MW



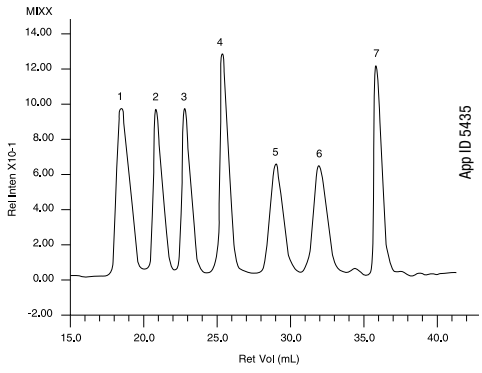
Polyethylene Oxide (PEO)

Column: Phenogel 10 µm 10^5, 10^4, 10^3 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



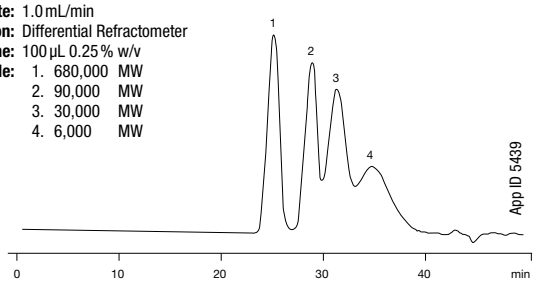
Polystyrenes (Wide MW Range)

Column: Phenogel 10 µm 10^5, 10^4, 10^3 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
2. 260,000 MW
3. 94,000 MW
4. 30,000 MW
5. 6,100 MW
6. 845 MW
7. 146 MW



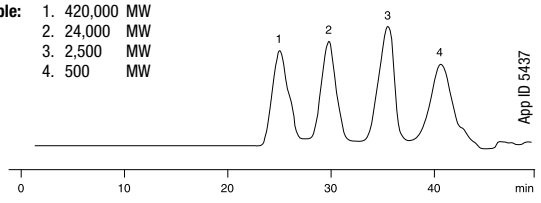
Poly-(α-Methyl Styrene) (Wide MW Range)

Column: Phenogel 5 µm 10^5, 10^4 , 10^3 , 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 10^5, 10^4, 10^3, 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

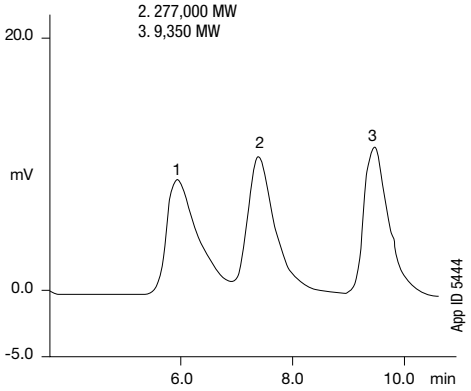


Linear Columns

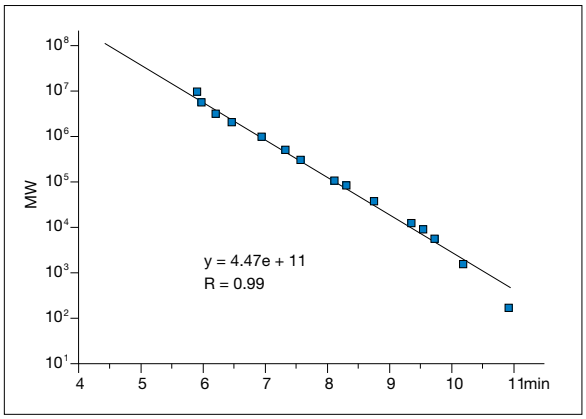
- **Linear calibration to 10 million daltons**
- **Long column lifetime**
- **Excellent mechanical stability**
- **Excellent for analyzing a wide range of molecular weights**

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: AR0-9925-13
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

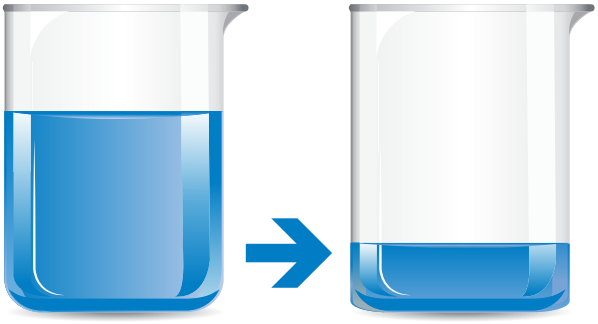
- **Decrease solvent consumption**
- **Retain same elution profile**
- **Reduce solvent disposal costs**

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!



7.5-8.0 mm ID 4.6 mm ID

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

Phenogel™ Organic GPC/SEC Columns

Ordering Information

5 µm Analytical Columns (mm)		Shipping Solvent			SecurityGuard™ Cartridges (mm)
		THF	Chloroform	DMF	
		300 x 7.8	300 x 7.8	300 x 7.8	4 x 3.0*
Pore Size	**MW Range**				/3pk
50 Å	100-3 K	00H-0441-K0	—	00H-0441-K0-DF	AJ0-9292
100 Å	500-6 K	00H-0442-K0	—	—	AJ0-9292
500 Å	1 K-15 K	00H-0443-K0	—	—	AJ0-9292
10^3 Å	1 K-75 K	00H-0444-K0	—	00H-0444-K0-DF	AJ0-9292
10^4 Å	5 K-500 K	00H-0445-K0	00H-0445-K0-CL	—	AJ0-9292
10^5 Å	10 K-1,000 K	00H-0446-K0	—	00H-0446-K0-DF	AJ0-9292
10^6 Å	60 K-10,000 K	00H-0447-K0	—	—	AJ0-9292
		300 x 7.8	300 x 7.8	300 x 7.8	4 x 3.0*
Mixed Beds					/3pk
Linear(2)	100-10,000 K	00H-3259-K0	00H-3259-K0-CL	00H-3259-K0-DF	AJ0-9292

for 3.2–8.0 mm ID

5 µm Narrow Bore (NB) Columns (mm)			SecurityGuard Cartridges (mm)
		300 x 4.6	4 x 3.0*
Pore Size	**MW Range**		/3pk
50 Å	100-3 K	00H-0441-E0	AJ0-9292
100 Å	500-6 K	00H-0442-E0	AJ0-9292
500 Å	1 K-15 K	00H-0443-E0	AJ0-9292
10^3 Å	1 K-75 K	00H-0444-E0	AJ0-9292
10^4 Å	5 K-500 K	00H-0445-E0	AJ0-9292
10^5 Å	10 K-1,000 K	00H-0446-E0	AJ0-9292
10^6 Å	60 K-10,000 K	00H-0447-E0	AJ0-9292
		300 x 4.6	4 x 3.0*
Mixed Beds			/3pk
Linear(2)	100-10,000 K	00H-3259-E0	AJ0-9292

for 3.2–8.0 mm ID

10 µm Analytical Columns (mm)			SecurityGuard Cartridges (mm)
		300 x 7.8	4 x 3.0*
Pore Size	**MW Range**		/3pk
50 Å	100-3 K	00H-0641-K0	AJ0-9292
100 Å	500-6 K	00H-0642-K0	AJ0-9292
500 Å	1 K-15 K	00H-0643-K0	AJ0-9292
10^3 Å	1 K-75 K	00H-0644-K0	AJ0-9292
10^4 Å	5 K-500 K	00H-0645-K0	AJ0-9292
10^5 Å	10 K-1,000 K	00H-0646-K0	AJ0-9292
10^6 Å	60 K-10,000 K	00H-0647-K0	AJ0-9292
		300 x 7.8	4 x 3.0*
Mixed Beds			/3pk
Linear(2)	100-10,000 K	00H-3260-K0	AJ0-9292

for 3.2–8.0 mm ID

5 µm Preparative Columns (mm)			Guards
		300 x 21.2	50 x 21.2
Pore Size	**MW Range**		
100 Å	500-6 K	00H-0442-P0	03B-0642-P0

10 µm Preparative Columns (mm)			Guards
		300 x 21.2	50 x 21.2
Pore Size	**MW Range**		
100 Å	500-6 K	00H-0642-P0	03B-0642-P0

Guard Cartridge Holder	
Part No.	**Description**
KJ0-4282	Reusable Holder (SecurityGuard Kit)

Column Union		
Part No.	**Description**	**Unit**
AQ0-8507	Zero Dead Union, SS, with 10-32 fittings	ea

Note: Additional union (AQ0-8507) may be necessary for SecurityGuard to fit in column oven with less than 30 cm length capacity.

Phenogel columns are routinely shipped in THF. However, columns are also available in commonly used solvents, Chloroform and DMF, for an additional charge for these shipping solvents. Please specify shipping solvent when ordering.

Phenogel Columns are a Recommended Alternative to:

Manufacturer	Columns
Agilent® (Polymer Labs)	PLgel™
Jordi Labs	Jordi Gel™ DVB Jordi Gel DVB Fluorinated Jordi Gel DVB Glucose
Polymer Standards Service (PSS)	SDV® GRAM PolarSil PFG POLEFIN®
Shodex®	GPC K-800 Series GPC KF-800 Series GPC KD-800 Series
Tosoh Bioscience®	TSKgel® SuperMultiporeHZ TSKgel SuperHZ TSKgel Hxl TSKgel SuperH TSKgel Hhr
Waters®	Styragel® Ultrastyragel™ ACQUITY® APC™

*SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282

For Column Heater, see p. 390

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

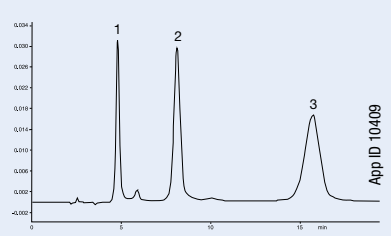
*pertains to dimethyltritylated (DMT) synthetic oligomer purification on a 150 x 4.1 mm column

Chromatographic Comparison** of Polymer Columns

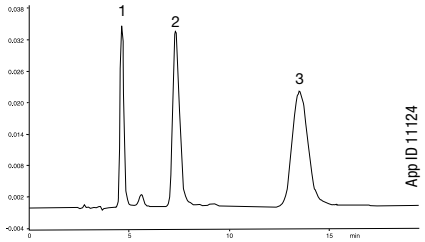
Tetracyclines

Dimensions: 150 x 4.6 mm
Mobile Phase: 50 g tertiary butyl alcohol in 200 mL water
60 mL pH 7.5 phosphate buffer
50 mL tetrabutyl ammonium hydrogen sulfate
10 mL EDTA disodium solution
diluted with water to 1000 mL
Flow Rate: 1.0 mL/min
Detection: UV @ 254 nm
Temperature: 60 °C
Injection Volume: 2 µL
Sample:
1. 4-Epioxytetracycline
2. Oxytetracycline
3. Tetracycline

PolymerX 5 µm RP-1



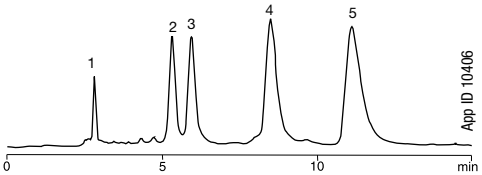
Agilent® 5 µm PLRP-S



**Comparative separations may not be representative of all applications.

Erythromycins

Column: PolymerX 7 µm RP-1
Dimensions: 250 x 4.6 mm
Part No.: 00G-4327-E0
Guard Cartridge: AJ0-5809
Guard Holder: KJ0-4282
Mobile Phase: A: 1.75 g dibasic potassium phosphate in 50 mL water, adjust to pH 9.0. Add 165 mL of tertiary butyl alcohol and 30 mL acetonitrile. Add water to a final volume of 1 L
B: Acetonitrile
A/B (50:50)
Flow Rate: 0.8 mL/min
Detection: UV @ 215 nm
Temperature: 75 °C
Injection Volume: 20 µL
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample:
1. Unknown
2. Erythromycin related compound N
3. Erythromycin C
4. Erythromycin A
5. Erythromycin B



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	00F-4338-Z0	—	—	—	—	—
5 µm	00F-4326-Z0	00F-4326-E0	00G-4326-Z0	00G-4326-E0	—	—
7 µm	—	—	—	00G-4327-E0	—	—
10 µm	—	—	00G-4328-Z0	00G-4328-E0	00G-4328-N0	00G-4328-P0

RP-1 SecurityGuard™ Cartridges (mm)

4 x 3.0*	10 x 10‡	15 x 21.2**
/10pk	/3pk	/ea
AJ0-5809	AJ0-7368	AJ0-8358
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. 398

*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

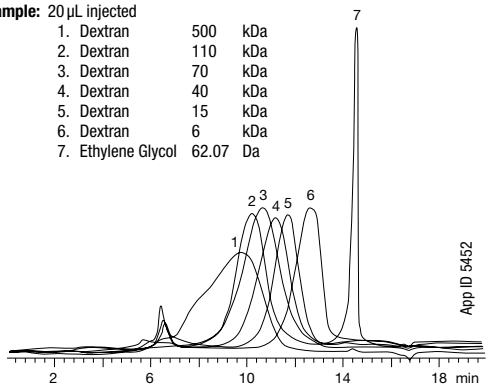
- **Highly hydrophilic synthetic polymer phase**
- **Suitable for water-soluble polymers**
- **Very low nonspecific interaction with the separation matrix**
- **Extremely cost-effective**
- **High efficiencies**
- **Good mechanical strength**

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.: CH0-9229
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



PolySep-GFC-P Technical Data and Specifications

Phase:	1000	2000	3000	4000	5000	6000	Linear
Exclusion Limits in Daltons:							
PEG	2×10^3	9×10^3	5×10^4	2×10^5	2×10^6	1×10^7	1×10^7
Pullulans	3.5×10^3	1×10^4	1×10^5	3.5×10^5	4×10^6	2×10^7	2×10^7
Separation Range (Da)	20 - 3K	100 - 10K	250 - 75K	3K - 400 K	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% NaN_3 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	CH0-9226	CH0-9225
2000	CH0-9227	CH0-9225
3000	CH0-9228	CH0-9225
4000	CH0-9229	CH0-9225
5000	CH0-9230	CH0-9225
6000	CH0-9231	CH0-9225
Linear	CH0-9232	CH0-9225

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. 336-339

For HPLC Column Heater (25-90 °C), see p. 390

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	00D-4222-B0	00F-4222-B0	00D-4222-D0	00A-4222-E0	00D-4222-E0	00F-4222-E0	AJ0-4286	AJ0-4287
							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	00D-4243-E0	100 x 4.6
3 µm ODS-3V	00F-4243-E0	150 x 4.6
5 µm ODS-3V	00F-4241-E0	150 x 4.6
5 µm ODS-3V	00G-4241-E0	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	—	00F-3300-B0	—	AJ0-4286
ODS-3 100 Å	00B-4097-B0	00F-4097-B0	00G-4097-B0	AJ0-4286
				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 150Å	—	00G-3301-Y0	—	—	AJ0-4289	AJ0-4290
ODS-2 150Å	—	—	00F-3300-R0	00G-3300-R0	AJ0-4286	AJ0-4287
ODS-3 100Å	00F-4097-Y0	00G-4097-Y0	00F-4097-R0	00G-4097-R0	AJ0-4286	AJ0-4287
					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 150Å	00A-3301-E0	00B-3301-E0	00D-3301-E0	00F-3301-E0	00G-3301-E0	AJ0-4290
5 µm ODS-2 150Å	00A-3300-E0	—	00D-3300-E0	00F-3300-E0	00G-3300-E0	AJ0-4287
5 µm Silica 100Å	—	—	—	—	00G-4098-E0	AJ0-4348
5 µm ODS-3 100Å	00A-4097-E0	00B-4097-E0	00D-4097-E0	00F-4097-E0	00G-4097-E0	AJ0-4287
5 µm Phenyl-3 (PH-3) 100Å	—	—	—	00F-4298-E0	00G-4298-E0	AJ0-4351
10 µm Silica-3 100Å	—	—	—	—	00G-4245-E0	AJ0-4348
10 µm ODS-3 100Å	—	—	—	—	00G-4244-E0	AJ0-4287
						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	00G-4097-N0	AJ0-7221
10 µm ODS-3 100 Å	00G-4244-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

For SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315

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-divinyl-benzene (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. 310)

