

## Chiral LC

Chiral LC Column Types.....	188
Polysaccharide Chiral Columns.....	301
<b>Lux</b> .....	301
Additional Chiral LC Columns	
Chirex .....	232
Ultron ES .....	354

## HPLC Column Selection

Column Selection Tree .....	189
Column Selection by Application .....	190
Column Selection by Manufacturer .....	191 -192
Column Selection by Separation Mode.....	193
Column Selection by USP Specifications .....	194-197
Column Selection by Ph. Eur. Listing .....	198-203

## HPLC Column Protection

Column Performance Check Standards .....	424-425
SecurityGuard Cartridge System.....	330

## HPLC/UHPLC Columns

<b>Aeris</b> .....	204
Aqua.....	208
<b>Axia Packed Columns</b> .....	384
BioSep .....	209
<b>Biozen</b> .....	210
Bondclone.....	231
Chirex.....	232
<b>Clarity</b> .....	404
<b>Gemini</b> .....	234
HyperClone.....	241
InertClone .....	243
Jupiter .....	244
<b>Kinetex</b> .....	246
LiChrosorb .....	275
LiChrospher .....	275
<b>Luna</b> .....	276
<b>Luna Omega</b> .....	290
<b>Lux</b> .....	301
<b>Lux AMP</b> .....	311
<b>Onyx</b> .....	313
<b>Phenogel</b> .....	315
PolymerX.....	321
PolySep-GFC-P .....	322
PREP/Preparative .....	383
Prodigy.....	323
<b>Rezex</b> .....	324

<b>SecurityGuard</b> .....	330
<b>SecurityGuard ULTRA</b> .....	335
Shodex.....	338
SphereClone .....	341
<b>Synergi</b> .....	343
Ultracarb .....	354
Ultremex.....	354
<b>Yarra</b> .....	356

## HPLC Accessories and Lab Safety .....

<b>SecurityCAP LC Solvent Safety Products</b> .....	417-418
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## Nano and Micro LC

<b>Biozen Nano</b> .....	225
Micro LC Columns, Traps, and Fittings.....	359

## Proteins/Peptides

Aeris .....	204
BioSep .....	209
Biozen .....	210
Jupiter .....	244
Yarra .....	356
Yarra PREP .....	358

## UHPLC Columns

Biozen for Analysis of Biologics .....	210
Kinetex 1.3 $\mu$ m, 1.7 $\mu$ m and 2.6 $\mu$ m Core-Shell Technology Columns.....	246
Luna Omega 1.6 $\mu$ m Fully Porous Columns .....	290
Aeris Core-Shell Technology for RP-LC of Proteins & Peptides.....	204
Clarity Core-Shell Columns for Synthetic DNA/RNA .....	404
SecurityGuard ULTRA Column Protection .....	335



186 - 362

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

**Chester Chan**  
**Nexgen Pharma, USA**

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

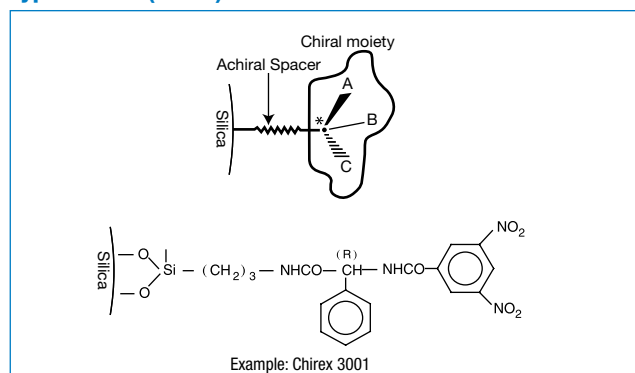
# Chiral LC Column Types

## LC Chiral Stationary Phase (CSP) Classification Diagram

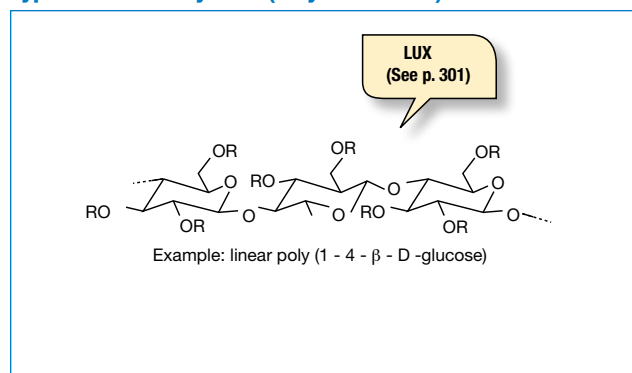
Type	Description	Chemistry	Mechanism	Brands	Page
I	Brush (Pirkle)	Low molecular weight chiral selectors Ionic or covalent bonding	Attractive interactions Hydrogen bonding Charge transfer ( $\pi$ - $\pi$ interaction) Dipole stacking	Chirex Sumichiral OA	232 Inquire
II	Helical Polymers	Cellulose and amylose derivatives	Attractive interactives Insertion complexes	Lux Cellulose and Amylose	301
III	Cavity	Cyclodextrins, Crown ether	Inclusion complexes	Chiral CD-Ph Sumichiral OA	Inquire Inquire
IV	Ligand Exchange	Amino acid-metal complex	Diastereomeric metal complex	Chirex Sumichiral OA	232 Inquire
V	Protein	$\alpha$ -acid glycoprotein Bovine Serum Albumin	Hydrophobic interactions Polar interactions	Ultron ES	354
VI	Macrocyclic	Antibiotics Glycopeptides	Hydrogen bonding Charge transfer ( $\pi$ - $\pi$ interaction) Inclusion complexation Ionic interactions Peptide bonding	None	

**Other Types** Carbon-Based (Hypercarb) and Ceramic-based (Ceramospher)

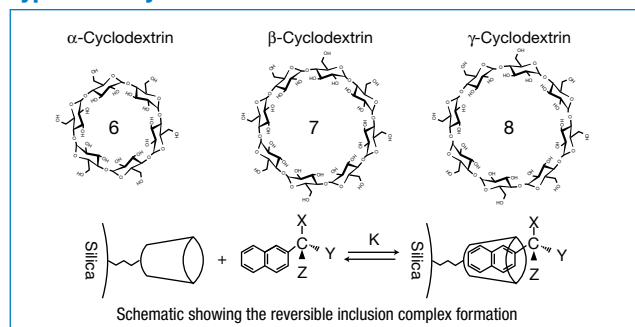
### Type I Brush (Pirkle)



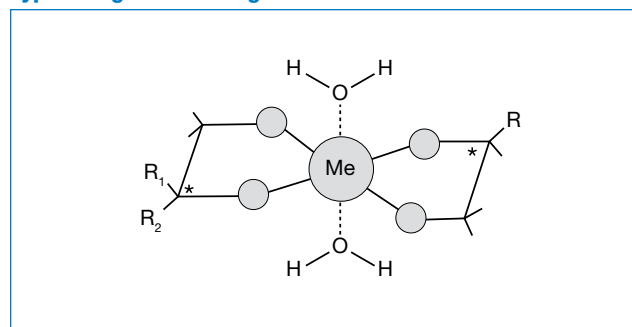
### Type II Helical Polymers (Polysaccharide)



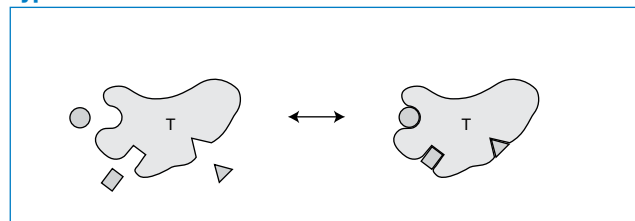
### Type III Cavity



### Type IV Ligand Exchange



### Type V Protein





# HPLC Column Selection Tree

Sample MW	Sample Solubility	Separation Mode	Our Recommended Column	Page	
MW < 5000	Organic-Soluble	Hexane-Soluble	Normal Phase Adsorption	Kinetex HILIC _____ 246 Luna Silica(2) _____ 276	
			Normal Phase Bonded	Luna CN, NH <sub>2</sub> , HILIC _____ 276	
		Methanol/Methanol/H <sub>2</sub> O Soluble	Reversed Phase Bonded	Kinetex C18, EVO C18, XB-C18, C8, Phenyl-Hexyl, Biphenyl, F5, Polar C18, PS C18 _____ 246	
				Synergi Max-RP, Fusion-RP _____ 343 Luna C8(2), C18(2) _____ 276	
		THF-Soluble	Chiral	Luna Omega C18, Omega PS C18, Omega Polar C18 _____ 290	
	Gemini C18, NX-C18, C6-Phenyl _____ 234				
	Aqueous-Soluble	Non ionic	Gel Permeation GPC	Lux _____ 301	
				Phenogel 50 Å, 100 Å _____ 315	
			Reversed Phase	Kinetex C18, EVO C18, XB-C18, C8, Phenyl-Hexyl, Biphenyl, F5, Polar C18, PS C18 _____ 246	
				Synergi Polar-RP, Hydro-RP _____ 343	
				Luna C8(2), C18(2), Luna PFP(2) _____ 276	
		Chiral	Luna Omega C18, Omega PS C18, Omega Polar C18 _____ 290		
			Gemini C18, NX-C18 _____ 234		
		Ionic	Reversed Phase	Onyx C18 _____ 313	
				Lux _____ 301	
Kinetex C18, EVO C18, XB-C18, C8, Polar C18, PS C18 _____ 246					
Synergi Max-RP, Hydro-RP _____ 343					
Luna C8(2), C18(2) _____ 276					
Ion Pairing / Reversed Phase	Luna Omega C18, Omega PS C18, Omega Polar C18 _____ 290				
	Gemini C18, NX-C18 _____ 234				
	Onyx C18 _____ 313				
Ion-Exchange	Ion-Exchange	Biozen WCX _____ 210			
		Luna SCX, NH <sub>2</sub> _____ 276			
		PhenoSphere SAX _____ Inquire			
		Kinetex HILIC _____ 246			
HILIC	HILIC	Luna HILIC, NH <sub>2</sub> , Silica(2) _____ 276			
		Biozen Glycan _____ 210			
Chiral	Chiral	Luna Omega SUGAR _____ 290			
		Lux _____ 301			
Peptides	Reversed Phase	Chirex _____ 232			
		Biozen Peptide PS-C18, XB-C18 _____ 210			
MW > 5000	Organic-Soluble	Gel Permeation Chromatography (GPC)	Biozen Peptide PS-C18, XB-C18 _____ 210		
			Aeris PEPTIDE _____ 204		
			Jupiter Proteo _____ 244		
			Unknown MW Range	Phenogel Linear (2) _____ 315 Shodex GPC _____ Inquire	
			Known MW Range	Specific Pore: Phenogel _____ 315 Shodex GPC _____ Inquire	
	Aqueous-Soluble	Gel Filtration Aqueous GFC/SEC	pH 2-7.5	Biozen dSEC-2 _____ 210	
				Yarra SEC Series _____ 355	
				BioSep-SEC-S Series _____ 209	
			pH > 7.5	PolySep-GFC-P _____ 322	
				Ion-Exchange	Cation-Exchange
		Anion-Exchange	Luna SCX _____ 276 Shodex IEC DEAE _____ 338		
		Reversed Phase	Reversed Phase	Biozen Intact XB-C8 _____ 210	
				pH 2-9	Aeris WIDEPOR C4, XB-C8, XB-C18 _____ 204
				Jupiter 300 C4, C5, C18 _____ 244	
		Hydrophobic Interaction (HIC)	Hydrophobic Interaction (HIC)	pH > 9	Hamilton PRP-3 _____ Inquire
Shodex HIC _____ 338					



# HPLC Column Selection by Application

This table is to aid you in selecting the right column for your application. For application notes or method development assistance please call your technical representative.

Amino Acids	Page
Phenomenex Chirex (chiral)	232
Phenomenex Lux (chiral)	301
Phenomenex Kinetex EVO C18 ( FMOC or OPA derivatized)	246
Anions	
Phenomenex Luna NH <sub>2</sub>	276
Phenomenex Lux (chiral)	301
Phenomenex PhenoSphere SAX	Inquire
Hamilton PRP	Inquire
Shodex IC	338
Phenomenex Rezex ROA-Organic Acid	324
Antibiotics	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Synergi	343
Biotechnology/Life Sciences	
Phenomenex Aeris WIDEPORÉ / PEPTIDE	204
Phenomenex Biozen WidePore C4	210
Phenomenex Biozen Intact XB-C8	210
Phenomenex Clarity	404
Phenomenex Jupiter 300/Jupiter Proteo	244
Phenomenex Biozen dSEC-2	210
Phenomenex BioSep-SEC-S	209
Phenomenex Yarra SEC	355
Phenomenex PolySep-GFC-P	322
Phenomenex Luna SCX	276
Phenomenex Biozen Peptide PS-C18 / XB-C18	210
Phenomenex Luna NH <sub>2</sub>	276
Phenomenex Biozen Glycan	210
Phenomenex Biozen WCX	210
Shodex GFC, KW	338
Carbohydrates	
Phenomenex Rezex	324
Phenomenex Luna Omega SUGAR	290
Phenomenex Luna NH <sub>2</sub>	276
Shodex SUGAR	338
Cations	
Phenomenex Luna SCX	276
Phenomenex Biozen WCX	210
Hamilton PRP	Inquire
Enantiomers (Chiral)	
Phenomenex Lux	301
Phenomenex Chirex	232
Environmental (Carbamates, PAHs, Explosives)	
Phenomenex Zebron (GC)	87
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Synergi	343
Foods, Flavors and Fragrances	
Phenomenex Rezex	324
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Luna	276
Phenomenex Luna Omega SUGAR	290
Phenomenex Lux (chiral)	301
Phenomenex Synergi	343
Phenomenex Zebron (GC)	87

Nucleosides and Nucleotides	Page
Phenomenex Kinetex EVO C18	246
Phenomenex Luna NH <sub>2</sub> , SCX	276
Phenomenex Luna Omega Polar C18, Luna Omega PS C18	290
Phenomenex Synergi Polar-RP	343
Phenomenex PhenoSphere SAX	Inquire
Oligonucleotides	
Phenomenex Biozen Oligo	210
Phenomenex Clarity Oligo-XT	404
Phenomenex Clarity Oligo-RP	404
Phenomenex Clarity Oligo-MS	404
Phenomenex Aeris WIDEPORÉ	204
Organic Acids	
Phenomenex Luna Omega PS C18	290
Phenomenex Rezex	324
Phenomenex Synergi Hydro-RP	343
Peptides/Proteins	
Phenomenex Aeris WIDEPORÉ / PEPTIDE	204
Phenomenex Biozen Peptide PS-C18 / XB-C18	210
Phenomenex Biozen WidePore C4	210
Phenomenex Jupiter 300/Jupiter Proteo	244
Phenomenex Biozen dSEC-2	210
Phenomenex Biozen Glycan	210
Phenomenex Biozen Intact	210
Phenomenex Luna SCX, NH <sub>2</sub>	276
Phenomenex Yarra SEC	355
Phenomenex BioSep-SEC-S	209
Phenomenex Biozen WCX	210
Pesticides, Herbicides, and Dioxins	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Zebron (GC)	87
Pharmaceuticals	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Lux (chiral)	301
Phenomenex Chirex (chiral)	232
Polymers, Plastics, Rubber	
Phenomenex Zebron (GC)	87
Phenomenex Phenogel	315
Vitamins	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Taxanes	
Phenomenex Kinetex F5	246
Phenomenex Luna PFP(2)	276
Textiles/Dyes	
Phenomenex Kinetex	246
Phenomenex Gemini / Gemini NX	234
Phenomenex Synergi	343
Phenomenex Luna	276
Phenomenex Luna Omega	290
Phenomenex Phenogel GPC	315

# HPLC Column Selection by Manufacturer

In recognizing the tremendous difficulty the chromatographer has in choosing from literally hundreds of columns and to aid in your selection of alternative materials from different manufacturers, an HPLC column selection guide is presented below.

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list, and the accuracy of the data is not guaranteed.

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
<b>Agilent Technologies / Varian / Polymer Labs</b>		
Advanced AAA	Gemini	Kinetex EVO
Advanced Bio Glycan	Biozen Glycan	—
Advanced Bio SEC	Yarra	Biozen dSEC-2
Advanced Bio PEPTIDE plus	Biozen Peptide XB-C18	Biozen Peptide PS-C18
Advanced Bio RP-Ab	Aeris WIDEPORE	Biozen WidePore C4
Advanced Bio Oligonucleotide	Clarity Oligo-XT	Biozen Oligo
Bio MAb (WCX)	Biozen WCX	—
Bio SEC	BioSep-SEC-S	Biozen dSEC-2
Chiradex	Shiseido Chiral CD-pH	—
HC-C18(2)	Luna C18(2)	Synergi Hydro-RP
MetaSil	Prodigy	Luna
MetaSil AQ C18	Aqua C18	Synergi Hydro-RP
Microsorb	Luna	Synergi
Microsorb 300 Å	Jupiter 300	Aeris WIDEPORE
PL-Aquagel-OH	PolySep GFC-P	Shodex OHPak SB-800H
PLgel	Phenogel	Phenogel
PL Hi-PLEX	Rezex	Rezex
PLRP-S	PolymerX RP-1	Gemini NX-C18
PLRP-S 300 Å	Hamilton PRP-3	Aeris WIDEPORE
PlusPore	Phenogel	Phenogel
Polaris C18 Amide, C8 Ether	Luna Omega Polar C18	Synergi Fusion-RP
Poroshell 300	Aeris WIDEPORE	Biozen WidePore C4
Poroshell 120	Kinetex	Kinetex
ProSEC 300S	Yarra	Biozen dSEC-2
Pursuit	Luna	Synergi
Pursuit DiPhenyl	Kinetex Biphenyl	Gemini C6-Phenyl
Pursuit PAH	Kinetex PAH	—
Pursuit XRs	Luna	Kinetex
Taxsil (1, 2, 3)	Luna PFP(2)	Kinetex F5
TC-C18(2)	Synergi Hydro-RP	Luna C18(2)
ZORBAX Eclipse AAA	Gemini C18	Kinetex EVO
ZORBAX Eclipse-XDB	Luna	Kinetex
ZORBAX Eclipse Plus	Gemini	Kinetex EVO C18
ZORBAX Rapid Resolution HT	Kinetex	Luna Omega
ZORBAX PrepHT	Luna(3) 10 µm	Luna 10 µm PREP
ZORBAX Rx	HyperClone	Luna
ZORBAX SB 80 Å	Kinetex XB-C18	Luna
ZORBAX SB 300 Å	Jupiter 300	Aeris WIDEPORE / Biozen Intact
ZORBAX SB Aq	Synergi Hydro-RP	Synergi Hydro-RP
ZORBAX GF (BioSeries)	BioSep-SEC-S	Biozen dSEC-2
ZORBAX Extend-C18	Gemini NX-C18	Kinetex EVO C18
ZORBAX 300 Extend	Jupiter 300	Aeris WIDEPORE
ZORBAX Bonus RP	Synergi Fusion-RP	Synergi Hydro-RP
ZORBAX Oligo	Clarity Oligo-RP	Clarity Oligo-MS
ZORBAX Carbohydrate	Luna NH <sub>2</sub> / Luna Omega SUGAR	Rezex
<b>Hichrom Ltd.</b>		
Alltima	Luna	Luna Omega
Alltima HP	Luna	Kinetex
Apex	Luna	Kinetex
Apollo	Luna	Kinetex
Genesis	Luna	Gemini
Prevail	Synergi	Luna Omega Polar
Vydac	Jupiter	Aeris
<b>Bio-Rad</b>		
Aminex	Rezex	Rezex
Macro-Prep	Biozen WCX	Shodex IEC
Nuvia	—	Shodex IEC
UNOsphere	Biozen WCX	Shodex IEC

\* Alternative - This category indicates an alternative column which will likely give a similar selectivity.

\*\* Recommended Alternative - This category indicates an alternative column which may yield somewhat different selectivity but may also lead to improved resolution.

Phenomenex

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
<b>Chiral Technologies/DAICEL Corporation</b>		
CHIRALCEL AY-H	—	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	—
CHIRALPAK IA	Lux i-Amylose-1	—
CHIRALPAK IC	Lux i-Cellulose-5	—
CHIRALPAK IG	Lux i-Amylose-3	—
<b>E.S. Industries</b>		
Aquasep	Synergi Fusion-RP	Synergi Hydro-RP
Chromegabond	Nucleosil	Luna
Chromegabond HC	Ultrasorb ODS (30)	Synergi Hydro-RP
Chromegabond BAS	Synergi Fusion-RP	Synergi Hydro-RP
Chromegabond WR	Luna	Gemini
Chromegapore	Yarra	Biozen dSEC-2
Epic	Synergi 2.5 µm	Kinetex
Epic Polar	Kinetex Biphenyl	Synergi Hydro-RP
FluoroSep-RP Phenyl	Luna Phenyl-Hexyl	Kinetex Phenyl-Hexyl
FluoroSep-RP Octyl	—	Kinetex C8
Gammabond C1	PhenoSphere C1	—
Gammabond C8, C18	Luna C8(2), C18(2)	Kinetex C8, C18
MacroSep BIO-Gold	Aeris	Biozen
MacroSep	Jupiter	Aeris WIDEPORE
Protec-RP	Synergi Fusion-RP	Synergi Hydro-RP
RingSep	Kinetex PAH	—
<b>GL Sciences</b>		
Inertsil ODS-Prep-100 Å	Luna 10 µm PREP C18(2)	Luna 10 µm C18(2)
Inertsil ODS(2)	Prodigy ODS(2)	Luna C18(2)
Inertsil ODS(3)	Prodigy ODS(3)	Luna C18(2)
Inertsil ODS(4)	Kinetex XB-C18	Synergi Max-RP
Inertsil Peptide C18	Aeris PEPTIDE	Luna Omega PS C18
Inertsil 300 Å WP300 C8	Jupiter C5	Aeris WIDEPORE C8 / Biozen Intact XB-C8
InertSustain	Gemini NX-C18	Kinetex EVO C18
InertSustain AQC18	Luna Omega Polar C18	Kinetex Polar C18
InertSustain Swift C18 (200Å)	Gemini NX-C18	Kinetex EVO C18
<b>MAC-MOD/Bischoff/ACT/Advanced Materials Technology</b>		
ACE C18	Gemini NX-C18	Kinetex XB-C18
ACE-AQ	Synergi Fusion-RP	Luna Omega Polar C18
ACE-300 A	Jupiter 300	Aeris WIDEPORE
ACE Excel	Gemini NX-C18	Kinetex EVO
ACE Ultracore	Kinetex	Luna Omega
HALO	Kinetex	Luna Omega
HALO Bioclass	Aeris	Biozen
HALO Glycan	Biozen Glycan	Biozen Glycan
HALO Peptide ES-C18	Aeris WIDEPORE XB-C18	Biozen Peptide
HALO Protein	Aeris WIDEPORE	Biozen WidePore C4
HALO Penta-HILIC	Kinetex HILIC	Luna HILIC
Hydrobond	Synergi Fusion-RP	Luna Omega Polar C18
Pronto Pearl	Luna Omega	Kinetex
ProntoSIL 120 Å	Luna C18(2)	Kinetex
ProntoSIL 300 Å	Jupiter 300	Aeris WIDEPORE
ProntoSIL Aq 120 Å	Synergi Hydro-RP	—
ProntoSIL Aq PLUS	Synergi Hydro-RP	Luna Omega Polar C18
ProntoSIL SH 120 Å	Gemini NX-C18	Luna C18(2)
ProntoSIL ACE-EPS	Synergi Hydro-RP	Luna Omega Polar C18
ProntoSIL Chiral AX	—	Chirex
ProntoSIL C30	Develosil C30	Luna Phenyl-Hexyl
Partisil	Luna	Synergi
Partisphere	Luna	Synergi
Ultrasphere	Luna	Synergi
<b>Restek</b>		
Allure	Ultrasorb ODS (30)	Luna C18(2)
Force	Luna Omega	Kinetex
Pinnacle DB	HyperClone	Luna C18(2)
Pinnacle Ultra C18	Ultrasorb ODS (20)	Luna C18(2)
Pinnacle II	HyperClone BDS	Luna C18(2)
Roc	Luna	Luna Omega
Raptor	Kinetex	Synergi
Ultra Aqueous	Synergi Hydro-RP	Luna Omega Polar C18
Ultra Aromax	Luna Phenyl-Hexyl	Kinetex Biphenyl
Ultra II	Kinetex	Synergi
Viva	Aeris WIDEPORE	Biozen WidePore C4

continued

# HPLC Column Selection by Manufacturer

This selection is, neither in terms of manufacturers nor in terms of their products, a complete list, and the accuracy of the data is not guaranteed.

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
<b>Supelco / Sigma-Aldrich / MilliporeSigma / Sepax Technologies</b>		
Ascentis	Synergi	Gemini NX-C18
Ascentis Express	Kinetex	Luna Omega
Ascentis Peptide	Biozen Peptide	Aeris PEPTIDE
Astec	Lux	—
BIOShell	Aeris WIDEPORE	Jupiter
Chromolith	Onyx	Onyx
Discovery Bio	Biozen Intact	Aeris WIDEPORE
Discovery HSF5	Luna PFP(2)	Kinetex F5
Discovery HSC18	Luna C18(2)	Kinetex C18
Discovery C18	Luna C18(2)	Kinetex C18
Discovery RP C16 Amide	Synergi Fusion-RP	Synergi Fusion-RP
Discovery (C18, C16)	Synergi Hydro-RP	Luna Omega
Supelco ABZ, ABZ+	Luna C8(2)	Luna C18(2)
Supelco LC-18-T	Prodigy (3)	Luna C18(2)
Supelco LC-18-S	Prodigy (3)	Luna C18(2)
Supelco LC-F	Luna PFP(2)	Kinetex F5
Supelco LC-PAH	—	Synergi Hydro-RP
Supelcosil LC	Luna C18(2)	Synergi Hydro-RP
Supelcogel	Rezex	Rezex
Supelcogel ODP-50	Asahipak ODP-50	Luna C18(2)
Supelcosil LC-DB	HyperClone BDS	Synergi Hydro-RP
Supelcosil LC-304/308/318	Jupiter 300	Aeris WIDEPORE
Supelcosil LC-NH <sub>2</sub> -NP	—	Luna NH <sub>2</sub>
Supelcosil LC-PCN	Luna CN	—
Supelcosil LC-SAX	PhenoSphere SAX	—
Supelcosil LC-SCX	PhenoSphere SCX	Luna SCX
Titan	Luna Omega	Kinetex
Unix SEC	Yarra	Yarra
SRT GFC	Yarra	Yarra
Zenix GFC	Yarra	Yarra
<b>Thermo Fisher Scientific / Thermo Scientific Dionex</b>		
Acclaim 120	Luna	Kinetex
Acclaim 300	Jupiter	Aeris WIDEPORE
Acclaim HILIC-10	Luna HILIC	Kinetex HILIC
Acclaim PA	Synergi Fusion-RP	Luna Omega Polar C18
Acclaim PA 2	Synergi Fusion-RP	Luna Omega Polar C18
Acclaim PepMap 300Å	Biozen	Aeris
Acclaim OA	Synergi Hydro-RP	Synergi Fusion-RP
Acclaim Surfactant	—	Gemini
Accucore	Kinetex	Luna Omega PS C18
Accucore Vanquish C18+	Kinetex EVO	Luna Omega PS C18
AminoPac PA	—	—
Aquasil	Synergi Hydro-RP	—
BetaBasic	Luna	Kinetex
BioBasic SEC	Yarra	Biozen dSEC-2
BioBasic IEX	Shodex IEC	Biozen WCX
BioBasic RP	Jupiter 300	Aeris WIDEPORE
BETASIL	Prodigy (3)	Luna
BetaMax	Luna	Gemini
BETASIL Phenyl-Hexyl	Luna Phenyl-Hexyl	Kinetex Phenyl-Hexyl
Carbamate	Synergi Fusion-RP	Synergi Hydro-RP
CarboPac (MA, PA)	—	Rezex
Deltabond	Luna C18(2)	Synergi Max-RP
DNAPac	Asahipak IEC	—
DNASwift	Clarity Oligo-RP	Biozen Oligo
Fluophase	Luna PFP(2)	Kinetex F5
GlycanPac	Biozen Glycan	Biozen Glycan
Hypercarb	—	Gemini
HyperREZ XP	Rezex	Rezex
HyperSil GOLD	Luna	Kinetex
HyperSil GOLD aQ C18	Luna Omega Polar C18	Synergi Hydro-RP
HyperSil Green	—	Synergi Hydro-RP
HyperSil	HyperClone	Synergi Max-RP
HyPURITY	Luna	Kinetex
HyPURITY ADVANCE	Synergi Fusion-RP	Luna Omega
HyPURITY AQUASTAR	Synergi Fusion-RP	Luna Omega

Column	Phenomenex Alternative*	Phenomenex Recommended Alternative**
<b>Thermo Fisher Scientific / Thermo Scientific Dionex (cont'd)</b>		
Ionpac AS series	—	Shodex IC series
IonPac CS series	Shodex IC series	Hamilton PRP-X200
IonPac ICE AS series	Rezex ROA	Rezex ROA
MAB Pac SEC-1	Biozen dSEC-2	Yarra
OmniPac	—	Luna SCX
Pep Map 300	Biozen Intact	Aeris
Prism RP	Synergi Hydro-RP	Luna Omega Polar C18, PS C18
ProPac	Biozen WCX	Shodex IEC
Synchronis	Luna	Kinetex
<b>Waters</b>		
ACQUITY APC	—	Phenogel
ACQUITY BEH	Luna Omega C18	Synergi 2.5 µm
ACQUITY CSH	Luna Omega PS C18	Kinetex EVO
ACQUITY Protein BEH SEC	Yarra	Yarra
ACQUITY UPC2	—	Kinetex
ACQUITY UPLC Glycan BEH Amide	Biozen Glycan	—
ACQUITY UPLC PEPTIDE BEH	Biozen Peptide XB-C18	Aeris PEPTIDE XB-C18
ACQUITY UPLC PEPTIDE CSH	Biozen Peptide PS-C18	Aeris PEPTIDE XB-C18
ACQUITY UPLC Oligonucleotide BEH C18	Clarity	Biozen Oligo
Atlantis	Synergi Fusion-RP	Synergi Hydro-RP
BioSuite IEX	Shodex IEC	—
BioSuite SEC	Yarra	Biozen dSEC-2
BioSuite RPC	—	Jupiter 300
Carbamate	—	Synergi Hydro-RP
Carbohydrate	Luna NH <sub>2</sub>	Luna Omega SUGAR
CORTECS	Kinetex	Kinetex
Deltapak 100A	—	Luna
Deltapak 300A	Aeris	Biozen Intact
GST	—	Luna HILIC
IC-pak	Hamilton PRP-X100	—
µBondapak	Bondclone	Synergi Hydro-RP
µPorasil	Bondclone Silica	Luna Silica
µStyragel	Phenogel	Phenogel
Novapak 4 µm	—	Synergi Hydro-RP
OST	Clarity Oligo-XT	Biozen Oligo
PAH C18	Kinetex PAH	—
Protein-Pak IEC	Shodex IEC	—
Protein-Pak SW	Yarra	Biozen dSEC-2
PrST	Aeris WIDEPORE	Biozen WidePore C4
PST	Aeris PEPTIDE	Biozen Peptide
Resolve	PhenoSphere	Luna
Spherisorb	SphereClone	Synergi Hydro-RP
Sugar-pak	Rezex	Rezex
SunFire	Luna	Kinetex
Symmetry C18, C8	Luna C18(2), C8(2)	Synergi Max-RP
Symmetry Shield C18, C8	Synergi Fusion-RP	Synergi Hydro-RP
Symmetry 300	Jupiter	Biozen WidePore
Styragel	Phenogel	Phenogel
UltraStyragel	Phenogel	Phenogel
Ultrahydrogel	PolySep-GFC-P	Shodex OHpak SB
XBridge	Gemini NX-C18	Kinetex EVO C18
XBridge Glycan BEH Amide	Biozen Glycan	—
XBridge Oligonucleotide BEH C18	Clarity	Clarity
XSelect	Luna Omega PS C18	Kinetex
XTerra MS	Gemini	Kinetex EVO C18
XTerra RP	Gemini	Kinetex EVO C18

\* Alternative - This category indicates an alternative column which will likely give a similar selectivity.

\*\* Recommended Alternative - This category indicates an alternative column which may yield somewhat different selectivity but may also lead to improved resolution.



# HPLC Column Selection by Separation Mode

This table is to aid you in selecting the right column from Phenomenex for the separation mode you desire. For specific application notes or method development assistance please call your Phenomenex technical consultant.

Separation Mode	Page
<b>Adsorption Chromatography</b>	
Phenomenex Kinetex HILIC	246
Phenomenex Luna Silica(2)	276
<b>Chiral Chromatography</b>	
Phenomenex Lux	301
Phenomenex Chirex	232
Shinwa Ultron ES	354
Sumika Sumichiral OA	Inquire
<b>Gel Filtration Chromatography</b>	
Phenomenex Biozen dSEC-2	210
Phenomenex Yarra SEC (silica)	355
Phenomenex BioSep SEC/GFC (silica)	209
Phenomenex PolySep GFC-P (polymer)	322
Shodex GFC OHpak SB, Sugar KS, Protein KW	338
<b>Gel Permeation Chromatography</b>	
Phenomenex Phenogel	315
<b>Hydrophilic Interaction Chromatography (HILIC)</b>	
Phenomenex Biozen Glycan	210
Phenomenex Kinetex HILIC	246
Phenomenex Luna HILIC	276
Phenomenex Luna NH <sub>2</sub>	276
Phenomenex Luna Silica(2)	276
Phenomenex Luna Omega SUGAR	290
<b>Hydrophobic Interaction Chromatography (HIC)</b>	
Shodex HIC	338
<b>Ion-Exclusion Chromatography</b>	
Phenomenex Rezex	324
Shodex RSpak, SUGAR	338
<b>Ion-Exchange Chromatography</b>	
Phenomenex Biozen WCX	210
Phenomenex Luna SCX, Luna NH <sub>2</sub>	276
Phenomenex PhenoSphere SAX	Inquire
Phenomenex Rezex	324
Macherey-Nagel Nucleosil SAX, SB	Inquire
Shodex IEC	Inquire
Shodex RSpak KC-811	338

Separation Mode	Page
<b>Ion Chromatography</b>	
Hamilton PRP	Inquire
Shodex IC	338
<b>Ligand Exchange Chromatography</b>	
Phenomenex Rezex	324
Shodex SUGAR	338
<b>Multi-Mode Chromatography</b>	
Phenomenex Luna SCX	276
Phenomenex Luna NH <sub>2</sub>	276
<b>Normal Phase Chromatography</b>	
Phenomenex Kinetex HILIC	246
Phenomenex Luna CN, NH <sub>2</sub> , Silica(2)	276
<b>Reversed Phase Chromatography</b>	
Phenomenex Kinetex	246
Phenomenex Luna Omega	290
Phenomenex Luna	276
Phenomenex Biozen	210
Phenomenex Gemini	234
Phenomenex Synergi	343
Phenomenex Aeris	204
Phenomenex Bondclone	231
Phenomenex Clarity	404
Phenomenex Gemini NX	234
Phenomenex HyperClone	241
Phenomenex Jupiter	244
Phenomenex Onyx	313
Phenomenex PolymerX	321
Phenomenex Prodigy	323
Phenomenex SphereClone	341
GL Sciences Inertsil	Inquire
Hamilton PRP	Inquire
Macherey-Nagel Nucleosil	Inquire
Merck KGaA LiChrospher, Superspher	275

# HPLC Column Selection by USP Listing

For each United States Pharmacopeia (USP) column specification, you will find listed the most suitable Phenomenex column.