Find the Column For Your Application

Phases Available	Description	Applications	Additional Notes
RCM-Monosaccharide (L19 packing)*	8 % cross-linked resin **CALCIUM** ionic form	Monosaccharides and sugar alcohols from sweeteners and corn and cane sugars Di, tri, and tetra saccharides	– Our most commonly used column type – Easy regeneration with calcium nitrate solutions
RHM-Monosaccharide (L17 packing)*	8 % cross-linked resin **HYDROGEN** 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
RAM-Carbohydrate	8 % cross-linked resin **SILVER** ionic form	Selectivity complementary to other Rezex column types	
RSO-Oligosaccharide	4 % cross-linked resin **SILVER** 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
RNO-Oligosaccharide	4 % cross-linked resin **SODIUM** ionic form	High resolution of oligosaccharides	
RPM-Monosaccharide (L34 packing)*	8 % cross-linked resin **LEAD** ionic form	Monosaccharides and sugar alcohol analysis. Cellobiose, glucose, xylose, arabinose, mannose and other cellulose products	
RNM-Carbohydrate (L58 packing)*	8 % cross-linked resin **SODIUM** ionic form	For matrices which contain high concentration of inorganic sodium, i.e. molasses	– Easily regenerated to the original ionic strength
ROA-Organic Acid (L22 packing)*	8 % cross-linked resin **HYDROGEN** 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
RFQ-Fast Acid	8 % cross-linked resin **HYDROGEN** ionic form	Rapid screening of fruit quality; ethanol, acetic acid, glycerol, and standard alcohol mixtures	– Analytes are routinely chromatographed under 5 minutes
RKP-Potassium	8 % cross-linked resin **POTASSIUM** ionic form	Analysis of glyphosate	
RCU-USP Sugar Alcohols (L19 packing)*	8 % cross-linked resin **CALCIUM** ionic form	For sugar analysis according to the USP procedures	– Sorbitol and mannitol can be resolved using simple isocratic conditions

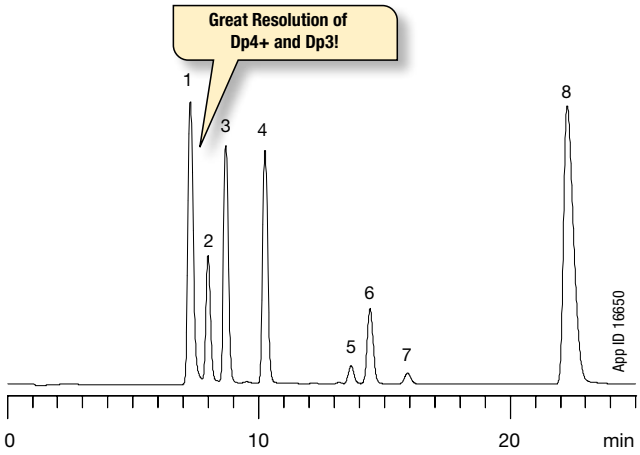
* United States Pharmacopeia (USP)

Bioethanol Fermentation Monitoring

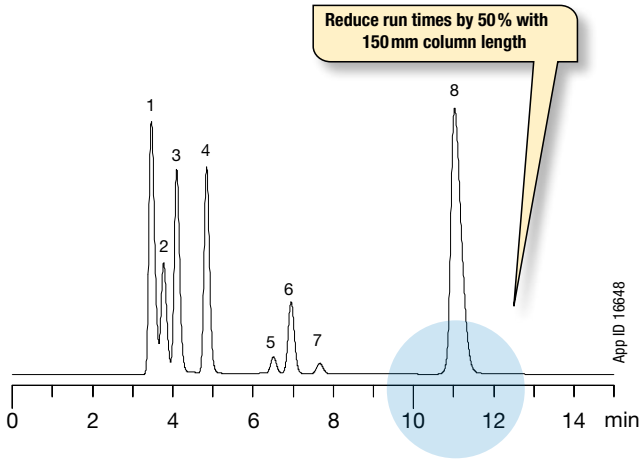
- **Easy quantitation of ethanol fermentation broth components**
- **Monitor starches, sugars, organic acids, and ethanol in one run**
- **Reliable lactic acid and acetic acid monitoring**
- **Increase throughput by reducing run times 50 % with 150 mm column length**

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: AR0-9925-13
Filter: AF0-8103-52
Temperature: 60 °C
System: Shimadzu® Prominence® LC-20A System
Sample:
1. Dp4+
2. Dp3
3. Maltose
4. Glucose
5. Lactic Acid
6. Glycerol
7. Acetic Acid
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: AR0-9925-13
Filter: AF0-8103-52
Temperature: 60 °C
System: Shimadzu Prominence LC-20A System
Sample:
1. Dp4+
2. Dp3
3. Maltose
4. Glucose
5. Lactic Acid
6. Glycerol
7. Acetic Acid
8. Ethanol

Shorten GC Fuel Quality Testing
Zebron ZB-Bioethanol GC column can shorten your quality test down to 5 minutes! (See pp. 112-113).

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. 10 and 311).

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.

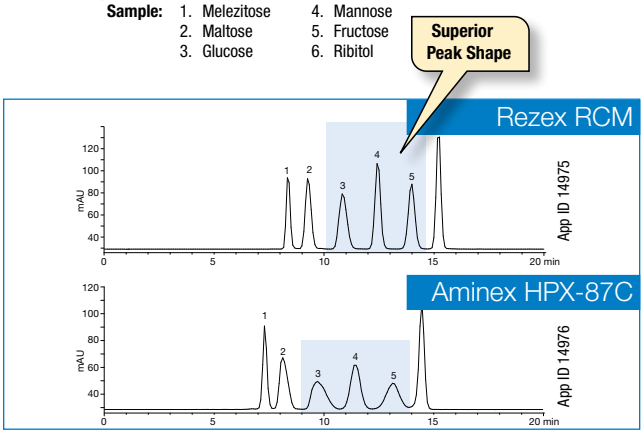
Easier, Accurate Quantitation

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 2. Maltose 3. Glucose 4. Mannose 5. Fructose 6. Ribitol



Comparative separations may not be representative of all applications.

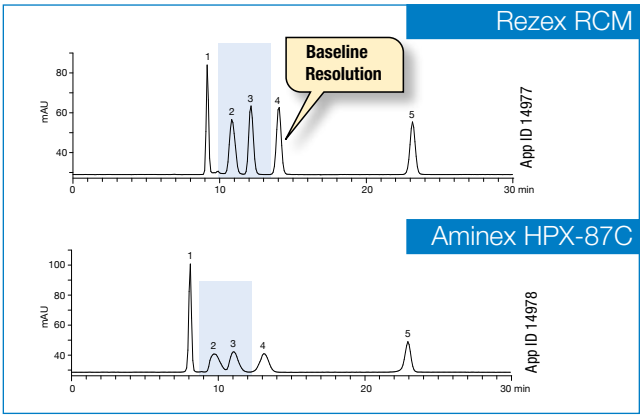
Baseline Separation of Critical Sample Components

Due to improved resolution

Sugars

Conditions for both columns:

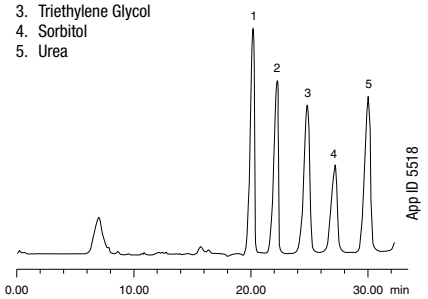
Column: Rezex RCM-Monosaccharide
Aminex HPX-87C
Dimensions: 300 x 7.8 mm
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: ELSD
Temperature: 80 °C
Sample: 1. Sucrose 2. Glucose 3. Galactose 4. Fructose 5. Sorbitol



Applications

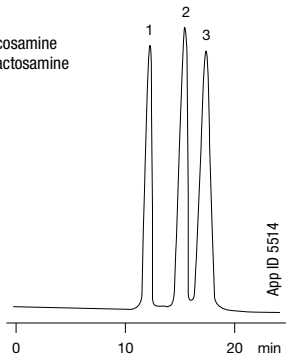
Food Softeners

Column: Rezex RCM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-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

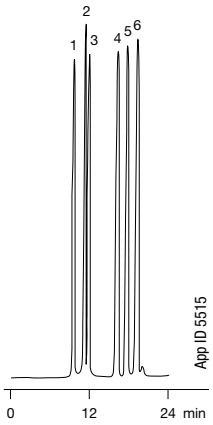
Column: Rezex ROA-Organic Acid
Dimensions: 300 x 7.8 mm
Part No.: 00H-0138-K0
Mobile Phase: 1 % Phosphoric Acid
Flow Rate: 0.6 mL/min
Detection: RI
Temperature: Ambient
Sample: 1. Glucose 2. N-Acetylglucosamine 3. N-Acetylgalactosamine



Rezex™ Organic Acid and Carbohydrate Columns

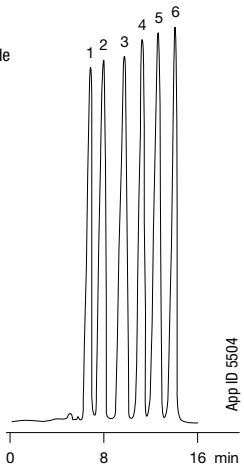
Organic Acids

Column: Rezex ROA-Organic Acid
Dimensions: 300 x 7.8 mm
Part No.: 00H-0138-K0
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: AR0-9925-13
Filter: AF0-8103-52
Temperature: 55 °C
Sample: 1. Oxalic
2. Citric
3. Tartaric
4. Succinic
5. Formic
6. Acetic



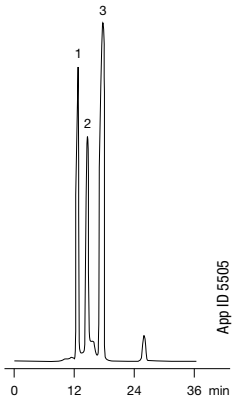
Saccharides

Column: Rezex RCM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-0130-K0
Guard Cartridge: AJ0-4493
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: RI
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 85 °C
Sample: 1. Melezitose
2. Maltose
3. Glucose
4. Mannose
5. Fructose
6. Ribitol



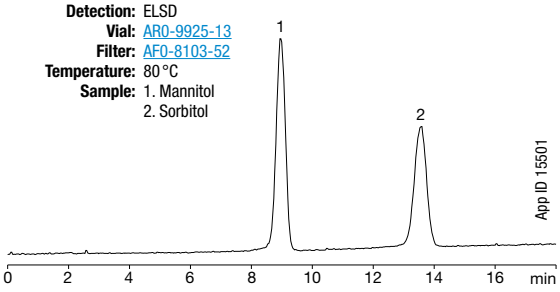
Apple Juice

Column: Rezex RCM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-0130-K0
Guard Cartridge: AJ0-4493
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: RI
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 75 °C
Sample: 1. Sucrose
2. Glucose
3. Fructose



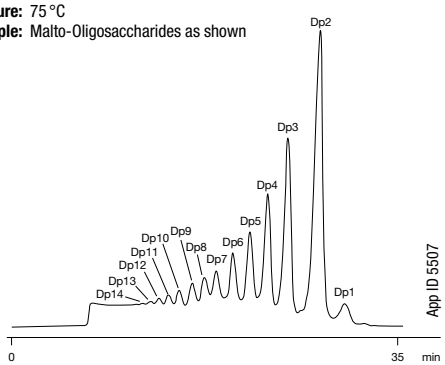
Mannitol and Sorbitol

Column: Rezex RPM-Monosaccharide
Dimensions: 100 x 7.8 mm
Part No.: 00D-0135-K0
Guard Cartridge: AJ0-4492
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: ELSD
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 80 °C
Sample: 1. Mannitol
2. Sorbitol



Oligosaccharides

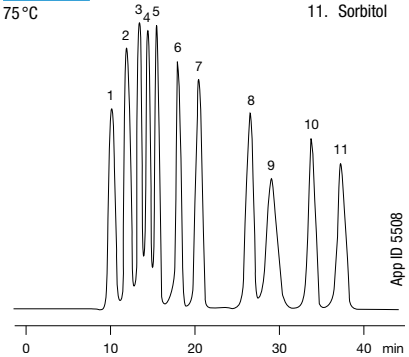
Column: Rezex RSO-Oligosaccharide
Dimensions: 200 x 10 mm
Part No.: 00P-0133-N0
Mobile Phase: Water
Flow Rate: 0.3 mL/min
Detection: RI
Vial: AR0-9925-13
Filter: AF0-8103-52
Temperature: 75 °C
Sample: Malto-Oligosaccharides as shown



Dp refers to Degree of polymerization

Saccharides

Column: Rezex RPM-Monosaccharide
Dimensions: 300 x 7.8 mm
Part No.: 00H-0135-K0
Guard Cartridge: AJ0-4492
Guard Holder: KJ0-4282
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Detection: RI
Vial: AR0-9925-13
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



Specifications and Operating Recommendations

	RCM-Monosaccharide	RSO-Oligosaccharide	RNO-Oligosaccharide	RNM-Carbohydrate	RAM-Carbohydrate
Part Number	00H-0130-K0	00P-0133-N0	00P-0137-N0	00H-0136-K0	00H-0131-K0
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-divinylbenzene				
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.	03B-0130-K0	03R-0133-N0	03R-0137-N0	03B-0136-K0	03B-0131-K0
Cleaning, Regeneration and Storage					
Organic Modifiers (Max)	5 % Methanol, IPA, EtOH				
Inorganic Modifiers	5 % $CaSO_4$, $Ca(NO_3)_2$, $CaCl_2$	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 $Ca(NO_3)_2$	0.1 M $AgNO_3$	0.1 M $NaNO_3$	0.1 M $NaNO_3$	0.1 M $AgNO_3$
Flow Rate (mL/min)	0.2	0.1	0.2	0.2	0.2
Temperature (°C)	85	85	85	85	85
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	00H-0135-K0	00H-0132-K0	00H-0138-K0	00D-0223-K0	00G-0130-D0
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-divinylbenzene				
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_2SO_4	0.005 N H_2SO_4	Water
pH Range	Neutral	1-8	1-8	1-8	Neutral
Guard Column Part No.	03B-0135-K0	03B-0132-K0	03B-0138-K0	03B-0223-K0	03A-0130-D0
Cleaning, Regeneration and Storage					
Organic Modifiers (Max)	5 % Methanol, IPA, EtOH				
Inorganic Modifiers	5 % Lead Nitrate	5 % HNO_3, H_3PO_4	5 % HNO_3, H_3PO_4	5 % HNO_3, H_3PO_4	5 % $CaSO_4$, $Ca(NO_3)_2$, $CaCl_2$
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 $Pb(NO_3)_2$	0.025 M H_2SO_4	0.025 M H_2SO_4	0.025 M H_2SO_4	0.1 M $Ca(NO_3)_2$
Flow Rate (mL/min)	0.2	0.2	0.2	0.2	0.1
Temperature (°C)	85	85	85	85	85
Duration (hrs)	4-16	4-16	4-16	4-16	4-16
Ship/Storage Solvent	Water	Water	0.005 N H_2SO_4	0.005 N H_2SO_4	Water

Retention Times for Some Carbohydrates and Sugar Alcohols

Counter Ion Analyte	RAM Ag^{+}	RCM Ca^{+2}	RNM Na^{+}	RHM H^{+}	RPM Pb^{+2}
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 125-0095	Supelcogel Ca	Sugar-Pak 1	CARBOSep CHO-820	Carbomix Ca
RHM-Monosaccharide	HPX-87H 125-0140	Supelcogel C-610H & H	N/A	ICSep ION-300	Carbomix H
RPM-Monosaccharide	HPX-87P 125-0098	Supelcogel Pb	N/A	CARBOSep COREGEL-87P	Carbomix Pb
RNM-Carbohydrate	HPX-87N 125-0143	N/A	N/A	N/A	Carbomix Na
RSO-Oligosaccharide	HPX-42A 125-0097	Supelcogel Ag1 & Ag2	N/A	N/A	N/A
ROA-Organic Acid	HPX-87H 125-0140	Supelcogel C-610H & H	N/A	N/A	N/A
RFQ-Fast Acid	Fast Acid 125-0100	N/A	N/A	N/A	N/A
RKP-Potassium	HPX-87K 125-0142	Supelcogel K	N/A	CARBOSep COREGEL-87K	Carbomix K
RCU-USP Sugar Alcohols	Sugar Alcohols 125-0094	N/A	N/A	N/A	N/A