It is widely understood that all HPLC packings are not alike, and no single column can perform a myriad of desired separations. HPLC packings differ in hydrophobicity, surface coverage, surface area, pore size and particle shape.

The USP does give chromatographers the flexibility to make adjustments to Monographs. As you can read below, column manufacturers or sources and materials stated in USP Monographs are only recommendations. Chromatographers can and should change and adapt the Monograph's specifications to yield the most satisfactory analytical results.

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
L1 Octadecyl silane chemically bonded to porous or non-porous silica or ceramic microparticles, 1.5 to 10 µm in diameter, or a monolithic rod.	Kinetex™ C18	Core-Shell	246
	Kinetex EVO C18	Core-Shell	246
	Kinetex Polar C18	Core-Shell	246
	Kinetex PS C18	Core-Shell	246
	Kinetex XB-C18	Core-Shell	246
	Luna™ C18(2)	Spherical	276
	Luna Omega C18	Spherical	290
	Luna Omega PS C18	Spherical	290
	Luna Omega Polar C18	Spherical	290
	Gemini™ NX-C18	Spherical	234
	Gemini C18	Spherical	234
	Synergi™ Hydro-RP	Spherical	343
	Synergi Fusion-RP	Spherical	343
	Biozen™ Peptide PS-C18	Spherical	210
	Onyx™ C18	Monolith	313
	Jupiter™ C18	Spherical	244
	Clarity™ Oligo-RP	Spherical	404
Clarity Oligo-MS	Core-Shell	404	
Clarity Oligo-XT	Core-Shell	404	
Aeris™ WIDEPORE XB-C18	Core-Shell	204	
Biozen Peptide XB-C18	Core-Shell	210	
L2 Octadecyl silane chemically bonded to silica gel of a controlled surface porosity that has been bonded to a solid spherical core, 30 to 50 µm in diameter.			
L3 Porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex HILIC	Core-Shell	246
	Luna Silica(2)	Spherical	276
L4 Silica gel of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter.			
L5 Alumina of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter.			
L6 Strong cation-exchange packing: sulfonated fluorocarbon polymer coated on a solid spherical core, 30 to 50 µm in diameter.			
L7 Octyl silane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex C8	Core-Shell	246
	Luna C8(2)	Spherical	276
	Biozen Intact XB-C8	Core-Shell	210
L8 An essentially monomolecular layer of aminopropyl-silane chemically bonded to totally porous silica gel support, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna NH <sub>2</sub>	Spherical	276
	Luna Omega SUGAR	Spherical	290
L9 Irregular or spherical, totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating, 3 to 10 µm in diameter.	Luna SCX	Spherical	276
L10 Nitrile groups chemically bonded to porous silica particles or superficially porous particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna CN	Spherical	276
L11 Phenyl groups chemically bonded to porous silica particles or superficially porous particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Kinetex Biphenyl	Core-Shell	246
	Kinetex Phenyl-Hexyl	Core-Shell	246
	Synergi Polar-RP	Spherical	343
	Luna Phenyl-Hexyl	Spherical	276
	Gemini C6-Phenyl	Spherical	234
Prodigy PH-3	Spherical	323	
L12 Strong anion-exchange packing made by chemically bonding a quaternary amine to a solid silica spherical core, 30 to 50 µm in diameter.			
L13 Trimethylsilane chemically bonded to porous silica particles, 3 to 10 µm in diameter.	Develosil® TMS-UG (C1) 130 Å	Spherical	Inquire
L14 Silica gel having a chemically bonded, strongly basic quaternary ammonium anion-exchange coating, 5 to 10 µm in diameter.	PhenoSphere™ SAX	Spherical	Inquire
L15 Hexyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter.	PhenoSphere C6	Spherical	Inquire
L16 Dimethyl silane chemically bonded to porous silica particles, 5 to 10 µm in diameter.			
L17 Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 6 to 12 µm in diameter.	Rezex™ RHM-Monosaccharide	Spherical	324
	Rezex ROA-Organic Acid	Spherical	324
L18 Amino and cyano groups chemically bonded to porous silica particles, 3 to 10 µm in diameter.			
L19 Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 5 to 15 µm in diameter.	Rezex RCM-Monosaccharide	Spherical	324
	Rezex RCU-Sugar Alcohols	Spherical	324
L20 Dihydroxypropane groups chemically bonded to porous silica or hybrid particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Luna HILIC	Spherical	276
	BioSep™-SEC-S	Spherical	209
	Biozen dSEC-2	Spherical	355
L21 A rigid, spherical styrene-divinylbenzene copolymer, 3 to 30 µm in diameter.	PolymerX™ RP-1	Spherical	321
	Phenogel™ 100 Å	Spherical	315
L22 A cation-exchange resin made of porous polystyrene gel with sulfonic acid groups, 5 to 15 µm in diameter.	Rezex ROA-Organic Acid	Spherical	324
L23 An anion-exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, 7-12 µm in size.	Shodex® IEC OA-825	Spherical	Inquire
L24 Polyvinylalcohol chemically bonded to porous silica particles, 5 µm in diameter.			
L25 Packing having the capacity to separate compounds with a MW range from 100 to 5000 daltons (as determined by polyethylene oxide), applied to neutral, anionic, and cationic water-soluble polymers. A polymethacrylate resin base, crosslinked with poly-hydroxylated ether (surface contained some residual carboxyl functional groups) was found suitable.	PolySep™-GFC-P2000	Spherical	322
	Shodex OHpak SB-802.5HQ	Spherical	338

# HPLC Column Selection by USP Listing

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
L26 Butyl silane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter.	Jupiter 300 C4	Spherical	244
	Biozen WidePore C4	Core-Shell	210
L27 Porous silica particles, 30 to 50 µm in diameter.	Sepra Silica	Irregular	401
L28 A multifunctional support, which consists of a high purity, 100Å, spherical silica substrate that has been bonded with anionic exchanger, amine functionality in addition to a conventional reversed phase C8 functionality.			
L29 Gamma alumina, reversed phase, low carbon percentage by weight, alumina-based polybutadiene spherical particles, 5 µm diameter with a pore volume of 80Å.			
L30 Ethyl silane chemically bonded to a totally porous silica particle, 3 to 10 µm in diameter.			
L31 A hydroxide-selective, strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 8.5 µm macroporous particles having a pore size of 2000Å and consisting of ethylvinylbenzene cross-linked with 55% divinyl benzene.			
L32 A chiral ligand-exchange resin packing-L-proline copper complex covalently bonded to irregularly shaped silica particles, 5 to 10 µm in diameter.			
L33 Packing having the capacity to separate dextrans by molecular size over a range of 4,000 to 500,000 daltons. It is spherical, silica-based and processed to provide pH stability.	Yarra SEC-2000 / SEC-3000	Spherical	355
	BioSep-SEC-S2000 / SEC-S3000	Spherical	209
L34 Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, 7 to 9 µm in diameter.	Rezex RPM-Monosaccharide	Spherical	324
L35 A zirconium-stabilized spherical silica packing with a hydrophilic (diol-type) molecular monolayer bonded phase having a pore size of 150Å.	(BioSep-SEC-S2000 or Yarra SEC-2000 may be used)	Spherical	209
		Spherical	355
L36 3,5-dinitrobenzoyl derivative of L-phenylglycine covalently bonded to 5 µm aminopropyl silica.			
L37 Polymethacrylate gel packing having the capacity to separate proteins by molecular size over a range of 2,000 to 40,000 daltons.	PolySep-GFC-P3000	Spherical	322
	Shodex OHPak SB-803HQ	Spherical	338
L38 Methacrylate-based size-exclusion packing for water-soluble samples.	PolySep-GFC-P series	Spherical	322
	Shodex OHPak SB-800HQ	Spherical	338
L39 Hydrophilic polyhydroxymethacrylate gel of totally porous spherical resin.	PolySep-GFC-P series	Spherical	322
	Shodex OHPak SB-800HQ series	Spherical	338
	Shodex RSpak DM-614	Spherical	338
L40 Cellulose tris-3,5-dimethylphenylcarbamate coated porous silica particles, 3 µm to 20 µm in diameter.	Lux Cellulose-1	Spherical	301
L41 Immobilized α <sub>1</sub> -acid glycoprotein on spherical silica particles, 5 µm in diameter.			
L42 Octylsilane and octadecylsilane groups chemically bonded to porous silica particles, 5 µm in diameter.			
L43 Pentafluorophenyl groups chemically bonded to silica particles or superficially porous particles, by a propyl spacer, 1.5 to 10 µm in diameter.	Kinetex F5	Core-Shell	246
	Luna PFP(2)	Spherical	276
L44 A multifunctional support, which consists of a high purity, 60Å, spherical silica substrate that has been bonded with a cationic exchanger, sulfonic acid functionality in addition to a conventional reversed phase C8 functionality.			
L45 Beta cyclodextrin, R, S-hydroxypropyl ether derivative, bonded to porous silica particles, 3 to 10 µm in diameter	Shiseido Chiral CD-Ph	Spherical	Inquire
L46 Polystyrene/divinylbenzene substrate agglomerated with quaternary amine functionalized latex beads, about 9 to 11 µm in diameter.			
L47 High capacity anion-exchange microporous substrate, fully functionalized with a trimethylamine group, 8 µm in diameter.			
L48 Sulfonated, cross-linked polystyrene with an outer layer of submicron, porous, anion-exchange microbeads, 5 to 15 µm in diameter.			
L49 A reversed phase packing made by coating a thin layer of polybutadiene on to spherical porous zirconia particles, 3 to 10 µm in diameter.			
L50 Multifunction resin with reversed phase retention and strong anion-exchange functionalities. The resin consists of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 3 to 15 µm in diameter, and a surface area of not less than 350 m <sup>2</sup> /g. Substrate is coated with quaternary ammonium functionalized latex particles consisting of styrene cross-linked with divinylbenzene.			
L51 Amylose tris-3,5-dimethylphenylcarbamate-coated, porous, spherical, silica particles, 3 to 10 µm in diameter.	Lux Amylose-1	Spherical	301
L52 A strong cation-exchange resin made of porous silica with sulfopropyl or sulfoethyl groups, 1 to 10 µm in diameter.			
L53 Weak cation-exchange resin consisting of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 3 to 15 µm diameter. Substrate is surface grafted with carboxylic acid and/or phosphoric acid functionalized monomers. Capacity not less than 500 µEq/column.			
L54 A size exclusion medium made of covalent bonding of dextran to highly cross-linked porous agarose beads, 5 to 15 µm in diameter.			
L55 A strong cation-exchange resin made of porous silica coated with polybutadiene-maleic acid copolymer, about 5 µm in diameter.			
L56 Propyl silane chemically bonded to totally or superficially porous silica particles, 3 to 10 µm in diameter.			
L57 A chiral-recognition protein, ovomucoid, chemically bonded to silica particles, about 5 µm in diameter, with a pore size of 120Å.	Ultron ES-OVM	Spherical	354
L58 Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 6 to 30 µm in diameter.	Rezex RNM-Carbohydrate	Spherical	324
L59 Size-exclusion separations of proteins (separation by molecular weight) over the range of 5 to 7000 kDa. Spherical (1.5 to 10 µm), silica or hybrid packing with a hydrophilic coating.	Yarra SEC-2000	Spherical	355
	BioSep-SEC-S2000	Spherical	209
	Yarra SEC-3000	Spherical	355
	BioSep-SEC-S3000	Spherical	209
L60 Spherical, porous silica gel, 10 µm or less in diameter, surface has been covalently modified with alkyl amide groups and endcapped.			
L61 Hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 µm microporous particles, pore size less than 10Å, and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 85 nm diameter microbeads bonded with alkanol quaternary ammonium ions (6%).			



# HPLC Column Selection by USP Listing

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
<b>L62</b> C30 silane bonded phase on a fully porous spherical silica or superficially porous particles, 3 to 15 µm in diameter.	FlexFire Fusion C30	Spherical	Inquire
<b>L63</b> Glycopeptide teicoplanin linked through multiple covalent bonds to a 100 Å spherical silica.			
<b>L64</b> Strongly basic anion-exchange resin consisting of 8% crosslinked styrene divinylbenzene copolymer with a quaternary ammonium group in the chloride form, 45 to 180 µm in diameter.			
<b>L65</b> 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.			
<b>L66</b> A crown ether coated on a 5 µm particle size silica gel substrate. The active site is (S)-18-crown-6-ether.			
<b>L67</b> 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
<b>L68</b> Spherical, porous silica, 10 µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and not endcapped.			
<b>L69</b> Ethylvinylbenzene/divinylbenzene substrate agglomerated with quaternary amine functionalized 130 nm latex beads, about 6.5 µm in diameter.			
<b>L70</b> Cellulose tris (phenyl carbamate) coated on 5 µm silica.			
<b>L71</b> A rigid, spherical polymethacrylate 4 to 6 µm in diameter.	Shodex RSpak DE-413 Shodex RSpak DE-613	Spherical Spherical	338 338
<b>L72</b> (S)-phenylglycine and 3,5-dinitroaniline urea linkage covalently bonded to silica.			
<b>L73</b> A rigid, spherical polydivinylbenzene particle 5 to 10 µm in diameter.			
<b>L74</b> 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.			
<b>L75</b> A chiral-recognition protein, bovine serum albumin (BSA), chemically bonded to silica particles, about 7 µm in diameter, with a pore size of 300 Å.			
<b>L76</b> 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.			
<b>L77</b> 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).			
<b>L78</b> 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.			
<b>L79</b> A chiral-recognition protein, human serum albumin (HSA), chemically bonded to silica particles, about 5 µm in diameter.			
<b>L80</b> Cellulose tris(4-methylbenzoate)-coated, porous, spherical, silica particles, 5 to 20 µm in diameter.	Lux Cellulose-3	Spherical	301
<b>L81</b> A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 9 µm porous particles having a pore size of 2000 Å units and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 70 nm diameter microbeads (6% crosslinked) bonded with alkanol quaternary ammonium ions.			
<b>L82</b> Polyamine chemically bonded to cross-linked polyvinyl alcohol polymer, 4 - 5 µm in diameter	Asahipak NH <sub>2</sub> P-50	Spherical	Inquire
<b>L83</b> A hydroxide-selective, strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 10.5 µm microporous particles having a pore size of 10 Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene.			
<b>L84</b> 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).			
<b>L85</b> 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.			
<b>L86</b> Fused core particle with a highly polar ligand possessing multiple hydroxyl groups tethered to the silica gel outer layer.			
<b>L87</b> Dodecyl silane chemically bonded to porous or superficially porous silica particles, 1.5 to 10 µm in diameter.	Synergi Max-RP	Spherical	343
<b>L88</b> Glycopeptide vancomycin linked through multiple covalent bonds to 100 Å spherical silica.			
<b>L89</b> Packing having the capacity to separate compounds with a molecular weight range from 100 - 3000 dalton (as determined by polyethylene oxide), applied to neutral and anionic water-soluble polymers. A polymethacrylate resin base, cross-linked with polyhydroxylate ether (surface contains some residual cationic functional groups).	Shodex OHpak SB-802.5 HQ	Spherical	338
<b>L90</b> Amylose tris-[(S)-alpha-methylbenzylcarbamate] coated on porous, spherical silica particles, 3 to 10 µm in diameter.			
<b>L91</b> Strong anion-exchange resin consisting of monodisperse porous polystyrene/divinylbenzene beads coupled with quaternary amine. Bead size is 3 to 10 µm.			
<b>L92</b> 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.			
<b>L93</b> Cellulose tris (3,5-dimethylphenylcarbamate) reversed phase chiral stationary phase coated on 3 or 5 µm silica gel particles.	Lux Cellulose-1	Spherical	301
<b>L94</b> 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.			
<b>L95</b> Highly polar alkyl ligand comprising five hydroxyl groups that are chemically bonded to totally porous or superficially porous silica, or a monolithic silica rod.			
<b>L96</b> 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 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP	Core-Shell Core-Shell Spherical Spherical	246 246 290 290
<b>L97</b> Weak cation-exchange resin consisting of a highly cross-linked core of 5.5 µm porous particles having a pore size of 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).			

# HPLC Column Selection by USP Listing

USP Column Classification	Recommended Phenomenex Column	Particle Shape	Page
<b>L98</b> Weak cation-exchange resin consisting of a highly cross-linked core of 8 µm microporous particles having an average pore size of 10Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 46 µEq/column (4 mm x 5 cm).			
<b>L99</b> Amylose tris-(3,5-dimethylphenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 µm in diameter	Lux i-Amylose-1	Spherical	301
<b>L100</b> A 55% cross-linked, microporous, hydrophobic resin core (9 µm microporous particles having a pore size of 10Å) that consists of a bilayer of anion and cation-exchange latex. The first layer is fully sulfonated (140 nm) and the second layer is fully aminated (76 nm).			
<b>L101</b> Cholesteryl groups chemically bonded to porous or non-porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter, or a monolithic rod.			
<b>L102</b> (Naproxen, (S,S)Wheik-O 1) 1-(3,5-dinitrobenzamido)-1,2,3,4-tetrahydrophenanthrene covalently bonded to porous spherical silica particles, 5 to 10 µm in diameter.			
<b>L103</b> A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 7.5 µm porous particles having a pore size of 2000Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene electrostatically bonded with hyperbranched alkanol quaternary ammonium ions.			
<b>L104</b> Triazole groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter.			
<b>L105</b> A strong anion-exchange resin consisting of a highly cross-linked 9 µm supermacroporous (2000 Å) particles functionalized with very low cross-linked latex (0.2%) to provide alkyl quaternary ammonium ion sites.			
<b>L106</b> Weak cation-exchange resin consisting of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 5-8 µm diameter, macroporous particles having an average pore size of 100Å units. Substrate is surface grafted with carboxylic acid and phosphonic acid functional groups. Capacity not less than 2800 µEq/column (4 mm x 25 cm).			
<b>L107</b> Cellulose tris(4-methylbenzoate)-coated porous spherical particles, 3 to 5 µm in diameter, for use with reversed phase mobile phases.	Lux Cellulose-3	Spherical	301
<b>L108</b> A chiral-recognition protein, cellobiohydrolase (CBH), chemically bonded to silica particles, about 5 µm in diameter.			
<b>L109</b> Spherical particles of porous graphitic carbon, 1.5 to 30 µm in diameter.			
<b>L110</b> A strong anion-exchange resin consisting of a highly cross-linked 13 µm microporous (less than 10Å) particles coated with very low cross-linked latex (0.5%) to provide alkanol quaternary ammonium ion-exchange sites.			
<b>L111</b> Polyamine chemically bonded to porous spherical silica particles, 5 µm in diameter.			
<b>L112</b> A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 8.5 µm porous particles having a pore size of 2000Å units and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 65 nm diameter microbeads (5% cross-linked) bonded with alkanol quaternary ammonium ions.			
<b>L113</b> A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 7.5 µm porous particles having a pore size of 2000Å units and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 65 nm diameter microbeads (5% crosslinked) bonded with alkanol quaternary ammonium ions.			
<b>L114</b> Sulfobetaine graft-polymerized to totally or superficially porous silica, 1.5 to 10 µm in diameter, or a monolithic rod. Packing having densely bonded zwitterionic groups with 1:1 charge balance.			
<b>L115</b> Ethylvinylbenzene/divinylbenzene substrate (55% cross-linked) agglomerated with quaternary amine functionalized 275 nm latex microbeads (6% cross-linked), about 8.5 µm in diameter.			
<b>L116</b> Sulfonated ethylvinylbenzene/divinylbenzene substrate agglomerated with hydrophilic quaternary amine functionalized glycidyl-derivative methacrylate microbeads, approximately 2 to 50 µm in diameter.			
<b>L117</b> A crown ether coated on a 5 µm particle size silica gel substrate. The active site is (R)-18-crown-6-ether.			
<b>L118</b> Aqueous polymerized C18 groups on silica particles, 1.2 to 5 µm in diameter.	Kinetex PAH	Core-Shell	246
<b>L119</b> Cellulose tris-(3,5-dichlorophenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 µm in diameter.	Lux i-Cellulose-5	Spherical	301
<b>L120</b> A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 µm microporous particles having a pore size of less than 10 Å units and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene with a latex coating composed of 65 nm diameter microbeads (8% cross-linked) bonded with alkanol quaternary ammonium ions. Capacity not less than 10 µEq/column (4 mm x 5 cm).			
<b>L121</b> A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 11 µm porous particles having a pore size of less than 10Å units and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene electrostatically bonded with hyperbranched alkanol quaternary ammonium ions.			
<b>L122</b> Sulfobetaine graft-polymerized to totally or superficially porous hydrophilic polymer particles, 1.0 to 10 µm in diameter, or a monolithic rod. Packing having densely bonded zwitterionic groups with 1:1 charge balance.			
<b>L123</b> Cellulose tris(3-chloro-4-methylphenylcarbamate) coated porous silica particles, 3 to 20 µm in diameter.	Lux Cellulose-2	Spherical	301
<b>L124</b> Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the silver form, average 9 µm in diameter.	Rezex RSO-Oligosaccharide	Spherical	324
<b>L125</b> Polyvinyl alcohol polymer gel weak cation-exchange packing material, 5 µm porous particles. The surface is polymerized with polybutadiene-maleic acid to provide carboxylic acid functionalities. The Capacity is not less than 1 mEq/column.	Shodex IC YS-50	Spherical	338
<b>L126</b> Amylose tris (3-chlorophenylcarbamate), immobilized on porous, spherical, silica particles, 1 µm to 20 µm in diameter.			
<b>L127</b> A crown ether chemically bonded to a 5 µm particle size silica gel substrate. The active site is (S)- pseudo-18-crown-6-ether.	Sumichiral OA-8000	Spherical	Inquire
<b>L128</b> Porous particles of polystyrene divinyl benzene with linear molecular weight operating range from 200 to 2,000,000 g/mol (polystyrene equivalent), 5 µm in diameter.			
<b>L130</b> Cellulose tris(3,5-dimethylphenylcarbamate) coated on 10 Åm silica gel particles.	Lux Cellulose-1	Spherical	301

# 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 Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column	Page
Silica gel T1-acceptor / T1-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 for chiral separation, amylose derivative of substituted amylose coated on very finely divided silica gel.	1171700	Lux Amylose-1	301
Silica gel for chiral separation, cellulose derivative of substituted cellulose coated on very finely divided silica gel.	1110300	Lux Cellulose-1, -2, -3 and -4	301
Silica gel for chromatography, human albumin coated.	1138500		
Silica gel for chiral separation, protein derivative of	1196300		
Silica gel for chiral separation, vancomycin-bonded	1205300		
Silica gel for CR+ for chiral chromatography (crown-ether)	1192400	Sumichiral OA-8000	Inquire
Silica gel for chiral separation, L-Penicillamine coated silica gel.	1200050	Sumichiral OA-5000L	Inquire
Silica gel for chromatography.	1076900	Kinetex HILIC Luna Silica(2)	246 276
Silica gel for chromatography, alkyl bonded for use with highly aqueous mobile phases.	1160200	Luna Omega Polar C18 Luna Omega PS C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	290 290 343 343 234 234 246 246 246 246 246
Silica gel for chromatography, alkyl bonded for use with highly aqueous mobile phases, endcapped. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1176900	Luna Omega Polar C18 Luna Omega PS C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	290 290 343 343 234 234 246 246 246 246 246
Silica gel for chromatography, alkylsilyl, solid core, endcapped. Spherical silica particles containing a non-porous solid silica core surrounded by a thinner outer porous silica coating with alkylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1194300	Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex C8 Kinetex Polar C18	246 246 246 246 246
Silica gel for chromatography, amidoalkylsilyl	1205400		
Silica gel for chromatography, amidohexadecylsilyl.	1170400		
Silica gel for chromatography, amidohexadecylsilyl, endcapped	1201100		
Silica gel for chromatography, aminopropylmethylsilyl.	1102400	SphereClone NH <sub>2</sub> (Amino) PhenoSphere NH <sub>2</sub> (Amino)	341 Inquire
Silica gel for chromatography, aminopropylsilyl.	1077000	SphereClone NH <sub>2</sub> (Amino) PhenoSphere NH <sub>2</sub> (Amino)	341 Inquire
Silica gel for chromatography, aminopropylsilyl R1 particle size of ~55 µm.	1077001	Strata NH <sub>2</sub>	70
Silica gel for chromatography, amylose derivative of chemically modified at the surface by the bonding of an amylose derivative	1109800	Lux i-Amylose-1 Lux i-Amylose-3	301
Silica gel for chromatography, butylsilyl. Spheroidal 300 Å; pore volume: 0.6 cm <sup>3</sup> /g; area: 80 m <sup>2</sup> /g.	1076200	Biozen Intact C4 Aeris WIDEPORE C4	210 204
Silica gel for chromatography, butylsilyl, endcapped.	1170500	Biozen WidePore C4 Aeris WIDEPORE C4 Jupiter 300 C4	210 204 244
Silica gel for chromatography, carbamoylsilyl. Chemically modified at the surface by the bonding of carbamoylsilyl groups.	1210400		



# HPLC Column Selection by Ph. Eur. Listing

Description According Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography compatible with 100 % aqueous mobile phase, octadecylsilyl, endcapped.	1188400	Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Kinetex EVO C18 Kinetex Polar C18	290 343 343 246 246
Silica gel for chromatography compatible with 100 % aqueous mobile phase, octadecylsilyl.	1203900	Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18	290 290 343 343 246 246 246
Silica gel for chromatography compatible with highly aqueous mobile phase, octadecylsilyl diol, endcapped.	1207500		
Silica gel for chromatography, crown-ether.	1178000	Sumichiral OA-8000	Inquire
Silica gel for chromatography, cyanopropylsilyl, endcapped, base-deactivated pre-treated by various techniques before the bonding of cyanopropyl-silyl groups. To minimize any interaction with basic compounds, it's carefully endcapped to cover most of the remaining silanol groups.	1194200	Luna CN (Cyano)	276
Silica gel for chromatography, cyanosilyl.	1109900	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire
Silica gel for chromatography, cyanopropylsilyl, endcapped.	1195000	Luna CN (Cyano)	276
Silica gel for chromatography, cyanolsilyl, endcapped, base-deactivated.	1211200	Luna CN (Cyano)	276
Silica gel for chromatography, di-isobutyloctadecylsilyl.	1140000	Kinetex XB-C18	246
Silica gel for chromatography, diisopropylcyanopropylsilyl.	1168100		
Silica gel for chromatography, 4-dimethylaminobenzylcarbamidesilyl. Chemically modified at the surface by bonding of 4-dimethylaminobenzylcarbamidesilyl groups.	1204000		
Silica gel for chromatography, dimethyloctadecylsilyl, irregular; area: 300 m <sup>2</sup> /g.	1115100	Bondclone C18	231
Silica gel for chromatography, diol dihydroxypropyl, 100 Å; 10 µm.	1110000	Spherex OH (Diol)	Inquire
Silica gel for chromatography, dodecylsilyl, endcapped.	1179700	Synergi Max-RP	343
Silica gel for chromatography, hexadecylamidylsilyl with hexadecylcarboxamidopropyl dimethylsilyl groups; 5 µm.	1162500		
Silica gel for chromatography, hexadecylamidylsilyl, endcapped with hexadecylcarboxamidopropyl dimethylsilyl groups; 5 µm.	1172400		
Silica gel for chromatography, hexylsilyl.	1077100	SphereClone C6 PhenoSphere C6	341 Inquire
Silica gel for chromatography, octylsilyl R1 Bonding of octylsilyl and methyl groups (double bonded phase)	1077101	Luna C8(2) Prodigy C8 Hyperclone C8 (MOS) Sphereclone C8 Kinetex C8	278 323 241 341 246
Silica gel for chromatography, octylsilyl R2 ultrapure silica gel, chemically modified at the surface by the bonding of octylsilyl groups	1077102	Luna C8(2) Prodigy C8 Hyperclone C8 (MOS) Sphereclone C8 Kinetex C8	278 323 241 341 246
Silica gel for chromatography, hexylsilyl, endcapped.	1174400	SphereClone C6 PhenoSphere C6	341 Inquire
Silica gel for chromatography, (hybrid material), octadecylsilyl, ethylene-bridged, charged surface, endcapped. Synthetic, spherical ethylene-bridged hybrid particles with a charged surface, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of octadecyl-silyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1202800	Kinetex EVO C18	246
Silica gel for chromatography, octadecylsilyl, ethylene-bridged (hybrid material), endcapped. Synthetic, spherical ethylene-bridged hybrid particles, containing both organic (organosiloxanes) and inorganic (silica) components.	1190500	Kinetex EVO C18 Gemini NX-C18	246 234
Silica gel for chromatography, octylsilyl (hybrid material), ethylene-bridged (hybrid material) endcapped. Synthetic, spherical ethylene-bridged hybrid particles with a charged surface, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of octadecyl-silyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1208800		
Silica gel for chromatography, (hybrid material) octylsilyl, ethylene-bridged, endcapped. Synthetic, spherical ethylene-bridged hybrid particles with a charged surface, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of octadecyl-silyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1204100		
Silica gel for chromatography, (hybrid material), phenylsilyl, ethylene-bridged, endcapped. Synthetic, spherical ethylene-bridged hybrid particles containing both organic (organosiloxanes) and inorganic (silica) components, chemically modified at the surface by bonding of phenylsilyl groups. To minimize the interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1200700	Gemini C6-Phenyl	234
Silica gel for chromatography, (hybrid material), polar-embedded, octadecylsilyl, ethylene-bridged, endcapped. Synthetic, spherical ethylene-bridged hybrid particles, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by bonding of polar embedded octadecylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1200800		
Silica gel for chromatography, hydrophilic surface has been modified to provide hydrophilic characteristics.	1077200	Luna HILIC Kinetex HILIC	276 246
Silica gel for chromatography, hydroxypropylsilyl chemically modified at the surface by bonding of hydroxypropylsilyl groups.	1210500		
Silica gel for chromatography, nitrile cyanopropylsilyl.	1077300	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire

# HPLC Column Selection by Ph. Eur. Listing

Description According Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, nitrile R1 chemically bonded nitrile groups.	1077400	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire
Silica gel for chromatography, nitrile R2 ultrapure silica (<20 ppm metal) with cyanopropylsilyl groups.	1119500	Luna CN (Cyano) HyperClone CN (Cyano) PhenoSphere CN (Cyano)	276 241 Inquire
Silica gel for chromatography, nitrile, endcapped with cyanopropylsilyl groups.	1174500	Luna CN (Cyano)	276
Silica gel for chromatography, 4-nitrophenylcarbamidesilyl. A very finely divided silica gel, chemically modified at the surface by bonding with 4-nitrophenylcarbamide groups.	1185200		
Silica gel for chromatography, octadecanoylamino-propylsilyl amino-propylsilyl groups which are acylated with octadecanoyl groups.	1115200		
Silica gel for chromatography, octadecylsilyl, endcapped. A very finely divided silica gel, chemically modified at the surface by bonding of octadecylphenylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1199300		
Silica gel for chromatography, octadecylsilyl.	1077500	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 HyperClone C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18 SphereClone C18 ODS(1) or (2)	276 290 290 290 343 343 234 234 241 246 246 246 246 246 341
Silica gel for chromatography, octadecylsilyl R1. A very finely divided ultrapure silica gel, chemically modified at the surface by the bonding of octadecylsilyl groups.	1110100	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Synergi Hydro-RP Synergi Fusion-RP Gemini C18 Gemini NX-C18 Jupiter C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 343 343 234 234 244 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl R2 ultrapure silica; 150 Å pore size; 20% C-load; optimized for the analysis of PAHs.	1115300	EnviroSep-PP	Inquire
Silica gel for chromatography, octadecylsilyl, base-deactivated pretreated by various techniques before the bonding of octadecylsilyl groups to minimize the interaction with basic components.	1077600	Luna C18(2) Luna Omega C18 Luna Omega Polar C18 Luna Omega PS C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex XB-C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 234 234 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl, cross-linked, endcapped. Chemically modified at the surface by cross-linking and bonding of octadecylsilyl groups. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1204200	Kinetex PAH	246
Silica gel for chromatography, octadecylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1115400	Luna C18(2) Luna Omega C18 Luna Omega PS C18 Luna Omega Polar C18 Gemini C18 Gemini NX-C18 Kinetex C18 Kinetex EVO C18 Kinetex XB-C18 Kinetex Polar C18 Kinetex PS C18	276 290 290 290 234 234 246 246 246 246 246
Silica gel for chromatography, octadecylsilyl, endcapped R1 ultrapure silica, chemically modified by the bonding of octadecylsilyl groups. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1115401	Luna C18(2) Gemini C18 Gemini NX C18 Kinetex C18 Kinetex XB C18 Kinetex EVO C18 Kinetex Polar C18 Kinetex PS C18 Luna Omega C18 Luna Omega Polar C18 Luna Omega PS C18	276           

# HPLC Column Selection by Ph. Eur. Listing

Description According Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column	Page		
Silica gel for chromatography, octadecylsilyl, endcapped, base-deactivated; pretreated by various techniques before the bonding of octadecylsilyl groups. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1108600	Luna C18(2)	276		
		Gemini C18	323		
		Gemini NX C18	234		
		Kinetex C18	234		
		Kinetex XB C18			
		Kinetex EVO C18			
		Kinetex Polar C18			
		Kinetex PS C18			
		Luna Omega C18			
		Luna Omega Polar C18			
		Luna Omega PS C18			
		Silica gel for chromatography, octadecylsilyl, extra-dense bonded, endcapped.	1188500	Luna C18(2)	276
				Luna Omega C18	290
Luna Omega PS C18	290				
Luna Omega Polar C18	290				
Gemini C18	234				
Gemini NX-C18	234				
Kinetex C18	246				
Kinetex EVO C18	246				
Kinetex XB-C18	246				
Kinetex Polar C18	246				
Kinetex PS C18	246				
Silica gel for chromatography, octadecylsilyl, for separation of polycyclic aromatic hydrocarbons. A very finely divided ultrapure silica gel, chemically modified at the surface by the bonding of octadecylsilyl groups, optimized for the analysis of polycyclic aromatic hydrocarbons.	1202900			Kinetex PAH	246
Silica gel for chromatography, octadecylsilyl, monolithic.	1154500			Onyx C18	313
Silica gel for chromatography, octadecylsilyl, endcapped, base-deactivated R1; pretreated before the bonding by careful washing and hydrolyzing most of the superficial siloxane bridges. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1162600	Luna C18(2)	276		
		Luna Omega C18	290		
		Luna Omega PS C18	290		
		Luna Omega Polar C18	290		
		Gemini C18	234		
		Gemini NX-C18	234		
		Kinetex C18	246		
		Kinetex EVO C18	246		
		Kinetex XB-C18	246		
		Kinetex Polar C18	246		
		Kinetex PS C18	246		
		Silica gel for chromatography, octadecylsilyl, polar embedded, encapsulated silica gel chemically modified at the surface by the bonding of polar embedded octadecylsilyl groups. To minimize any interaction with basic compounds it's carefully encapsulated to cover most of the remaining silanol groups.	1206600		
		Silica gel for chromatography, octadecylsilyl, polar endcapped.	1205500	Synergi Hydro RP	343
Luna Omega Polar C18	290				
Silica gel for chromatography, octadecylsilyl, solid core.	1205600	Kinetex C18	246		
		Kinetex XB-C18	246		
		Kinetex EVO C18	246		
		Kinetex Polar C18	246		
		Kinetex PS C18	246		
		Aeris PEPTIDE XB-C18	204		
		Aeris WIDEPORE XB-C18	204		
		Silica gel for chromatography, octadecylsilyl, solid core, endcapped with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octadecylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1193900	Biozen Peptide XB C18	210
Kinetex C18	246				
Kinetex XB-C18	246				
Kinetex EVO C18	246				
Kinetex Polar C18	246				
Kinetex PS C18	246				
Aeris PEPTIDE XB-C18	204				
Aeris WIDEPORE XB-C18	204				
Silica gel for chromatography, octadecylsilyl, with polar embedded groups, endcapped; a very finely divided silica gel, chemically modified at the surface by the bonding of polar-embedded octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1177900	Synergi Fusion-RP	343		
Silica gel for chromatography, octadecylsilyl, with extended pH range, endcapped (resistant to bases up to pH 11)	1196700	Gemini C18	234		
		Gemini NX-C18	234		
		Kinetex EVO C18	246		
Silica gel for chromatography, octadecylsilyl, with polar incorporated groups, endcapped; the particles are based on silica, chemically modified with a reagent providing a surface with chains having polar incorporated groups and terminating octadecyl groups.	1165100	Synergi Fusion-RP	343		
Silica gel for chromatography, octylsilyl.	1077700	Kinetex C8	246		
		Luna C8(2)	276		
		Prodigy C8	323		
		HyperClone C8 (MOS)	241		
		SphereClone C8	341		
		Silica gel for chromatography, octylsilyl R1. Bonding of octylsilyl and methyl groups (double bonded phase).	1077701	Kinetex C8	246
Luna C8(2)	276				
Prodigy C8	323				
HyperClone C8 (MOS)	241				
SphereClone C8	341				
Silica gel for chromatography, octylsilyl R2 ultrapure silica (<20 ppm metal); pore size 100Å; C-load: 19%.	1077702				
Silica gel for chromatography, octylsilyl R3 ultrapure silica, bonding of octylsilyl groups and sterically protected with branched hydrocarbons at the silanes.	1155200	Biozen Intact XB-C8	210		
Silica gel for chromatography, octylsilyl, base-deactivated pretreated by various techniques before the bonding of octylsilyl groups to minimize the interaction with basic components.	1131600	Luna C8(2)	276		
		Prodigy C8	323		
		HyperClone C8 (BDS)	241		
		Kinetex C8	246		



# HPLC Column Selection by Ph. Eur. Listing

Description According Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column	Page
Silica gel for chromatography, octylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1119600	Kinetex C8 Luna C8(2) Prodigy C8 HyperClone C8 (BDS)	246 276 323 241
Silica gel for chromatography, octylsilyl, endcapped, base-deactivated pretreated by various techniques before the bonding with octylsilyl groups. To further minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1148800	Luna C8(2) Prodigy C8 Kinetex C8 HyperClone C8 (BDS)	276 323 246 241
Silica gel for chromatography, octylsilyl, with embedded polar groups, endcapped; a very finely divided silica gel, chemically modified at the surface by the bonding of polar-embedded octylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1152600		
Silica gel for chromatography, octylsilyl, extra-dense bonded, endcapped.	1200900	Luna C8(2) Kinetex C8	276 246
Silica gel for chromatography, octylsilyl, solid core, endcapped. Silica gel with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octyl-silyl groups. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1208600	Biozen Intact XB-C8 Kinetex C8 Aeris WIDEPORE XB-C8	210 246 204
Silica gel for chromatography, octylsilyl, solid core. Silica gel with spherical silica particles containing a non-porous solid silica core surrounded by a thin outer porous silica coating with octylsilyl groups.	1209900	Biozen Intact XB-C8 Kinetex C8 Aeris WIDEPORE XB-C8	210 246 204
Silica gel for chromatography, oxypropionitrilsilyl	1184700		
Silica gel for chromatography, palmitamidopropylsilyl, endcapped bonding with palmitamidopropyl groups and endcapped with acetamidopropyl groups.	1161900		
Silica gel for chromatography, pentafluorophenylpropylsilyl, solid core, endcapped.	1207600	Kinetex F5 Kinetex PFP	246 246
Silica gel for chromatography, phenylhexylsilyl.	1153900	Kinetex Phenyl-Hexyl Luna Phenyl-Hexyl Gemini C6-Phenyl	246 276 234
Silica gel for chromatography, phenylhexylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1170600	Kinetex Phenyl-Hexyl Luna Phenyl-Hexyl Gemini C6-Phenyl	246 276 234
Silica gel for chromatography, phenylhexylsilyl, solid core, endcapped. Silica gel with spherical silica particles containing a non-porous solid core surrounded by a thin outer porous silica coating with phenylhexylsilyl groups. To minimize any interaction with basic compounds it is carefully endcapped to cover most of the remaining silanol groups.	1198900	Kinetex Phenyl-Hexyl	246
Silica gel for chromatography, phenylsilyl.	1110200	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	343 276 234 323 246 246
Silica gel for chromatography, phenylsilyl, endcapped. To minimize any interaction with basic compounds it's carefully endcapped to cover most of the remaining silanol groups.	1154900	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	343 276 234 323 246 246
Silica gel for chromatography, phenylsilyl, endcapped, base-deactivated.	1197900	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6-Phenyl Prodigy Phenyl-3 (PH3) Kinetex Biphenyl Kinetex Phenyl-Hexyl	343 276 234 323 246 246
Silica gel for chromatography, phenylsilyl, extra-dense bonded, endcapped.	1207700	Synergi Polar-RP Luna Phenyl-Hexyl Gemini C6 Phenyl Prodigy Phenyl PH3 Kinetex Phenyl-Hexyl Kinetex Biphenyl	343 276 234 323 246 246
Silica gel for chromatography, propoxybenzene, endcapped.	1174600	Synergi Polar-RP	343
Silica gel for chromatography, propylsilyl.	1170700		
Silica gel for chromatography, strong anion-exchange bonding of quaternary ammonium groups; pH limit of use: 2 to 8.	1077800	PhenoSphere SAX	Inquire
Silica gel for chromatography, strong cation-exchange bonding of sulfonic acid groups.	1161400	Luna SCX	276
Silica gel for chromatography, trimethylsilyl.	1115500	Capcell Pak	Inquire
Silica for size-exclusion chromatography, 10 µm silica with a very hydrophilic surface. Pore size average: 30 nm; pH stability 2 to 8; exclusion range for proteins: 1 x 10 <sup>3</sup> to 3 x 10 <sup>5</sup> ; 10 µm.	1077900	BioSep-SEC-S3000 Yarra SEC-3000	209 355
Silica gel OC for chiral separations. Coated with cellulose tris (phenylcarbamate); 5 µm.	1146800		
Silica gel OD for chiral separations.	1110300	Lux Cellulose-1	301
Silica gel OJ for chiral separations. Coated with cellulose tris (4-methylbenzoate).	1179800	Lux Cellulose-3	301
Encapsulated octadecylsilyl silica gel for chromatography. Silica gel that is encapsulated to cover most of the silanol groups, then chemically modified at the surface by the bonding of octadecylsilyl groups	1218100	Capcell Pak (all C18)	
Organosilica polymer, amorphous, octadecylsilyl. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by trifunctionally bonded octadecylsilyl groups.	1144200	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234

# HPLC Column Selection by Ph. Eur. Listing

Description According Pharm. Eur. 11 - 4.1.1. Reagents 2024	Number	Recommended Phenomenex Column	Page
Organosilica polymer, amorphous, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by trifunctionally bonded octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1178600	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234
Organosilica polymer, amorphous, polar embedded, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of polar embedded octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1150600		
Organosilica polymer, amorphous, polar embedded propyl-2-phenylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of polar embedded propyl-2-phenylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1178100		
Organosilica polymer for mass spectrometry, amorphous, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles containing both inorganic (silica) and organic (organosiloxanes) components. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1164900	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234
Organosilica polymer compatible with 100% aqueous mobile phases, octadecylsilyl, solid core, endcapped.	1201700	Kinetex EVO C18	246
Organosilica polymer, multi-layered, octadecylsilyl, endcapped. Synthetic, spherical hybrid particles, multi-layered, containing both inorganic (silica) and organic (organosiloxanes) components, chemically modified at the surface by the bonding of octadecylsilyl groups. To minimize any interaction with basic compounds, it is carefully endcapped to cover most of the remaining silanol groups.	1202500	Kinetex EVO C18 Gemini C18 Gemini NX-C18	246 234 234
Vinyl polymer for chromatography, amino alkyl. Spherical particles (5 µm) of a vinyl alcohol copolymer, bonding of amino alkyl groups.	1191500	Asahipak NH <sub>2</sub> -P	Inquire
Vinyl polymer for chromatography, octadecyl. Spherical particles (5 µm) of a vinyl alcohol copolymer, bonding of octadecyl groups on the hydroxyl groups.	1155400	Asahipak ODP-50	Inquire
Vinyl polymer for chromatography, octadecylsilyl. Spherical particles (5 µm) of a vinyl alcohol copolymer bonded to an octadecylsilane. C-load: 17%.	1121600	Asahipak ODP-50	Inquire
Ion-exclusion resin for chromatography. A resin with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1131000	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	324 324
Cation-exchange resin, strong. Strong cation-exchange resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1156800	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	324 324
Cation-exchange resin. A resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 8% divinylbenzene. Available as spherical beads.	1016700	Rezex ROA-Organic Acid Rezex RHM-Monosaccharide	324 324
Cation-exchange resin R1. A resin in protonated form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 4% divinylbenzene. Available as spherical beads.	1121900		
Cation-exchange resin R2. Resin containing strongly acidic propylsulfonic acid groups.	1195400		
Cation-exchange resin (Calcium form), strong. Resin in calcium form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with 8% divinylbenzene	1104600	Rezex RCM-Monosaccharide Rezex RCU-USP Sugar Alcohols	324 324
Cation-exchange resin (Sodium form), strong. Resin in sodium form with sulfonic acid groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1176100	Rezex RNM-Carbohydrate	324
Cation-exchange resin, weak. Weak cation-exchange resin in pronated form with carboxylate functional groups attached to a polymer lattice consisting of polystyrene cross-linked with divinylbenzene.	1203200	Biozen WCX	210
Anion-exchange resin. Resin in chlorinated form containing quaternary ammonium groups [CH <sub>3</sub> N+(CH <sub>3</sub> ) <sub>3</sub> ] attached to a polymer lattice consisting of polystyrene cross-linked with 2% of divinylbenzene. Available as spherical beads.	1007200		
Anion-exchange resin R1. Resin containing quaternary ammonium groups [CH <sub>3</sub> N+(CH <sub>3</sub> ) <sub>3</sub> ] attached to a lattice consisting of methacrylate.	1123400		
Anion-exchange resin R2. Conjugate of homogeneous 10 µm hydrophilic polyether particles, and a quaternary ammonium salt, providing a matrix suitable for strong anion-exchange chromatography of proteins.	1141900		
Anion-exchange resin R3. Resin with quaternary ammonium groups attached to a lattice of ethylvinyl-benzene crosslinked with 55% of divinylbenzene.	1180900		
Anion-exchange resin for chromatography, strongly basic with quaternary ammonium groups attached to a lattice of latex cross-linked divinylbenzene.	1112700		
Anion-exchange resin for chromatography, strongly basic R1. Non-porous resin agglomerated with a 100 nm alkyl quaternary ammonium functionalized latex.	1187400		
Anion-exchange resin, weak resin with diethylaminoethyl groups attached to lattice consisting of poly(methyl methacrylate).	1146700		

## Core-Shell HPLC / UHPLC Columns for Proteins and Peptides

Find newer methods in our Biozen Portfolio

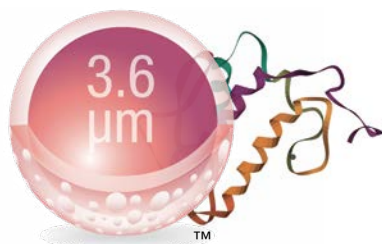
See pp. 210-230

### Ultra-High Resolution and Performance

Introducing Aeris, a specialized line of reversed phase core-shell HPLC / UHPLC columns, built exclusively for the ultra-high performance separation and analysis of proteins and peptides.

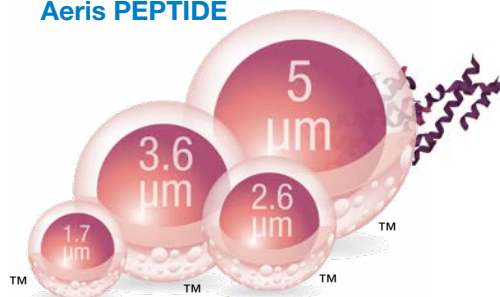
These columns can provide improved resolving power, selectivity, throughput, sensitivity, column lifetime, and method flexibility compared to other fully porous and core-shell columns typically used for bioseparations.

#### Aeris WIDEPORE



Large pore optimized for intact proteins and polypeptides

#### Aeris PEPTIDE



Small pore optimized for peptides and for peptide mapping

### The precise architecture of Aeris core-shell particles provides dramatic leaps in performance in two important ways:

**1** The thin, porous layer, or “shell”, decreases the diffusion path length, thus reducing the time it takes for biomolecules to adsorb/desorb into and out of the particle.

**2** Expert manufacturing combined with tight packing specifications and high particle density reduces losses in efficiency and performance due to band broadening.

#### Aeris Core-Shell Particle

- High particle density helps create optimal bed structure which reduces band broadening effects of Eddy Diffusion
- Ultra-high performance on HPLC and UHPLC systems alike
- Reduced diffusion path improves efficiency



#### Fully Porous Particle

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



### The result is:

- **3.6 μm core-shell particles** that can perform like sub-2 μm columns on both HPLC and UHPLC systems at a fraction of the pressure
- **5 μm core-shell particles** allow scale up to preparative dimensions
- **1.7 μm and 2.6 μm core-shell particles** that can provide higher peak capacities compared to fully porous sub-2 μm columns on UHPLC systems



To see our entire BioSeparations column and accessory portfolio, visit: [www.phenomenex.com/biopharm](http://www.phenomenex.com/biopharm)

## Selecting the Optimal Aeris Column for Your Applications

Aeris core-shell columns are designed for the separation of complex protein and peptide mixtures. Chromatographers can easily narrow down the column(s) that has a high probability of success for their separation by selecting from a variety of phase, pore size, and particle size options.

### Aeris PEPTIDE

Recommended for the separation of low molecular weight peptides and for peptide mapping.

- **XB-C18 chemistry best suited for resolving peptides**
- **1.7 μm, 2.6 μm, and 3.6 μm particles for method development flexibility between HPLC and UHPLC systems**
- **5 μm particle for peptide purification**
- **Small pore optimized for peptide diffusion**

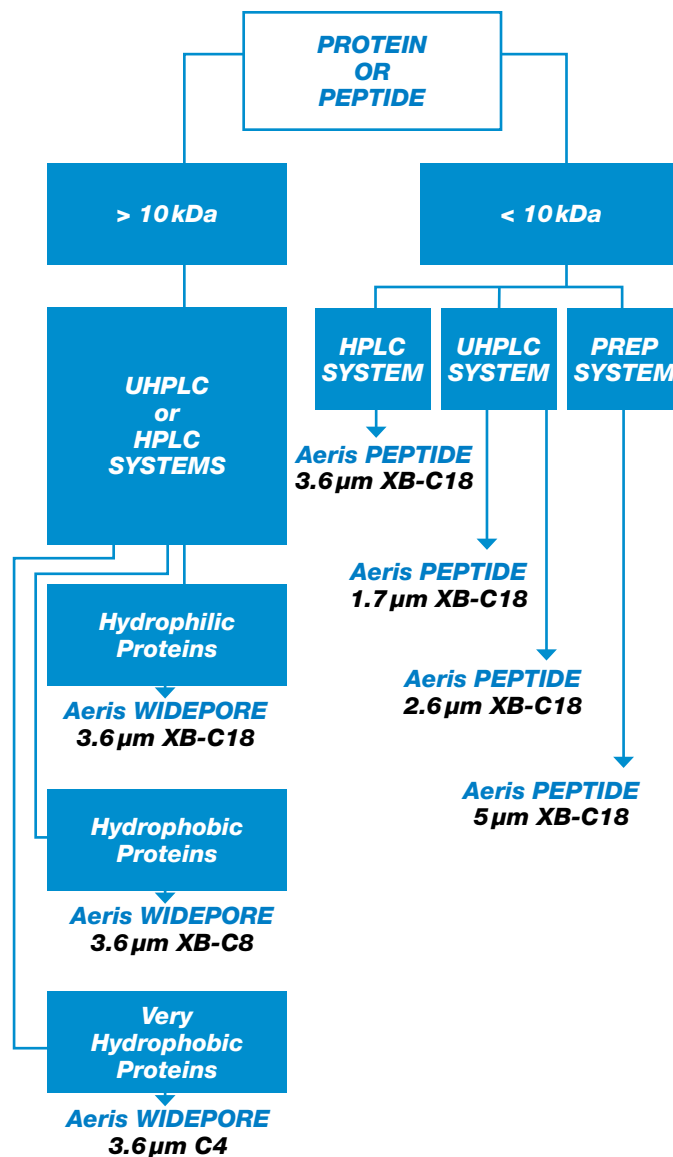
For increased resolving power, use a longer column, preferably a 250mm (or 150mm for the Aeris 1.7 μm XB-C18). Due to the lower backpressure of Aeris 3.6 μm, one can easily run 250mm columns on both HPLC and UHPLC systems, AND one can couple multiple 250mm columns together and run them inline for even better results. For maximum UHPLC resolution, the 150mm length Aeris 1.7 μm or 250mm length Aeris 2.6 μm columns are excellent choices.

### Aeris WIDEPORE

Recommended for the separation of intact proteins and polypeptides.

- **XB-C18, XB-C8, and C4 phases for alternate selectivities**
- **3.6 μm particle for system flexibility**
- **Large pore optimized for fast protein adsorption/desorption**

Because of the reduced hydrophobicity compared to fully porous 300Å columns, one should start gradients with reduced organic concentrations compared to other columns to improve peak shape of polar proteins and peptides. Shallower gradients compared to other fully porous columns may be appropriate.



### Material Characteristics

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

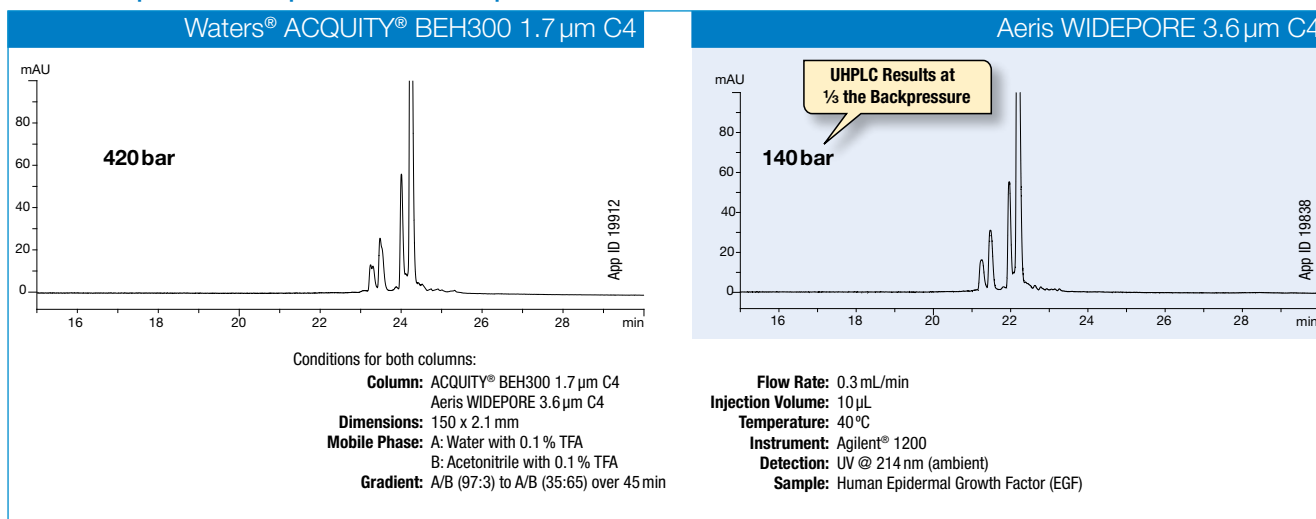


## Maximize Resolving Power with Unique Wide Pore 3.6 μm Core-Shell Particle

3.6 μm core-shell technology combined with inert surface chemistries and tight packing specifications results in Aeris WIDEPOR columns delivering exceptional resolving power at significantly lower backpressures. Chromatographers now have the ability to

generate higher quality data than typically produced by columns packed with fully porous particles for every protein analysis – on HPLC or UHPLC systems.

### Performance Equivalent to Sub-2 μm Particle at Low Backpressure

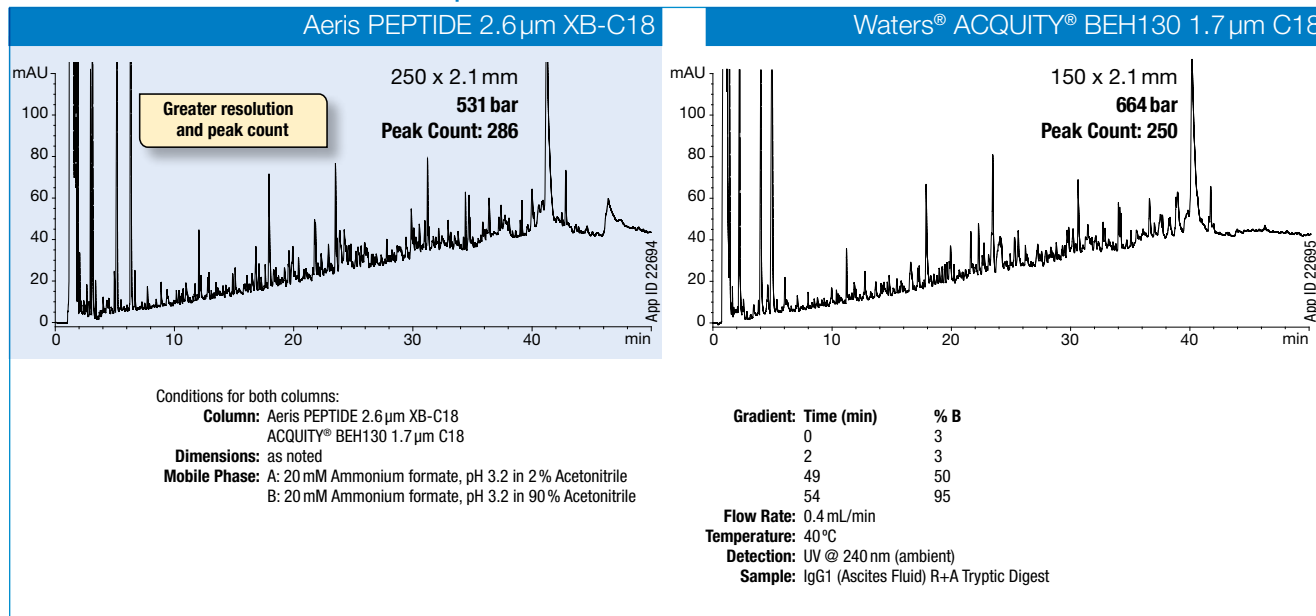


## Ultra-High Resolving Power on UHPLC Systems with Aeris PEPTIDE 2.6 μm Columns of 250mm Length

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

systems while maintaining similar efficiencies to sub-2 μm fully porous particles, longer columns can be used to further maximize the separation power while still being well within the backpressure constraints of the instrumentation.

### Increase UHPLC Performance with Aeris PEPTIDE 2.6 μm Columns



Comparative chromatograms may not be representative of all applications.

# Aeris™ Core-Shell LC Columns for Proteins & Peptides

## Ordering Information

Aeris PEPTIDE 1.7 µm Minibore Columns (mm)				SecurityGuard™ ULTRA Cartridges*
Phase	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
XB-C18	<a href="#">00B-4506-AN</a>	<a href="#">00D-4506-AN</a>	<a href="#">00F-4506-AN</a>	<a href="#">AJ0-8948</a>

for 2.1 mm ID

Aeris PEPTIDE 2.6 µm Minibore Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	<a href="#">00B-4505-AN</a>	<a href="#">00D-4505-AN</a>	<a href="#">00F-4505-AN</a>	<a href="#">00G-4505-AN</a>	<a href="#">AJ0-8948</a>

for 2.1 mm ID

Aeris PEPTIDE 2.6 µm MidBore™ and Analytical Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	150 x 3.0	150 x 4.6	250 x 4.6	3/pk	3/pk
XB-C18	<a href="#">00F-4505-Y0</a>	<a href="#">00F-4505-E0</a>	<a href="#">00G-4505-E0</a>	<a href="#">AJ0-8947</a>	<a href="#">AJ0-8946</a>

for 3.0 mm ID

for 4.6 mm ID

Aeris PEPTIDE 3.6 µm Minibore Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	<a href="#">00B-4507-AN</a>	<a href="#">00D-4507-AN</a>	<a href="#">00F-4507-AN</a>	<a href="#">00G-4507-AN</a>	<a href="#">AJ0-8948</a>

for 2.1 mm ID

Aeris PEPTIDE 3.6 µm Analytical Columns (mm)				SecurityGuard ULTRA Cartridges*	
Phase	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
XB-C18	<a href="#">00B-4507-E0</a>	<a href="#">00D-4507-E0</a>	<a href="#">00F-4507-E0</a>	<a href="#">00G-4507-E0</a>	<a href="#">AJ0-8946</a>

for 4.6 mm ID

Aeris PEPTIDE 5 µm Analytical Scout and Semi-Prep Columns (mm)				SecurityGuard ULTRA Cartridges*	SecurityGuard SemiPrep Cartridges**	
Phase	150 x 4.6	250 x 4.6	150 x 10.0	250 x 10.0	3/pk	10 x 10 /3pk
XB-C18	<a href="#">00F-4632-E0</a>	<a href="#">00G-4632-E0</a>	<a href="#">00F-4632-N0</a>	<a href="#">00G-4632-N0</a>	<a href="#">AJ0-8946</a>	<a href="#">AJ0-9317</a>

for 4.6 mm ID

for 10 mm ID

Aeris PEPTIDE 5 µm Axia™ Packed Preparative Columns (mm)			SecurityGuard PREP Cartridges†
Phase	150 x 21.2	250 x 21.2	15 x 21.2 /ea
XB-C18	<a href="#">00F-4632-PO-AX</a>	<a href="#">00G-4632-PO-AX</a>	<a href="#">AJ0-9318</a>

for 21.2 mm ID

Aeris WIDEPORE 3.6 µm Minibore Columns (mm)				SecurityGuard™ ULTRA Cartridges*	
Phases	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	3/pk
XB-C18	<a href="#">00B-4482-AN</a>	<a href="#">00D-4482-AN</a>	<a href="#">00F-4482-AN</a>	<a href="#">00G-4482-AN</a>	<a href="#">AJ0-8783</a>
XB-C8	<a href="#">00B-4481-AN</a>	<a href="#">00D-4481-AN</a>	<a href="#">00F-4481-AN</a>	<a href="#">00G-4481-AN</a>	<a href="#">AJ0-8785</a>
C4	<a href="#">00B-4486-AN</a>	<a href="#">00D-4486-AN</a>	<a href="#">00F-4486-AN</a>	<a href="#">00G-4486-AN</a>	<a href="#">AJ0-8899</a>

for 2.1 mm ID

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	<a href="#">00D-4482-E0</a>	<a href="#">00F-4482-E0</a>	<a href="#">00G-4482-E0</a>	<a href="#">AJ0-8769</a>
XB-C8	<a href="#">00D-4481-E0</a>	<a href="#">00F-4481-E0</a>	<a href="#">00G-4481-E0</a>	<a href="#">AJ0-8771</a>
C4	<a href="#">00D-4486-E0</a>	<a href="#">00F-4486-E0</a>	<a href="#">00G-4486-E0</a>	<a href="#">AJ0-8901</a>

for 4.6 mm ID

\*SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

\*\*SemiPREP SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

†PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)



For HPLC Column Performance Check Standards, see pp. 424-425



Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 417-418

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

For more about SecurityGuard ULTRA, see p. 335

For Core-Shell Performance Enhancement Kit, see p. 421

## A C18 Column with Polar Endcapping

Use Luna™ Omega Polar C18, an Improved Alternative to Aqua 125 Å

See p. 296

### Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m <sup>2</sup> /g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m <sup>2</sup> )	End Capping
AQUA C18	Spher. 3, 5	125	1.05	320	15	N/A	Proprietary
AQUA C18	Spher. 5	200	1.15	215	11	N/A	Proprietary

### 125 Å Aqua C18 Column

Aqua's polar endcapping produces a surface chemistry that is well suited for the analysis of small peptides. This chemistry...

- makes it an excellent column for smaller, basic peptides
- allows for faster column equilibration in gradient analyses
- ensures a surface that can be "wetted" with aqueous trifluoroacetic acid (TFA)

### 200 Å Aqua C18 Column

- Increased pore size for enhanced diffusion of large pharmaceuticals and biomolecules
- Reduced surface area for faster analyses and greater sample throughput

### Ordering Information

3 µm Minibore, Analytical, LC-MS and CombiChem Columns (mm)						SecurityGuard™ Cartridges (mm)	
Phases	50 x 2.0	75 x 2.0	150 x 2.0	100 x 4.6	150 x 4.6	4 x 2.0*	4 x 3.0*
C18 125 Å	<a href="#">00B-4311-B0</a>	<a href="#">00C-4311-B0</a>	<a href="#">00F-4311-B0</a>	<a href="#">00D-4311-E0</a>	<a href="#">00F-4311-E0</a>	<a href="#">AJ0-7510</a>	<a href="#">AJ0-7511</a>
						for ID: 2.0–3.0 mm	3.2–8.0 mm

5 µm Minibore, MidBore™ and LC-MS Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	50 x 2.0	150 x 2.0	250 x 2.0	150 x 3.0	250 x 3.0	4 x 2.0*
C18 125 Å	<a href="#">00B-4299-B0</a>	<a href="#">00F-4299-B0</a>	<a href="#">00G-4299-B0</a>	<a href="#">00F-4299-Y0</a>	<a href="#">00G-4299-Y0</a>	<a href="#">AJ0-7510</a>
C18 200 Å	—	<a href="#">00F-4331-B0</a>	—	—	—	<a href="#">AJ0-7510</a>
						for ID: 2.0–3.0 mm

5 µm Analytical, CombiChem, SemiPrep and Preparative Columns (mm)				SecurityGuard™ Cartridges (mm)	
Phases	150 x 4.6	250 x 4.6	250 x 10	4 x 3.0*	10 x 10 <sup>‡</sup>
C18 125 Å	<a href="#">00F-4299-E0</a>	<a href="#">00G-4299-E0</a>	<a href="#">00G-4299-N0</a>	<a href="#">AJ0-7511</a>	<a href="#">AJ0-7512</a>
C18 200 Å	<a href="#">00F-4331-E0</a>	<a href="#">00G-4331-E0</a>	—	<a href="#">AJ0-7511</a>	<a href="#">AJ0-7512</a>
				for ID: 3.2–8.0 mm	9–16 mm



For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334

\*SecurityGuard Analytical Cartridges require holder, Part No.: [KJ0-4282](#)  
<sup>‡</sup>SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

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

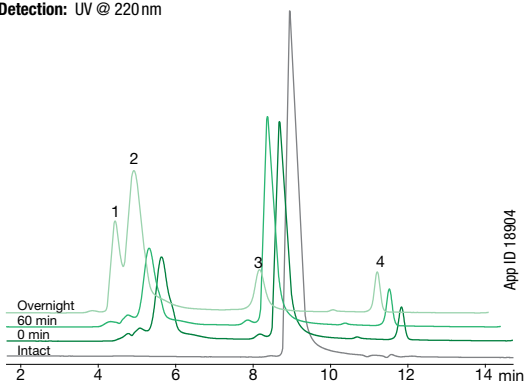
Gel Filtration Chromatography is used to analyze and/or characterize proteins, peptides, and other biomolecules; including antibodies, immunoglobulins, protein complexes, protein aggregates, and desalting. BioSep GFC columns offer many important benefits for your separation needs.