Ordering Information

Columns					Guards		SecurityGuard™ Cartridges (mm)
							4 x 3.0*
Description	Part No.	Cross Linkage	Ionic Form	Size (mm)	Part No.	Size (mm)	/10pk
RCM-Monosaccharide	00F-0130-K0	8 %	Calcium	150 x 7.8	03B-0130-K0	50 x 7.8	AJ0-4493
RCM-Monosaccharide	00H-0130-K0	8 %	Calcium	300 x 7.8	03B-0130-K0	50 x 7.8	AJ0-4493
RHM-Monosaccharide	00H-0132-K0	8 %	Hydrogen	300 x 7.8	03B-0132-K0	50 x 7.8	AJ0-4490
RAM-Carbohydrate	00H-0131-K0	8 %	Silver	300 x 7.8	—	—	AJ0-4491
RSO-Oligosaccharide	00P-0133-N0	4 %	Silver	200 x 10.0	03R-0133-N0	60 x 10.0	—
RNO-Oligosaccharide	00P-0137-N0	4 %	Sodium	200 x 10.0	03R-0137-N0	60 x 10.0	—
RPM-Monosaccharide	00H-0135-K0	8 %	Lead	300 x 7.8	03B-0135-K0	50 x 7.8	AJ0-4492
RPM-Monosaccharide	00D-0135-K0	8 %	Lead	100 x 7.8	03B-0135-K0	50 x 7.8	AJ0-4492
RNM-Carbohydrate	00H-0136-K0	8 %	Sodium	300 x 7.8	03B-0136-K0	50 x 7.8	—
ROA-Organic Acid	00F-0138-E0	8 %	Hydrogen	150 x 4.6	—	—	AJ0-4490
ROA-Organic Acid	00G-0138-E0	8 %	Hydrogen	250 x 4.6	—	—	AJ0-4490
ROA-Organic Acid	00F-0138-K0	8 %	Hydrogen	150 x 7.8	03B-0138-K0	50 x 7.8	AJ0-4490
ROA-Organic Acid	00H-0138-K0	8 %	Hydrogen	300 x 7.8	03B-0138-K0	50 x 7.8	AJ0-4490
RKP-Potassium	00H-3252-K0	8 %	Potassium	300 x 7.8	—	—	—
RFQ-Fast Acid	00D-0223-K0	8 %	Hydrogen	100 x 7.8	03B-0223-K0	50 x 7.8	AJ0-4490
RCU-USP Sugar Alcohols	00G-0130-D0	8 %	Calcium	250 x 4.0	03A-0130-D0	30 x 4.0	AJ0-4493

for ID: 3.2-8.0 mm

*SecurityGuard Analytical Cartridges require universal holder Part No.: KJ0-4282

For Column Heater, see p. 390

For our full line of Column Performance Check Standards, see pp. 398-399

SecurityGuard™ Standard HPLC and SFC Column Protection

2014 Laboratory Equipment Readers' Choice WINNER

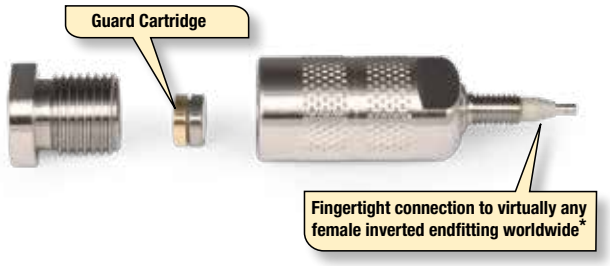
U.S. Patent No. 6, 162, 362

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.

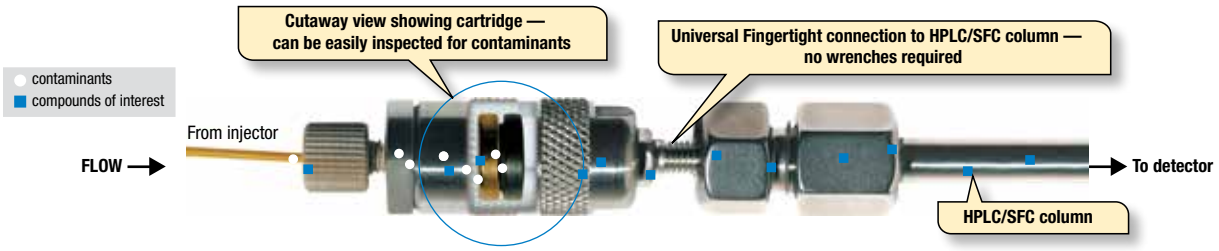


See SecurityGuard Standard in action video:
www.phenomenex.com/SecurityGuardInstallation

A Universal Guard Cartridge System

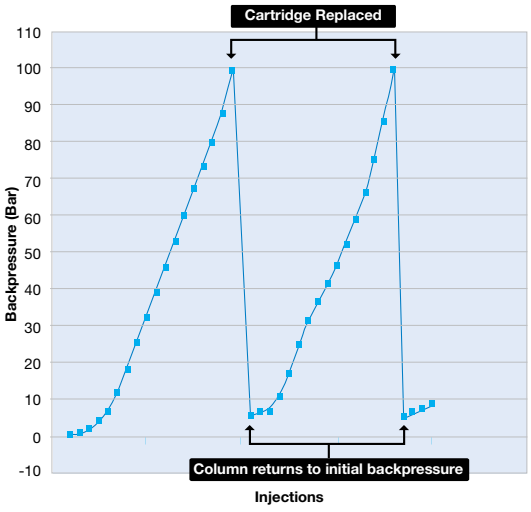
How SecurityGuard Standard Works*

The SecurityGuard Standard analytical cartridge holder (patented) directly finger-tightens into virtually any manufacturer's non core-shell and ≥ 3 µm 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.



Accelerated lifetime test using endogenous biomolecule matrix on a reversed phase C18 column, 5 µm, 50 x 4.6 mm with SecurityGuard Standard C18 cartridges. Backpressure values represent additional backpressure contributed by SecurityGuard.

The SecurityGuard Standard holder and cartridges are pressure rated to 5000 psi (345 bar).
For all core-shell and / or < 3 µm particle columns, and all applications at higher pressures, use SecurityGuard ULTRA, see p. 316. For available Semi-Preparative and PREP sizes, see pp. 313-315. 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. 315.

*Feature applies to traditional analytical-sized guard system only, and does not apply to SemiPrep or PREP guard cartridges.

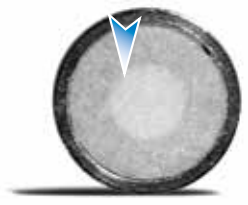
U.S. Patent No. 6, 162, 362

See Your "Dirt" Feature

The "see your dirt" feature lets you know exactly when it's time to replace your cartridge.

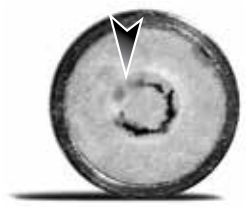
Visually inspect the surface of the cartridge's packing material any time, without disturbing the packing bed. Now you can easily monitor visual contaminant build-up, and change your guard cartridge before it's too late!

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.

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

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

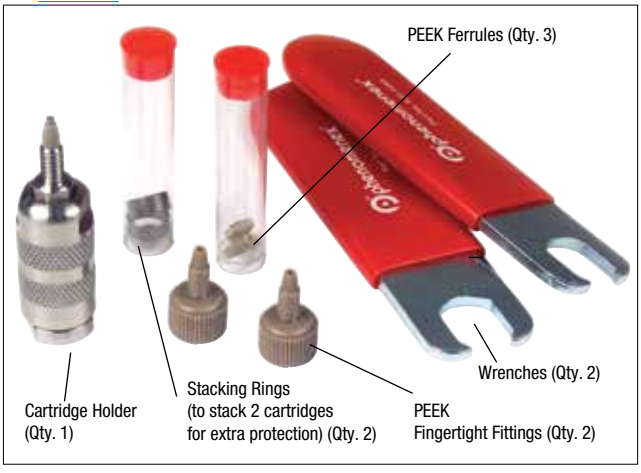
Analytical Kit

Part No.	Description
KJ0-4282	SecurityGuard Standard Kit* (includes holder)

Replacement Parts and Accessories

Part No.	Description	Unit
AJ0-4283	PEEK Ferrules	3/pk
AJ0-4285	Stacking Rings	2/pk
AQ0-1389	PEEK Fingertight Fittings	10/pk
AJ0-4284	SecurityGuard Wrenches	2/pk

***Kit KJ0-4282 Includes:**



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
AJ0-9281	Holder for 10.0 mm ID cartridges	ea

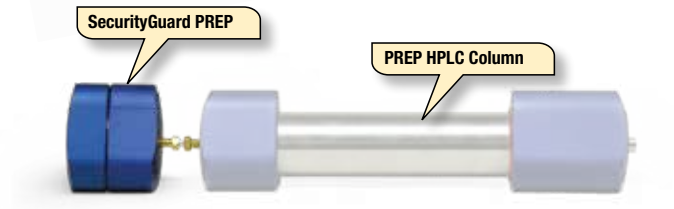
Accessories

Part No.	Description	Unit
Nut and Ferrule		
AQ0-3018	10-32 Threaded Male Nut and Ferrule Set for 1/16 in. OD capillary tubing	ea
Sure-Lok™ Fingertight Fittings		
AQ0-1388	PEEK Sure-Lok Male Nut	ea
AQ0-1389	PEEK Sure-Lok Male Nut	10/pk
Sure-Lok™ Couplers		
AQ0-1392	PEEK Sure-Lok Coupler	ea
AQ0-1393	PEEK Sure-Lok Coupler	10/pk
Column Sealing Plugs		
AQ0-0217	Column Sealing Plug, 10-32 Thread size	10/pk
SemiPrep Guard Holder Wrench		
AQ0-8904	Wrench, Open End, 1/2 x 9/16 in.	ea

For Semi-Preparative and Preparative Cartridges, see pp. 314-315

Holder

Cartridge
(10 x 10 mm ID)



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
AJ0-8223	HPLC Holder Kit for 21.2 mm ID cartridges, includes column coupler	ea
AJ0-8617	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
AJ0-8277	HPLC Holder Kit for 30.0 mm ID cartridges, includes column coupler	ea
AJ0-8618	SFC Holder Kit for 30.0 mm ID cartridges, includes column coupler	ea

Replacement Parts and Accessories

Part No.	Description	Unit
AQ0-8376	PREP Coupler, SS Tube, Nuts, and Ferrules, 10-32 Threads, 1/16 in. OD x 0.030 in. ID	ea
AQ0-8222	PREP Replacement O-Rings, Kalrez® For 15 x 21.2 mm SG HPLC Holder, Size 2-021	2/pk
AQ0-8318	PREP Replacement O-Rings, Kalrez® For 15 x 30 mm SG HPLC Holder, Size 2-025	2/pk
AQ0-8500	PREP Replacement O-Rings, Teflon® For 15 x 21.2 mm SG SFC Holder, Size 2-021	2/pk
AQ0-8501	PREP Replacement O-Rings, Teflon® For 15 x 30 mm SG SFC Holder, Size 2-025	2/pk
AT0-0465	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 10 cm length	5/pk
AT0-0466	Capillary S.S. Tubing, 0.020 in. ID x 0.062 in. (1/16 in.) OD x 20 cm length	5/pk
AQ0-8903	Wrench, Open End, 1/4 x 5/16 in.	ea

Holders

PREP

21.2 mm ID
HPLC Holder

30 mm ID
HPLC Holder

SFC

21.2 mm ID
SFC Holder

30 mm ID
SFC Holder

Cartridges

Cartridge
(15 x 21.2 mm ID)

Cartridge
(15 x 30.0 mm ID)

O-Rings

Kalrez
O-Rings

Teflon
O-Rings

Coupler

PREP Coupler

Cartridges and Holders

Step 1: Choose column ID

Step 2: Match column phase

Choose your HPLC Column Internal Diameter, ID (mm):

2.0 - 3.0	3.2 - 8.0	9.0 - 16.0	18.0 - 29.0	30.0 - 49.0
Analytical	Analytical	SemiPrep	PREP HPLC or SFC	PREP HPLC or SFC
Use Cartridges (mm):				
4.0 x 2.0	4.0 x 3.0	10 x 10.0	15 x 21.2	15 x 30.0





Ordering Information

Material	Description	pH Stability	/10pk	/10pk	/3pk	ea	ea
Cartridges for General Purpose/Pharmaceutical							
C18	(ODS, Octadecyl)	1.5 - 10	AJ0-4286	AJ0-4287	AJ0-7221	AJ0-7839	AJ0-8301
C12	(Dodecyl)	1.5 - 10	AJ0-6073	AJ0-6074	AJ0-7275	AJ0-7842	AJ0-8304
C8	(MOS, Octyl)	1.5 - 10	AJ0-4289	AJ0-4290	AJ0-7222	AJ0-7840	AJ0-8302
C5	(Pentyl)	1.5 - 10	AJ0-4292	AJ0-4293	AJ0-7372	—	—
C1	(TMS)	2 - 9	—	AJ0-4299	—	—	—
Silica	—	—	AJ0-4347	AJ0-4348	AJ0-7223	AJ0-7229	AJ0-8312
HILIC	(HILIC)	1.5 - 8	AJ0-8328	AJ0-8329	AJ0-8902	—	—
NH_2	(Amino, Aminopropyl)	1.5 - 11	AJ0-4301	AJ0-4302	AJ0-7364	AJ0-8162	AJ0-8309
CN	(Cyano, Cyanopropyl)	2 - 7.5	AJ0-4304	AJ0-4305	AJ0-7313	AJ0-8220	AJ0-8311
Phenyl	(Phenylhexyl)	1.5 - 10	AJ0-4350	AJ0-4351	AJ0-7314	AJ0-7841	AJ0-8303
PFP(2)	(Pentafluorophenyl)	1.5 - 8	AJ0-8326	AJ0-8327	AJ0-8376	AJ0-8377	AJ0-8378
SCX	(SA, Strong Cation Exchanger)	2.5 - 7.5	AJ0-4307	AJ0-4308	—	—	AJ0-8596
SAX	(SB, Strong Anion Exchanger)	2.5 - 7.5	—	AJ0-4311	—	—	—
RP-1	(Reversed Phase - Polymer)	0 - 14	—	AJ0-5809	AJ0-7368	AJ0-8358	—
Polar-RP	(Ether-linked Phenyl)	1.5 - 7	AJ0-6075	AJ0-6076	AJ0-7276	AJ0-7845	—
Fusion-RP	(C18 Polar Embedded)	1.5 - 10	AJ0-7556	AJ0-7557	AJ0-7558	AJ0-7844	—
AQ C18	(Polar Endcapped C18)	1.5 - 7.5	AJ0-7510	AJ0-7511	AJ0-7512	AJ0-7843	AJ0-8305
Gemini®NX-C18	(C18 Twin-NX™ Technology)	1 - 12	AJ0-8367	AJ0-8368	AJ0-8369	AJ0-8370	AJ0-8371
Gemini C18	(C18 Twin™ Technology)	1 - 12	AJ0-7596	AJ0-7597	AJ0-7598	AJ0-7846	AJ0-8308
Gemini C6-Phenyl	(C6-Phenyl Twin Technology)	1 - 12	AJ0-7914	AJ0-7915	AJ0-9156	AJ0-9157	AJ0-9158
Luna® Omega Polar C18	(Polar Functional C18)	1.5 - 10	AJ0-7600	AJ0-7601	AJ0-9519	AJ0-7603	AJ0-7604
Luna Omega PS C18	(Mixed-Mode C18)	1.5 - 10	AJ0-7605	AJ0-7606	AJ0-9520	AJ0-7608	AJ0-7609
Cartridges for Chiral			/10pk	/10pk	/3pk	ea	ea
For use with chiral columns, such as Lux® Cellulose-1, -2, -3, -4, i-Cellulose-5, i-Amylose-1, & Amylose-1, -2 (Phenomenex); CHIRALCEL® OD-H®, OJ-H®& CHIRALPAK® AD®-H, IA®, IC®, IG® (DAICEL Corporation)							
Lux i-Amylose-1	Amylose tris (3, 5-dimethyl-phenylcarbamate)	2 - 9	—	AJ0-8641	AJ0-8642	AJ0-8643	AJ0-8644
Lux i-Amylose-3	Amylose tris (3-chloro-5-methylphenylcarbamate)	2 - 9	AJ0-8651	AJ0-8650	AJ0-8652	AJ0-8653	AJ0-8654
Lux i-Cellulose-5	Cellulose tris (3, 5-dichloro-phenylcarbamate)	2 - 9	AJ0-8631	AJ0-8632	AJ0-8633	AJ0-8634	—
Lux Cellulose-1	Cellulose tris (3, 5-dimethyl-phenylcarbamate)	2 - 9	AJ0-8402	AJ0-8403	AJ0-8404	AJ0-8405	AJ0-8406
Lux Cellulose-2	Cellulose tris (3-chloro-4-methylphenylcarbamate)	2 - 9	AJ0-8398	AJ0-8366	AJ0-8399	AJ0-8400	—
Lux Cellulose-3	Cellulose tris (4-methylbenzoate)	2 - 9	AJ0-8621	AJ0-8622	AJ0-8623	AJ0-8624	AJ0-8625
Lux Cellulose-4	Cellulose tris (4-chloro-3-methylphenylcarbamate)	2 - 9	AJ0-8626	AJ0-8627	AJ0-8628	AJ0-8629	AJ0-8630
Lux Amylose-1	Amylose tris (3, 5-dimethyl-phenylcarbamate)	2 - 9	AJ0-9337	AJ0-9336	AJ0-9344	AJ0-9338	AJ0-9339
Lux Amylose-2	Amylose tris (5-chloro-2-methylphenylcarbamate)	2 - 9	AJ0-8471	AJ0-8470	AJ0-8472	AJ0-8473	—
Lux AMP	—	1 - 11.5	AJ0-8475	AJ0-8476	—	—	—
HPLC Guard Cartridge Holders (one-time purchase only)			/kit		/holder	/kit	/kit
Reusable Holder			KJ0-4282		AJ0-9281	AJ0-8223	AJ0-8277