### Low MW Proteins and Peptides on BioSep-SEC-s2000

#### PEGylated b-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 b-Lactoglobulin  
 3. b-Lactoglobulin  
 4. PEG Reagent

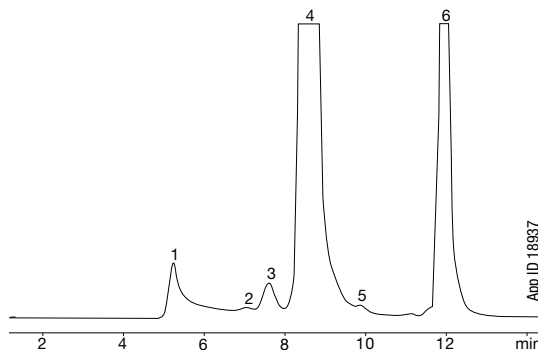


### Medium MW Proteins on BioSep-SEC-s3000

#### 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

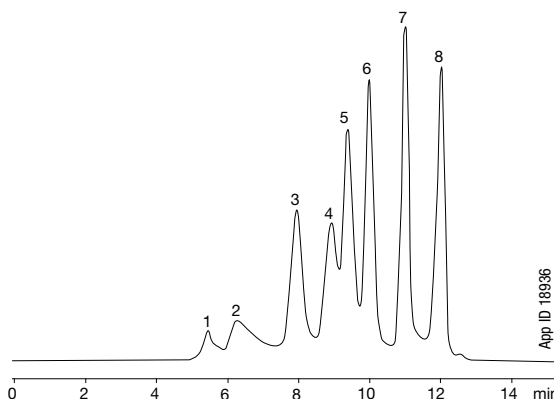


### Large MW Proteins on BioSep-SEC-s4000

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



#### Ordering Information

Columns (mm)	Analytical			SecurityGuard™ Cartridges (mm)
	Narrow Bore	300 x 7.8	600 x 7.8	4 x 3.0*
BioSep-SEC-s2000	<a href="#">00H-2145-E0</a>	<a href="#">00H-2145-K0</a>	<a href="#">00K-2145-K0</a>	<a href="#">AJ0-4487</a>
BioSep-SEC-s3000	<a href="#">00H-2146-E0</a>	<a href="#">00H-2146-K0</a>	<a href="#">00K-2146-K0</a>	<a href="#">AJ0-4488</a>
BioSep-SEC-s4000	<a href="#">00H-2147-E0</a>	<a href="#">00H-2147-K0</a>	<a href="#">00K-2147-K0</a>	<a href="#">AJ0-4489</a>

\*SecurityGuard Analytical cartridges require holder, Part No.: [KJO-4282](#)

for ID: 4.6-7.8 mm

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



For Aqueous SEC1 Column Check Standard, see p. 424

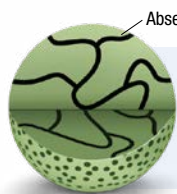


## 4 Advanced Particle Platforms

All four of the Biozen particle platforms were individually designed and built by Phenomenex to provide integral levels of performance, ruggedness, and reproducibility for biotherapeutic

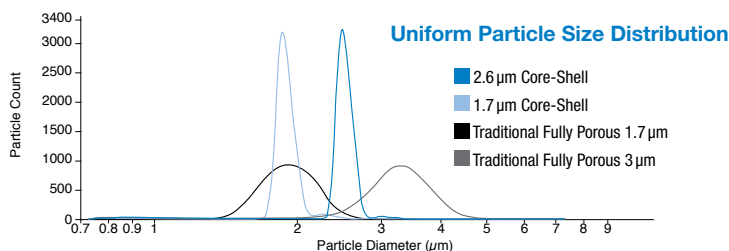
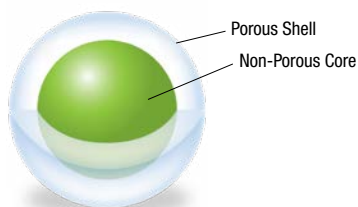
characterization applications. Individually, each platform differs in the proprietary processing techniques used to control particle size and morphology.

### Thermally Modified Fully Porous



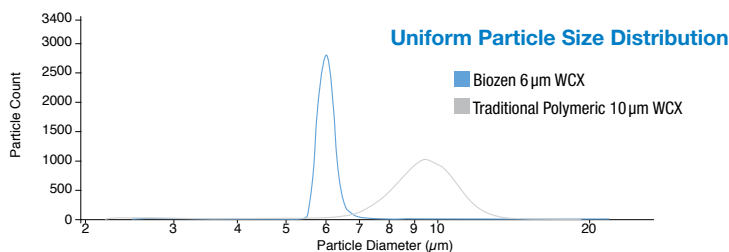
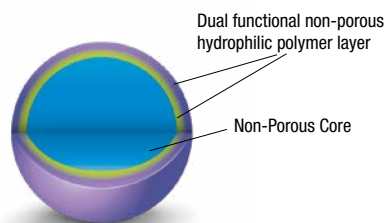
Through a proprietary series of thermal processing steps, we eliminate micropores and further improve consistency, leading to higher column efficiency and reproducibility.

### Core-Shell Technology



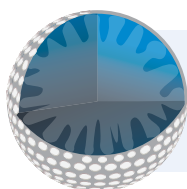
Using sol-gel processing techniques that incorporate nano structuring technology, a durable, homogeneous porous shell is grown on a solid silica core. This highly optimized process combined with industry leading column packing technology produces highly reproducible columns that generate extremely high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

### Pore Controlled Technology

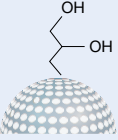


dSEC columns are packed with low pore volume silica coupled with a proprietary hydrophilic diol-type bonded surface chemistry that prevents the silica surface from interacting with protein samples.

## 9 Particle Chemistries


With a single innovative product line, you can now find a variety of quality particle chemistries designed and tested for biologics.

**Size Exclusion Chromatography**



**Biozen dSEC-2**  
1.8 μm and 3 μm

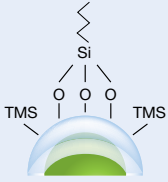
Inert, high-strength porous particle for the separation and quantitation of monoclonal antibody aggregate and fragments



**Biozen dSEC-3**  
1.8 μm

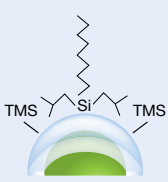
Extremely inert, high density fully porous particle with high efficiency and high molecular weight (HMW) separation range of 10k – 700 kDa

**Intact**



**Biozen WidePore C4**  
2.6 μm

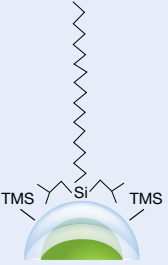
Core-shell particle with butyl stationary phase and optimal wide pore size distribution for better resolution of large biologics, including monoclonal antibodies and subunit analysis.



**Biozen Intact XB-C8**  
3.6 μm

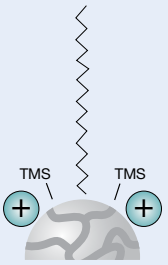
Large pore core-shell particle for fast intact and subunit biologic entry. C8 provides highly useful moderate hydrophobic selectivity.

**Peptide**



**Biozen Peptide XB-C18**  
1.7 μm and 2.6 μm

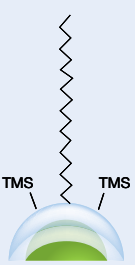
Overall retention of both acidic and basic peptides through C18 stationary phase with di-isobutyl side chains.



**Biozen Peptide PS-C18**  
1.6 μm and 3 μm

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

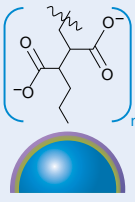
**Oligonucleotides**



**Biozen Oligo**  
1.7 μm and 2.6 μm

Organo-silica core-shell particle bonded with a C18 stationary phase offers high selectivity for even minute oligo differences alongside high and low pH robustness.

**Ion-Exchange**

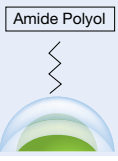


**Biozen WCX**  
6 μm

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

Note: Biozen Peptide PS-C18 available in core-shell for nano columns.

**Glycan**

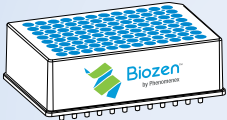


**Biozen Glycan**  
2.6 μm

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


## 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.

**MagBeads**



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

➔ To learn more, see p. 78

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

## Oligo Characterization and Quantitation

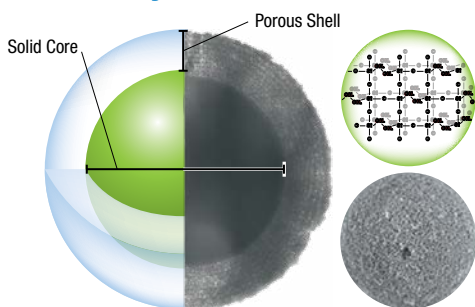
### Advanced Oligonucleotide Analysis for Increased Recovery and Reproducibility

The Biozen Oligo LC Column brings a unique combination of core-shell versatility and high pH ruggedness necessary for oligonucleotide separations. Additionally, Biozen Oligo is packed in a unique bio-inert titanium hardware designed to minimize the sample loss and adsorption issues typically seen with stainless steel hardware, demonstrating this column's optimal utility for oligonucleotide characterization and quantitation.

- **BioTi™ Hardware Reduces Sample Loss and Adsorption**
- **Robustness at High pH and Temperature**
- **Core-Shell Advantage for High Efficiency**

### Patented Technology and Advanced Core-Shell Particle Chemistry

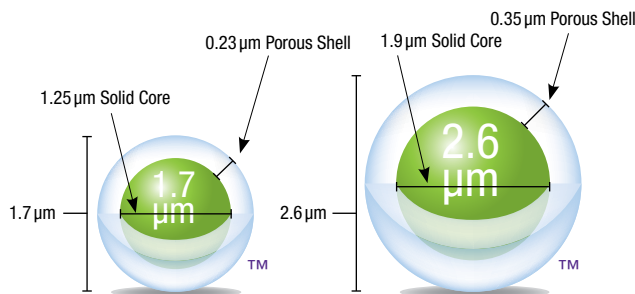
#### Patented Core-Shell Particle Chemistry



Biozen Oligo uses a patented organo-silica grafting process that incorporates uniform stabilizing ethylene cross-linking to provide resistance to high pH and temperature which are fundamental to reversed phase analysis of oligonucleotides.

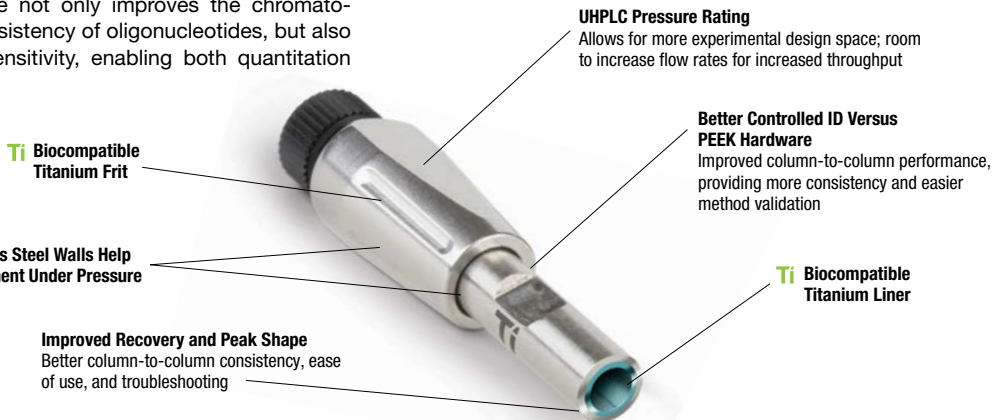
### High Efficiency Core-Shell Particle

After meticulous core construction, a uniform porous silica layer is grown around the spherical solid silica core. This unique combination of precise particle architecture and particle size provides dramatic leaps in performance.



### Inside the Biozen Oligo Biocompatible Hardware Difference

The use of bioinert hardware not only improves the chromatographic performance and consistency of oligonucleotides, but also provides improvements in sensitivity, enabling both quantitation and characterization.



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

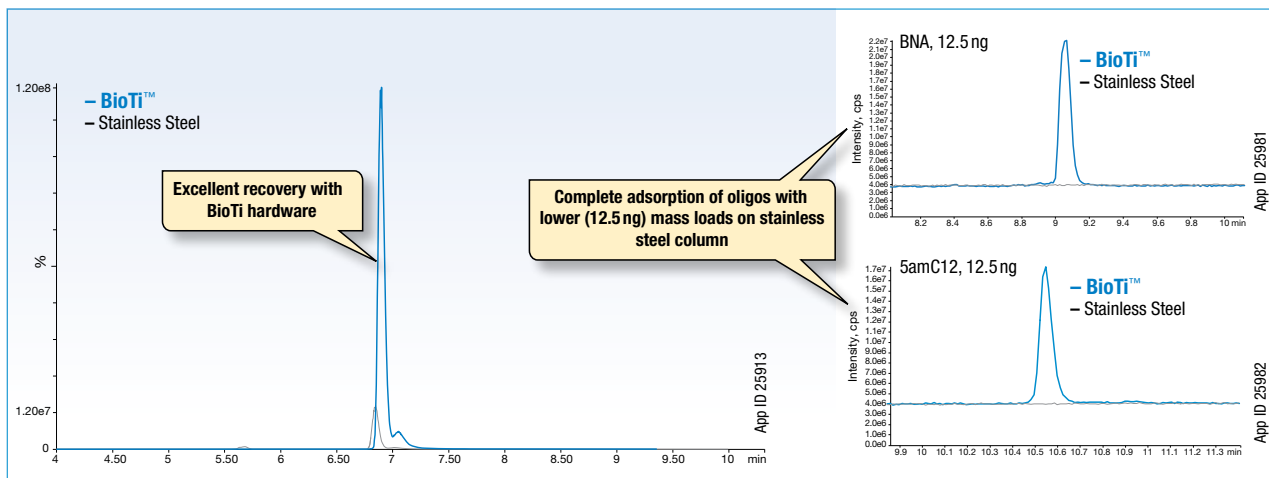
## Oligo Characterization and Quantitation (cont'd)

### BioTi versus Traditional Stainless Steel Hardware

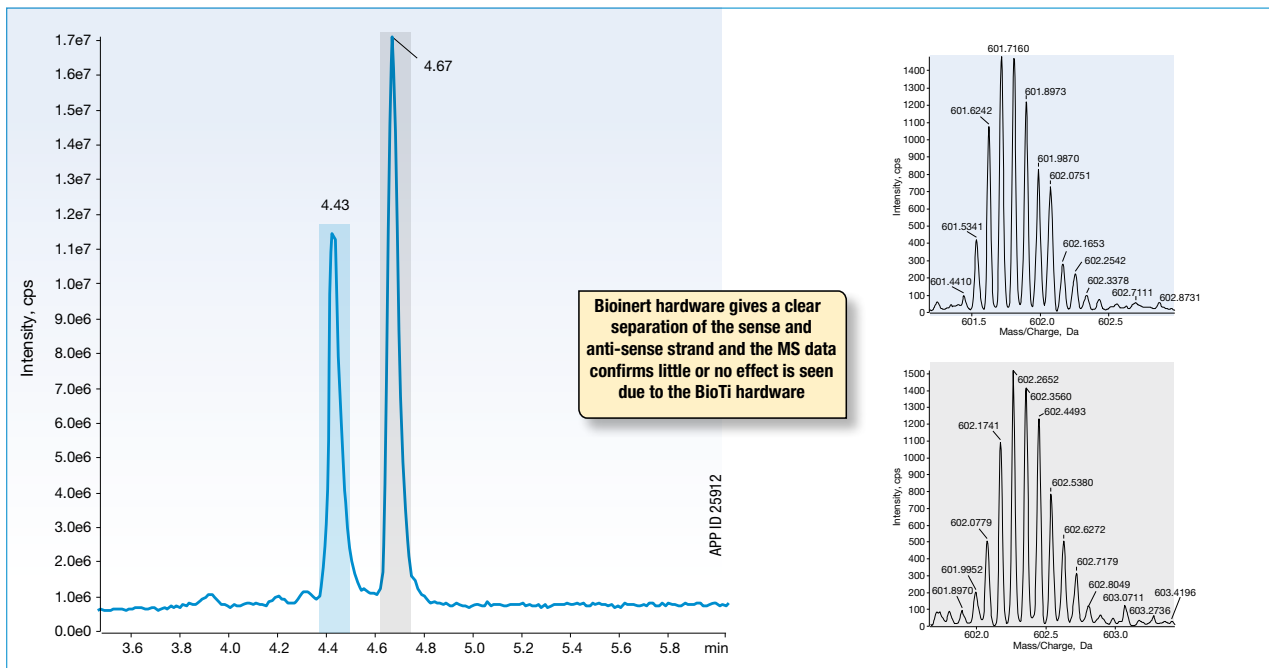
Oligos can chelate to trace heavy metals in stainless steel column hardware, leading to poor recovery, inconsistent chromatography and problematic carryover. The Biozen Oligo bioinert hardware pro-

vides greater sensitivity as well as improved recovery, demonstrating this column's optimal utility for oligonucleotide characterization and quantitation.

#### BioTi Ensures Method Robustness and Consistency from Injection-to-Injection!



#### LC-MS Analysis of siRNA using Bioinert Hardware



#### Ordering Information

Biozen Columns (mm)	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	Biocompatible Guard Cartridges		
							for 2.1 mm /3pk	for 4.6 mm /3pk	Holder ea
Biozen 1.7 μm Oligo	<a href="#">00B-4791-AN</a>	<a href="#">00D-4791-AN</a>	<a href="#">00F-4791-AN</a>	—	—	—	<a href="#">AJ0-9820</a>	<a href="#">AJ0-9822</a>	<a href="#">AJ0-9000</a>
Biozen 2.6 μm Oligo	<a href="#">00B-4790-AN</a>	<a href="#">00D-4790-AN</a>	<a href="#">00F-4790-AN</a>	<a href="#">00B-4790-E0</a>	<a href="#">00D-4790-E0</a>	<a href="#">00F-4790-E0</a>	<a href="#">AJ0-9820</a>	<a href="#">AJ0-9822</a>	<a href="#">AJ0-9000</a>

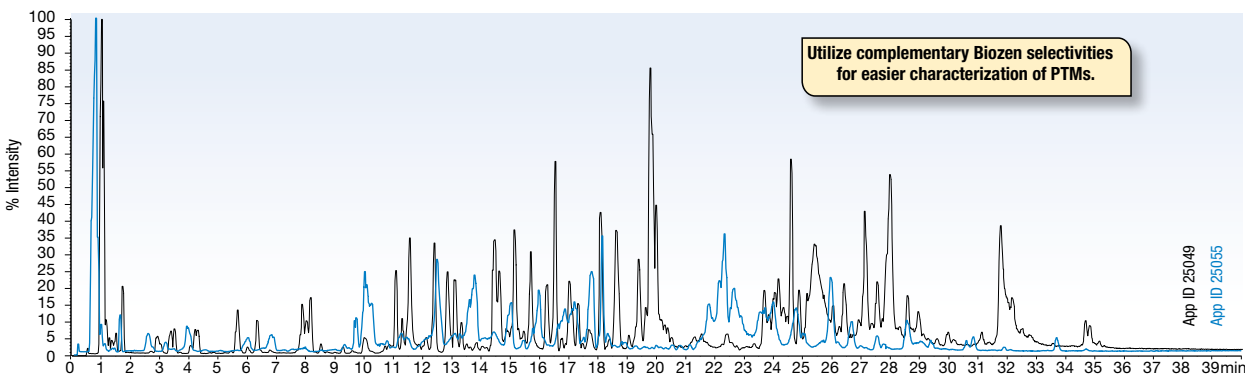


## Peptide Mapping

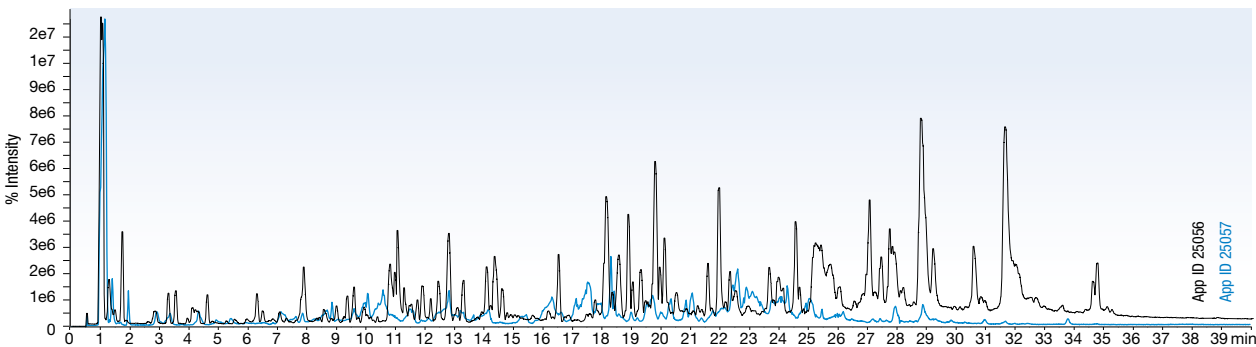
Digested mAbs or ADCs typically include a large body of compounds which are crucial to understanding post translation modifications. So we designed two Biozen Peptide LC columns to offer highly useful and unique retention profiles. Each allows for fast and

effective elution windows by utilizing either high efficiency core-shell or thermally modified fully porous particles to gain sharper peaks, better peak capacities, and overall higher sensitivity.

### Trastuzumab Biosimilar Peptide Map



### Infliximab Biosimilar Peptide Map



#### Conditions for all columns:

<b>Columns:</b>	■ Biozen 1.6 µm Peptide PS-C18 ■ Biozen 2.6 µm Peptide XB-C18	<b>Gradient:</b>	<b>Time (min)</b> 0 0.5 50 55 56	<b>% B</b> 1 1 50 50 95
<b>Dimensions:</b>	150 x 2.1 mm	<b>Flow Rate:</b>	0.3 mL/min	
<b>Part No.:</b>	00F-4770-AN (1.6 µm Peptide PS-C18) 00F-4768-AN (2.6 µm Peptide XB-C18)	<b>Temperature:</b>	40 °C	
<b>Mobile Phase:</b>	A: 0.1 % Formic Acid in Water B: 0.1 % Formic Acid in Acetonitrile	<b>Detection:</b>	QTOF (SCIEX® X500B)	

### Ordering Information

Biozen Columns (mm)							Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
Biozen 1.6 µm Peptide PS-C18	00B-4770-AN	00D-4770-AN	00F-4770-AN	—	—	—	/3pk AJO-9803	—	ea AJO-9000
Biozen 3 µm Peptide PS-C18	00B-4771-AN	—	00F-4771-AN	—	00B-4771-E0	00F-4771-E0	/10pk AJO-7605	/10pk AJO-7606	ea KJO-4282
Biozen 1.7 µm Peptide XB-C18	00B-4774-AN	00D-4774-AN	00F-4774-AN	—	—	—	/3pk AJO-9806	—	ea AJO-9000
Biozen 2.6 µm Peptide XB-C18	00B-4768-AN	00D-4768-AN	00F-4768-AN	00G-4768-AN	00B-4768-E0	00F-4768-E0	/3pk AJO-9806	/3pk AJO-9808	ea AJO-9000



Nano Low Flow Columns available in specific particle chemistries, see p. 225

## Aggregate Analysis

With the expectation of low level protein aggregation (<0.1% peak area compared to monomer) robust aggregate analysis is critically sought after. Biozen SEC columns are designed to address deficiencies in traditional SEC columns through low pore volume

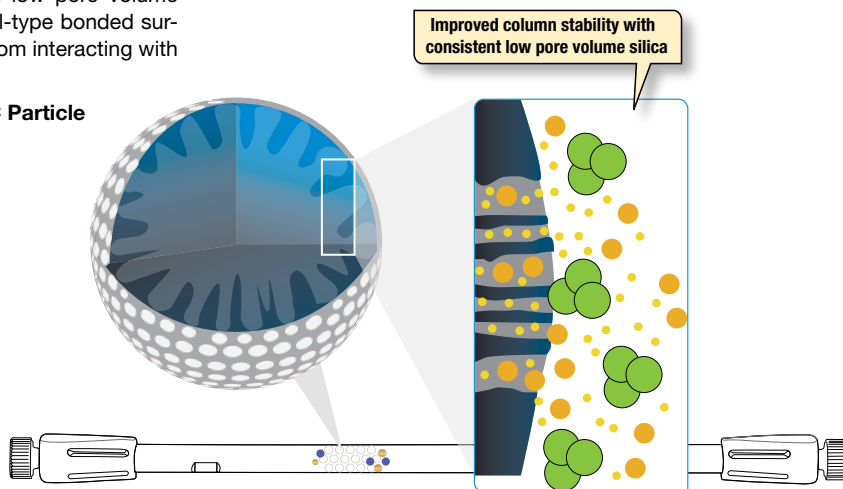
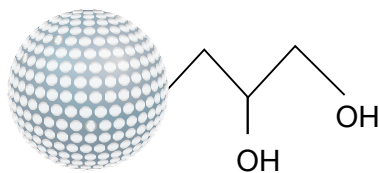
silica packed into BioTi™ hardware. Rest assured your resolution, peak shape, and % recovery demands, even at low concentrations, will be achieved.

## Biozen dSEC-2 Size Exclusion Columns

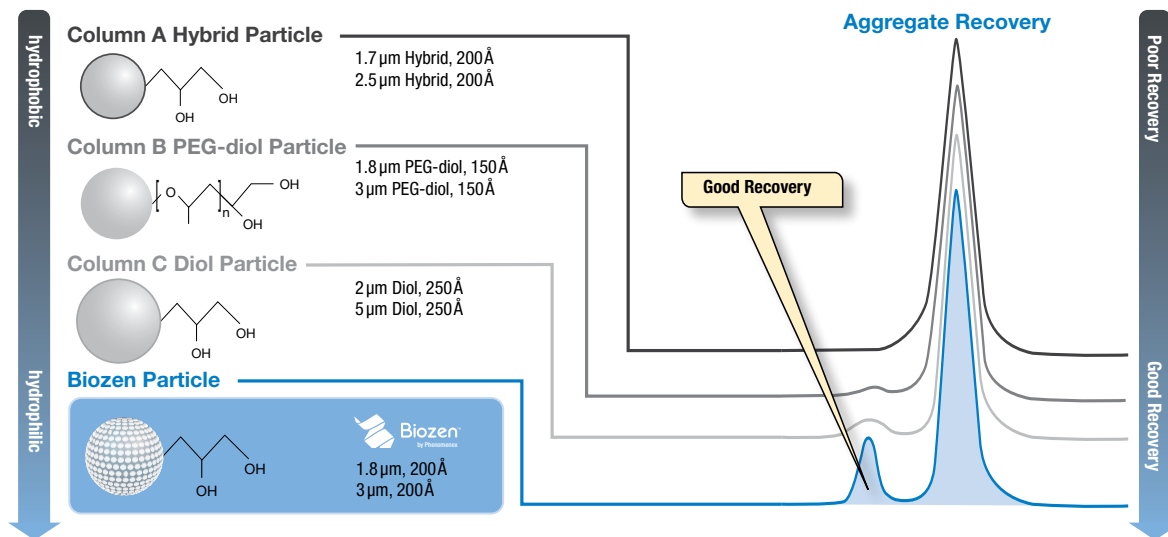
### Advanced SEC Silica Particle Technology and Surface Chemistry for Characterization Biomolecules

The Biozen dSEC-2 columns are packed with low pore volume silica coupled with a proprietary hydrophilic diol-type bonded surface chemistry that prevents the silica surface from interacting with protein samples.

- Exceptionally Robust, Pore Controlled SEC Particle
- Extreme Stability and Improved Lifetime
- Reproducible Separations



### Biozen dSEC-2 Hydrophilic Surface Chemistry Improves Aggregate Analysis



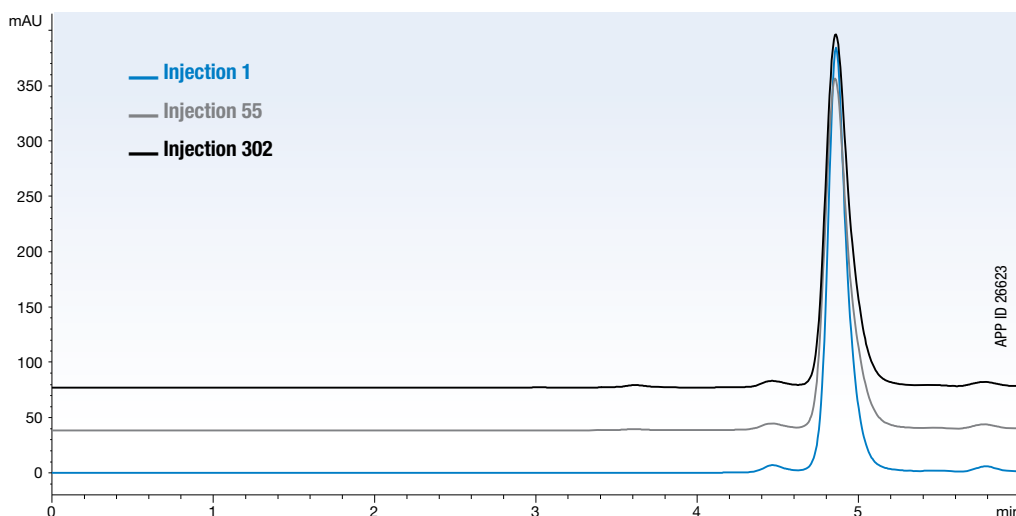
Comparative separations may not be representative of all applications.

## Aggregate Analysis (cont'd)

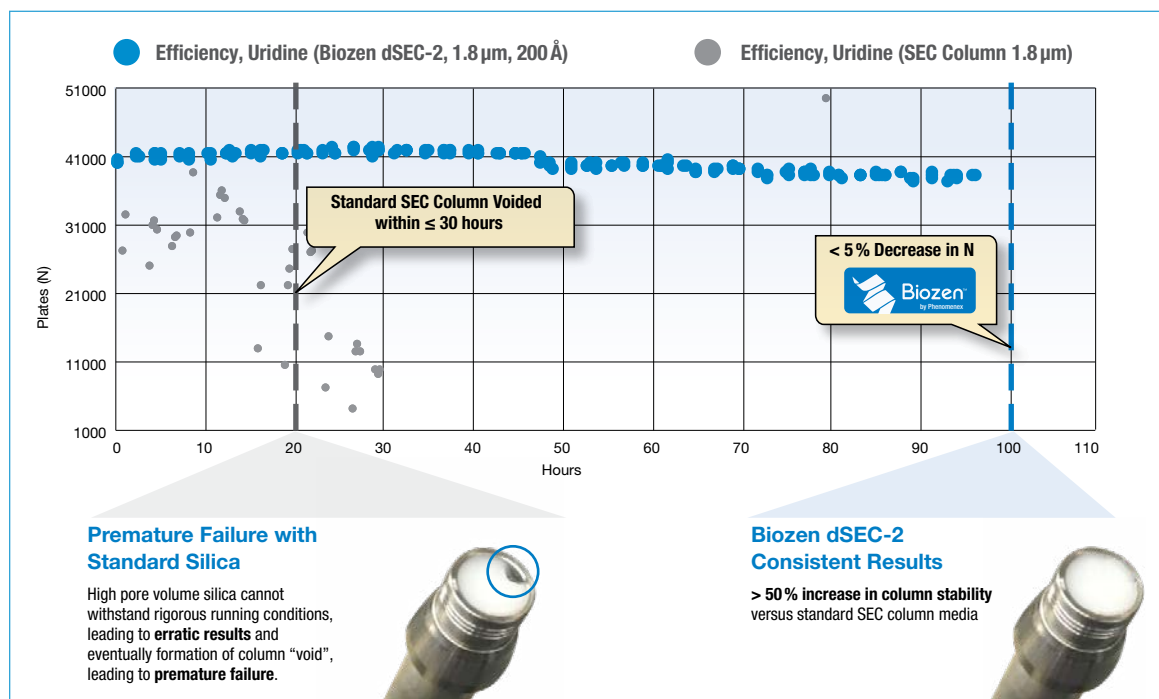
### Improved Column Lifetime and Performance Stability

Phenomenex's optimized Biozen dSEC-2 column loading technology has significantly improved the overall packing density and silica distribution of the columns leading to improved chromatographic lifetime and stability.

#### Unchanged Performance After 300 Injections



#### Unchanged Performance After 100 Hours of Extreme Running Conditions

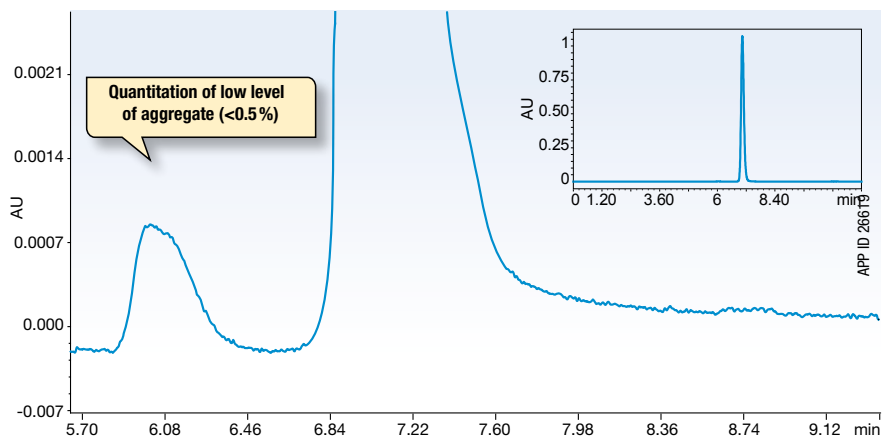


## Aggregate Analysis (cont'd)

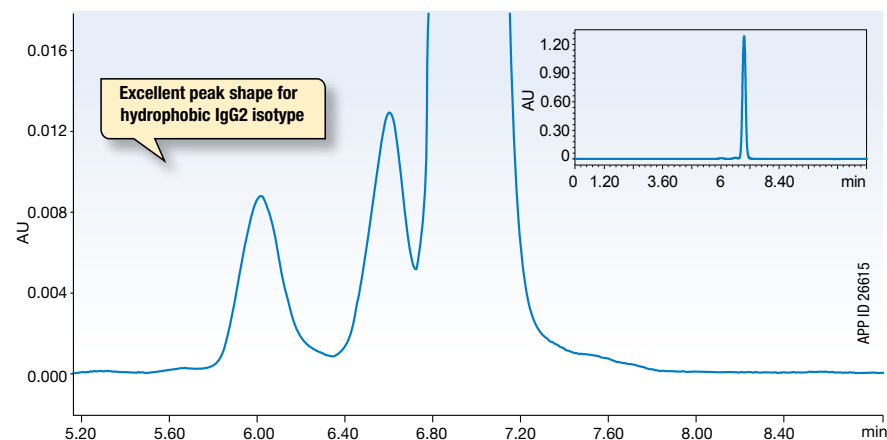
### New Standard for Platform SEC Methods

Whether IgG2 or IgG4 isotypes, bispecifics, or Fc-Fusions, dSEC-2 columns provide the optimum pore volume and surface chemistry finely tuned to maximize separation and sample recovery for many different classes of biotherapeutics.

#### Bispecific Emicizumab



#### IgG2 Panitumumab



#### Conditions for both columns:

Column: Biozen 1.8 μm dSEC-2, 200 Å

Dimensions: 300 x 4.6 mm

Part No.: 00H-4787-EQ

Mobile Phase: 200 Potassium Phosphate + 250 mM KCl, pH 6.2

Flow Rate: 0.35 mL/min

Injection Volume: 10 μL

Temperature: 25 °C

Detector: UV @ 280 nm

Sample: Various, 10 mg/mL

#### Ordering Information

Biozen Columns (mm)	Biozen Columns (mm)						for 2.1 mm	Holder
	50 x 2.1	150 x 2.1	100 x 4.6	150 x 4.6	300 x 4.6	150 x 7.8		
Biozen 1.8 μm dSEC-2	<a href="#">00B-4787-AN</a>	<a href="#">00F-4787-AN</a>	—	<a href="#">00F-4787-EQ</a>	<a href="#">00H-4787-EQ</a>	—	—	/3pk ea
Biozen 3 μm dSEC-2	—	—	—	<a href="#">00F-4788-EQ</a>	<a href="#">00H-4788-EQ</a>	<a href="#">00F-4788-KO</a>	<a href="#">00H-4788-KO</a>	—
Biozen 1.8 μm SEC-3	<a href="#">00B-4772-AN</a>	—	<a href="#">00D-4772-EQ</a>	<a href="#">00F-4772-EQ</a>	<a href="#">00H-4772-EQ</a>	—	—	AJO-9851 AJO-9000

#### Guard Columns

Guard Columns	Guard Columns	
	30 x 4.6	40 x 7.8
Biozen 3 μm dSEC-2 Guard	<a href="#">03A-4788-EQ</a>	<a href="#">03Q-4788-KO</a>

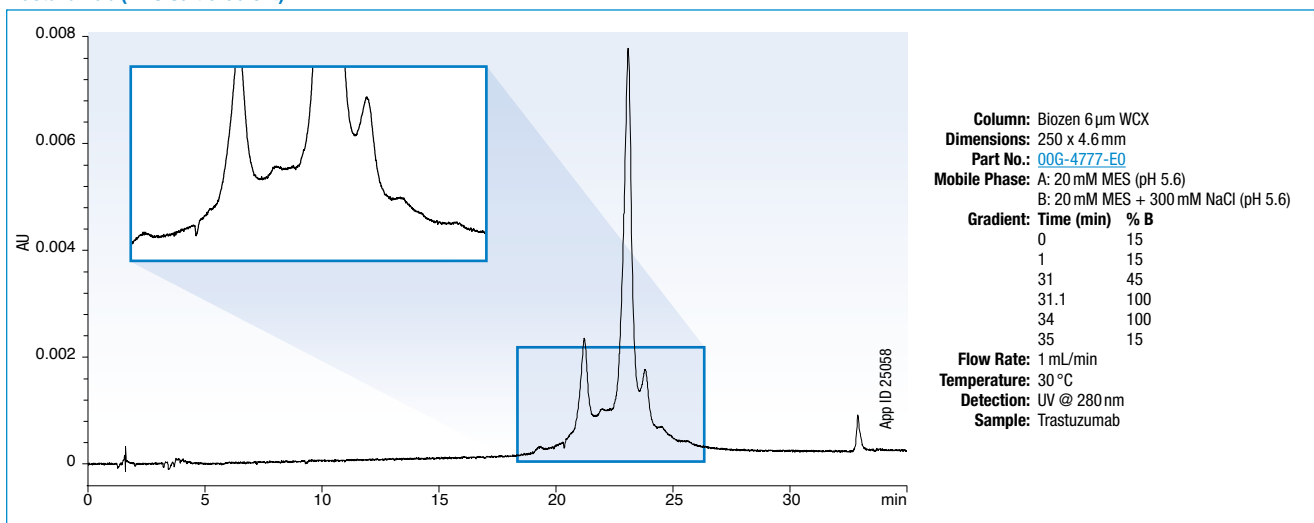


## Charge Variant Analysis

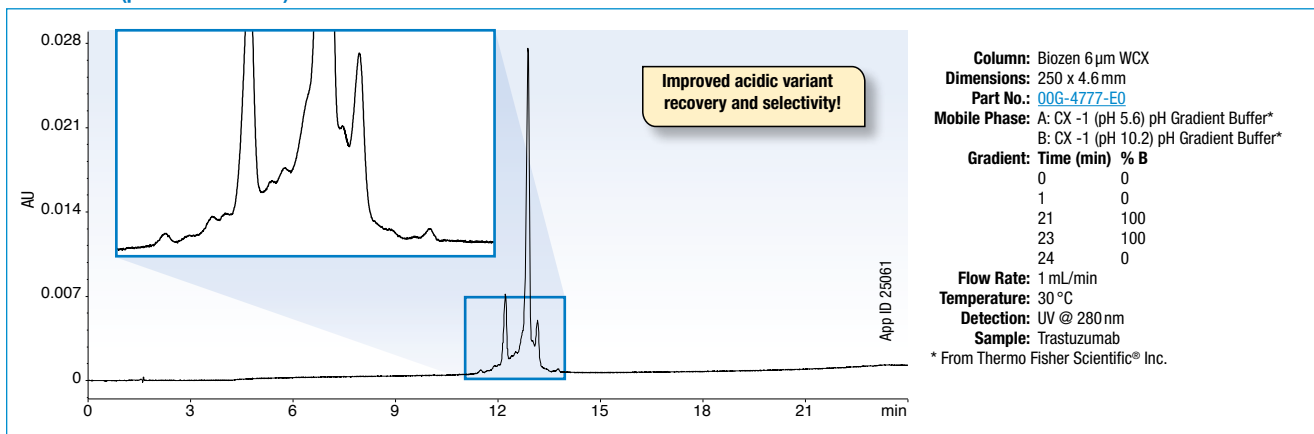
Biozen WCX was crafted to consistently differentiate between native protein charge variants that arise from PTMs within biotherapeutics throughout discovery, development and manufacturing. The linear polycarboxylate chains grafted to monosized non-porous polymeric particles envelop and separate proteins from acidic and basic variants

in both ionic strength and pH-based method extremes. Biozen WCX media enables scientists to reproducibly characterize charge heterogeneity while ensuring excellent recovery through both particle inertness and bioinert titanium BioTi™ column hardware.

### Trastuzumab (MES Salt Gradient)



### Trastuzumab (pH Gradient Buffer)



### Ordering Information

Biozen Columns (mm)	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	Biocompatible Guard Cartridges	
					for 2.1 mm	Holder
Biozen 6 μm WCX	00B-4777-AN	00D-4777-AN	00F-4777-AN	00G-4777-AN	AJO-9401	KJO-4282
					/10pk	ea
					AJO-9401	KJO-4282

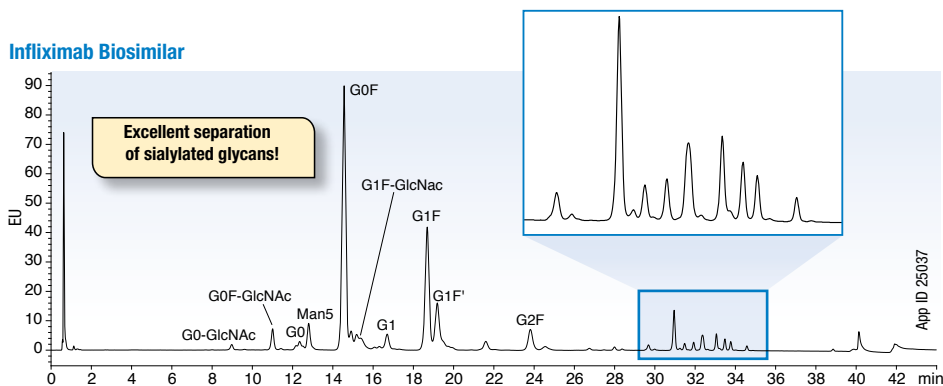
Biozen Columns (mm)	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	Biocompatible Guard Cartridges	
					for 4.6 mm	Holder
Biozen 6 μm WCX	00B-4777-E0	00D-4777-E0	00F-4777-E0	00G-4777-E0	AJO-9400	KJO-4282
					/10pk	ea
					AJO-9400	KJO-4282

## Glycan Analysis

The unique selectivity of Biozen Glycan are designed to resolve highly chemically similar sugar moieties of released and labeled N- and O-linked glycans. With a 2.6 μm core-shell particle, both HPLC or UHPLC systems can benefit from its high efficiency particle morphology to achieve sharper peak shapes within faster run

times. Under HILIC-FLR or HILIC-MS conditions, the Biozen Glycan column excels with increased polar retention and selectivity to enable fast reproducible characterization of your biotherapeutic's glycosylation profile

### Infliximab Biosimilar



#### Conditions for both separations:

**Column:** Biozen 2.6 μm Glycan

**Dimensions:** 150 x 2.1 mm

**Part No.:** [00F-4773-AN](#)

**Mobile Phase:** A: 100 mM Ammonium Formate, pH 4.5

B: Acetonitrile

Gradient:	Time (min)	% B
	0	78
	10	74.5
	24	72
	38.5	55.9
	38.6	40
	40.6	40
	40.7	78
	48	78

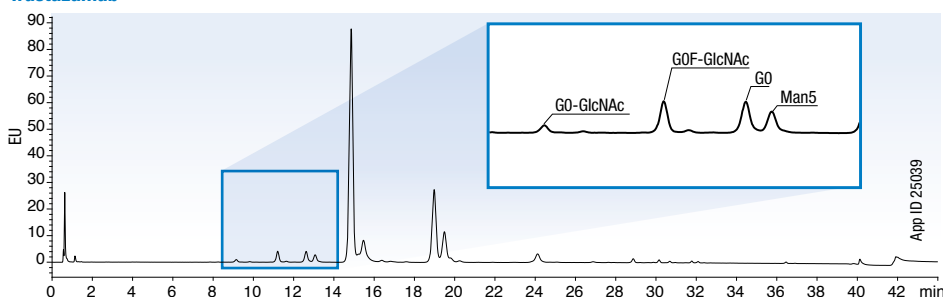
**Flow Rate:** 0.5 mL/min

**Temperature:** 50 °C

**Detection:** FLD ex/em 285/345 nm

**Sample:** As noted

### Trastuzumab



### Ordering Information

Biozen Columns (mm)	Biocompatible Guard Cartridges				
	50 x 2.1	100 x 2.1	150 x 2.1	for 2.1 mm	Holder
Biozen 2.6 μm Glycan	<a href="#">00B-4773-AN</a>	<a href="#">00D-4773-AN</a>	<a href="#">00F-4773-AN</a>	<a href="#">AJO-9800</a>	<a href="#">AJO-9000</a>

## Sample Preparation

### Ordering Information

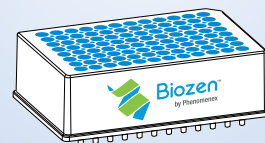
Format	Biozen Solid Phase Extraction	Sorbent Mass	Part Number	Unit
Microelution 96-Well Plate	Biozen N-Glycan Clean-Up	5 mg/well	<a href="#">8M-S009-NGA</a>	1/box



## Biozen N-Glycan Clean-Up

Novel solid phase extraction (SPE) HILIC stationary phase that excels at retention and recovery of labeled, released N-glycans! Available in microelution 96-well plate format that works extremely well for processing and clean-up of small sample volumes.

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



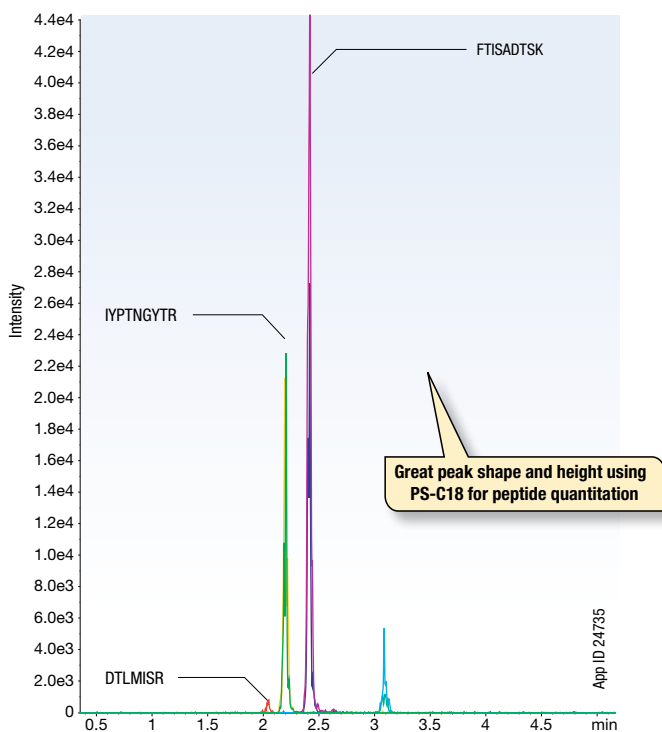
## Peptide Quantitation

When quantifying signature peptides, sharp peak shape and sufficient retention of hydrophilic and hydrophobic peptides are pivotal. Both Biozen Peptide columns are developed to deliver orthogonal selectivities for highly chemically similar peptides. In addition to providing excellent peak capacity and higher sample loads for improved detection of low-level analytes, both peptide columns

improve overall peak shape by minimizing unwanted secondary interactions of basic peptides. Biozen Peptide XB-C18 blocks secondary interactions via isobutyl side chains, while the Biozen Peptide PS-C18 contains a positively charged weak base that improves peak shapes, especially for basic peptides.

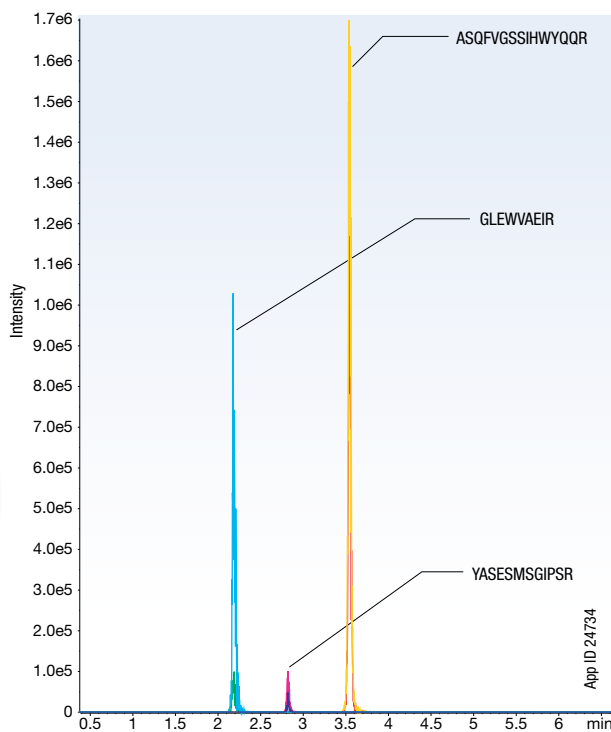
### Kadcyla

(4 Signature Peptides)



### Infliximab

(3 Signature Peptides)



Conditions same for both samples:

Column: Biozen 3µm Peptide PS-C18

Dimensions: 50 x 2.1 mm

Part No.: [00B-4771-AN](#)

Mobile Phase: A: 0.1 % Formic Acid in Water

B: 0.1 % Formic Acid in Acetonitrile

Gradient	Time (min)	% B
	0	3
	1	3
	4.5	25

Flow Rate: 0.5 mL/min

Temperature: 22 °C

LC System: ExionLC™ AD HPLC

Detection: MS/MS

Detector: SCIEX® QTRAP® 5500

Sample: As noted

### Ordering Information

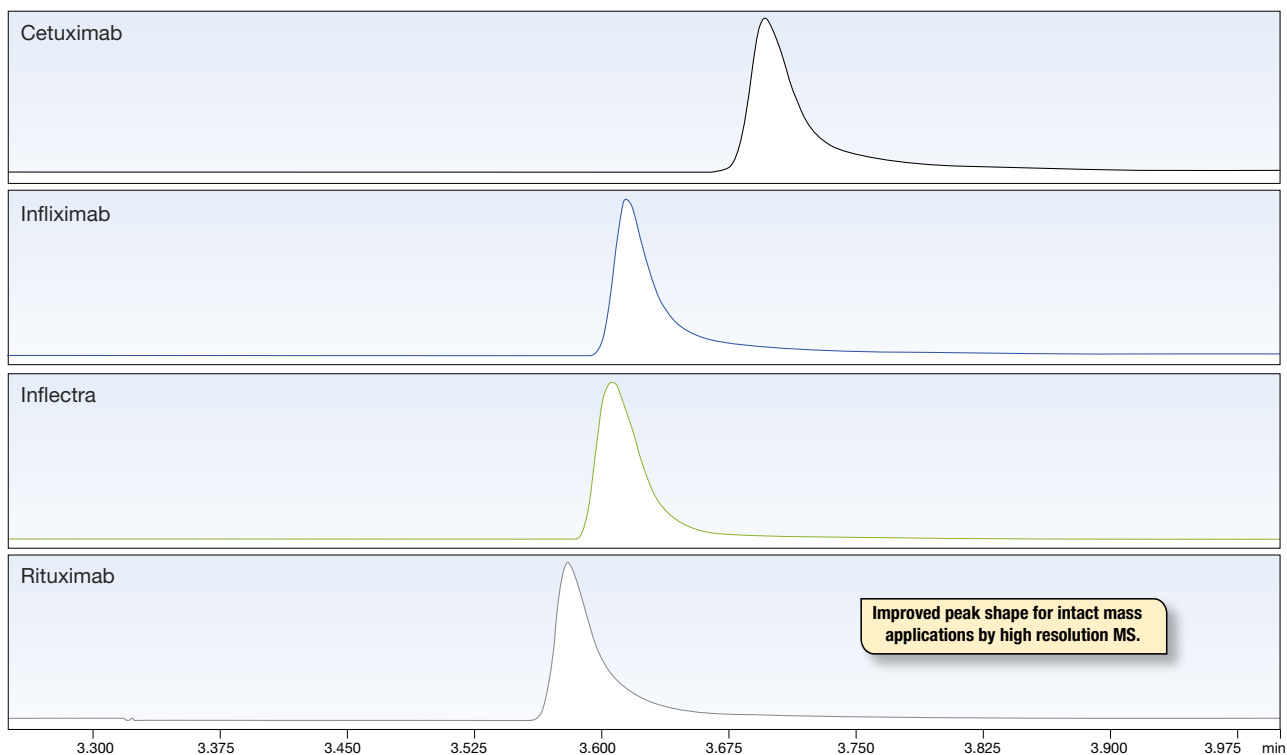
Biozen Columns (mm)							Biocompatible Guard Cartridges		
	50 x 2.1	100 x 2.1	150 x 2.1	250 x 2.1	50 x 4.6	150 x 4.6	for 2.1 mm	for 4.6 mm	Holder
Biozen 1.6µm Peptide PS-C18	<a href="#">00B-4770-AN</a>	<a href="#">00D-4770-AN</a>	<a href="#">00F-4770-AN</a>				/3pk <a href="#">AJ0-9803</a>	—	<a href="#">AJ0-9000</a>
Biozen 3µm Peptide PS-C18	<a href="#">00B-4771-AN</a>	—	<a href="#">00F-4771-AN</a>		<a href="#">00B-4771-E0</a>	<a href="#">00F-4771-E0</a>	/10pk <a href="#">AJ0-7605</a>	/10pk <a href="#">AJ0-7606</a>	<a href="#">KJ0-4282</a>
Biozen 1.7µm Peptide XB-C18	<a href="#">00B-4774-AN</a>	<a href="#">00D-4774-AN</a>	<a href="#">00F-4774-AN</a>				/3pk <a href="#">AJ0-9806</a>	—	<a href="#">AJ0-9000</a>
Biozen 2.6µm Peptide XB-C18	<a href="#">00B-4768-AN</a>	<a href="#">00D-4768-AN</a>	<a href="#">00F-4768-AN</a>	<a href="#">00G-4768-AN</a>	<a href="#">00B-4768-E0</a>	<a href="#">00F-4768-E0</a>	/3pk <a href="#">AJ0-9806</a>	/3pk <a href="#">AJ0-9808</a>	<a href="#">AJ0-9000</a>

## Intact and Subunit Analysis

Impurity profiling and characterization of intact biologic fragments is a challenging undertaking because of the need to identify very small differences between variants. Biozen WidePore C4 columns contain skillfully manufactured large pore core-shell particles that

provide narrower, taller peaks in conjunction with higher resolution between the target HC/LC, Fc/Fab, or isoforms and are ideal for large biologics to optimize analysis.

### Diverse mAb Comparison with Chromatographic Performance Suitable for Intact MS Analysis



App ID 25840

HPLC/UHPLC | BIOZEN | ANALYSIS OF BIOLOGICS

#### Conditions same for all samples:

**Column:** Biozen 2.6 μm WidePore C4  
**Dimensions:** 100 x 2.1 mm  
**Part No.:** [00D-4786-AN](#)  
**Mobile Phase:** A: 0.1 % Formic Acid in Water  
 B: 0.1 % Formic Acid in Acetonitrile  
**Gradient:**

Time (min)	% B
0	10
4	90

  
**Flow Rate:** 0.3 mL/min  
**Temperature:** 80 °C  
**Detection:** UV @ 280 nm  
**Sample:** mAbs, Various (1 mg/mL)

Sample	Retention Time (min)	Width @ (50%)
Rituximab	3.580	0.0233
Infliximab Biosimilar	3.606	0.0272
Cetuximab	3.696	0.0270
Infliximab	3.615	0.0222

### Ordering Information

Biozen Columns (mm)	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	Biocompatible Guard Cartridges		
								for 2.1 mm	for 4.6 mm	Holder
Biozen 2.6 μm WidePore C4	<a href="#">00B-4786-AN</a>	<a href="#">00D-4786-AN</a>	<a href="#">00F-4786-AN</a>	<a href="#">00B-4786-E0</a>	<a href="#">00D-4786-E0</a>	<a href="#">00F-4786-E0</a>	<a href="#">00G-4786-E0</a>	<a href="#">AJ0-9816</a>	<a href="#">AJ0-9818</a>	<a href="#">AJ0-9000</a>
Biozen 3.6 μm Intact XB-C8	<a href="#">00B-4766-AN</a>	<a href="#">00D-4766-AN</a>	<a href="#">00F-4766-AN</a>	<a href="#">00B-4766-E0</a>	—	<a href="#">00F-4766-E0</a>	—	<a href="#">AJ0-9812</a>	<a href="#">AJ0-9814</a>	<a href="#">AJ0-9000</a>

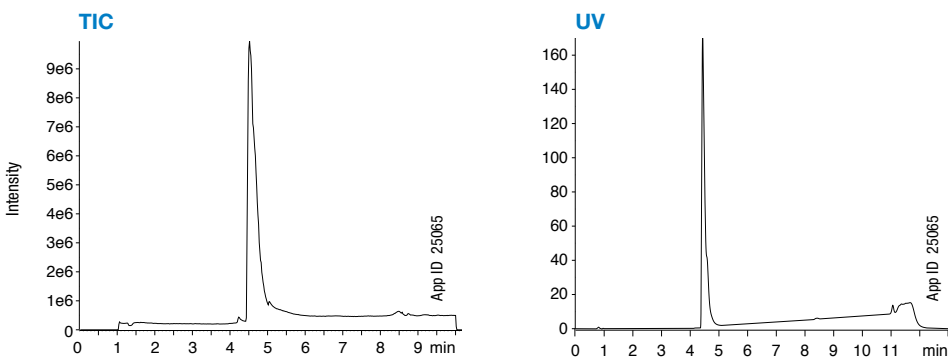


## Intact Mass

Mass spectrometric analysis of intact proteins provides pivotal information required by regulatory agencies to ensure protein drug efficacy. Analysis offers accurate molecular weight information about the protein as well as relative abundance of its isoforms. This information often serves as a benchmark for characterizing further

variabilities in PTMs, protein sequence, impurities and degradation products. Biozen WidePore C4 and Intact XB-C8 offer orthogonal selectivities for robust intact mass method development to facilitate fast run times and sharp peak shapes to maximize the information collected from MS characterization.

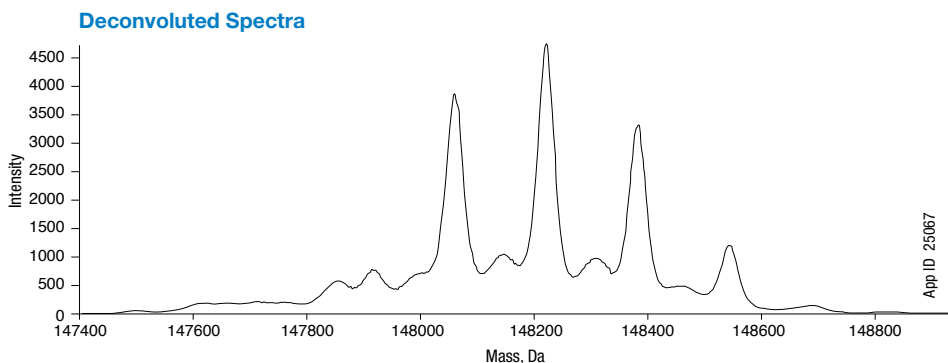
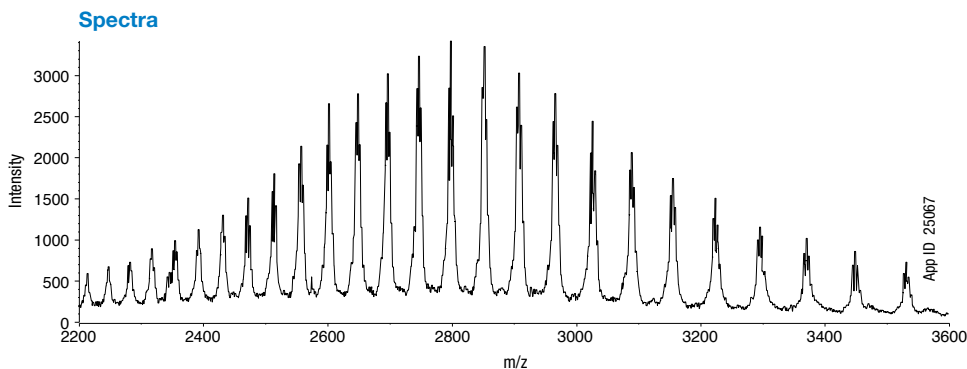
## Intact Mass of Trastuzumab Biosimilar using a Biozen Intact XB-C8 and SCIEX® X500B



**Columns:** Biozen 3.6 μm Intact XB-C8  
**Dimensions:** 150 x 2.1 mm  
**Part No.:** [00F-4766-AN](#)  
**Mobile Phase:** A: 0.1% Formic Acid in Water  
 B: 0.1% Formic Acid in Acetonitrile / Isopropyl alcohol (50:50)  
**Gradient:**

Time (min)	% B
2.5	20
10	65
10.1	95

**Flow Rate:** 0.3 mL/min  
**Temperature:** 90 °C  
**Detection:** QTOF (SCIEX X500B)  
**Sample:** Trastuzumab



### Ordering Information

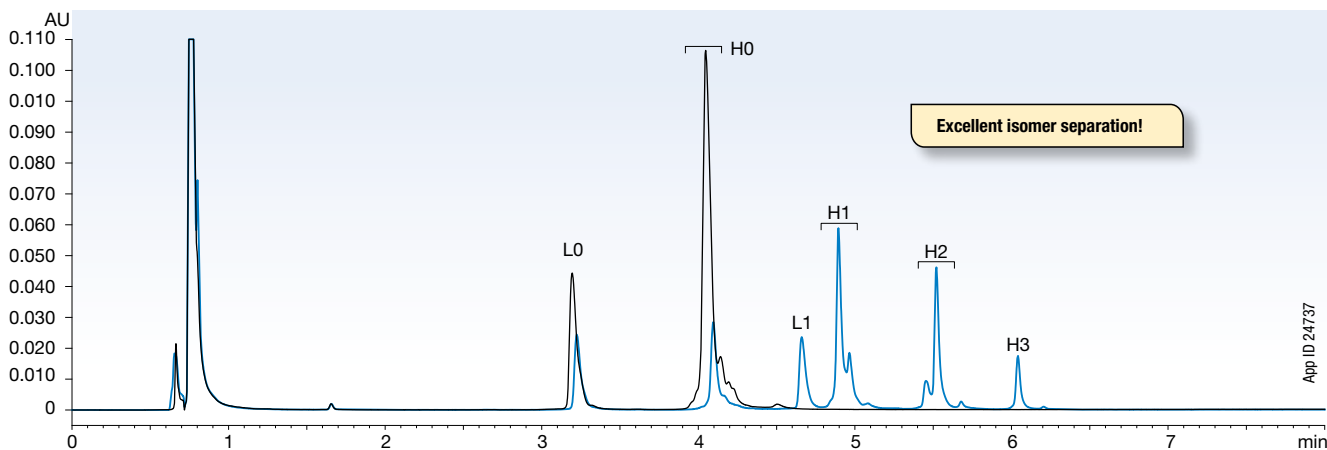
Biozen Columns (mm)	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	Biocompatible Guard Cartridges		
								for 2.1 mm	for 4.6 mm	Holder
Biozen 2.6 μm WidePore C4	<a href="#">00B-4786-AN</a>	<a href="#">00D-4786-AN</a>	<a href="#">00F-4786-AN</a>	<a href="#">00B-4786-E0</a>	<a href="#">00D-4786-E0</a>	<a href="#">00F-4786-E0</a>	<a href="#">00G-4786-E0</a>	<a href="#">AJ0-9816</a>	<a href="#">AJ0-9818</a>	<a href="#">AJ0-9000</a>
Biozen 3.6 μm Intact XB-C8	<a href="#">00B-4766-AN</a>	<a href="#">00D-4766-AN</a>	<a href="#">00F-4766-AN</a>	<a href="#">00B-4766-E0</a>	—	<a href="#">00F-4766-E0</a>	—	<a href="#">AJ0-9812</a>	<a href="#">AJ0-9814</a>	<a href="#">AJ0-9000</a>

## Drug Antibody Ratio (DAR)

The drug-to-antibody ratio of ADCs must be well understood to determine drug efficacy and safety. The Biozen Intact XB-C8 is an excellent solution for determining drug load distribution and DAR for cysteine conjugated mAbs. Its large pore size allows intact ADCs to interact with a moderately retentive stationary phase while the core-

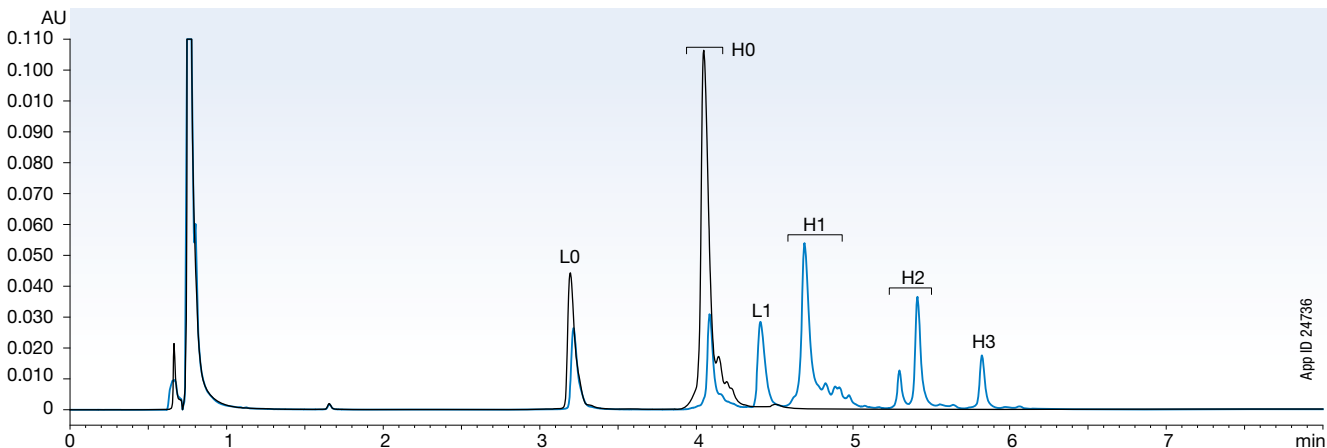
shell particle supplies increased efficiency. With the ease of reverse phase method development combined with the resolving power of a moderately retentive, core-shell particle stationary phase, Biozen Intact XB-C8 offers optimum separation and recovery between DAR species.

Herceptin—vcMMAE using Biozen 3.6 µm Intact XB-C8



App ID 24737

Herceptin—mcMMAF using Biozen 3.6 µm Intact XB-C8



App ID 24736



**Acknowledgment**  
We would especially like to thank Colin McKee and ADC Biotechnology LTD for their support and ADC samples for this application.