SFC Guard Cartridge Holders			/kit	/holder	/kit	/kit
Reusable Holder			KJ0-4282	AJ0-9281	AJ0-8617	AJ0-8618

*For all core-shell and/or < 3µm particle columns use 2.1 to 4.6mm ID SecurityGuard ULTRA Holder and Cartridges, see page 316

Continued on next page

Cartridges and Holders *(cont'd)*

Step 1: Choose column ID

Step 2: Match column phase

Choose your HPLC Column Internal Diameter, ID (mm):

2.0 - 3.0	3.2 - 8.0	9.0 - 16.0	18.0 - 29.0	30.0 - 49.0
Analytical		SemiPrep	PREP HPLC or SFC	
Use Cartridges (mm):				
4.0 x 2.0	4.0 x 3.0	10 x 10.0	15 x 21.2	15 x 30.0





Ordering Information *(continued)*

Material	Description	pH Stability					
Cartridges for Core-Shell Media			—	—	/3pk	ea	ea
For core-shell media columns, such as Kinetex® and Aeris™ (Phenomenex).							
EVO C18	(ODS, Octadecyl)	1 - 12	*	*	AJ0-9306	AJ0-9304	AJ0-9305
C18	(ODS, Octadecyl)	1.5 - 8.5	*	*	AJ0-9278	AJ0-9145	AJ0-9204
C8	(MOS, Octyl)	1.5 - 8.5	*	*	—	AJ0-9205	—
PFP	(Pentafluorophenyl)	1.5 - 8.5	*	*	—	AJ0-9146	—
F5	(Pentafluorophenylpropyl)	1.5 - 8.5	*	*	AJ0-9323	AJ0-9324	—
Phenyl-Hexyl	(Phenylhexyl)	1.5 - 9	*	*	—	AJ0-9147	AJ0-9216
Biphenyl	(Biphenyl)	1.5 - 8.5	*	*	AJ0-9280	AJ0-9272	—
HILIC	(HILIC)	2 - 7.5	*	*	—	AJ0-9277	—
C18-Peptide	(ODS, Octadecyl)	1.5 - 9	*	*	AJ0-9317	AJ0-9318	—
Cartridges for Protein and Polypeptide Reversed Phase			/10pk	/10pk	/3pk	ea	ea
For use with silica columns for separation of proteins & peptides, such as Jupiter® (Phenomenex) and other widepore or 300 Å brands.							
Widepore C18	(ODS, Octadecyl)	1.5 - 10	AJ0-4320	AJ0-4321	AJ0-7224	AJ0-7230	AJ0-8313
Widepore C5	(Pentyl)	1.5 - 10	AJ0-4326	AJ0-4327	AJ0-7371	—	—
Widepore C4	(Butyl)	1.5 - 10	AJ0-4329	AJ0-4330	AJ0-7225	AJ0-7231	AJ0-8314
For use with columns like bioZen™ (Phenomenex).							
Peptide PS-C18	(Positive Functional C18)	1.5 - 8.5	AJ0-7605	AJ0-7606	—	—	—
Ion-Exchange	(Weak Cation Exchanger)	2 - 12	AJ0-9401	AJ0-9400	—	—	—
Cartridges for Synthetic DNA / RNA Analysis			/10pk	/10pk	/3pk	ea	ea
For use with columns like Clarity® (Phenomenex).							
Oligo-RP™	(C18 Twin Technology)	1 - 12	AJ0-8134	AJ0-8135	AJ0-8136	AJ0-8210	—
Oligo-WAX™	(WA, Weak Anion Exchanger)	1.5 - 11	—	AJ0-8324	AJ0-8325	—	—
Oligo-XT	(ODS, Octadecyl)	1 - 12	*	*	AJ0-9516	AJ0-9517	AJ0-9518
Cartridges for Silica GFC (Gel Filtration Chromatography)			—	/10pk	—	ea	—
(Aqueous SEC) For use with silica GFC columns, such as Yarra™ and BioSep™ (Phenomenex); ZORBAX® GF-Series (Agilent); Bio-Sil® (Bio-Rad®).							
GFC-2000	—	2 - 7.5	—	AJ0-4487	—	AJ0-8588	—
GFC-3000	—	2 - 7.5	—	AJ0-4488	—	AJ0-8589	—
GFC-4000	—	2 - 7.5	—	AJ0-4489	—	AJ0-8590	—
Cartridges for Polymer GPC (Gel Permeation Chromatography)			—	/3pk	—	—	—
(Organic GPC) For use with polymer GPC columns, such as Phenogel™ (Phenomenex); PLgel™(Agilent®); SDV® (PSS); Styragel® (Waters®); GPC Series (Shodex®); TSKgel® (Tosoh Bioscience®)							
GPC***	—	0 - 14	—	AJ0-9292	—	—	—
Cartridges for Carbohydrate/Organic Acid			—	/10pk	—	—	—
For organic acid and carbohydrate analysis, such as Rezex™ (Phenomenex); Aminex® (Bio-Rad); Sugar-Pak™ (Waters).							
Carbo-H+	—	1 - 8	—	AJ0-4490	—	—	—
Carbo-Ag+**	—	Neutral	—	AJ0-4491	—	—	—
Carbo-Pb+2	—	Neutral	—	AJ0-4492	—	—	—
Carbo-Ca+2	—	Neutral	—	AJ0-4493	—	—	—
HPLC Guard Cartridge Holders (one-time purchase only)			/kit		/holder	/kit	/kit
Reusable Holder			KJ0-4282		AJ0-9281	AJ0-8223	AJ0-8277




SFC Guard Cartridge Holders			/kit		/holder	/kit	/kit
Reusable Holder			KJ0-4282		AJ0-9281	AJ0-8617	AJ0-8618

*For all core-shell and/or < 3µm particle columns use 2.1 to 4.6mm ID SecurityGuard ULTRA Holder and Cartridges, see page 316

**For use with saccharide and oligosaccharide columns in Ag+ 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**

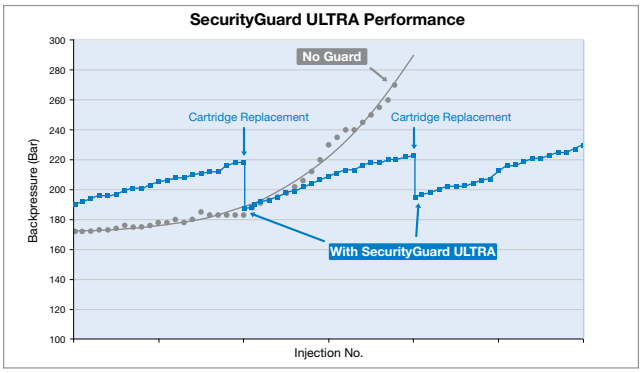
Universal Fit

Use SecurityGuard ULTRA with virtually all UHPLC columns 2.1 to 4.6 mm 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!

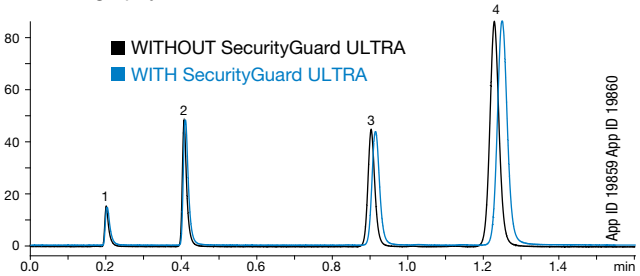
When contaminates and particulates build up at the head of your column or on the guard cartridge, system backpressures can increase dramatically. By simply replacing the SecurityGuard ULTRA cartridge, instead of your column, you are able to regain normal operating conditions and reclaim original column 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

2014 Laboratory Equipment Readers' Choice WINNER

2012 R&D 100 Award Recipient
50th ANNIVERSARY

SecurityGuard ULTRA Cartridges

Ordering Information

Material	Description	pH Stability	Column ID (mm) 2.1 /3pk	3.0 /3pk	4.6 /3pk
Cartridges for General Purpose/ Pharmaceutical					
EVO C18	(ODS, Octadecyl)	1.0 – 12.0	AJ0-9298	AJ0-9297	AJ0-9296
C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-8782	AJ0-8775	AJ0-8768
C8	(MOS, Octyl)	1.5 – 8.5*	AJ0-8784	AJ0-8777	AJ0-8770
PFP	(Pentafluorophenyl)	1.5 – 8.5	AJ0-8787	AJ0-8780	AJ0-8773
F5	(Pentafluorophenyl)	1.5 – 8.5	AJ0-9322	AJ0-9321	AJ0-9320
Biphenyl	(Biphenyl)	1.5 – 8.5*	AJ0-9209	AJ0-9208	AJ0-9207
Phenyl	(Phenylhexyl)	1.5 – 8.5*	AJ0-8788	AJ0-8781	AJ0-8774
HILIC	(HILIC)	2.0 – 7.5	AJ0-8786	AJ0-8779	AJ0-8772
Polar C18	(Polar Functional C18)	1.5 – 8.5*	AJ0-9532	AJ0-9531	AJ0-9530
Cartridges for General Purpose/Pharmaceutical (Fully Porous Columns)					
For fully porous columns like Luna® Omega (Phenomenex)					
C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-9502	AJ0-9501	AJ0-9500
Polar C18	(Polar Functional C18)	1.5 – 8.5*	AJ0-9505	—	—
PS C18	(Positive Functional C18)	1.5 – 8.5*	AJ0-9508	—	—
Cartridges for Protein and Peptide Reversed Phase					
For use with columns like Aeris™ (Phenomenex)					
Widepore C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-8783	—	AJ0-8769
Widepore C8	(MOS, Octyl)	1.5 – 8.5*	AJ0-8785	—	AJ0-8771
Widepore C4	(Butyl)	1.5 – 8.5*	AJ0-8899	—	AJ0-8901
Peptide C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-8948	—	AJ0-8946
For use with columns like bioZen™ (Phenomenex)					
Glycan	(Amide Polyol)	2.0 – 7.5	AJ0-9800	—	—
Peptide PS-C18	(Positive Functional C18)	1.5 – 8.5	AJ0-9803	—	—
Peptide XB-C18	(ODS, Octadecyl)	1.5 – 9.0**	AJ0-9806	—	AJ0-9808
Intact C4	(Butyl)	1.5 – 9.0**	AJ0-9809	—	AJ0-9811
Intact XB-C18	(MOS, Octyl)	1.5 – 9.0**	AJ0-9812	—	AJ0-9814
SEC-2	(Silica)	2.5 – 7.5	—	—	AJ0-9850
SEC-3	(Silica)	2.5 – 7.5	—	—	AJ0-9851
Cartridges for Synthetic DNA / RNA Analysis					
For use with columns like Clarity® (Phenomenex)					
Oligo-MS C18	(ODS, Octadecyl)	1.5 – 8.5*	AJ0-9068	—	—
Oligo-XT	(ODS, Octadecyl)	1.0 – 12.0	AJ0-9515	—	AJ0-9514
Cartridges for Silica GFC (Gel Filtration Chromatography)					
(Aqueous SEC) For use with silica GFC columns such as Yarra™ (Phenomenex)					
X150	—	1.5 – 8.5	—	—	AJ0-9512
X300	—	1.5 – 8.5	—	—	AJ0-9513

*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
AJ0-9000	SecurityGuard ULTRA Cartridge Holder	ea

Initial SecurityGuard ULTRA installation and cartridge replacement, requires 3 wrenches, which must be purchased separately: one ⅜ in. wrench (AQ0-8959; fits Kinetex, Aeris, and Oligo-MS column end-fittings), and two 5⁄16 in. wrenches (AQ0-8903; fits ULTRA cartridge and holder). See p. 401

SecurityLINK UHPLC Connections in a Click

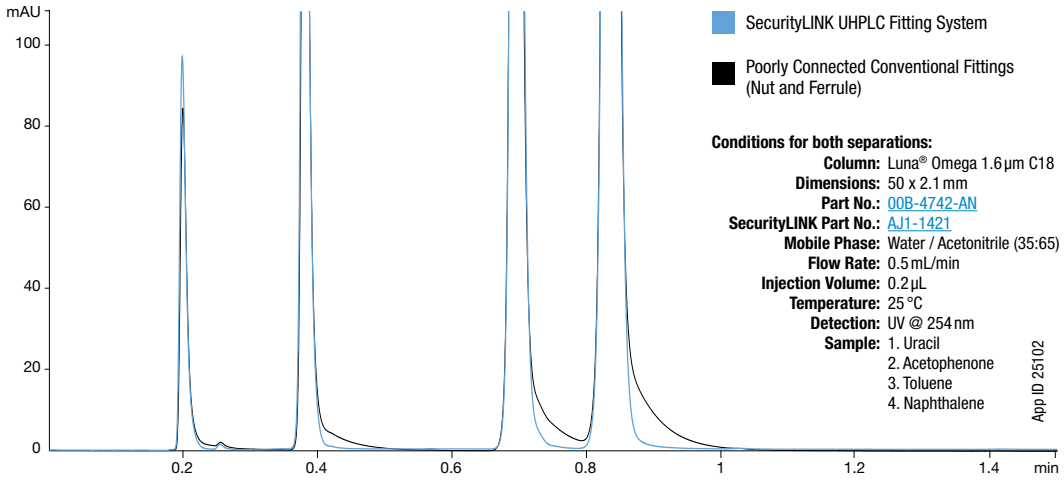
The SecurityLINK UHPLC fingertight fitting system simplifies your system and column connections and provides consistent performance with torque limiting technology that prevents column damaging overtightening.

SecurityLINK UHPLC Fittings

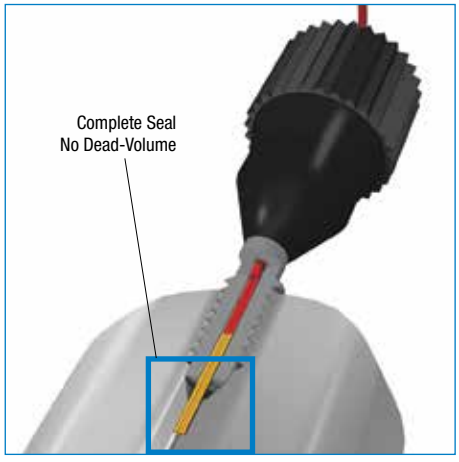
- **No tools required for quick and easy installation**
- **Fitting self-adjusts at column inlet to ensure zero dead-volume for better chromatographic results**
- **Torque limiting technology prevents system and column port damage**
- **UHPLC and HPLC compatibility: pressure rated to 19,000 psi (1,310 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.