Find the conditions online at:  
[www.phenomenex.com/Biozen](http://www.phenomenex.com/Biozen)

### Ordering Information

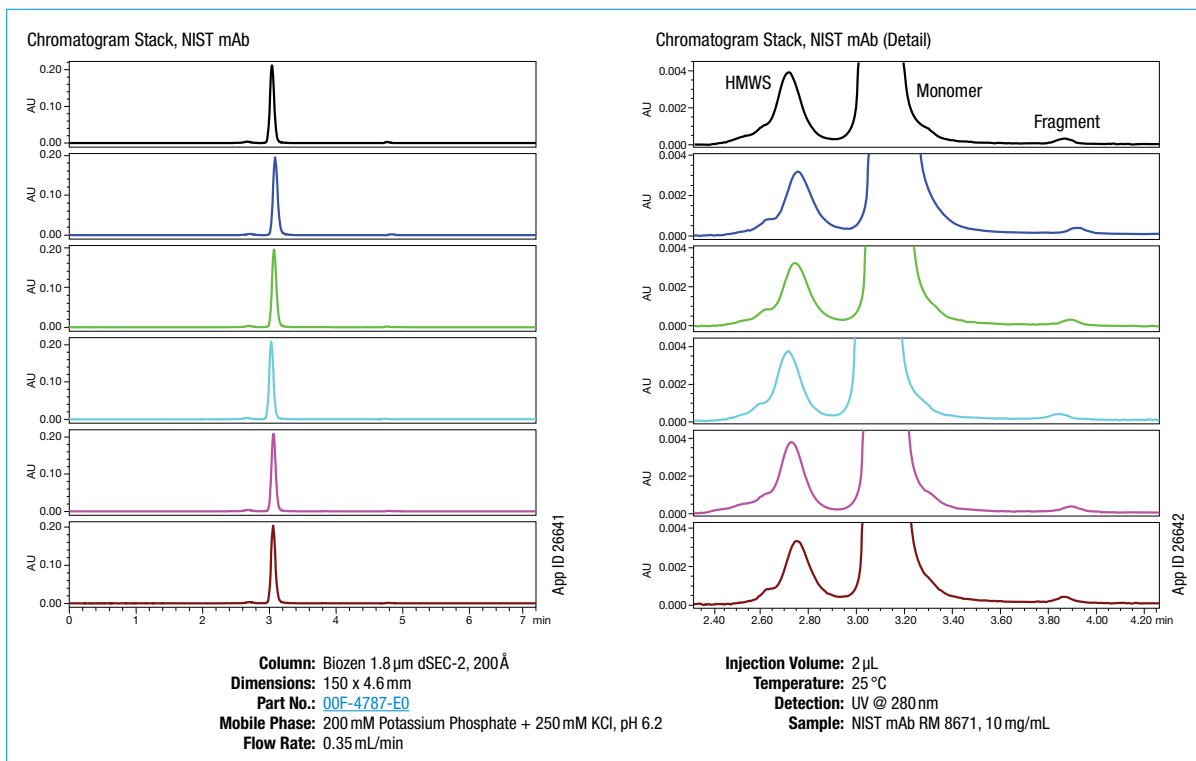
Biozen Columns (mm)	50 x 2.1	100 x 2.1	150 x 2.1	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	Biocompatible Guard Cartridges		
								for 2.1 mm	for 4.6 mm	Holder
Biozen 2.6 µm WidePore C4	<a href="#">00B-4786-AN</a>	<a href="#">00D-4786-AN</a>	<a href="#">00F-4786-AN</a>	<a href="#">00B-4786-EQ</a>	<a href="#">00D-4786-EQ</a>	<a href="#">00F-4786-EQ</a>	<a href="#">00G-4786-EQ</a>	<a href="#">AJ0-9816</a>	<a href="#">AJ0-9818</a>	<a href="#">AJ0-9000</a>
Biozen 3.6 µm Intact XB-C8	<a href="#">00B-4766-AN</a>	<a href="#">00D-4766-AN</a>	<a href="#">00F-4766-AN</a>	<a href="#">00B-4766-EQ</a>	—	<a href="#">00F-4766-EQ</a>	—	<a href="#">AJ0-9812</a>	<a href="#">AJ0-9814</a>	<a href="#">AJ0-9000</a>

## Bio QC Testing

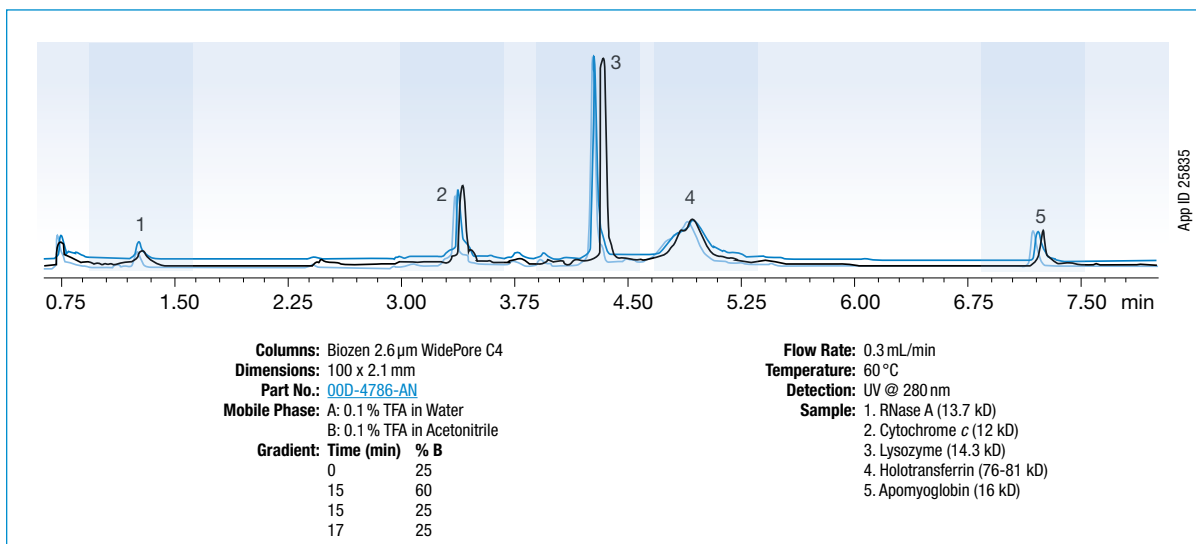
At every stage of our manufacturing and quality testing we keep you and your biologics analysis in mind. We initially focus on innovative products that will enhance workflows, then we work tirelessly to ensure that those products are reliably made time and time again. To further enrich the quality of these products, we assign very specific application-oriented testing protocols that properly mimic the conditions that you and other customers ultimately require.

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

### Chromatographic Results for NIST mAb, 6 Batch Robustness Assessment using Biozen 1.8 µm dSEC-2



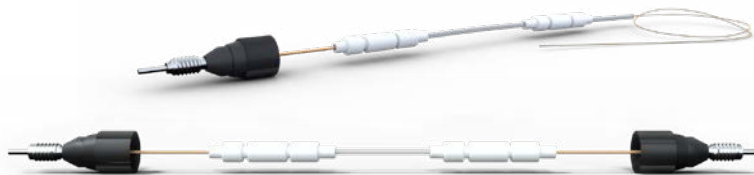
### Batch-to-Batch Results—Biozen 2.6 µm WidePore C4



## Biozen Nano LC Columns

Biozen Nano Columns offer a powerful combination of an advanced particle platform, three unique column chemistries, and fully integrated SecurityLINK™ Fitting Technology for a zero dead-volume connection.

- **Integrated SecurityLINK fittings for easy installation and leak-free connections (Now with double-ended SecurityLINK)**
- **Maximized resolution for improved protein/peptide identification**
- **Increased robustness and sensitivity**



## Core Shell Technology

- **High Efficiency**
- **Excellent Inertness**
- **Increased Sensitivity**
- **Exceptional Quality and Robustness**



## 3 Unique Nano Chemistries and Growing!

Peptide	Polar
<p><b>Biozen Peptide PS-C18</b> Excellent retention by combined positively charged surface ligand and C18 ligand.</p>	<p><b>Biozen Polar C18</b> Enhanced selectivity / retention for polar analytes without diminishing useful non-polar retention</p>
<p><b>Biozen Peptide XB-C18</b> Overall retention of both acidic and basic peptides through C18 stationary phase with di-isobutyl side chains.</p>	

## Material Characteristics

Biozen Nano Phases	Particle Size (µm)	Pore Size (Å)	Effective Surface Area (m <sup>2</sup> /g)	pH Stability	Temp (°C)	Pressure (psi)
Peptide XB-C18	2.6, 5	100	200	1.5-9	90	15,000
Peptide PS-C18	2.6	100	200	1.5-8.5	60	15,000
Polar C18	2.6	100	200	1.5-8.5	60	15,000

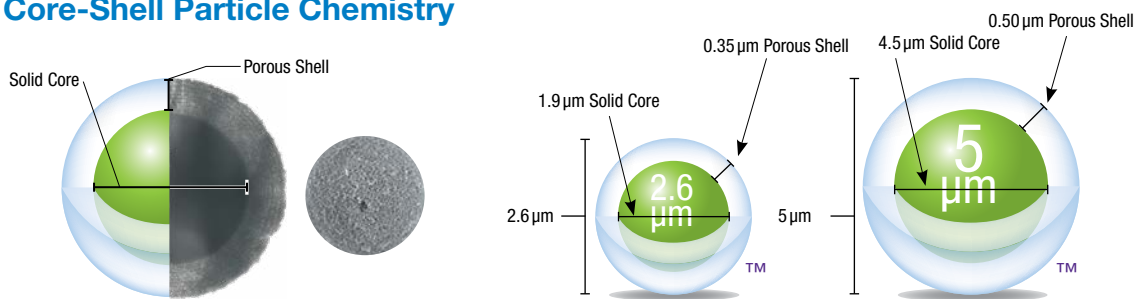
Chat with a live technical expert to learn about our Biozen Nano Connections that are available [www.phenomenex.com/chat](http://www.phenomenex.com/chat)



## Advanced Core-Shell Particle in Nano Format

The Biozen Nano columns utilize core-shell particles with a highly consistent morphology that minimizes band broadening associated with diffusion and mass transfer, leading to higher efficiency and minimal peak widths, which enhances the separation for omics analysis.

## Core-Shell Particle Chemistry



<b>High Efficiency Core-Shell Particle</b> Using a rigorous core construction process, a uniform porous silica layer is grown around the spherical solid silica core. This unique combination of precise particle architecture and particle size provides dramatic leaps in performance.	Fully Porous	VS	Biozen Nano Core-Shell	Average Efficiency Gain with Biozen Nano Core-Shell
	5 μm		5 μm	90% Higher
	3 μm		2.6 μm	85% Higher
	1.7 μm		2.6 μm	Equivalent Efficiency

## Better Performance than Fully Porous Particles

Core-Shell Technology provides extremely high efficiencies for omics analysis. Industry leading column packing technology in combination with high particle consistency produces highly reproducible columns that generate greater performance compared to

fully porous particles. This ultra-high efficiency can be leveraged to achieve increased resolution, improved sensitivity, and higher productivity.

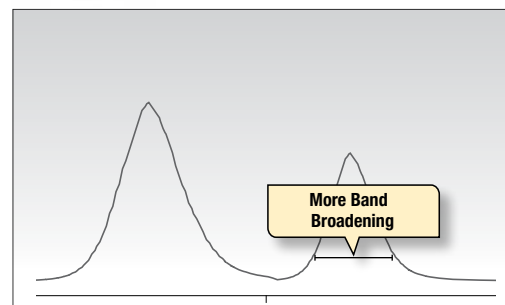
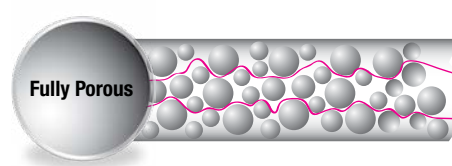
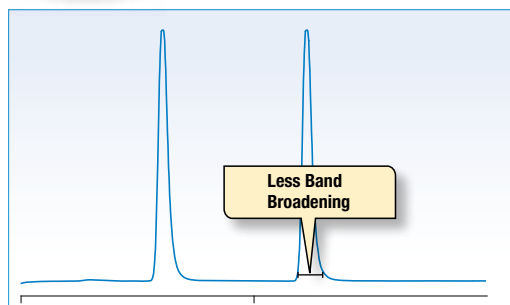
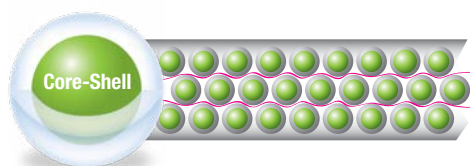
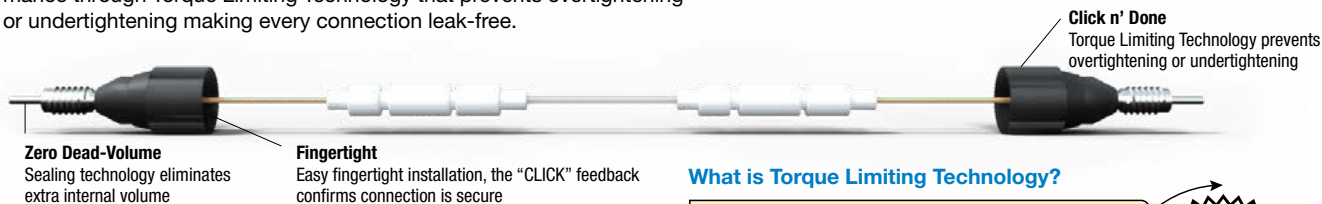


Illustration - not actual test data

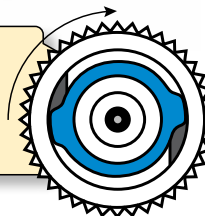
## Zero Dead-Volume Nano LC Connections in a CLICK

Biozen Nano's fully integrated SecurityLINK™ fingertight fitting system simplifies your system connections while providing consistent performance through Torque Limiting Technology that prevents overtightening or undertightening making every connection leak-free.

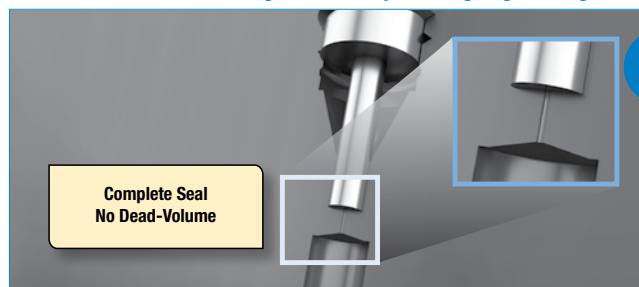


### What is Torque Limiting Technology?

Once the perfect connection has been made through fingertightening, the SecurityLINK fitting offers a haptic "CLICK" to confirm that optimum torque has been reached. This ensures a consistent connection each and every time and prevents over or undertightening that may cause column performance issues.



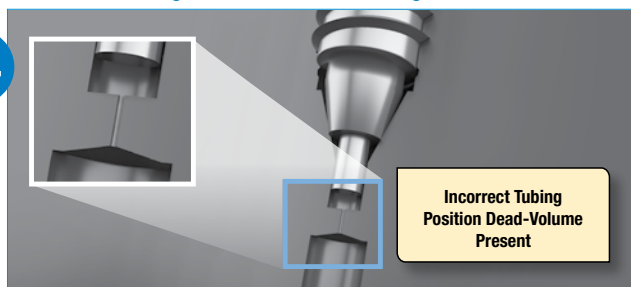
### Biozen Nano Column with Integrated SecurityLINK Fingertight Fittings



Complete Seal  
No Dead-Volume

VS.

### Nano Columns using Standard Nut Ferrule Fittings



Incorrect Tubing  
Position Dead-Volume  
Present

## Biozen Nano LC Columns with Integrated SecurityLINK™ Fitting

### Ordering Information

Biozen Nano LC Columns (mm)			
Phases	150 x 0.075 mm	250 x 0.075 mm	500 x 0.075 mm
Biozen 2.6 µm Peptide PS-C18	<a href="#">00F-4797-AW-21</a>	<a href="#">00G-4797-AW-21</a>	—
Biozen 2.6 µm Peptide XB-C18	<a href="#">00F-4768-AW-21</a>	<a href="#">00G-4768-AW-21</a>	<a href="#">00J-4768-AW-21</a>
Biozen 2.6 µm Polar-C18	<a href="#">00F-4796-AW-21</a>	<a href="#">00G-4796-AW-21</a>	—
Biozen 5 µm Peptide XB-C18	—	—	<a href="#">00J-4792-AW-21</a>



## Biozen Nano LC Columns with Double SecurityLINK™ Fitting

### Ordering Information

Biozen Nano LC Columns (mm)			
Phases	150 x 0.075 mm	250 x 0.075 mm	500 x 0.075 mm
Biozen 2.6 µm Peptide PS-C18	<a href="#">00F-4797-AW-22</a>	<a href="#">00G-4797-AW-22</a>	—
Biozen 2.6 µm Peptide XB-C18	<a href="#">00F-4768-AW-22</a>	<a href="#">00G-4768-AW-22</a>	<a href="#">00J-4768-AW-22</a>
Biozen 2.6 µm Polar-C18	<a href="#">00F-4796-AW-22</a>	<a href="#">00G-4796-AW-22</a>	—
Biozen 5 µm Peptide XB-C18	—	—	<a href="#">00J-4792-AW-22</a>



## Biozen Nano LC Columns with Open Fused-Silica Inlet Fitting

### Ordering Information

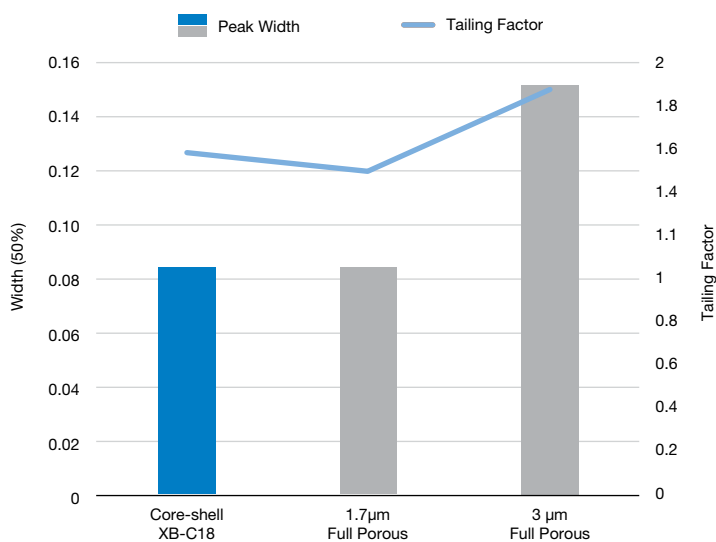
Biozen Nano LC Columns (mm)			
Phases	150 x 0.075 mm	250 x 0.075 mm	500 x 0.075 mm
Biozen 2.6 µm Peptide PS-C18	<a href="#">00F-4797-AW-11</a>	<a href="#">00G-4797-AW-11</a>	—
Biozen 2.6 µm Peptide XB-C18	<a href="#">00F-4768-AW-11</a>	<a href="#">00G-4768-AW-11</a>	—
Biozen 2.6 µm Polar-C18	<a href="#">00F-4796-AW-11</a>	<a href="#">00G-4796-AW-11</a>	—
Biozen 5 µm Peptide XB-C18	—	—	<a href="#">00J-4792-AW-11</a>



## Robust Performance for Low-Flow Analysis

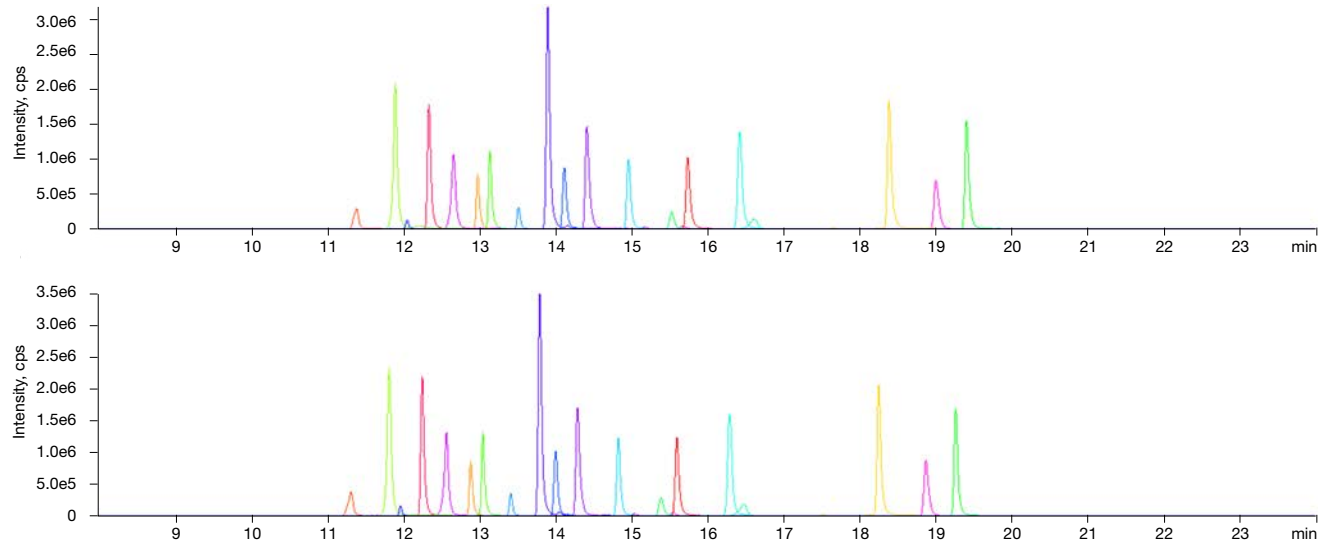
Peak widths and tailing factors obtained from a mixture of 20 isotopically labeled peptides injected on columns packed with Biozen 2.6  $\mu\text{m}$  core-shell Peptide XB-C18, Thermo Fisher® Acclaim™ PepMap™ 100 nanoViper™ 3  $\mu\text{m}$  fully porous C18, and Waters® nanoEase® M/Z Peptide BEH 1.7  $\mu\text{m}$  fully porous C18 particles, respectively

### Minimum Peak Widths with Nano Core-Shell



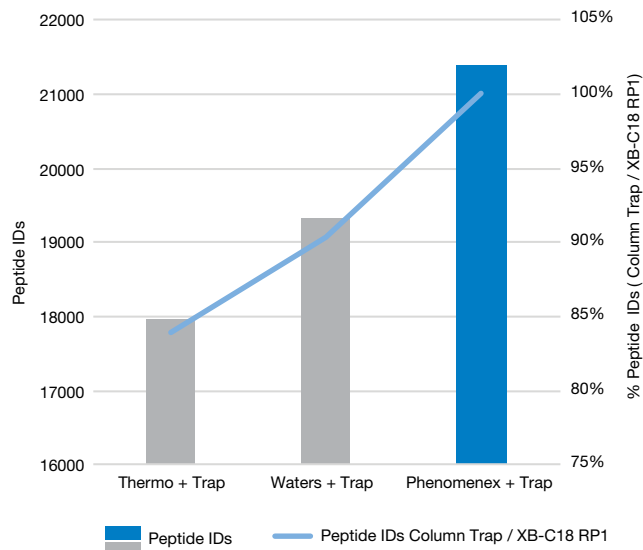
### Reproducible Performance

Extracted Ion chromatograms of injection 1 and 100 from a mixture of 20 isotopically labeled peptides run on a Biozen 2.6  $\mu\text{m}$  Peptide XB-C18 150 x 0.075 mm column.

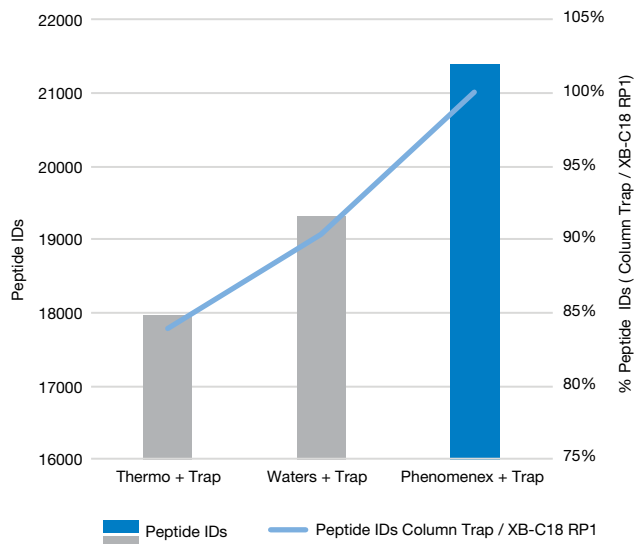


## Robust Column Performance

Number of proteins and peptides that were identified on a nano LC-MS analysis of a digested HeLa sample using a Thermo Fisher® Acclaim™ PepMap™ 100 nanoViper™ 3 μm C18, Waters® nanoEase® M/Z Peptide BEH 1.7 μm C18, and Biozen 2.6 μm Peptide XB-C18,



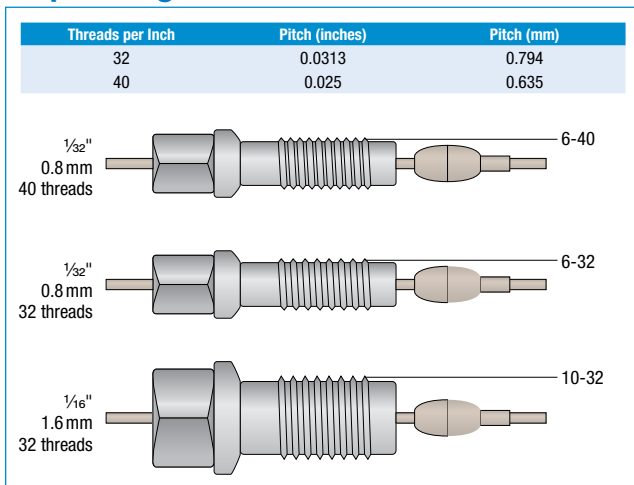
in trap and elute mode with Thermo Fisher Acclaim PepMap nano-Viper, Waters nanoEase M/Z Symmetry C18, and Nano Trap RP-1 (General RP) traps, respectively.



## Complementary Nano LC Column and Trap Selectivity

Similar to analytical scale LC, the performance and optimization of your separation is directly affected by the chosen stationary phase. By utilizing different combinations of column and trap selectivities you can positively alter relative recovery and separation performance

### Trap Fitting Guide



**!** The installation of an improper nut could potentially cause cross-threading or damage to the port and fitting. Verify fit: Traps are available for 1/16" connections (10-32 thread) or with 1/32" connections (6-40 or 6-32 thread).

Phenomenex



### Nano Trap Columns

#### Ordering Information

Trap Columns (mm)	Phases	10 x 0.075	Unit
RP-1 (General RP)		<a href="#">05N-4252-AW</a>	3/pk
RP-2 (Aqueous Stable RP)		<a href="#">05N-4754-AW</a>	3/pk

### Fittings

#### Ordering Information

Trap Fittings	Part No.	Description	Unit
	<a href="#">AQO-7602</a>	PEEKlok™ fittings with 6-40 thread for 1/32" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
	<a href="#">AQO-7603</a>	PEEKlok fittings with 6-32 thread for 1/32" OD tubing (2 x fittings, 6 x ferrules and 1 x tightening tool)	ea
	<a href="#">AQO-7600</a>	PEEKlok fittings with 10-32 thread for 1/16" OD tubing with low profile hex head (2 x fittings, 6 x ferrules and 1 x wrench)	ea



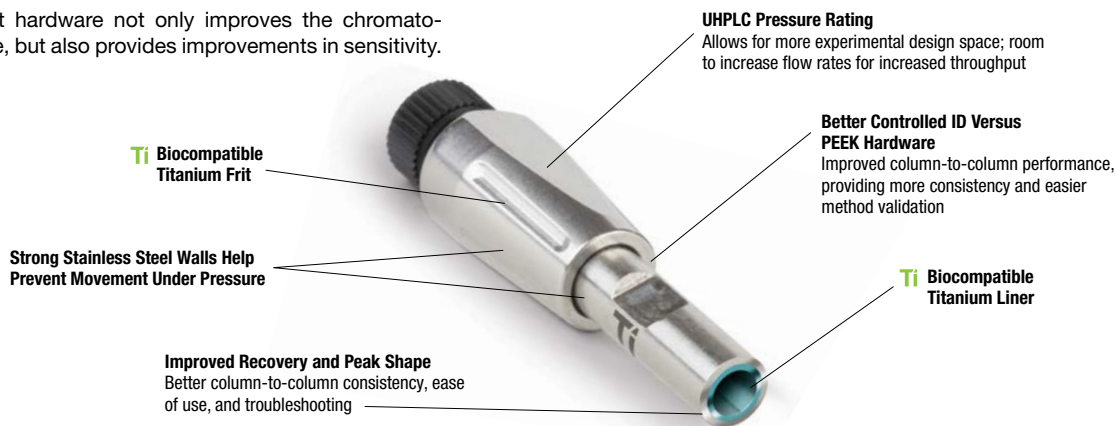
## Biozen High pH Fractionation Column

### Bio-Inert Hardware

The Biozen High pH Fractionation HPLC Column provides superior performance with its titanium hardware which minimizes nonspecific adsorption resulting in increased confidence in your peptide identifications.

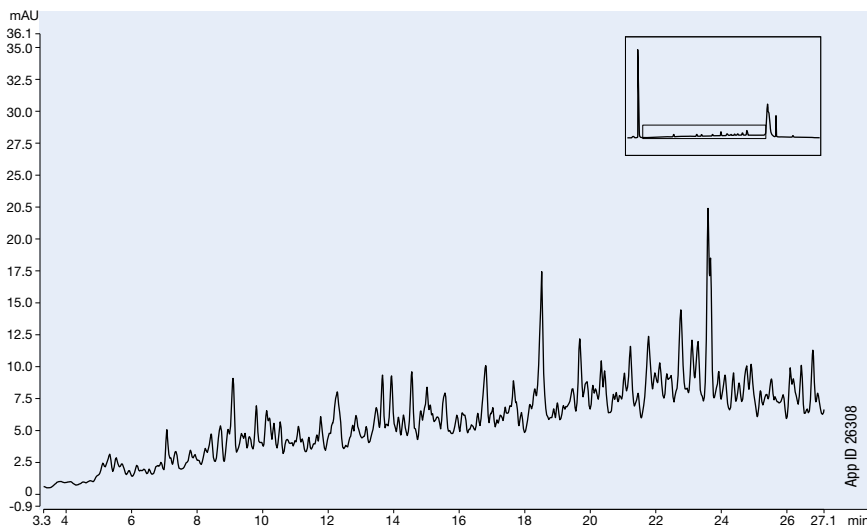
### Inside the Biozen Biocompatible Hardware Difference

The use of bio-inert hardware not only improves the chromatographic performance, but also provides improvements in sensitivity.



## Deep Proteome Coverage on HeLa Lysate using a Biozen Fractionation Column for High pH

UV trace of a 30 minute basic pH reversed phase separation using 100 µg of HeLa tryptic digest.



#### Fractionation LC Conditions

**Column:** Biozen 3 µm High pH Fractionation Column  
**Dimensions:** 150 x 2.1 mm  
**Part No.:** [00F-4793-AN](#)  
**Pressure (bar):** 150 bar  
**Mobile Phase:** A: 10 mM Ammonium formate in Water  
 B: 10 mM Ammonium formate in 90 % Acetonitrile and 10 % Water  
**Gradient:**

Time (min)	% B
0	1
1	1
25	25
27	60
28	70
33	70
34	1

**Flow Rate:** 300 µL/min  
**Injection Volume:** 100 µL  
**Temperature:** 50 °C  
**LC System:** Vanquish™ Flex UHPLC  
**Detection:** UV @ 280 nm  
**µg on Column:** 100 µg

## High pH Fractionation Column

### Ordering Information

Fractionation Column		
Part Number	Description	Dimension
00F-4793-AN	Biozen 3 µm High pH Fractionation Column	150 x 2.1 mm



## Guaranteed Replacement to $\mu$ Bondapak®

- Highly reproducible
- Long column life
- Mimics performance of Waters®  $\mu$ Bondapak®

Phenomenex Bondclone columns have been developed to provide chromatographic behavior that mimics that of Waters  $\mu$ Bondapak 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 $\mu$ m	296.0 m <sup>2</sup> /g	1.1 cc/g	148.7 Å

\*Single point total pore volume.

\*\*Average pore diameter (4V/A by BET).

Data provided by an independent laboratory.

### Ordering Information and Cross-Reference Chart

Ordering Information and Cross-Reference Chart				SecurityGuard™ Cartridges (mm)
Waters		Phenomenex		4 x 3.0
Description (mm)	Part No.	Part No.	Description (mm)	/ 10pk
$\mu$ Bondapak C18 300 x 3.9	WAT027324	<a href="#">00H-2117-C0</a>	Bondclone C18 300 x 3.9	<a href="#">AJ0-4287</a>
$\mu$ Bondapak C18 150 x 3.9	WAT086684	<a href="#">00F-2117-C0</a>	Bondclone C18 150 x 3.9	<a href="#">AJ0-4287</a>
—	—	<a href="#">00G-2117-E0</a>	Bondclone C18 250 x 4.6	<a href="#">AJ0-4287</a>
$\mu$ Bondapak C18 Radial-Pak Cartridge 100 x 8	WAT085721	<a href="#">00D-2117-L0</a>	Bondclone C18 100 x 8 (S.S. Column)	<a href="#">AJ0-4287</a>
$\mu$ Bondapak Phenyl 300 x 3.9	WAT027198	<a href="#">00H-3129-C0</a>	Bondclone Phenyl <sup>†</sup> 300 x 3.9	<a href="#">AJ0-4351</a>
—	—	<a href="#">00H-3127-C0</a>	Bondclone CN 300 x 3.9	<a href="#">AJ0-4305</a>
$\mu$ Bondapak NH <sub>2</sub> 300 x 3.9	WAT084040	<a href="#">00H-3128-C0</a>	Bondclone NH <sub>2</sub> 300 x 3.9	<a href="#">AJ0-4302</a>
$\mu$ Porasil Silica 300 x 3.9	WAT02 7477	<a href="#">00H-2119-C0</a>	Bondclone Silica 300 x 3.9	<a href="#">AJ0-4348</a>

<sup>†</sup>Bondclone phenyl phase uses a different silica than other phases in the Bondclone series.

for ID: 3.2-8.0 mm

SecurityGuard™ Analytical Cartridges require universal holder Part No.: [KJ0-4282](#)

### Guard Column

Size (mm)	C18
Conventional Guard Column 30 x 3.9	<a href="#">03A-2117-C0</a>

- **High enantioselectivity**
- **Fast run times**
- **Rugged, long-lived columns**
- **Easy scale-up to preparative**
- **Allow direct/indirect resolution of enantiomeric amines, amino acids, hydroxy acids, alcohols, carboxylic acids, ketones, ethers, and esters**



Hundreds of applications demonstrate the performance of Chirex phases for a multitude of pharmaceutical and agrochemical compounds. For a complete list, please contact your Phenomenex technical consultant.

Chiral separations are extremely important to the pharmaceutical and biotechnology industries, as well as most other areas of natural products chemistry. Optically active therapeutic drugs require selective and sensitive techniques. Government regulations also continue to spur and require the development of rapid, accurate and reproducible methods for the analysis and purification of enantiomeric compounds.

The challenge is to provide selective yet versatile HPLC columns for both trace analysis and the purification of bulk drug.

Phenomenex meets these challenges with Chirex brand HPLC columns. Chirex is available in 7 different stationary phases. These chemically rugged, versatile columns are used for the direct and indirect resolution of enantiomeric amines, alcohols, carboxylic acids, hydroxy acids, amino acids, ketones, lactones, ethers, esters, and other biologically active compounds.

## Which Chirex Stationary Phase?

Stationary phase selection depends on presence/absence of chemical groupings in the chiral molecule.