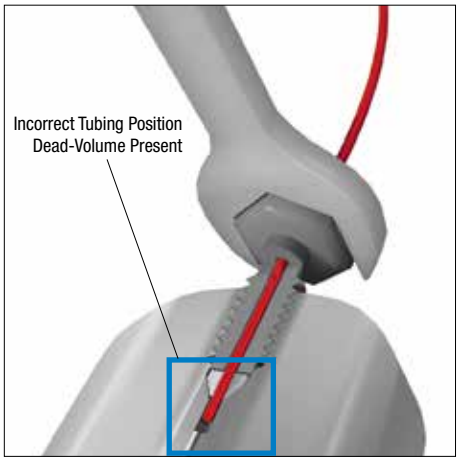


SecurityLINK UHPLC Fitting System



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)
AJ1-2111	25	100
AJ1-2121	25	150
AJ1-2141	25	250
AJ1-2151	25	300
AJ1-2171	25	500
AJ1-2191	25	750
AJ1-21A1	25	1000
AJ1-2211	50	100
AJ1-2221	50	150
AJ1-2231	50	200
AJ1-2241	50	250
AJ1-2251	50	300
AJ1-2271	50	500
AJ1-2291	50	750
AJ1-22A1	50	1000
AJ1-2321	75	150
AJ1-2341	75	250
AJ1-2371	75	500
AJ1-23A1	75	1000
AJ1-2411	100	100
AJ1-2421	100	150
AJ1-2441	100	250
AJ1-2471	100	500
AJ1-24A1	100	1000

Stainless Steel

Stainless Steel Double-Sided 10-32 Fittings for 1/16 in. Ports

Part No.	ID (µm)	Length (mm)
AJ1-1421	100	150
AJ1-1441	100	250
AJ1-1461	100	350
AJ1-1471	100	500
AJ1-1481	100	600
AJ1-1521	125	150
AJ1-1541	125	250
AJ1-1561	125	350
AJ1-1571	125	500
AJ1-1581	125	600
AJ1-1621	254	150
AJ1-1641	254	250
AJ1-1661	254	350
AJ1-1671	254	500
AJ1-1681	254	600

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)
AJ1-3121	25	150
AJ1-3141	25	250
AJ1-3161	25	350
AJ1-3171	25	500
AJ1-3181	25	600
AJ1-3221	50	150
AJ1-3241	50	250
AJ1-3261	50	350
AJ1-3271	50	500
AJ1-3281	50	600
AJ1-3321	75	150
AJ1-3341	75	250
AJ1-3361	75	350
AJ1-3371	75	500
AJ1-3381	75	600
AJ1-3421	100	150
AJ1-3441	100	250
AJ1-3461	100	350
AJ1-3471	100	500
AJ1-3481	100	600

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)
AJ1-2224	50	150
AJ1-2274	50	500
AJ1-2294	50	750
AJ1-22A4	50	1000

SecurityLINK tubing material includes a sleeve that provides: ID, length and part number information.

Phenomenex Column / Tubing ID Recommendation Chart

	Column ID	Tubing ID
Nano	0.05 - 0.1 mm (50 µm - 100 µm)	25 µm
Microbore	0.3 - 0.5 mm (300 µm - 500 µm)	50 µm
	1 mm	50 µm - 75 µm
Analytical	2.1 mm	100 µm
	3 mm	100 µm
	4.6 mm	100 µm
Semi-Prep	7.8 mm	120 µm
	9.0 - 16.0 mm	254 µm

Shodex®

By Showa Denko K.K.

- **High efficiency polymer columns**
- **Wide application range**

Guide for Shodex Column Selection

Solubility	Molecular Weight	Separation Mode	Column	Page
Water-insoluble	over 2000	SEC	GPC KF-803-805	319
Water-insoluble	under 2000	SEC	GPC KF-802	319
Water-insoluble	under 2000	RPC	RSpak DE-413, 413L, DM-614	321
Sample / Water-soluble	over 2000	SEC	OHpak SB-803-806HQ, SUGAR KS-803-804, PROTEIN KW-802.5-804	320
Sample / Water-soluble	over 2000	IEC	IEC QA-825, DEAE-825, SP-825, CM-825	321
Sample / Water-soluble	over 2000	HIC	HIC PH-814	321
Water-soluble	under 2000	SEC	SB-802-802.5HQ, SUGAR KS-801, 803-804	320
Water-soluble	under 2000	LEC	SUGAR SC1011, SP0810	321
Water-soluble	under 2000	IEX	RSpak KC-811, SUGAR SH1011, SUGAR SH1821	320, 321
Water-soluble	under 2000	IC	IC SI-90 4E, SI-50 4E, IC I-524A, YK-421	321
Water-soluble	under 2000	RPC	RSpak DE-613, 413	321
Water-soluble	under 2000	NPC	SUGAR SZ5532	321

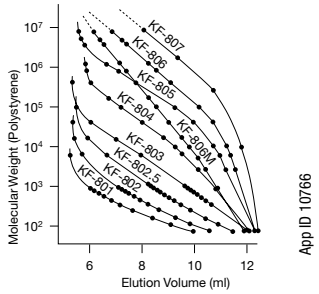
Organic GPC Columns

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



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	5×10^3
GPC KF-803	8 x 300	>16,000	7×10^4
GPC KF-804	8 x 300	>16,000	4×10^5
GPC KF-805	8 x 300	>10,000	4×10^6

NOTE: Exclusion Limits in parentheses,( ), are estimated values.

Note: 803, 804, and 805 are available packed in HFIP.

Shodex®

By Showa Denko K.K.

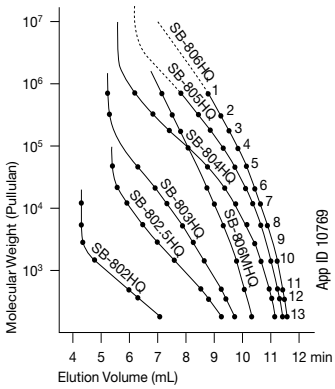
GFC (Aqueous GPC) Columns

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	4×10^3
OHpak SB-802.5HQ	8 x 300	>15,000	1×10^4
OHpak SB-803HQ	8 x 300	>15,000	1×10^5
OHpak SB-804HQ	8 x 300	>15,000	1×10^6
OHpak SB-805HQ	8 x 300	>10,000	4×10^6
OHpak SB-806HQ	8 x 300	>10,000	(2×10^7)
OHpak SB-806MHQ	8 x 300	>10,000	(2×10^7)
SUGAR KS-801 (Na^+)	8 x 300	>15,000	1×10^3
SUGAR KS-803 (Na^+)	8 x 300	>15,000	5×10^4
SUGAR KS-804 (Na^+)	8 x 300	>15,000	4×10^5
PROTEIN KW-802.5	8 x 300	>20,000	5×10^4
PROTEIN KW-803	8 x 300	>20,000	1.5×10^5
PROTEIN KW-804	8 x 300	>10,000	6×10^5

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+

*Note: RSpak KC-811 was formerly known as Ionpak KC-811.

Shodex®

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 (SO4)	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 (CH0-8194)	4.6 x 125	≥5,500	PVA	Carboxyl	Suppressor and non-suppressor methods
IC YS-G (CH0-8195)	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)	PlateNumber	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^+	SEC + IEX
SUGAR SH1821	8 x 300	>15,000	10,000	S-DVB gel	H^+	SEC + IEX
SUGAR SC1011	8 x 300	>12,000	1,000	S-DVB gel	Ca^{2+}	SEC + LEC
SUGAR SP0810	8 x 300	>10,000	1,000	S-DVB gel	Pb^{2+}	SEC + LEC
SUGAR SC1211	6 x 250	>5,000		S-DVB gel	Ca^{2+}	P&A + LEC
SUGAR SZ5532	6 x 150	>5,000		S-DVB gel	Zn^{2+}	P&A + LEC
SUGAR KS-801	8 x 300	>15,000	1,000	S-DVB gel	Na^+	SEC + LEC

For improved carbohydrate retention and separation under HILIC conditions, see Luna Omega SUGAR p. 279

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

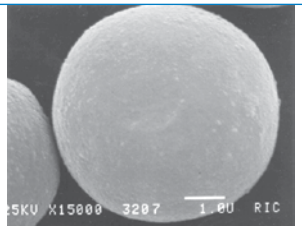
Guaranteed Replacement to Spherisorb®

- **Highly reproducible**
- **Long column life**
- **Mimics performance of Waters® Spherisorb®**
- **Economically priced**

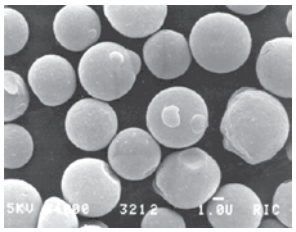
Phenomenex SphereClone columns have been developed to provide chromatographic behavior that mimics that of Waters Spherisorb columns. For comparative applications, please contact your local Phenomenex representative.

SphereClone™ VS. Spherisorb®†

SEM of Base Silica



Surface
15,000x Magnification

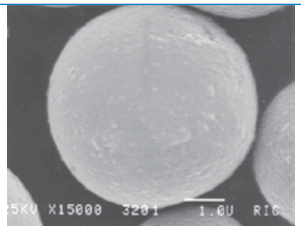


Physical Mass Distribution and Shape
4,000x Magnification

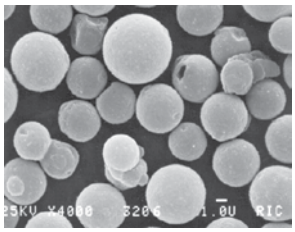
Material Characteristics

SphereClone™		Spherisorb®†
3, 5, 10 µm	Particle Size	3, 5, 10 µm
80 Å	Pore Size	80 Å
200 m^2/g	Surface Area	200 m^2/g
	Carbon Load	
—	Silica	—
6%	C6	6%
6%	C8	6%
7%	ODS(1)	6.2%
12%	ODS(2)	12%
2%	NH_2	2%

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**
				/10pk
C8	—	00D-4133-E0	—	AJ0-4290
ODS(1)	—	00D-4134-E0	00F-4134-E0	AJ0-4287
ODS(2)	00B-4135-E0	00D-4135-E0	00F-4135-E0	AJ0-4287
NH_2	—	—	00F-4137-E0	AJ0-4302

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**
			/10pk
Silica	00F-4139-E0	00G-4139-E0	AJ0-4348
C6	00F-4141-E0	00G-4141-E0	—
C8	00F-4142-E0	00G-4142-E0	AJ0-4290
ODS(1)	00F-4143-E0	00G-4143-E0	AJ0-4287
ODS(2)	00F-4144-E0	00G-4144-E0	AJ0-4287
NH_2	00F-4147-E0	00G-4147-E0	AJ0-4302
SAX	00F-4149-E0	00G-4149-E0	AJ0-4311

for ID: 3.2-8.0 mm

10 µm Columns (mm)		SecurityGuard™ Cartridges (mm)
Phases	**250 x 4.6**	**4 x 3.0**
		/10pk
ODS(2)	00G-4156-E0	AJ0-4287
SAX	00G-4160-E0	AJ0-4311

for ID: 3.2-8.0 mm

For SecurityGuard Cartridge Holders and Cartridges, see pp. 311-315

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**

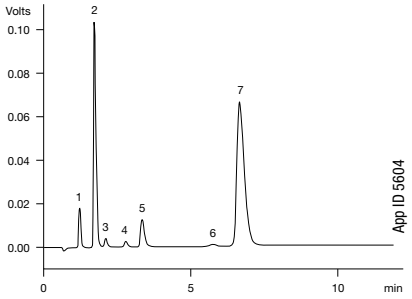
Material Specifications

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 $NaHCO_3$/ 1.8 mM Na_2CO_3
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
00D-4090-E0-BV	STAR-ION A300 Anion column (PEEK)	100 x 4.6	ea
AL0-3420	STAR-ION A300 Test Mix		ea
AQ0-3351	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
AQ0-1388	PEEK long-nut fitting		ea
AT0-1107	PEEK capillary tubing 1/16 in. OD x 0.010 in. D x 5 ft. L		ea
AT0-1110	Polymer tubing cutter		ea

For HPLC Column Heater (25-90˚C), see p. 390

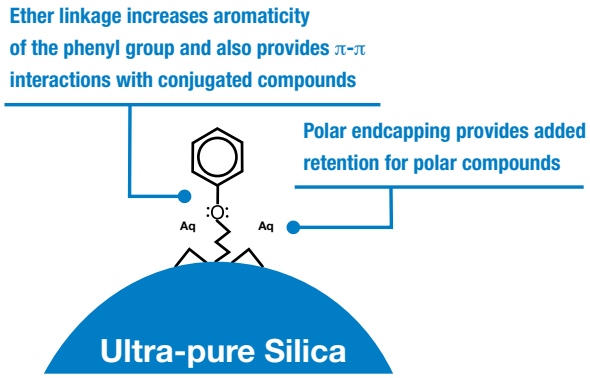
Full Range Selectivity for Reversed Phase Separation

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.

Synergi Polar-RP

Phenyl Ether-Linked

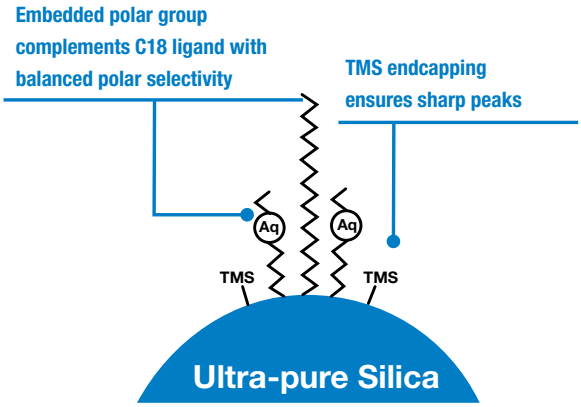
For polar and aromatic mixtures



Synergi Fusion-RP

C18 Polar Embedded

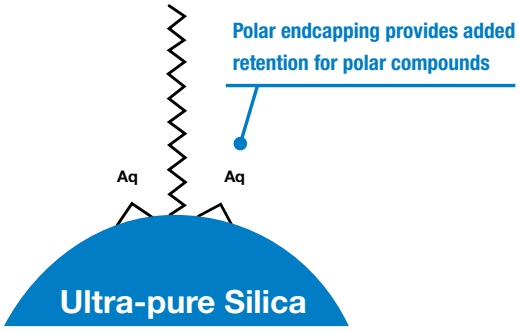
Balanced non-polar and polar performance



Synergi Hydro-RP

C18 Polar Endcapped

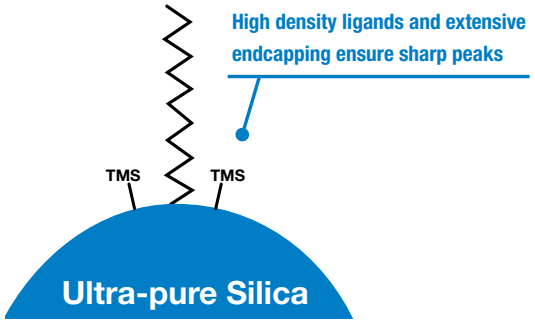
Strong non-polar and polar retention



Synergi Max-RP

C12 TMS Endcapped

Excellent for basic compounds at neutral pH



SFC APPROVED

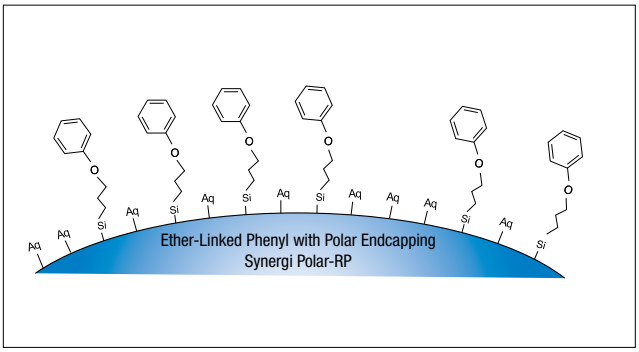
SYNERGI | HPLC/UHPLC

Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m^2)	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.

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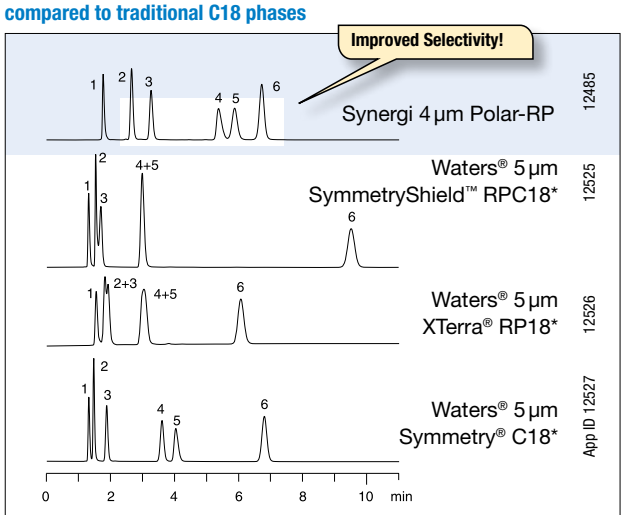
HPLC / UHPLC | SYNERGI

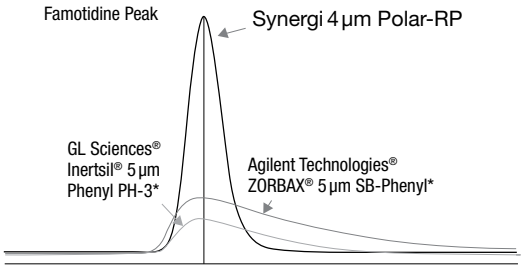
Increased resolution of polar compounds with Synergi Polar-RP compared to traditional C18 phases



Conditions for all columns:

Columns: Synergi 4 µm Polar-RP
Waters 5 µm SymmetryShield RPC18
Waters 5 µm Symmetry C18
Waters 5 µm XTerra RP18
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate pH 3 / Methanol (50:50)
Flow Rate: 1.0 mL/ min
Detection: UV @ 230 nm
Temperature: Ambient
Injection: 2 µL
Sample:
1. Metaproterenol (0.4 µg)
2. Pindolol (0.6 µg)
3. Metoprolol (0.15 µg)
4. Alprenolol (0.3 µg)
5. Propranolol (0.04 µg)
6. Ethylparaben (0.4 µg)

Improve peak symmetry of polar compounds with Synergi Polar-RP compared to other phenyl phases



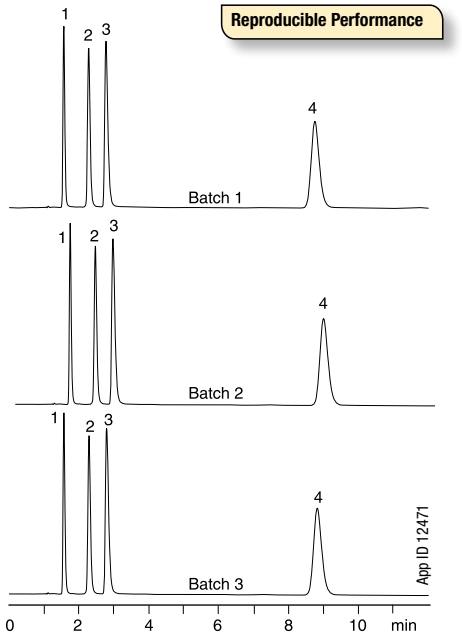
Conditions for all columns:

Columns: Synergi 4 µm Polar-RP
ZORBAX 5 µm SB-Phenyl
Inertsil 5 µm Phenyl PH-3
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate pH 7.0/Acetonitrile (80:20)
Flow Rate: 1.0 mL/ min
Detection: UV @ 254 nm
Temperature: 25 °C
Sample: Famotidine

*See p. 330 for disclaimer information. Comparative separations may not be representative of all applications.

Synergi Polar-RP *(cont'd)*

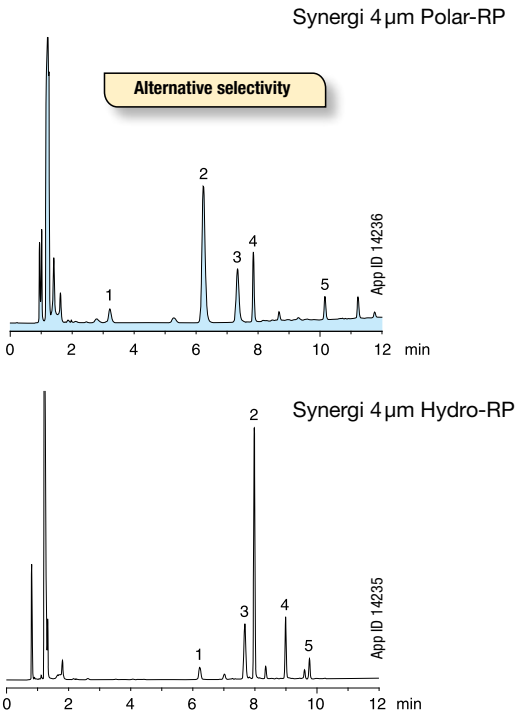
Synergi Polar-RP is highly reproducible



Conditions for all columns:

Column: Synergi 4 µm Polar-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4336-E0
Guard Cartridge: AJ0-6076
Guard Holder: KJ0-4282
Mobile Phase: Methanol/20 mM Potassium Phosphate pH 6.5 (35:65)
Flow Rate: 1.5 mL/ min
Detection: UV @ 210 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection: 1 µL
Temperature: 22 °C
Sample: 1. Phenylephrine (1 µg)
2. Phenylpropanolamine (1 µg)
3. Pseudoephedrine (1 µg)
4. Methylparaben (1 µg)

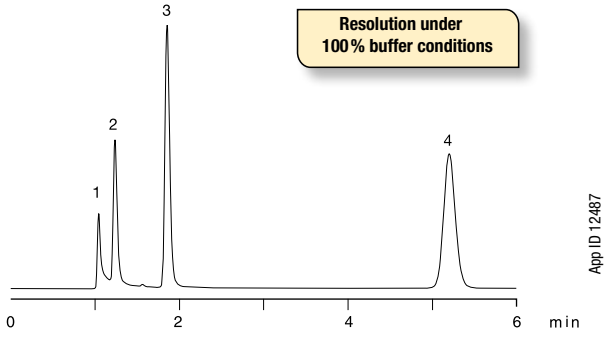
The selectivity of Synergi Polar-RP can provide differences in peak elution order for confirmation or better separation



Conditions for all columns:

Dimensions: 150 x 4.6 mm
Mobile Phase: A: 20 mM KH_2PO_4 + 0.1 % Hexane Sulfonate, pH 3.0
B: Acetonitrile
Gradient: A/B (97:3) for 3 minutes, then to A/B (50:50) in 15 minutes
Flow Rate: 1.5 mL/ min
Detection: UV @ 210 nm
Temperature: 22 °C
Sample: 1. Pantothenic acid
2. Pyridoxine
3. p-Aminobenzoic acid
4. Thiamine
5. Riboflavin

100 % buffer mobile phase stability allows for separation of extremely polar compounds, like nucleic acid bases, on Synergi Polar-RP



Nucleic Acid Bases

Column: Synergi 4 µm Polar-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4336-E0
Guard Cartridge: AJ0-6076
Guard Holder: KJ0-4282
Mobile Phase: 20 mM Potassium phosphate pH 2.7
Flow Rate: 2.0 mL/ min
Detection: UV @ 254 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection: 2.5 µL
Temperature: 22 °C
Sample: 1. Thymidine triphosphate (TTP) (1.25 µg)
2. Thymidine diphosphate (TDP) (1.25 µg)
3. Thymidine monophosphate (TMP) (1.25 µg)
4. Thymidine (1.25 µg)

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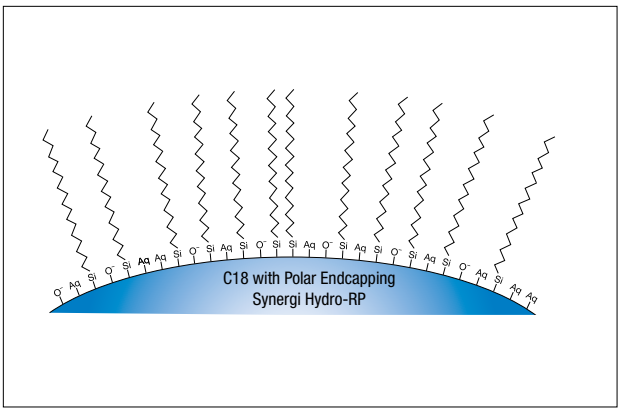
Synergi Hydro-RP

A Polar Endcapped C18 Column



Synergi Hydro-RP

USP: L1

pH Stability:	**1.5 – 7.5**
Particle Size:	2.5 µm, 4 µm, and 10 µm
Phase:	C18 with polar endcapping
Application:	For extreme retention of non-polar and extremely polar alkyl compounds
Strength:	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.

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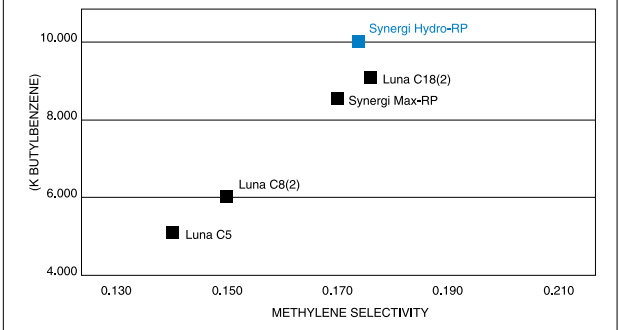
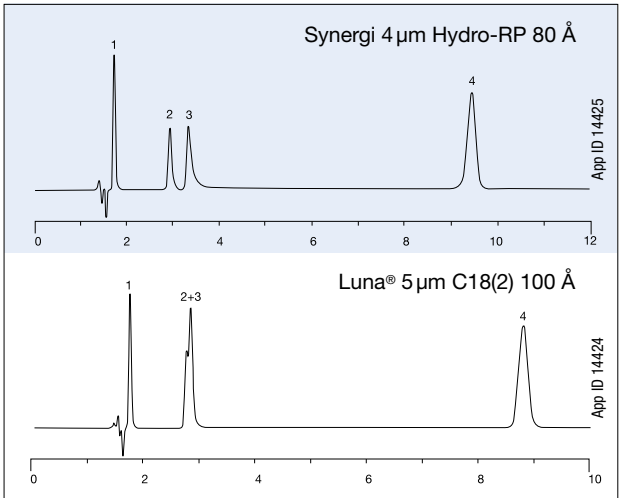
Extreme hydrophobic retention relative to other hydrophobic selectivity phases



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.

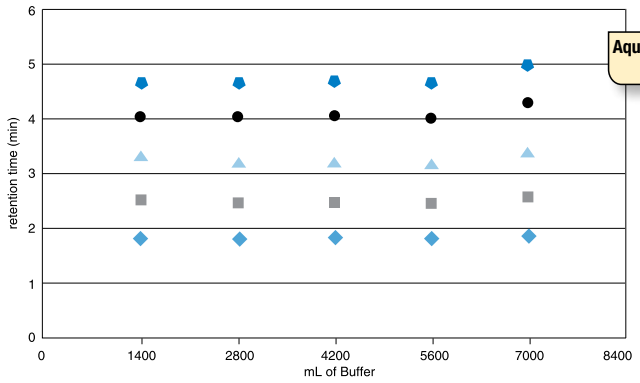
Additional polar selectivity provides separation where traditional C18 columns cannot



Conditions for all columns:
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate, pH 7.0 /Methanol (60:40)
Flow Rate: 1 mL/ min
Temperature: 22 °C
Detection: UV @ 210 nm
Sample: 1. Phenylephrine
2. Phenylpropanolamine
3. Pseudoephedrine
4. Methylparaben

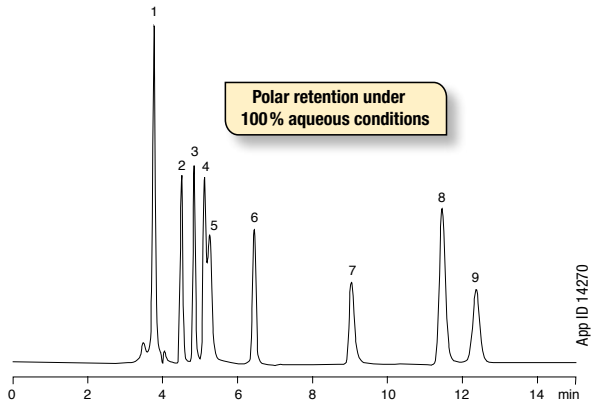
Synergi Hydro-RP *(cont'd)*

Synergi Hydro-RP is stable in 100 % aqueous mobile phase, providing improved retention of extremely polar compounds



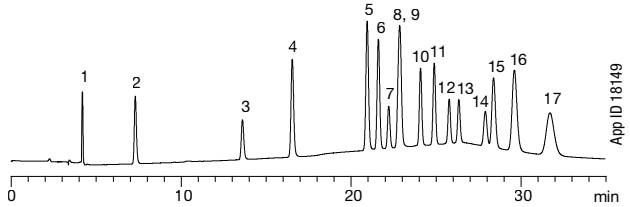
Column: Synergi 4 µm Hydro-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4375-E0
Guard Cartridge: AJ0-7511
Guard Holder: KJ0-4282
Mobile Phase: 20 mM Potassium phosphate, pH 2.5
Flow Rate: 1.0 mL/min
Temperature: 35 °C
Detection: UV @ 210 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Injection: 5 µL
Sample: 1. Norepinephrine (0.8 mg/mL)
2. Epinephrine (0.5 mg/mL)
3. Normetanephrine (0.6 mg/mL)
4. Dopamine (0.4 mg/mL)
5. L-DOPA (0.3 mg/mL)

Synergi Hydro-RP is able to separate very polar compounds, as well as, mixtures of polars and non-polars



Organic Acids

Column: Synergi 4 µm Hydro-RP
Dimensions: 250 x 4.6 mm
Part No.: 00G-4375-E0
Guard Cartridge: AJ0-4287
Guard Holder: KJ0-4282
Mobile Phase: 20 mM Potassium phosphate, pH 2.9
Flow Rate: 0.7 mL/min
Temperature: 22 °C
Detection: UV @ 220 nm
Vial: AR0-9925-13
Filter: AF0-8103-52
Sample: 1. Oxalic acid
2. Tartaric acid
3. Glycolic acid
4. Formic acid
5. Pyruvic acid
6. Malonic acid
7. Acetic acid
8. Maleic acid
9. Citric acid



Explosives

Column: Synergi 4 µm Hydro-RP
Dimensions: 250 x 4.6 mm
Part No.: 00G-4375-E0
Mobile Phase: A: Methanol
B: Water

Gradient:	**Time (min)**	**% B**
	0	45
	2	45
	22	25
	22.01	45
	25	45

Flow Rate: 1 mL/min
Temperature: 22 °C
Detection: UV @ 254 nm / 220 nm (ambient)
Sample: 1. Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
2. Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
3. 1,3,5-Trinitrobenzene
4. Methyl-2,4,6-trinitrophenylnitramine (Tetryl)
5. 1,3-Dinitrobenzene
6. Nitrobenzene
7. Nitroglycerin
8. 2,4,6-Trinitrotoluene (TNT)
9. 3,5-Dinitroaniline
10. 4-Amino-2,6 dinitrotoluene
11. 2 Amino-4,6 dinitrotoluene
12. 2,6-Dinitrotoluene
13. 2,4-Dinitrotoluene
14. Pentaerythritol tetranitrate (PETN)
15. 2-Nitrotoluene
16. 4-Nitrotoluene
17. 3-Nitrotoluene

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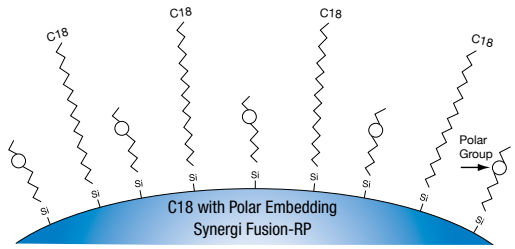
Synergi Fusion-RP

A Polar Embedded C18 Column



NON-NITROGEN Polar Infused 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.

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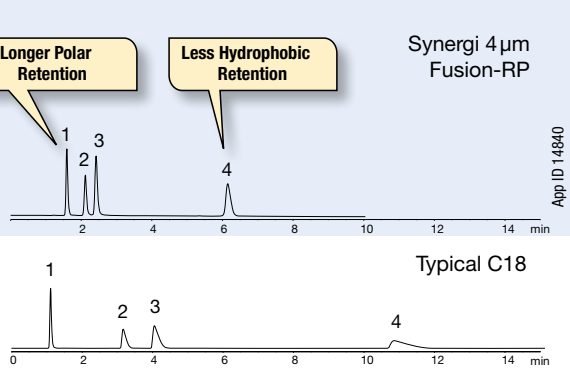
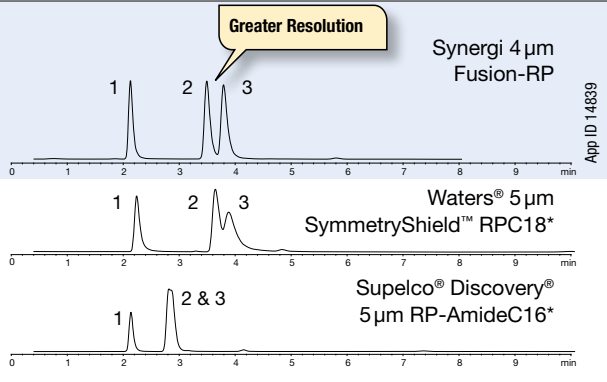
Balanced Polar and Hydrophobic Retention Allows for Superior Selectivity

Hydrophobic Basic Compounds



Conditions for all columns:
Columns: Synergi 4 µm Fusion-RP
Typical C18
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mm Potassium Phosphate, pH 2.5 / Acetonitrile (75:25)
Flow Rate: 1.0 mL/ min
Detection: UV @ 210 nm
Sample:
1. Maleic acid
2. Chlorpheniramine
3. Triprolidine
4. Diphenhydramine

Antihistamines

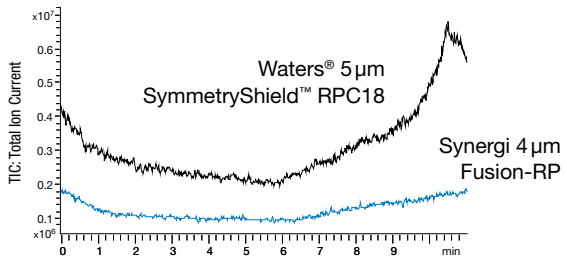


Conditions for all columns:
Columns: Synergi 4 µm Fusion-RP
Waters 5 µm SymmetryShield™ RPC18
Supelco Discovery® 5 µm RP-AmideC16
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mm Potassium Phosphate, pH 2.5 / Methanol (70:30)
Flow Rate: 1.0 mL/ min
Detection: UV @ 210 nm
Sample:
1. Phenylephrine
2. Phenylpropanolamine
3. Pseudoephedrine

*See p. 330 for disclaimer information. Comparative separations may not be representative of all applications.