### Chirex Column Selection Guide

Presence of Chemical Groupings in Chiral Molecule							Recommended Columns:	
Class	Aromatic	-N-	-COOH	-OH	Other	Comment	First Choice	Second Choice
Group 1	Y	Y	Y			Aromatic 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. 301

### 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	<a href="#">00B-3014-E0</a>
3020	(S)-LEU and (R)-NEA	Covalent	Urea	<a href="#">00B-3020-E0</a>
3126	(D)-Penicillamine	Ion-Metal	Lig Exchange	<a href="#">00B-3126-E0</a>



Preparative Columns and Bulk Media are available in 15 and 30 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. 425

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	<a href="#">00F-3001-E0</a>	—	—
3011	(S)-LEU and DNAN	Covalent	Urea	—	<a href="#">00G-3011-E0</a>	—
3014	(S)-VAL and (R)-NEA	Covalent	Urea	—	<a href="#">00G-3014-E0</a>	—
3019	(S)-LEU and (S)-NEA	Covalent	Urea	—	<a href="#">00G-3019-E0</a>	—
3020	(S)-LEU and (R)-NEA	Covalent	Urea	—	<a href="#">00B-3020-E0</a>	—
3022	(S)-ICA and (R)-NEA	Covalent	Urea	<a href="#">00F-3022-E0</a>	<a href="#">00G-3022-E0</a>	—
3126	(D)-Penicillamine	Ion-Metal	Lig Ex	<a href="#">00F-3126-E0</a>	<a href="#">00G-3126-E0</a>	<a href="#">03A-3126-E0</a>



## Chiral HPLC of Amino Acids

- Pirkle-concept and Ligand Exchange type columns
- High enantioselectivity
- Excellent efficiency

Chirex HPLC columns are an excellent choice for underivatized and derivatized amino acids.

### Separations of Amino Acid Derivatives

Compound	Chirex Phase	Separation Factor ( $\alpha$ )	App ID No.
<b>N-FMOC Derivatives (9-Fluorenylmethyloxycarbonyl)</b>			
N-FMOC-Leucine	3011	1.20	13800
N-FMOC-Phenylalanine	3011	1.10	13796
N-FMOC-Valine	3011	1.12	13798
<b>Z-Derivatives (Benzyloxycarbonyl)</b>			
Z-Alanine	3011	1.16	13729
Z-Leucine	3011	1.17	13731
Z-Norvaline	3011	1.13	13755
Z-Serine	3011	1.09	13758
Z-Valine	3011	1.13	13753
<b>N-Acetyl Derivatives</b>			
N-Acetylalanine	3126	1.17	14052
N-Acetylleucine	3126	1.39	14058
N-Acetylmethionine	3126	1.27	13728
N-Acetylvaline	3126	1.50	14055
<b>N-Formyl Derivatives</b>			
N-Formylvaline	3126	1.37	13721
N-Formylmethionine	3126	1.25	13722
<b>N-Dansyl Derivatives (5-5-Dimethyl-aminonaphthalene-1-sulfonyl derivative)</b>			
N-Dansylnorvaline	3011	1.24	13766
N-Dansylphenylalanine	3011	1.27	13771
N-Dansylvaline	3011	1.28	13763
<b>PTH Derivatives (Phenylthiohydantoin)</b>			
PTH-Valine	3014	1.12	13921



Separation potential of some other amino acid derivatives:  
 (Recommended columns: Chirex 3011, 3014)  
 CBZ-Derivatives (carbobenzoxy; benzyloxycarbonyl);  
 IC-Derivatives (phenylisocyanate);  
 Dabsyl Derivatives (4-4-dimethylaminoazobenzene-4'-sulfonyl)

### Separations of Underivatized "Free" Amino Acids

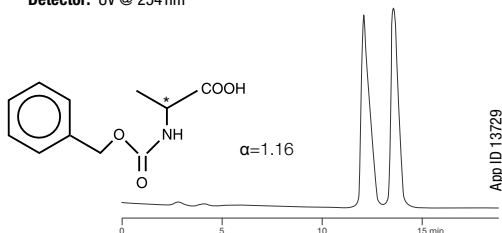
Compound	Chirex Phase	Separation Factor ( $\alpha$ )	App ID No
Alanine	3126	1.66	14004
Alanylglycine	3126	2.26	14080
Alanylglycyl-glycine	3126	1.62	14082
Alloisoleucine	3126	1.67	14038
Allothreonine	3126	1.19	14046
Arginine	3126	2.15	14027
Asparagine	3126	1.10	14049
Aspartic acid	3126	1.42	14019
Baclofen	3126	1.23	13785
p-Boronophenylalanine	3126	1.36	13790
2-amino-n-Butyric acid	3126	1.80	14034
Cystine	3126	2.47	14085
2,6-Diaminopimelic acid	3126	2.77	14066
3-(3,4-Dihydroxyphenyl)-alanine (DOPA)	3126	1.22	13750
Glutamic acid	3126	1.11	14047
Glutamine	3126	1.71	14022
Glycylalanine	3126	1.78	14079
Glycylvaline	3126	1.69	14081
Histidine	3126	1.32	13745
Isoleucine	3126	1.70	14035
Leucine	3126	1.56	14009
Leucylglycyl-glycine	3126	1.36	14083
Lysine	3126	1.83	14018
Methionine	3126	1.42	14024
a-Methyl Leucine	3126	1.59	14457
a-Methyl Tryptophan	3126	1.18	14456
Naphthylglycine	3126	1.42	13789
Norvaline	3126	1.95	14029
Ornithine	3126	1.38	14041
Phenylalanine	3126	1.44	13740
Phenylglycine	3126	1.78	13748
Pipecolic acid	3126	1.77	14031
Proline	3126	2.50	14011
Serine	3126	1.17	14016
Threonine	3126	1.20	14043
dl-Threo-3-phenylserine	3126	1.15	13787
Tryptophan	3126	1.11	13737
Tyrosine	3126	1.34	13743
Valine	3126	1.91	14006



Alpha ( $\alpha$ )= Separation Factor =  $k_2/k_1$

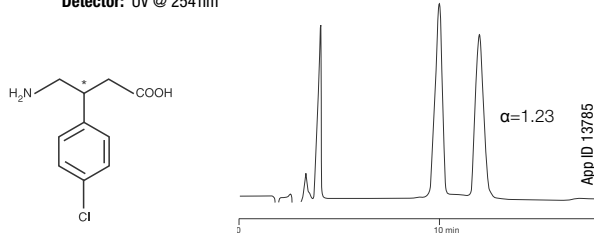
#### Z-Alanine

**Column:** Chirex 3011  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3011-DO  
**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-EO  
**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

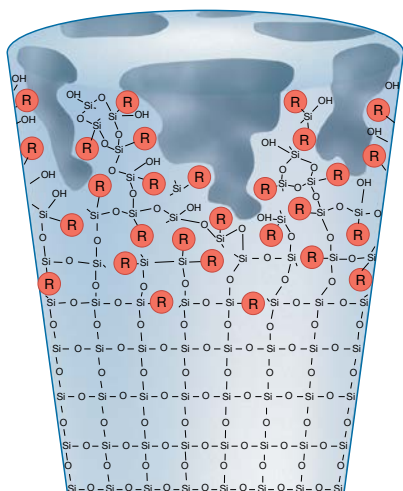
Phase	Description	USP Classification
NX-C18	The most rugged Gemini column, offering 5 times the durability of previous generation hybrid columns	L1
C6-Phenyl	A low bleed phenyl phase. For UV and MS detection, which offers an aromatic selectivity complementary to C18 phases	L11
C18	Selectivity, high structural integrity and increased loadability for preparative and purification applications in pre-packed columns and bulk media	L1



### TWIN™ (Two-In-One) Technology

#### Gemini C18 and C6-Phenyl

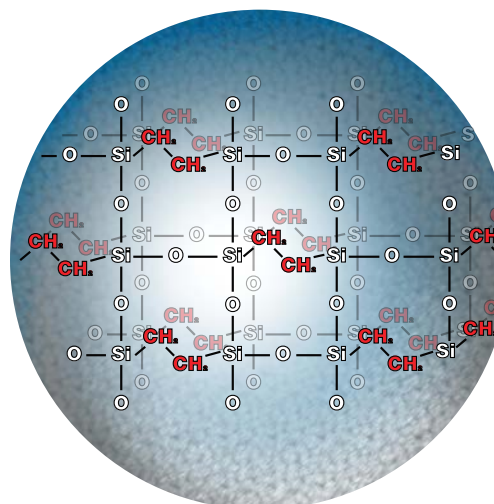
During the final stage of silica manufacturing a unique silica-organic layer is grafted to create a completely new composite particle. Since the internal base silica is unaltered by this manufacturing process, the particle retains its mechanical strength and rigidity along with excellent efficiency,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



# Gemini™ pH Flexible LC Columns

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

## Gemini NX-C18

- pH stable 1-12 for durability
- Consistent performance in both volatile and non-volatile buffers
- High sample loading capacity for metabolite identification and preparative purification

### Gemini NX-C18

USP: L1

LC-MS Certified

**pH Stability:** 1.0 – 12.0

Particle Size: 3 µm, 5 µm, and 10 µm

Phase: C18

Application: Small molecules, basic compounds

Strength: Extremely durable pH stable particle

Pore Size (Å): 110

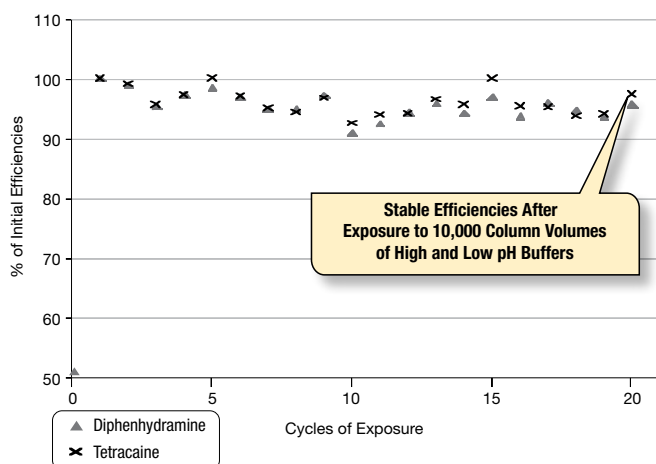
Surface Area (m<sup>2</sup>/g): 375

Carbon Load %: 14

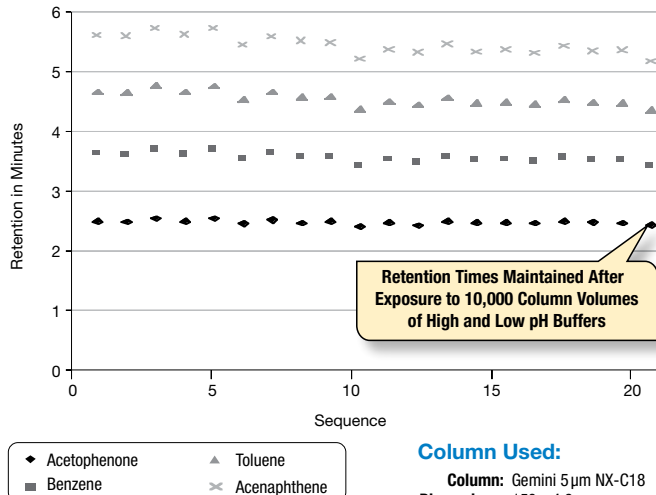
End Capping: TMS

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

Column Efficiencies Maintained in High Testing for 20 Cycles



## Retention Times of Four Probes Maintained in Neutral pH Testing for 20 Cycles



### Column Used:

Column: Gemini 5 µm NX-C18  
Dimensions: 150 x 4.6 mm  
Part No.: 00F-4454-E0

## Column Testing Cycle

### Step 1

#### 24x High pH Flush Procedures

**Mobile Phase:** A: 10 mM Ammonium Bicarbonate pH 10.5  
B: Acetonitrile

**Gradient:** 5% to 95% B in 6 min Hold at 95% B for 2 min

**Re-equilibrate:** 5% B for 2 min

**Flow Rate:** 1.5 mL/min

### Step 2

#### High pH Testing

**Isocratic:** 10 mM Ammonium Bicarbonate pH 10.5 / Acetonitrile (50:50)

**Flow Rate:** 1.5 mL/min

**Detection:** UV @ 230 nm

**Samples:** 1. Tetracaine  
2. Diphenhydramine

### Step 3

#### 1x Neutral Flush Procedure

**Mobile Phase:** A: Water  
B: Acetonitrile

**Gradient:** 5% B for 2 min

5% to 100% B in 3 min Hold at 100% B for 5 min

**Flow Rate:** 1.5 mL/min

### Step 4

#### Neutral pH Testing

**Isocratic:** Water / Acetonitrile (35:65)

**Flow Rate:** 1.0 mL/min

**Detection:** UV @ 254 nm

**Samples:** 1. Acetophenone  
2. Benzene  
3. Toluene  
4. Acenaphthene

### Step 5

#### 24x Low pH Flush Procedure

**Mobile Phase:** A: 0.5% Formic Acid in Water  
B: 0.5% Formic Acid in Acetonitrile, pH 2.0

**Gradient:** 5% to 95% B in 6 min

Hold at 95% B for 2 min

**Re-equilibrate:** 5% B for 2 min

**Flow Rate:** 1.5 mL/min

### Step 6

Neutral pH Flush Repeats  
Repeats for 20 Cycles



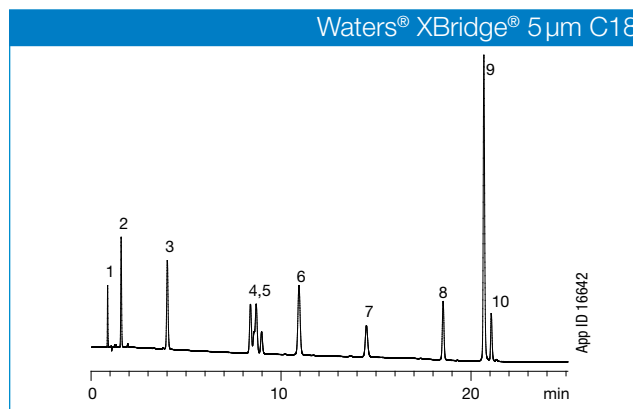
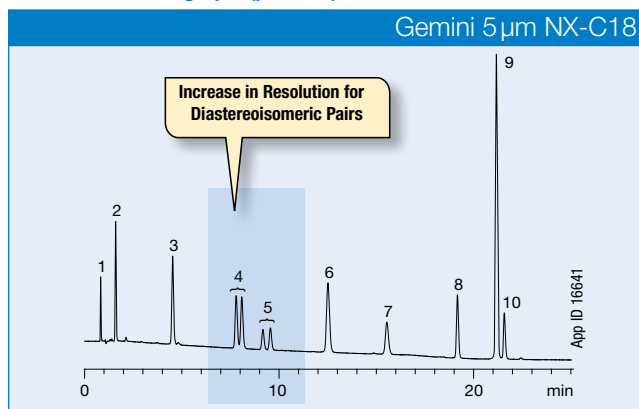
HPLC/UHPLC | GEMINI

# Gemini™ pH Flexible LC Columns

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

## Gemini NX-C18 (cont'd)

### Polar Bases at High pH (pH 10.5)



Y-axis normalized for all chromatograms.

### Polar Bases (Beta Blockers) at High pH

Conditions for all columns:

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** A: 10 mM Ammonium Bicarbonate pH 10.5  
B: Acetonitrile

**Gradient:** A/B (85:15) to (70:30) in 15 min to (50:50) in 5 min, Hold for 5 min

**Flow Rate:** 1.5 mL/min

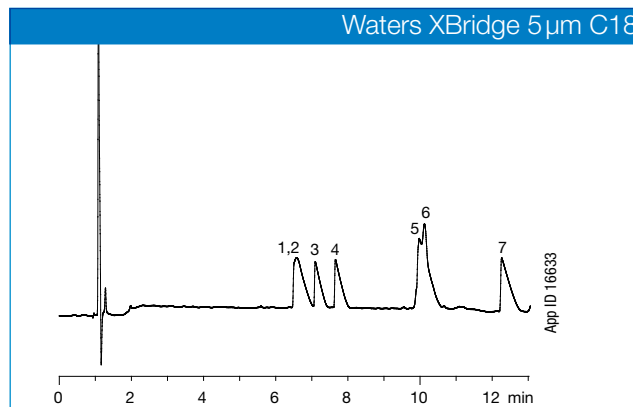
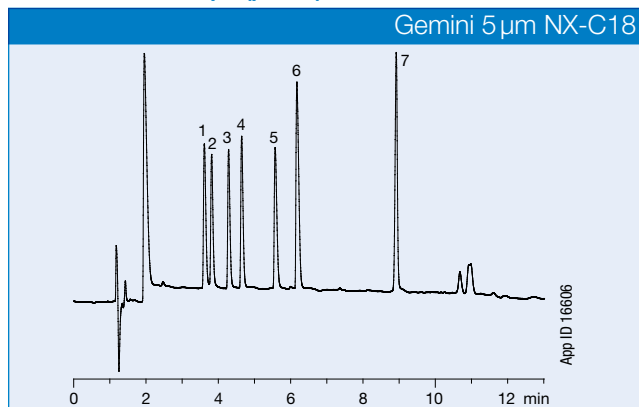
**Temperature:** Ambient

**Detection:** UV @ 230 nm

- Sample:**
1. Bisoprolol Contaminant
  2. Sotalol
  3. Atenolol
  4. Labetalol (Diastereoisomeric Pair)
  5. Nadolol (Diastereoisomeric Pair)
  6. Pindolol
  7. Metoprolol
  8. Bisoprolol
  9. Propranolol
  10. Alprenolol



### Polar Bases at Low pH (pH 2.7)



Y-axis normalized for all chromatograms.

### Polar Bases (Antihistamines) in Formic Acid

Conditions for all columns:

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** A: 0.1% Formic Acid in Water  
B: 0.1% Formic Acid in Acetonitrile

**Gradient:** A/B (90:10) to (50:50) in 10 min

**Flow Rate:** 1.5 mL/min

**Temperature:** Ambient

**Detection:** UV @ 210 nm

- Sample:**
1. Pyrilamine
  2. Tripelemnamine
  3. Chlorpheniramine
  4. Brompheniramine
  5. Chloropyramine
  6. Diphenhydramine
  7. Loratadine

Comparative chromatograms 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.

## Gemini C18

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

### Gemini C18

USP: L1

LC-MS Certified

**pH Stability: 1.0 – 12.0**

Particle Size: 3 µm, 5 µm, and 10 µm

Phase: C18

Application: Small molecules, basic compounds

Strength: Wide pH stability, high efficiency

Pore Size (Å): 110

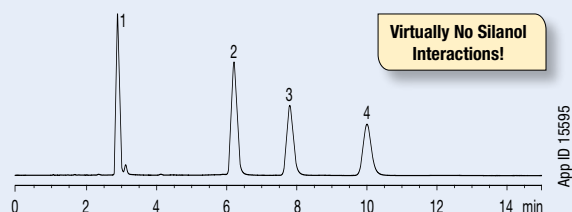
Surface Area (m<sup>2</sup>/g): 375

Carbon Load %: 14

End Capping: TMS

### Chromatographic Comparisons

#### Gemini 5 µm C18 110 Å



#### Tricyclic Antidepressants at Neutral pH

Conditions for all columns:

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** 20 mM Phosphate buffer pH 7.0/Acetonitrile/Methanol (30:35:35)

**Flow Rate:** 1.5 mL/min

**Detection:** UV @ 254 nm

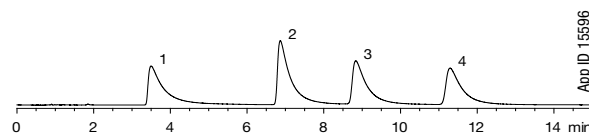
**Sample:** 1. Nortriptyline

2. Imipramine

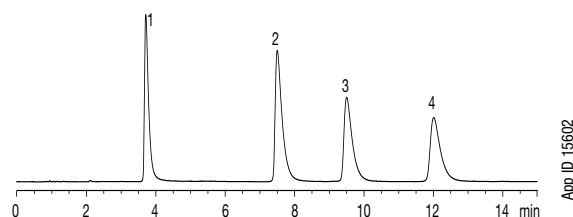
3. Amitriptyline

4. Clomipramine

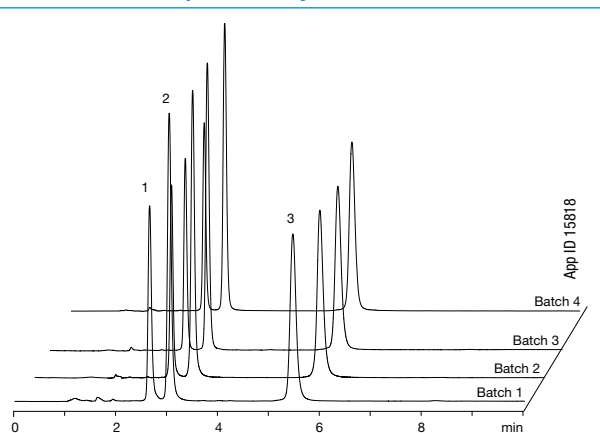
#### Agilent Technologies® ZORBAX® 5 µm Extend-C18 80 Å



#### Advanced Chromatography Technologies ACE® 5 µm C18 100 Å



### Batch-to-Batch Reproducibility



Conditions for all separations:

**Column:** Gemini 5 µm C18

**Dimensions:** 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

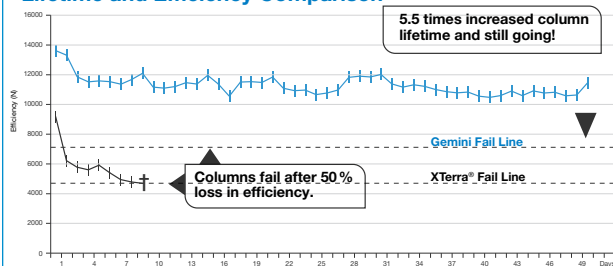
2. Metoprolol

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

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.

## Gemini C6-Phenyl

- pH stable 1-12 for durability
- Great aromatic selectivity
- Extremely low UV and MS bleed

### Gemini C6-Phenyl

USP: L11

LC-MS Certified

**pH Stability:** 1.0 – 12.0

Particle Size: 3 µm and 5 µm

Phase: Phenyl with C6 linker

Application: Aromatic, polar, or basic compounds

Strength: High aromatic selectivity with exceptional peak shape even in neutral conditions. Extremely low bleed phenyl column.

Pore Size (Å): 110

Surface Area (m<sup>2</sup>/g): 375

Carbon Load %: 12

End Capping: TMS

### Enhanced Performance for Aromatic Compounds

#### Sulfa Drug Application

Resolution	Pursuit 5 µm DiPhenyl	Gemini 5 µm C6-Phenyl
RS <sub>1,2</sub>	1.0	4.0
RS <sub>2,3</sub>	9.8	16.0

Conditions for all columns:

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** 0.1 % Formic Acid in Water/  
Methanol (70:30)

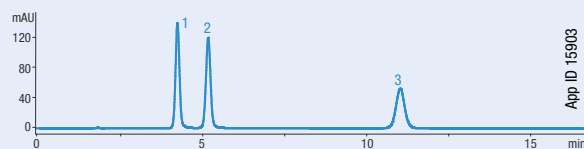
**Flow Rate:** 1.0 mL/min

**Temperature:** Ambient

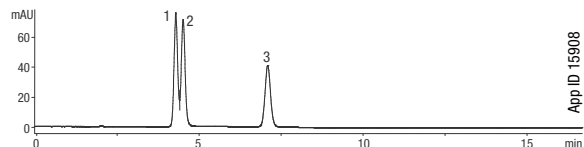
**Detection:** UV @ 254 nm

**Sample:** 1. Sulfathiazole  
2. Sulfamerazine  
3. Sulfamethoxazole

#### Phenomenex Gemini 5 µm C6-Phenyl



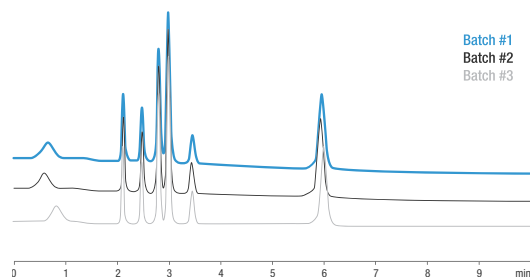
#### Agilent Technologies® Pursuit® 5 µm DiPhenyl



GEMINI | HPLC/UHPLC

### Reproducible Phenyl Phase

#### Aliphatic Acid Application



Conditions for all columns:

**Column:** Gemini 5 µm C6-Phenyl

**Dimensions:** 150 x 4.6 mm

**Part No.:** 00F-4444-EO

**Mobile Phase:** 20 mM Phosphate buffer,  
pH 2.5/Methanol (97:3)

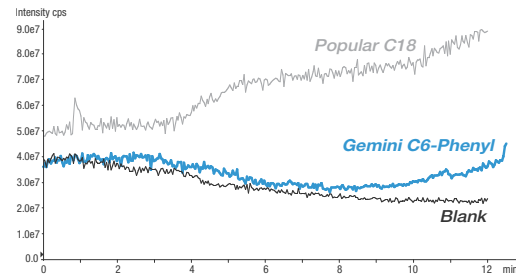
**Flow Rate:** 1.0 mL/min

**Temperature:** Ambient

**Detection:** UV @ 220 nm

**Sample:** 1. Tartaric Acid 4. Acetic Acid  
2. Malic Acid 5. Citric Acid  
3. Lactic Acid 6. Propionic Acid

### Low Bleed Phenyl Phase



Conditions for all columns:

**Dimensions:** 150 x 3.0 mm

**Mobile Phase:** A: 0.1 % Formic acid in Water

B: 0.1 % Formic acid in Acetonitrile  
**Gradient:** 5 % B to 95 % B in 10 min, then hold  
95 % B for 2 min

**Flow Rate:** 0.6 mL/min

**Temperature:** Ambient

**MS Detection:** ESI + ion mode,  
M/Z 100-700

Comparative 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.

## Gemini C8(3)

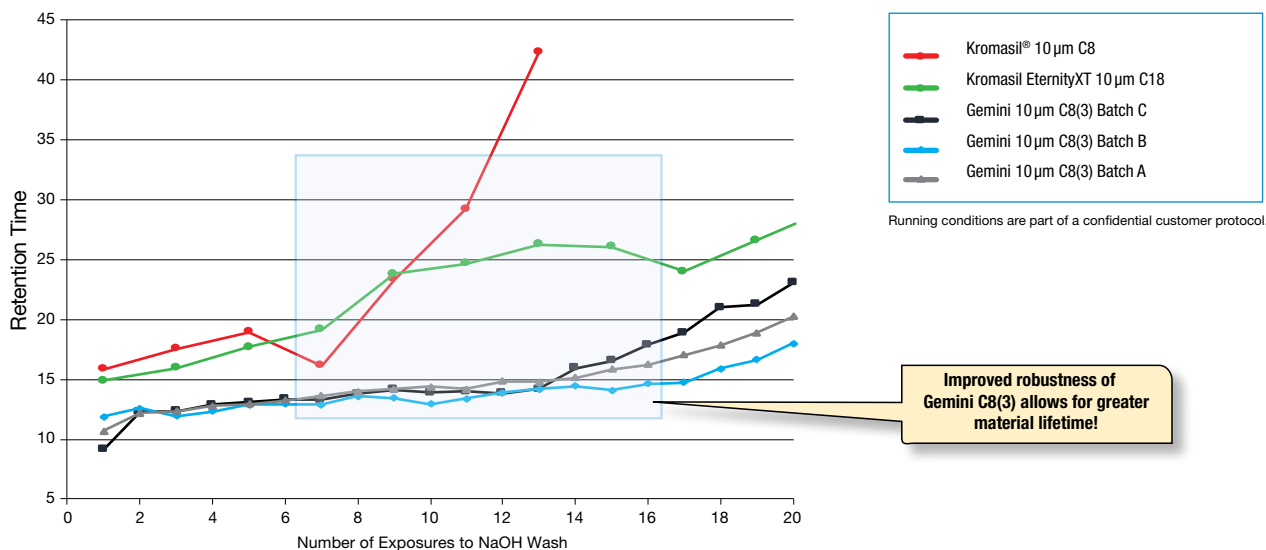
### The Material Developed for High pH Insulin Purification

Many products can separate human insulin and its degradant, while few can withstand high pH caustic washes for aggregate removal. Now, there is a clear media choice. Gemini C8(3) provides the needed separation, the needed low/high pH robustness, and the overall consistency in terms of efficiency and retention cycle to cycle. You don't have to choose between consistent performance or robustness; Gemini C8(3) was developed to give you the best of both worlds.

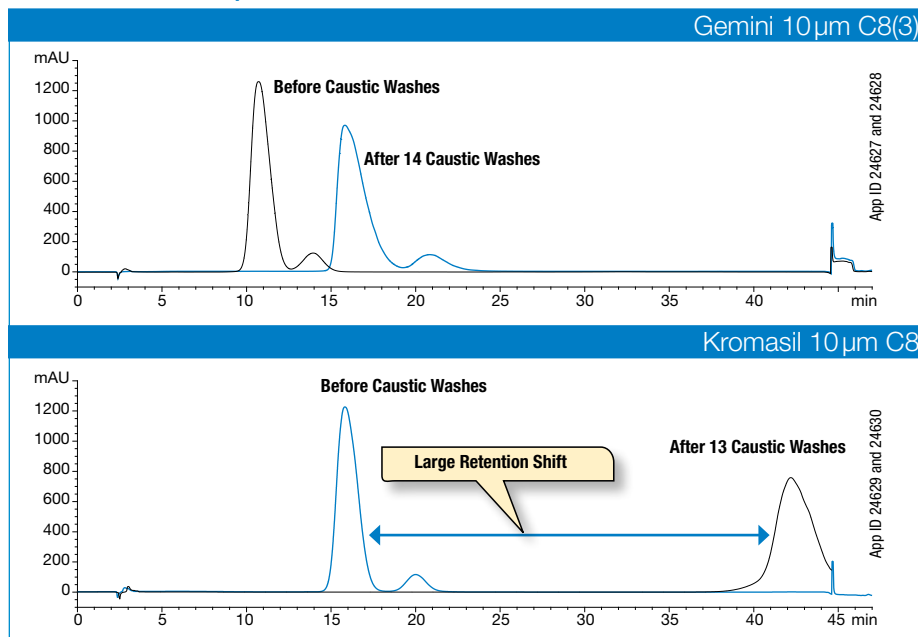
### Gemini C8(3)

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

### Insulin Retention vs. Exposures to NaOH Wash



### Insulin Retention Comparison



Comparative separations may not be representative of all applications.

# Gemini™ pH Flexible LC Columns

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

## Ordering Information

3 µm Micro LC Columns (mm)			
Phases	50 x 0.30	150 x 0.30	50 x 0.50
C18	00B-4439-AC	00F-4439-AC	00B-4439-AF



For information on Micro LC Columns, Traps, and Fittings, see pp. 359-361

3 µm Microbore, Minibore and MidBore™ Columns (mm)										SecurityGuard™ Cartridges (mm)	
Phases	50 x 1.0	20 x 2.0	30 x 2.0	50 x 2.0	100 x 2.0	150 x 2.0	50 x 3.0	100 x 3.0	150 x 3.0	4 x 2.0* /10pk	
C18	00B-4439-A0	00M-4439-B0	00A-4439-B0	00B-4439-B0	00D-4439-B0	00F-4439-B0	00B-4439-Y0	00D-4439-Y0	00F-4439-Y0	AJO-7596	
C6-Phenyl	—	—	—	00B-4443-B0	00D-4443-B0	00F-4443-B0	00B-4443-Y0	00D-4443-Y0	00F-4443-Y0	AJO-7914	
NX-C18	00B-4453-A0	00M-4453-B0	00A-4453-B0	00B-4453-B0	00D-4453-B0	00F-4453-B0	00B-4453-Y0	00D-4453-Y0	00F-4453-Y0	AJO-8367	

for ID: 2.0-3.0 mm

3 µm Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0* /10pk
C18	00A-4439-E0	00B-4439-E0	00D-4439-E0	00F-4439-E0	00G-4439-E0	AJO-7597
C6-Phenyl	00A-4443-E0	00B-4443-E0	00D-4443-E0	00F-4443-E0	00G-4443-E0	AJO-7915
NX-C18	—	00B-4453-E0	00D-4453-E0	00F-4453-E0	00G-4453-E0	AJO-8368

for ID: 3.2-8.0 mm



5 µm Minibore and MidBore Columns (mm)								SecurityGuard™ Cartridges (mm)	
Phases	30 x 2.0	50 x 2.0	150 x 2.0	250 x 2.0	50 x 3.0	100 x 3.0	150 x 3.0	250 x 3.0	4 x 2.0* /10pk
C18	00A-4435-B0	00B-4435-B0	00F-4435-B0	00G-4435-B0	00B-4435-Y0	00D-4435-Y0	00F-4435-Y0	00G-4435-Y0	AJO-7596
C6-Phenyl	—	00B-4444-B0	00F-4444-B0	—	—	—	—	00G-4444-Y0	AJO-7914
NX-C18	00A-4454-B0	00B-4454-B0	00F-4454-B0	—	00B-4454-Y0	00D-4454-Y0	00F-4454-Y0	00G-4454-Y0	AJO-8367

for ID: 2.0-3.0 mm

5 µm Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0* /10pk
C18	00A-4435-E0	00B-4435-E0	00D-4435-E0	00F-4435-E0	00G-4435-E0	AJO-7597
C6-Phenyl	—	00B-4444-E0	00D-4444-E0	00F-4444-E0	00G-4444-E0	AJO-7915
NX-C18	—	00B-4454-E0	00D-4454-E0	00F-4454-E0	00G-4454-E0	AJO-8368

for ID: 3.2-8.0 mm



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

for ID: 9-16 mm

Axia™ Packed Preparative Columns (mm)							SecurityGuard™ Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	50 x 30	75 x 30	15 x 21.2**	15 x 30.0*
<b>5 µm</b>							/ea	/ea
C18	00B-4435-P0-AX	00D-4435-P0-AX	00F-4435-P0-AX	00G-4435-P0-AX	00B-4435-U0-AX	—	AJO-7846	AJO-8308
C6-Phenyl	—	00D-4444-P0-AX	00F-4444-P0-AX	00G-4444-P0-AX	—	—	AJO-9157	AJO-9158
NX-C18	00B-4454-P0-AX	00D-4454-P0-AX	00F-4454-P0-AX	00G-4454-P0-AX	00B-4454-U0-AX	00C-4454-U0-AX	AJO-8370	AJO-8371
<b>10 µm</b>							/ea	/ea
C18	—	00D-4436-P0-AX	00F-4436-P0-AX	00G-4436-P0-AX	—	—	AJO-7846	AJO-8308
NX-C18	00B-4455-P0-AX	00D-4455-P0-AX	00F-4455-P0-AX	00G-4455-P0-AX	—	—	AJO-8370	AJO-8371
C8(3)	—	—	—	00G-4763-P0-AX	—	—	—	—

for ID: 18-29 mm

30-49 mm

Axia™ Packed Preparative Columns (mm) continued						SecurityGuard™ Cartridges (mm)	
Phases	100 x 30	150 x 30	250 x 30	100 x 50	150 x 50	250 x 50	15 x 30.0*
<b>5 µm</b>							/ea
C18	00D-4435-U0-AX	00F-4435-U0-AX	00G-4435-U0-AX	—	—	—	AJO-8308
NX-C18	00D-4454-U0-AX	00F-4454-U0-AX	00G-4454-U0-AX	—	—	—	AJO-8371
<b>10 µm</b>							/ea
C18	00D-4436-U0-AX	00F-4436-U0-AX	00G-4436-U0-AX	—	00F-4436-V0-AX	00G-4436-V0-AX	AJO-8308
NX-C18	00D-4455-U0-AX	00F-4455-U0-AX	00G-4455-U0-AX	00D-4455-V0-AX	00F-4455-V0-AX	00G-4455-V0-AX	AJO-8371
C8(3)	—	—	00G-4763-U0-AX	—	—	—	—

for ID: 30-49 mm

For UHPLC system connections, see SecurityLINK™

UHPLC fingertight fitting system on pp. 336-337

For PREP Columns & Bulk Media, see pp. 383-401

For SecurityGuard Holders and Cartridges, see pp. 330-335

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

\*SecurityGuard™ Analytical Cartridges require holder, Part No.: KJO-4282

\*\*SemiPrep SecurityGuard™ Cartridges require holder, Part No.: AJO-9281

\*\*\*PREP SecurityGuard™ Cartridges require holder, Part No.: AJO-8223

◆PREP SecurityGuard™ Cartridges require holder, Part No.: AJO-8277



GEMINI | HPLC/UHPLC

# HyperClone™ Guaranteed Replacement to Hypersil

## Guaranteed Replacement to Hypersil®

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

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

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

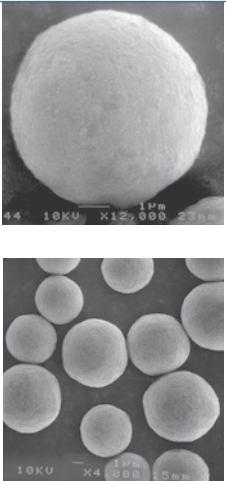
### HyperClone

VS.