Synergi Fusion-RP *(cont'd)*

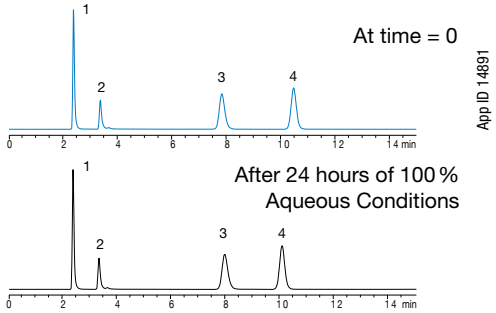
Synergi Fusion-RP has negligible MS bleed compared to other polar modified C18 columns



Conditions for all columns:

Dimensions: 150 x 4.6 mm
Mobile Phase: A: 0.1 % CH_3COOH in Water
B: 0.1 % CH_3COOH in Methanol
Gradient: 95:5 (A/B) linear to 5:95 over 8 min, hold for 5 min
Flow Rate: 0.5 mL/ min
Detection: Bruker-Daltonics Esquire 2000 IT
Ion Source: ESI
Scan Rate: 13000 m/z/s
Scan Range: 50-1000

100 % aqueous stable for added method flexibility



Column: Synergi 4 µm Fusion-RP
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate buffer pH 2.5
Flow Rate: 1.0 mL/ min
Detection: UV @ 254 nm
Injection: 1 µL
Temperature: 30 °C
Sample:
1. Thiourea
2. Adenine
3. Guanosine-5-monophosphate
4. Thymine

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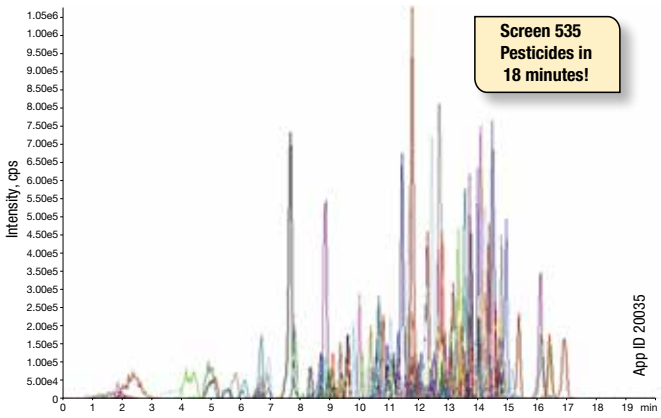
Excellent Multi-Compound Screening Ability



Column: Synergi 2.5 µm Fusion-RP 100 Å
Dimensions: 50 x 2.0 mm
Part No.: 00B-4423-B0
Mobile Phase: A: Water/Methanol (90:10) + 5 mm Ammonium formate
B: Methanol/Water (90:10) + 5 mm Ammonium formate
Gradient:

Time (min)	% B
0	0
1	0
15	100
18	100
18.05	0
20	0

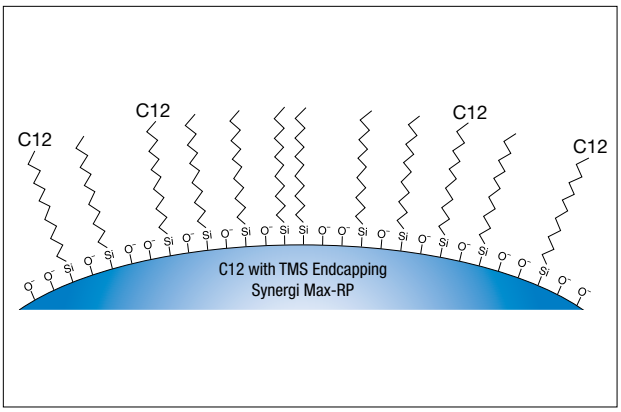
Flow Rate: 400 µL/min
Temperature: 40 °C
Detection: Tandem Mass Spectrometer (MS/MS) (400 °C)
Vial: AR0-9925-13
Filter: AF0-8203-52
Detector: SCIEX API 3200™ System
Sample: Multi-Residue Screening in Foods of Plant Origin
See full list of analytes online at www.phenomenex.com

*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:

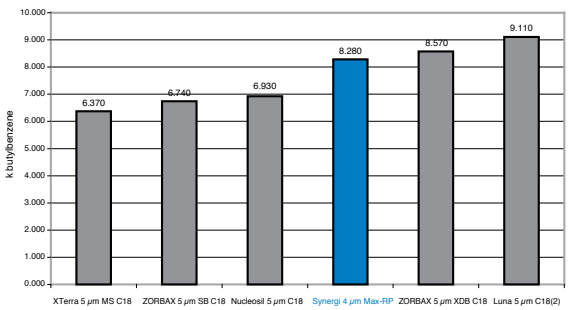
You need to retain compounds based on hydrophobic selectivity exclusively, but cannot accomplish peak separation with C18 column.

Selectivity Solution:

The C12 ligands on Synergi Max-RP give a hydrophobic selectivity that may separate peaks where C18 columns cannot.

SFC APPROVED

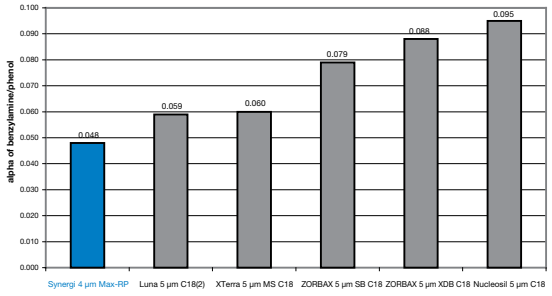
Hydrophobic Retention: Synergi Max-RP (C12) Performs Like a C18*



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:

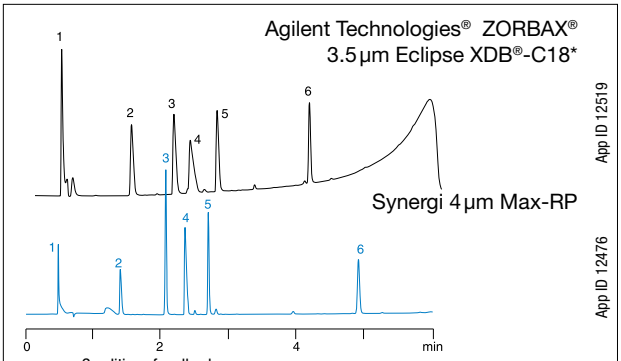
Columns: Waters XTerra 5 µm MS C18
Agilent Technologies ZORBAX 5 µm SB C18
Macherey Nagel Nucleosil 5 µm C18
Synergi 4 µm Max-RP
Agilent Technologies ZORBAX 5 µm XDB C18
Luna 5 µm C18(2)
Dimensions: 150 x 4.6 mm
Mobile Phase: Methanol/20 mM Potassium phosphate, pH 2.5 (30:70)
Flow Rate: 1 mL/ min
Detection: UV @ 254 nm
Injection: 5 µL
Temperature: Ambient
Sample: 1. Benzylamine
2. Phenol

*See p. 330 for disclaimer information. Comparative separations may not be representative of all applications.

Synergi Max-RP *(cont'd)*

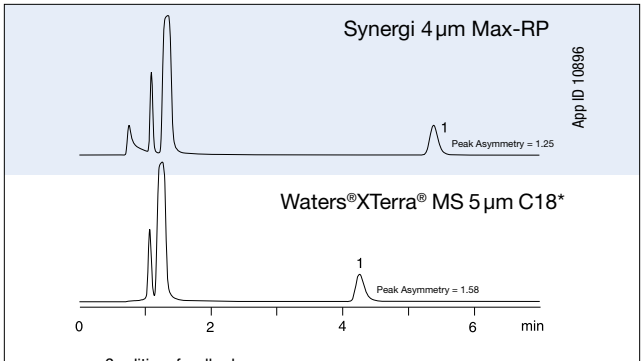
Sharper Peaks

The Synergi Max-RP C12 ligands are densely bound to silica surface, significantly decreasing the number of active silanol groups, which cause peak tailing



Conditions for all columns:

Columns: Synergi 4 µm Max-RP
Agilent Technologies ZORBAX 3.5 µm Eclipse XDB-C18
Dimensions: 50 x 4.6 mm
Mobile Phase: A: Water with 0.1 % Formic acid
B: Acetonitrile with 0.1 % Formic acid
Gradient: A/B (95:5) to 100 **% B** in 5 min
Flow Rate: 1.5 mL/ min
Detection: UV @ 254 nm
Injection: 5 µL
Temperature: 30 °C
Sample:
1. Thiourea (0.25 µg)
2. Codeine (1 µg)
3. Chlorpheniramine (2 µg)
4. Propranolol (6 µg)
5. Desipramine (0.5 µg)
6. Ibuprofen (6 µg)



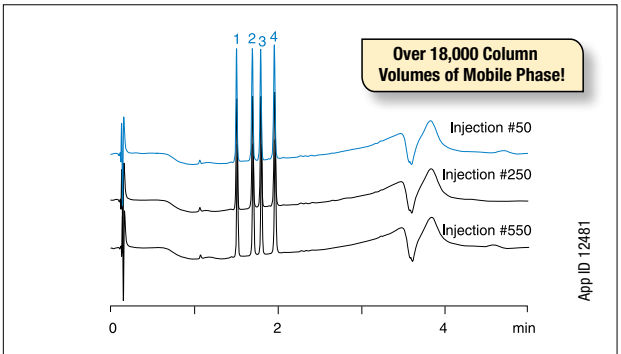
Conditions for all columns:

Columns: Synergi 4 µm Max-RP
Waters XTerra MS 5 µm C18
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate pH 7 / Acetonitrile / Methanol (50:25:25)
Flow Rate: 1.5 mL/ min
Detection: UV @ 210 nm
Injection: 1 µL
Temperature: 30 °C
Sample: Methanol extract from Chlortrimeton Allergy Pills
1. Chlorpheniramine

*See p. 330 for disclaimer information. Comparative separations may not be representative of all applications.

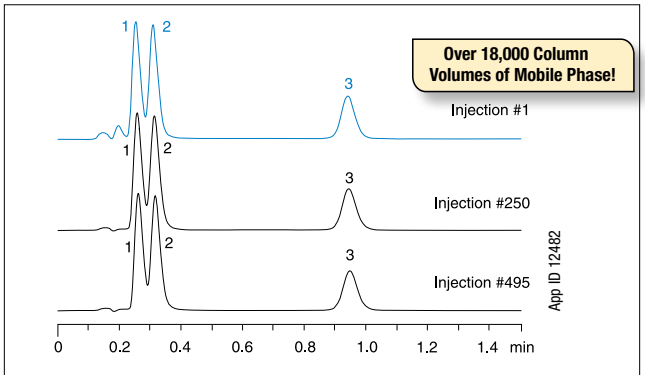
Achieve Reproducibility and Long Column Lifetimes Even at pH Extremes with Synergi Max-RP

Stability @ pH 1.5



Column: Synergi 4 µm Max-RP
Dimensions: 30 x 2.0 mm
Part No.: 00A-4337-B0
Mobile Phase: A: Water with 0.1 % TFA
B: Acetonitrile with 0.1 % TFA
Gradient: A/B (95:5) to
A/B (5:95) in 3 min
Flow Rate: 1.0 mL/ min
Detection: UV @ 254 nm
Injection: 1 µL
Temperature: 30 °C
Sample: Precipitated porcine serum (2:1 Acetonitrile:serum) containing:
1. Oxazepam (50 ng)
2. Temazepam (50 ng)
3. Nordiazepam (50 ng)
4. Diazepam (50 ng)

Stability @ pH 10.0



Column: Synergi 4 µm Max-RP
Dimensions: 30 x 2.0 mm
Part No.: 00A-4337-B0
Mobile Phase: Water with 0.1 % Ammonium hydroxide, pH 10 / Acetonitrile with 0.1 % Ammonium hydroxide, pH 10 (50:50)
Flow Rate: 0.5 mL/ min
Detection: UV @ 254 nm
Injection: 5 µL
Temperature: 30 °C
Sample:
1. Pyridine
2. Phenol
3. Toluene

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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	00A-4372-B0	00B-4372-B0	00D-4372-B0	00B-4372-Y0	00D-4372-Y0	00B-4372-E0
Hydro-RP	00A-4387-B0	00B-4387-B0	00D-4387-B0	00B-4387-Y0	00D-4387-Y0	00B-4387-E0
Polar-RP	00A-4371-B0	00B-4371-B0	00D-4371-B0	00B-4371-Y0	00D-4371-Y0	00B-4371-E0
Fusion-RP	00A-4423-B0	00B-4423-B0	00D-4423-B0	00B-4423-Y0	00D-4423-Y0	00B-4423-E0

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	00N-4372-B0-CE	—	00M-4372-B0-CE	00M-4372-D0-CE	—	—
Hydro-RP	00N-4387-B0-CE	—	00M-4387-B0-CE	—	—	—
Polar-RP	00N-4371-B0-CE	00N-4371-D0-CE	00M-4371-B0-CE	—	00M-4377-B0	—
Fusion-RP	00N-4423-B0-CE	—	—	—	—	00M-4423-D0

MercuryMS™ Cartridge Holders

Direct-Connect Holder

Standard Holder

Ordering Information

Direct-Connect Cartridge Holders	
Part No.	**Description**
CH0-7187	10 mm direct-connect holder
CH0-7188	20 mm direct-connect holder

Standard Cartridge Holders	
Part No.	**Description**
CH0-5846	10 mm standard holder
CH0-5845	20 mm standard holder

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 391-392

Capillary Columns

Ordering Information

4 µm Synergi Capillary Columns (mm)					
Phases	**50 x 0.30**	**150 x 0.30**	**50 x 0.50**	**150 x 0.50**	**250 x 0.50**
Max-RP	—	—	00B-4337-AF	00F-4337-AF	—
Hydro-RP	00B-4375-AC	00F-4375-AC	00B-4375-AF	—	00G-4375-AF
Fusion-RP	—	00F-4424-AC	—	00F-4424-AF	—
Polar-RP	—	—	—	00F-4336-AF	—

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*
								/10pk
Max-RP	00B-4337-A0	—	00A-4337-B0	00B-4337-B0	00C-4337-B0	00F-4337-B0	—	AJ0-6073
Hydro-RP	00B-4375-A0	00F-4375-A0	00A-4375-B0	00B-4375-B0	00C-4375-B0	00F-4375-B0	00G-4375-B0	AJ0-7510
Polar-RP	—	—	00A-4336-B0	00B-4336-B0	00C-4336-B0	00F-4336-B0	00G-4336-B0	AJ0-6075
Fusion-RP	00B-4424-A0	00F-4424-A0	00A-4424-B0	00B-4424-B0	00C-4424-B0	00F-4424-B0	00G-4424-B0	AJ0-7556

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*
					/10pk
Max-RP	—	00B-4337-Y0	00F-4337-Y0	00G-4337-Y0	AJ0-6073
Hydro-RP	—	00B-4375-Y0	00F-4375-Y0	00G-4375-Y0	AJ0-7510
Polar-RP	00A-4336-Y0	00B-4336-Y0	00F-4336-Y0	00G-4336-Y0	AJ0-6075
Fusion-RP	—	00B-4424-Y0	00F-4424-Y0	00G-4424-Y0	AJ0-7556

for ID: 2.0-3.0 mm

For UHPLC system connections, see SecurityLINK™ UHPLC fingertight fitting system on pp. 317-318

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*
						/10pk
Max-RP	00A-4337-E0	00B-4337-E0	00C-4337-E0	00F-4337-E0	00G-4337-E0	AJ0-6074
Hydro-RP	00A-4375-E0	00B-4375-E0	00C-4375-E0	00F-4375-E0	00G-4375-E0	AJ0-7511
Polar-RP	—	00B-4336-E0	00C-4336-E0	00F-4336-E0	00G-4336-E0	AJ0-6076
Fusion-RP	—	00B-4424-E0	00C-4424-E0	00F-4424-E0	00G-4424-E0	AJ0-7557

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**
4 µm					/ea
Max-RP	—	—	00F-4337-P0-AX	00G-4337-P0-AX	AJ0-7842
Hydro-RP	00B-4375-P0-AX	—	00F-4375-P0-AX	00G-4375-P0-AX	AJ0-7843
Polar-RP	00B-4336-P0-AX	00D-4336-P0-AX	00F-4336-P0-AX	00G-4336-P0-AX	AJ0-7845
Fusion-RP	—	00D-4424-P0-AX	00F-4424-P0-AX	00G-4424-P0-AX	AJ0-7844
10 µm					/ea
Hydro-RP	—	—	Inquire	00G-4376-P0-AX	AJ0-7843
Polar-RP	—	—	Inquire	00G-4351-P0-AX	AJ0-7845
Fusion-RP	—	—	00F-4425-P0-AX	00G-4425-P0-AX	AJ0-7844

for ID: 18-29 mm

Ordering Information

Axia™ Packed Preparative Columns (mm) continued		SecurityGuard™ Cartridges (mm)
Phases	250 x 30	15 x 30.0♦
4 µm		/ea
Max-RP	00G-4337-U0-AX	AJ0-8304

for ID: 30-49 mm

Ordering Information

4 µm Semi-Prep Columns (mm)		SecurityGuard™ Cartridges (mm)
Phases	250 x 10	10 x 10‡
		/3pk
Max-RP	00G-4337-N0	AJ0-7275
Hydro-RP	00G-4375-N0	AJ0-7512
Polar-RP	00G-4336-N0	AJ0-7276
Fusion-RP	00G-4424-N0	AJ0-7558

for ID: 9-16 mm

*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

For more dimensions and phases of Axia packed preparative columns, see pp. 361-362, or contact your Phenomenex Technical Consultant

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‡
			/10pk	/3pk
Max-RP	—	00G-4350-N0	AJ0-6074	AJ0-7275
Hydro-RP	00G-4376-E0	00G-4376-N0	AJ0-7511	AJ0-7512
Polar-RP	00G-4351-E0	00G-4351-N0	AJ0-6076	AJ0-7276
Fusion-RP	00G-4425-E0	00G-4425-N0	AJ0-7557	AJ0-7558
			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.

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
					/10pk
3 µm ODS (20)	00B-0205-E0	00D-0205-E0	00F-0205-E0	—	AJ0-4287
5 µm C8	—	—	00F-2134-E0	00G-2134-E0	AJ0-4290
5 µm ODS (20)	—	—	00F-0206-E0	00G-0206-E0	AJ0-4287
5 µm ODS (30)	—	00D-0351-E0	00F-0351-E0	00G-0351-E0*	AJ0-4287
					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
			/10pk
C8	00F-0047-E0	—	AJ0-4290
C18	00F-0048-E0	00G-0048-E0	AJ0-4287
			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. 17
For In-line Filters specifically designed to protect your chiral column investment, see p. 17

For Chiral Column Performance Check Standards, see p. 399

For HPLC Column Heater System (25-90 °C), see p. 390

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**

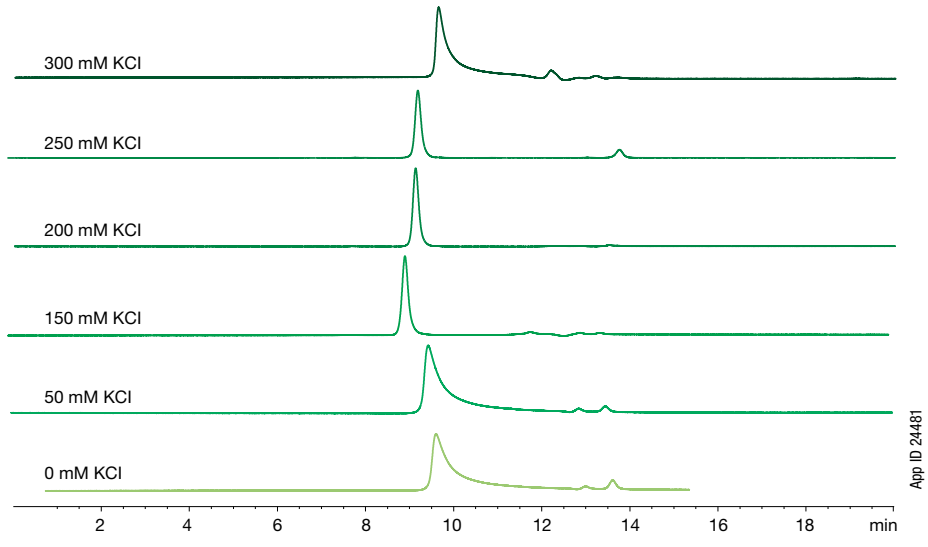
Yarra vs. Waters® BEH SEC

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



Column: Yarra 1.8 µm SEC-X300
Dimensions: 300 x 4.6 mm
Part No.: 00H-4745-E0-SS
Mobile Phase: 50 mM KH_2PO_4, pH 6.8
KCl (as indicated)
Flow Rate: 0.3 mL/min
Detection: UV-Vis @ 280 nm
Temperature: Ambient
LC System: Agilent® 1100

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**

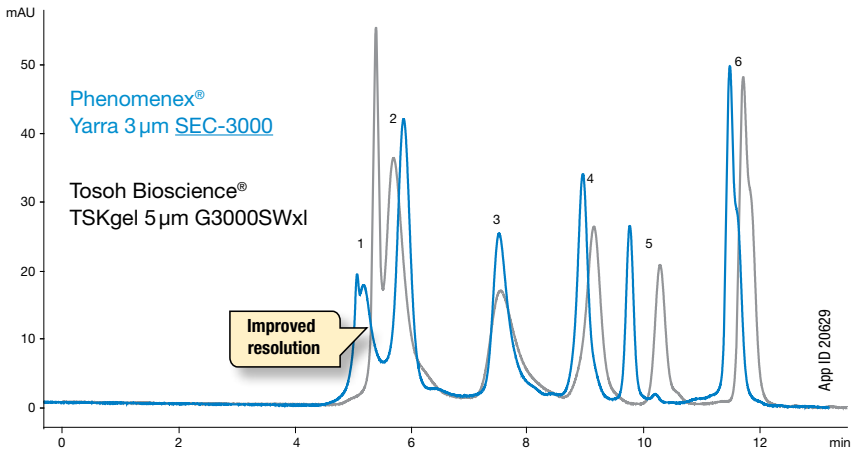
Starting with 3 µm ultra-pure silica, Yarra particles are densely bonded with a proprietary hydrophilic surface chemistry. Coupled with tight particle and pore size distribution as well as strict packing and QC specifications, Yarra columns allow for very high efficiency and resolution.

Higher Efficiency, Much Lower Price Compared to TSKgel®— GUARANTEED!

Yarra			VS.	TSKgel*†		
				G2000SWxl	G3000SWxl	G4000SWxl
3	3	3	**Particle Size (µm)**	5	5	8
145	290	500	**Pore Size (Å)**	125	250	450
1 k - 300 k	5 k - 700 k	15 k - 1,500 k	**MW Range in native conditions (Da)**	5 k - 150 k	10 k - 500 k	20 k - 7,000 k
2.5 - 7.5	2.5 - 7.5	2.5 - 7.5	**pH Stability**	2.5 - 7.5	2.5 - 7.5	2.5 - 7.5
3000	3000	1700	**Maximum Backpressure (psi)**	1015	1015	508
50	50	50	**Maximum Temperature (°C)**	30	30	30
1.5	1.5	1.2	**Maximum Flow Rate (mL/min)**	1.2	1.2	1.2
48,000	48,000	38,000	**Efficiency (minimum theoretical plates)**	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

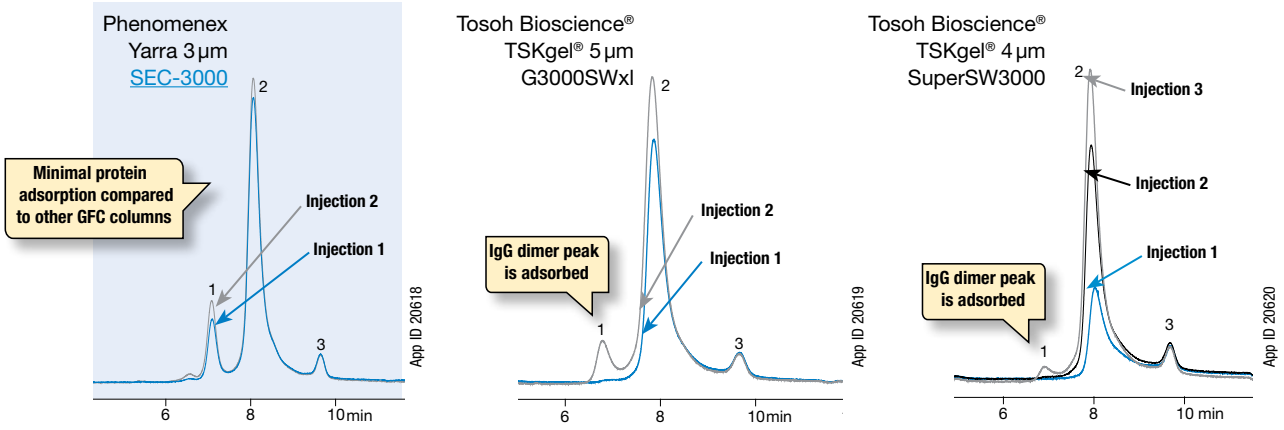
Sample:
1. IgM
2. Thyroglobulin (669 kDa)
3. Beta Amylase
4. Ovalbumin (44 kDa)
5. Myoglobin (17 kDa)
6. Uridine

Comparative separations may not be representative of all applications.
†All TSKgel specifications were taken from Tosoh Bioscience 2004-5 Laboratory Products Catalog

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)

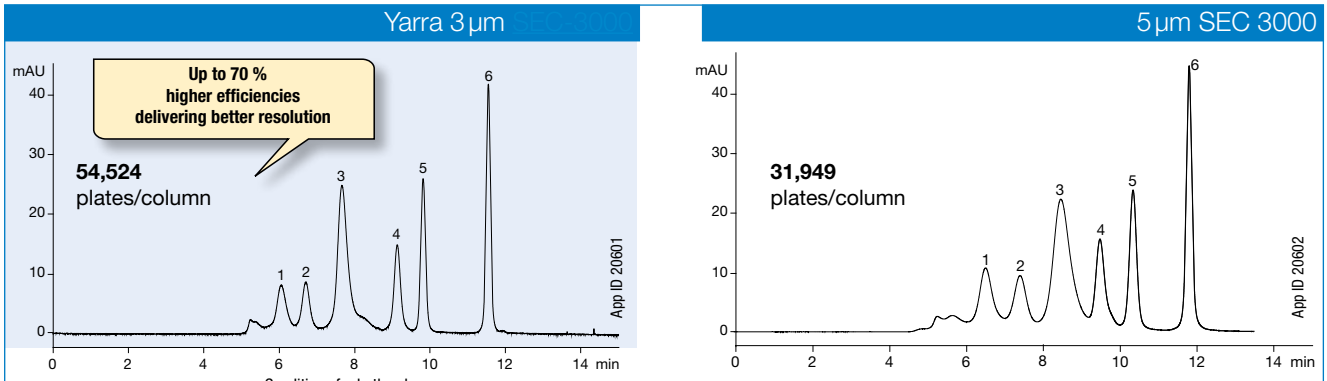
Temperature: Ambient

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



Conditions for both columns:

Columns: Yarra 3 µm SEC-3000
5 µm SEC 3000 Column

Dimensions: 300 x 7.8 mm

Mobile Phase: 100 mM Sodium Phosphate in Water pH 6.8 + 0.025 % NaN_3

Flow Rate: 1 mL/min

Temperature: Ambient

Detection: UV @ 280 nm

Sample: 1. Thyroglobulin (669 kDa)
2. IgA (300 kDa)
3. IgG (150 kDa)
4. Ovalbumin (44 kDa)
5. Myoglobin (17 kDa)
6. Uridine

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*
				/10pk
Yarra 3 µm SEC-2000	00H-4512-E0	00F-4512-K0	00H-4512-K0	AJ0-4487
Yarra 3 µm SEC-3000	00H-4513-E0	00F-4513-K0	00H-4513-K0	AJ0-4488
Yarra 3 µm SEC-4000	00H-4514-E0	—	00H-4514-K0	AJ0-4489

*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJ0-4282 for ID: 4.6 - 7.8 mm

For information on SecurityGuard column protection, see p. 311

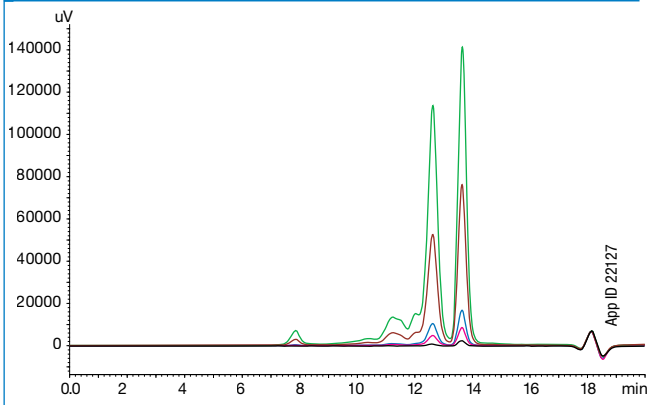
Yarra™ 5 µm PREP Aqueous GFC/SEC Columns

Higher Performance for Preparative BioSeparations at a Lower Price

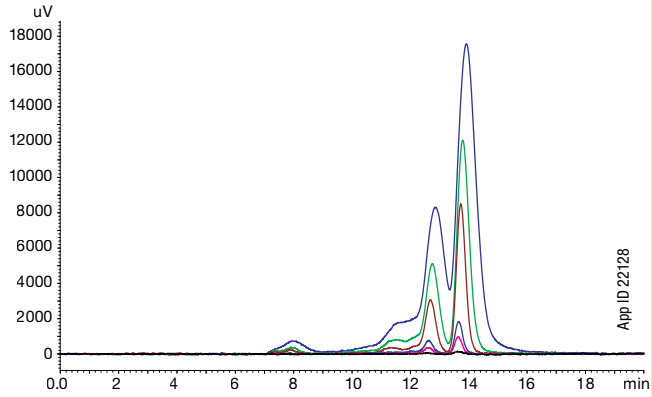
Enjoy the same selectivity and ultra-high efficiency of Yarra 3 µm for your preparative gel filtration applications. Yarra SEC PREP features a 5 µm particle size version of the original Yarra 3 µm particle with the same chemistry on a 21.2 mm ID column for preparative purification, desalting, and characterization 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

Increasing sample concentrations with fixed injection volume



Increasing injection volumes with fixed sample concentration



Injection Volume: 100 µL
0.1 mg/mL - 0.01 mg
0.5 mg/mL - 0.05 mg
1 mg/mL - 0.10 mg
5 mg/mL - 0.50 mg
10 mg/mL - 1.0 mg

Conditions for both applications:
Columns: Yarra 5 µm SEC-2000 PREP
Dimensions: 300 x 21.2 mm
Part No: 00H-4619-P0
Mobile Phase: 100 mM Sodium Phosphate pH 6.8
Flow Rate: 5 mL/min
Temperature: Ambient
Detection: UV @ 280 nm (ambient)
Sample: 1. Bovine Serum Albumin (66 kDa)
2. Myoglobin (17 kDa)

Sample concentration: 1 mg/mL
10 µL - 0.01 mg
50 µL - 0.05 mg
100 µL - 0.1 mg
500 µL - 0.5 mg
1 mL - 1 mg
2 mL - 2 mg

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	00H-4619-P0	AJ0-8588
Yarra 5 µm SEC-3000 PREP	00H-4620-P0	AJ0-8589
Yarra 5 µm SEC-4000 PREP	00H-4621-P0	AJ0-8590

**PREP SecurityGuard™ Cartridges require holder, Part No.: AJ0-8223 for ID: 18 - 29 mm

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