### Hypersil

Material Characteristics

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 (m²/g)	170	
0.6	Pore Volume (mL/g)	0.6	

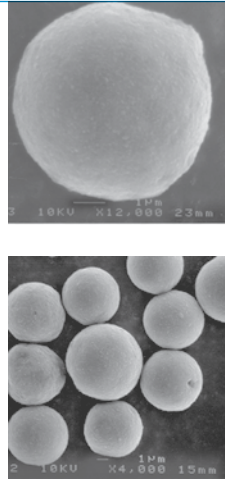
  

HyperClone (regular silica)		Hypersil† (regular silica)‡	
3, 5	Particle Size (µm)	3, 5	
120	Pore Size (Å)	120	
155	Surface Area (m²/g)	170	
0.6	Pore Volume (mL/g)	0.6	

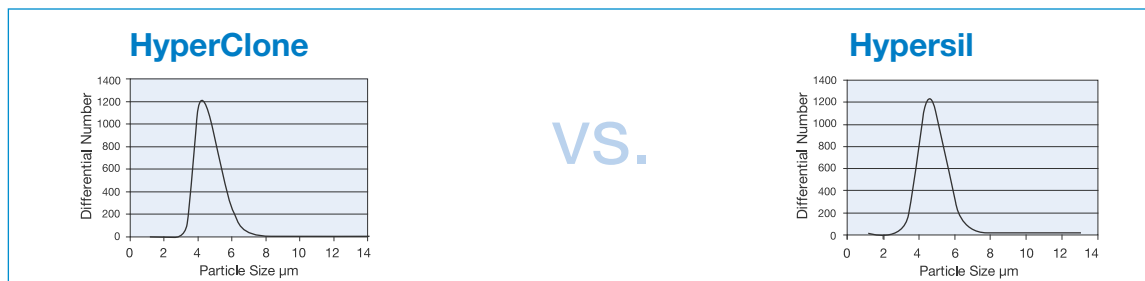
  

HyperClone		Hypersil†	
Carbon Load %			
7	BDS C8	7	
11	BDS C18	11	
6.5	MOS (C8)	6.5	
10	ODS (C18)	10	
4	CN (CPS)	4	

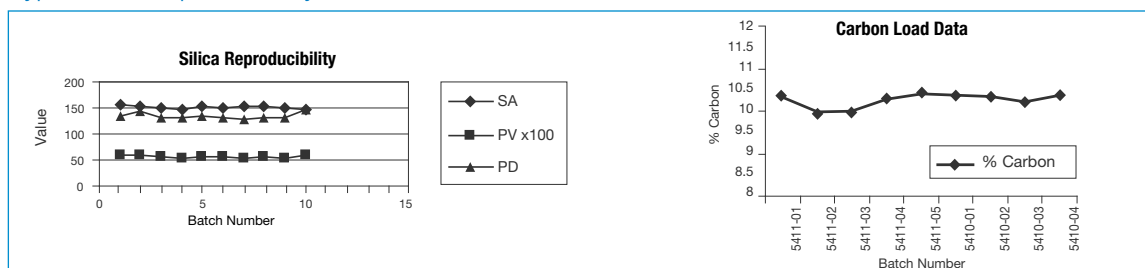
SEM of Base Silica



### Particle Size Distribution†



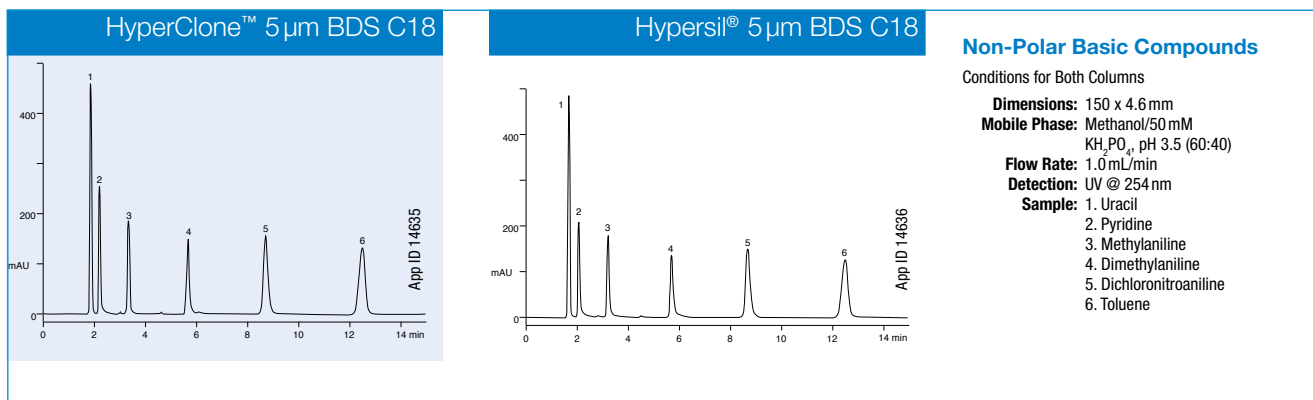
### HyperClone Reproducibility



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

# HyperClone™ Guaranteed Replacement to Hypersil

## VS.



### Ordering Information

Phases	3 µm Minibore and Analytical Columns (mm)			SecurityGuard™ Cartridges (mm)	
	100 x 4.6	125 x 4.0	150 x 4.6	4 x 2.0*	4 x 3.0*
ODS (C18)	00D-4356-E0	00E-4356-D0	00F-4356-E0	/10pk AJ0-4286	/10pk AJ0-4287
BDS C8	—	—	00F-4417-E0	AJ0-4289	AJ0-4290
BDS C18	00D-4419-E0	—	00F-4419-E0	AJ0-4286	AJ0-4287

for ID: 2.0-3.0 mm      3.2-8.0 mm

Phases	5 µm Minibore and Analytical Columns (mm)						SecurityGuard™ Cartridges (mm)		
	150 x 2.0	250 x 3.2	125 x 4.0	250 x 4.0	100 x 4.6	150 x 4.6	250 x 4.6	4 x 2.0*	4 x 3.0*
Silica	—	—	—	—	—	00F-4358-E0	00G-4358-E0	AJ0-4347	AJ0-4348
MOS (C8)	—	—	00E-4359-D0	—	00D-4359-E0	00F-4359-E0	00G-4359-E0	AJ0-4289	AJ0-4290
ODS (C18)	—	00G-4361-R0	00E-4361-D0	00G-4361-D0	00D-4361-E0	00F-4361-E0	00G-4361-E0	AJ0-4286	AJ0-4287
CN (CPS)	—	—	—	—	—	00F-4422-E0	00G-4422-E0	AJ0-4304	AJ0-4305
BDS C8	—	—	—	—	—	00F-4418-E0	00G-4418-E0	AJ0-4289	AJ0-4290
BDS C18	00F-4420-B0	—	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

Phases	5 µm SemiPrep Columns (mm)	SecurityGuard™ Cartridges (mm)
	250 x 10	10 x 10 †
ODS (C18)	00G-4361-N0	/3pk AJ0-7221

for ID: 9-16 mm

\*SecurityGuard™ Analytical Cartridges require holder, Part No.: [KJ0-4282](#)  
 †SemiPrep SecurityGuard™ Cartridges require holder, Part No.: [AJ0-9281](#)



Other dimensions available upon request.



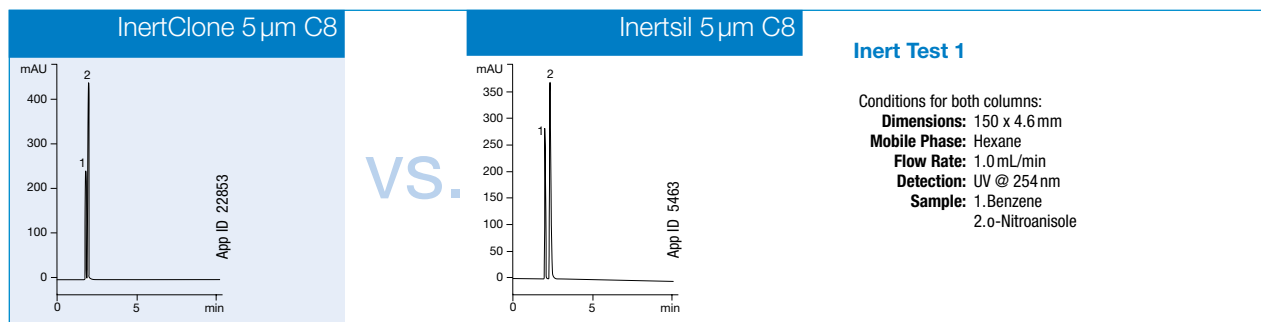
For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334.

Comparative separations may not be representative of all applications.

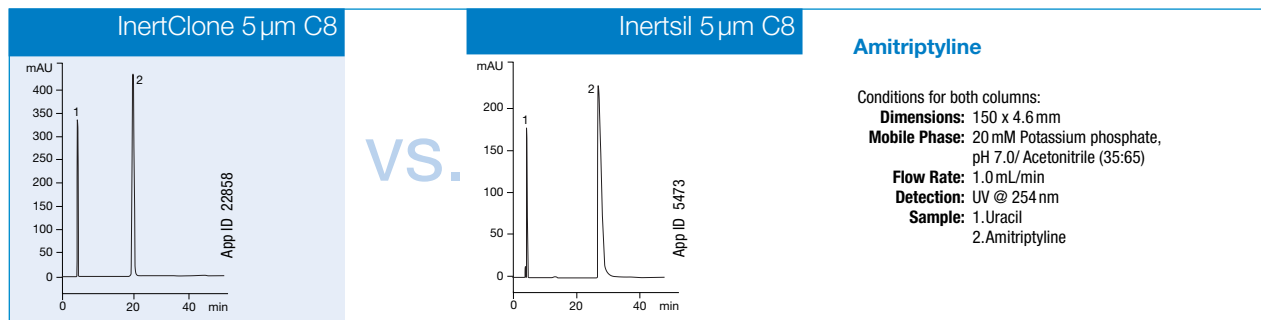
## Guaranteed Replacement to Inertsil®

### InertClone VS. Inertsil Material Characteristics

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



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



Comparative separations may not be representative of all applications.

### Ordering Information

3 µm Analytical Columns (mm)			SecurityGuard™ Cartridges (mm)	
Phase	100 x 4.6	150 x 4.6	4 x 3.0*	
ODS-3	100Å	<a href="#">00D-4340-E0</a>	<a href="#">00F-4340-E0</a>	<a href="#">AJ0-4287</a> /10 pk

for ID: 3.2-8.0 mm

5 µm Analytical Columns (mm)				
Phases	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
ODS-2	150Å	<a href="#">00D-4342-E0</a>	<a href="#">00F-4342-E0</a>	<a href="#">AJ0-4287</a> /10pk
C8	150Å	—	<a href="#">00F-4391-E0</a>	<a href="#">AJ0-4290</a>
ODS-3	100Å	—	<a href="#">00F-4341-E0</a>	<a href="#">AJ0-4287</a>

for ID: 3.2-8.0 mm

\*SecurityGuard™ Analytical Cartridges require universal holder Part No.: [KJO-4282](#)



## RP-HPLC for Protein/Peptide Analysis and Purification

The Jupiter HPLC column portfolio, including Jupiter 300 and Jupiter Proteo, offers optimized reversed phase solutions for protein and peptide characterization and purification. With these columns, one can identify, purify, and analyze almost any protein.

**Jupiter C4, C5, C18 300Å** columns are 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 – 90Å** 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
- Micro flow columns available for increased sensitivity

### Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load %	Calculated Bonded Phase Coverage (µmole/m <sup>2</sup> )	End Capping
C4	Spher. 5, 10, 15	300	170	5.0	6.30	Yes
C5	Spher. 5, 10	300	170	5.5	5.30	Yes
C18	Spher. 3, 5, 10, 15	300	170	13.3	5.50	Yes
Proteo	Spher. 4, 10	90	475	15.0	—	Yes

## Engineered for Robustness, Reproducibility, and Quality

It is tough to compete with Jupiter standards. Each column has consistent specifications and thus consistent performance.

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

### pH 1.5 – 10 Stability

A wide pH range means opportunity for method development, in addition to longer column life. Jupiter columns are stable for over 2500 hours at pH extremes. Jupiter 300 and Jupiter Proteo provide excellent separations using various MS compatible buffers and provide good resolution down to 0.01 % TFA.

### Quality Proven

A Materials Validation Document (MVD) is available online for 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.

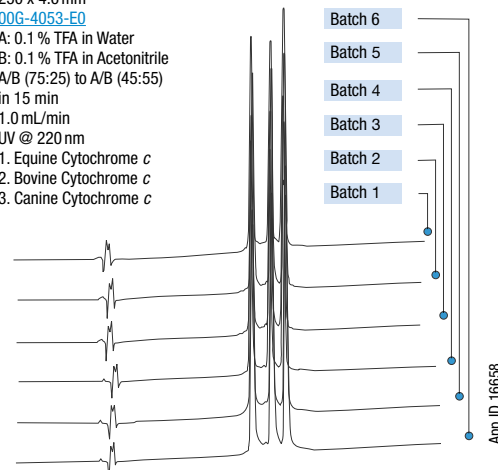


Available digitally at: [www.phenomenex.com/QD](http://www.phenomenex.com/QD)

### Reproducibility Assured

Batch-to-batch and column-to-column is critical to HPLC column performance. Through great advances in silica, bonding, and material characterization technology, Jupiter columns set a benchmark in reproducibility.

**Column:** Jupiter 5 µm C18 300Å  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** [00G-4053-E0](#)  
**Mobile Phase:** A: 0.1 % TFA in Water  
 B: 0.1 % TFA in Acetonitrile  
**Gradient:** A/B (75:25) to A/B (45:55) in 15 min  
**Flow Rate:** 1.0 mL/min  
**Detection:** UV @ 220 nm  
**Sample:** 1. Equine Cytochrome c  
 2. Bovine Cytochrome c  
 3. Canine Cytochrome c



App ID 16658

# Jupiter™ LC Columns for Proteins & Peptides

## Ordering Information

4 µm & 5 µm Micro Columns (mm)				Trap Column	Trap Column
Phases	50 x 0.30	50 x 0.50	150 x 0.50	20 x 0.30	20 x 0.50
5 µm C4 300Å	<a href="#">00B-4167-AC</a>	<a href="#">00B-4167-AF</a>	—	<a href="#">05M-4167-AC</a>	<a href="#">05M-4167-AF</a>
5 µm C18 300Å	<a href="#">00B-4053-AC</a>	<a href="#">00B-4053-AF</a>	—	—	—
4 µm Proteo 90Å	<a href="#">00B-4396-AC</a>	—	<a href="#">00F-4396-AF</a>	—	—



See p. 240 for more Micro LC Part Numbers

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 300Å	—	<a href="#">00F-4167-A0</a>	<a href="#">00G-4167-A0</a>	<a href="#">00B-4167-B0</a>	<a href="#">00F-4167-B0</a>	<a href="#">00G-4167-B0</a>	<a href="#">AJ0-4329</a>
5 µm C5 300Å	—	—	—	—	<a href="#">00F-4052-B0</a>	—	<a href="#">AJ0-4326</a>
5 µm C18 300Å	—	—	—	<a href="#">00B-4053-B0</a>	<a href="#">00F-4053-B0</a>	<a href="#">00G-4053-B0</a>	<a href="#">AJ0-4320</a>
4 µm Proteo 90Å	<a href="#">00B-4396-A0</a>	—	—	<a href="#">00B-4396-B0</a>	<a href="#">00F-4396-B0</a>	<a href="#">00G-4396-B0</a>	<a href="#">AJ0-6073</a>
							/10pk
3 µm C18 300Å	—	—	—	<a href="#">00B-4263-B0</a>	<a href="#">00F-4263-B0</a>	—	<a href="#">AJ0-4320</a>

for ID: 2.0-3.0 mm

3 µm, 4 µm & 5 µm Analytical, Semi-Prep, and Preparative Columns (mm)						SecurityGuard 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 300Å	<a href="#">00B-4167-E0</a>	<a href="#">00F-4167-E0</a>	<a href="#">00G-4167-E0</a>	<a href="#">00G-4167-N0</a>	<a href="#">00G-4167-P0</a>	<a href="#">AJ0-4330</a>	<a href="#">AJ0-7225</a>	<a href="#">AJ0-7231</a>
5 µm C5 300Å	<a href="#">00B-4052-E0</a>	<a href="#">00F-4052-E0</a>	<a href="#">00G-4052-E0</a>	<a href="#">00G-4052-N0</a>	<a href="#">00G-4052-P0</a>	<a href="#">AJ0-4327</a>	<a href="#">AJ0-7371</a>	—
5 µm C18 300Å	<a href="#">00B-4053-E0</a>	<a href="#">00F-4053-E0</a>	<a href="#">00G-4053-E0</a>	<a href="#">00G-4053-N0</a>	<a href="#">00G-4053-P0</a>	<a href="#">AJ0-4321</a>	<a href="#">AJ0-7224</a>	<a href="#">AJ0-7230</a>
4 µm Proteo 90Å	—	<a href="#">00F-4396-E0</a>	<a href="#">00G-4396-E0</a>	<a href="#">00G-4396-N0</a>	—	<a href="#">AJ0-6074</a>	<a href="#">AJ0-7275</a>	—
						/10pk	—	—
3 µm C18 300Å	—	<a href="#">00F-4263-E0</a>	<a href="#">00G-4263-E0</a>	—	—	<a href="#">AJ0-4321</a>	—	—

for ID: 3.2-8.0 mm    9-16 mm    18-29 mm

10 µm Analytical, Semi-Prep, and Preparative Columns (mm)				SecurityGuard 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 300Å	<a href="#">00G-4168-E0</a>	<a href="#">00G-4168-N0</a>	—	<a href="#">AJ0-4330</a>	<a href="#">AJ0-7225</a>	<a href="#">AJ0-7231</a>
C18 300Å	<a href="#">00G-4055-E0</a>	<a href="#">00G-4055-N0</a>	<a href="#">00G-4055-P0</a>	<a href="#">AJ0-4321</a>	<a href="#">AJ0-7224</a>	<a href="#">AJ0-7230</a>
Proteo 90Å	<a href="#">00G-4397-E0</a>	<a href="#">00G-4397-N0</a>	—	<a href="#">AJ0-6074</a>	<a href="#">AJ0-7275</a>	—

for ID: 3.2-8.0 mm    9-16 mm    18-29 mm

15 µm Analytical, Semi-Prep, and Preparative Columns (mm)					SecurityGuard 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 300Å	<a href="#">00G-4169-E0</a>	<a href="#">00G-4169-N0</a>	<a href="#">00G-4169-P0</a>	—	<a href="#">00G-4169-V0</a>	<a href="#">AJ0-4330</a>	<a href="#">AJ0-7225</a>	<a href="#">AJ0-7231</a>	—
C18 300Å	<a href="#">00G-4057-E0</a>	—	<a href="#">00G-4057-P0</a>	<a href="#">00G-4057-U0</a>	<a href="#">00G-4057-V0</a>	<a href="#">AJ0-4321</a>	<a href="#">AJ0-7224</a>	<a href="#">AJ0-7230</a>	<a href="#">AJ0-8313</a>

for ID: 3.2-8.0 mm    9-16 mm    18-29 mm    30-49 mm



For Jupiter Proteo Axia™ Packed Preparative columns, see p. 393

## Ordering Information

Bulk Material			
10 µm Bulk Packings			
Phases	100 g	1 kg	10 kg
C4 300Å	<a href="#">04G-4168</a>	<a href="#">04K-4168</a>	<a href="#">04M-4168</a>
C5 300Å	—	<a href="#">04K-4054</a>	—
C18 300Å	<a href="#">04G-4055</a>	<a href="#">04K-4055</a>	<a href="#">04M-4055</a>
Proteo 90Å	<a href="#">04G-4397</a>	<a href="#">04K-4397</a>	—

15 µm Bulk Packings				
Phases	100 g	1 kg	5 kg	10 kg
C4 300Å	<a href="#">04G-4169</a>	<a href="#">04K-4169</a>	<a href="#">04L-4169</a>	<a href="#">04M-4169</a>
C18 300Å	<a href="#">04G-4057</a>	<a href="#">04K-4057</a>	—	<a href="#">04M-4057</a>



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



For SecurityGuard Cartridge Holders and Cartridges, see pp. 330-334

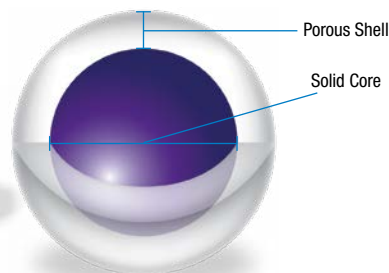


For Column Heater (25-90 °C), see p. 416



## Performance Gains on Any LC System

- Obtain higher throughput without sacrificing resolution
- Easy method transfer across LC system platforms
- Reduce solvent consumption with faster analysis
- Reach lower levels of detection and quantitation



### Complete scalable solution from UHPLC to HPLC to PREP LC

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

KINETEX | HPLC/UHPLC



For more information on Kinetex PREP LC applications, see p. 391

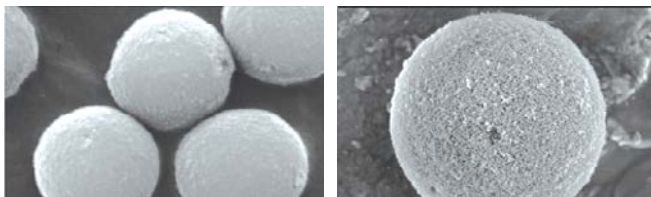


Kinetex has earned the SelectScience Gold Seal of Quality!

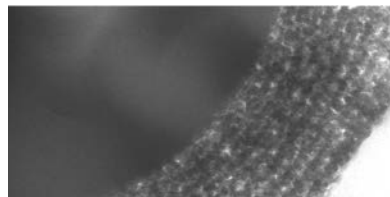
## Innovation in Particle Technology

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

### SEM of Kinetex Core-Shell Particles



### Cross Section of Kinetex Core-Shell Particle

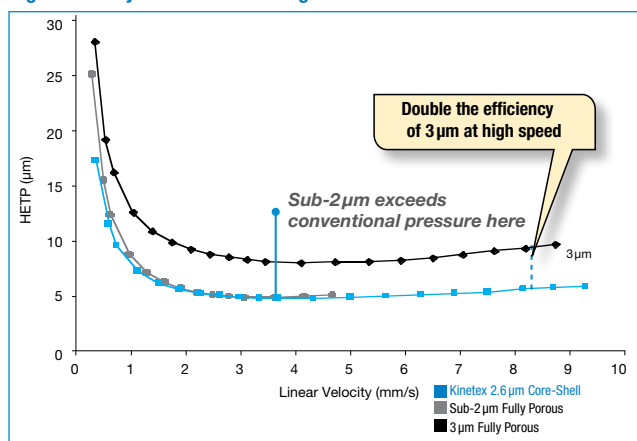


## Optimized for Ultra-High Performance

### High Efficiency, High Density Particle

Kinetex particles are built with a solid high density core that promotes the particles to settle into an optimal bed structure. This reduces the band broadening effects of Eddy Diffusion since the interstitial space between the particles is virtually homogeneous and results in ultra-high column efficiency and excellent reproducibility.

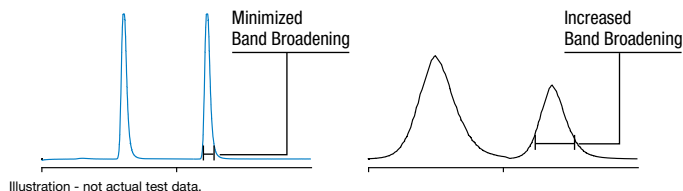
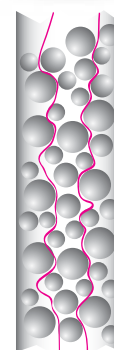
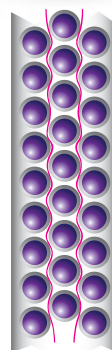
### High Efficiency over Extended Range of Flow Rates



## Illustration of Eddy Diffusion Effects

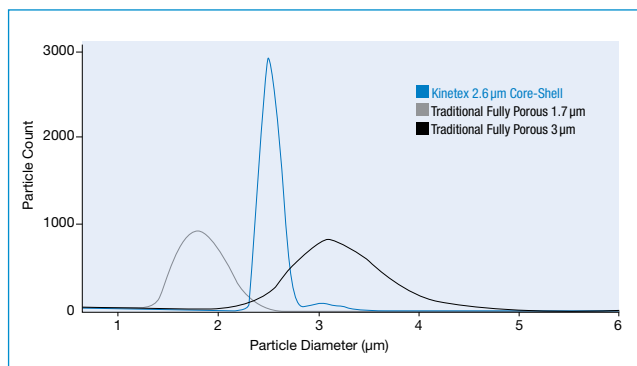
Kinetex Core-Shell

Fully Porous

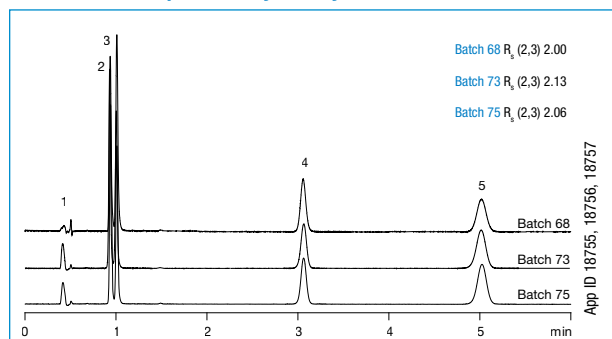


Kinetex particles are nearly monodispersed. This extremely narrow particle size distribution results in increased column efficiency and excellent reproducibility.

### Uniform Particle Size Distribution



### Batch-to-Batch Reproducibility Overlay



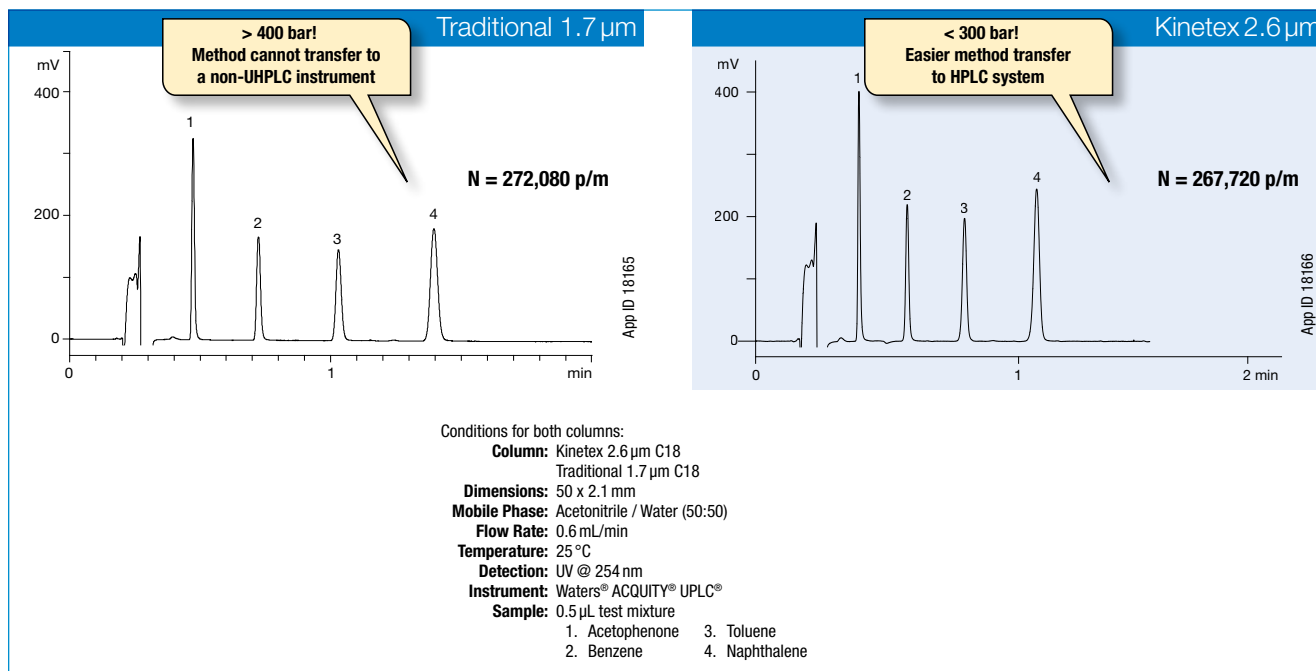
Conditions same for all batches:

- Column:** Kinetex 2.6 µm C18
- Dimensions:** 50 x 4.6 mm
- Part No.:** 00B-4462-E0
- Mobile Phase:** Water / Acetonitrile (65:35)
- Flow Rate:** 1.0 mL/min
- Detection:** UV @ 254 nm
- Sample:**
  - Uracil
  - Hydroxycortisone
  - Cortisone
  - Cortisone acetate
  - 17-Hydroxyprogesterone



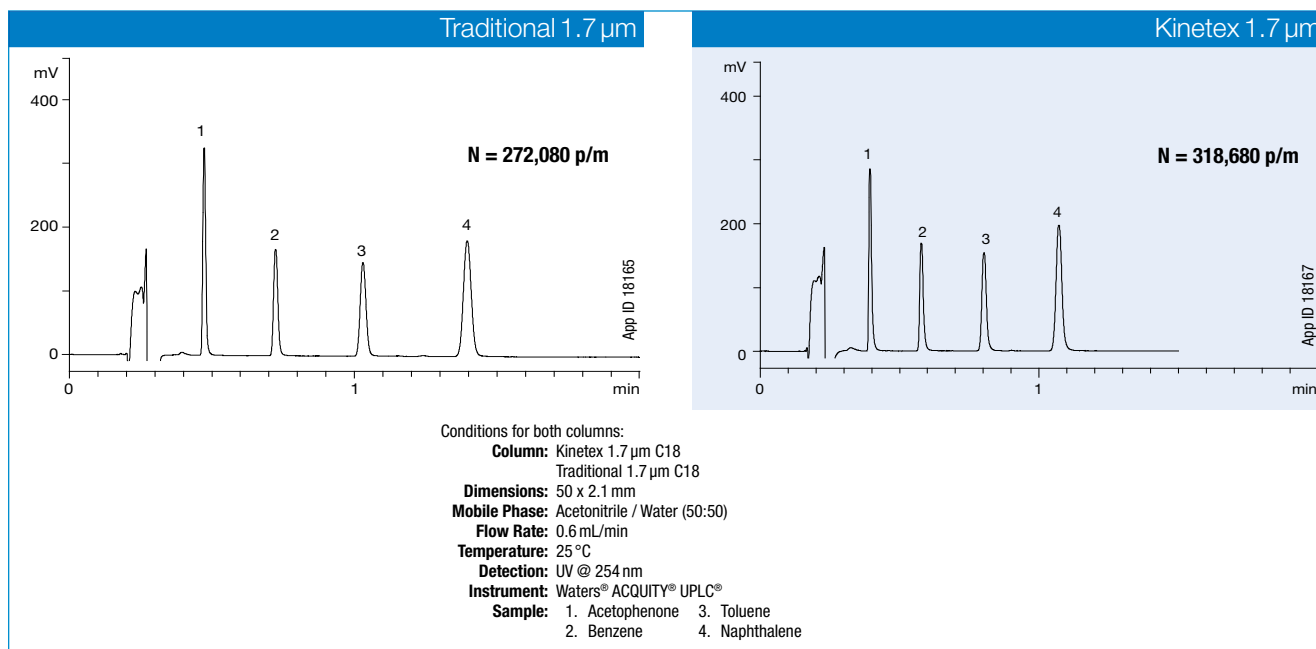
## Achieve Sub-2 $\mu$ m Performance within HPLC Backpressure Limitations

With the efficiency of a sub-2 $\mu$ m column and typical operating backpressure less than 400 bar<sup>†</sup>, you can achieve the promise of ultra-high performance on **any** LC system.



## Unparalleled Levels of Ultra-High Performance

For users of higher pressure capable instruments who want increased levels of efficiency, we offer the Kinetex 1.7 $\mu$ m column—the first sub-2 $\mu$ m core-shell particle to be available on the market.



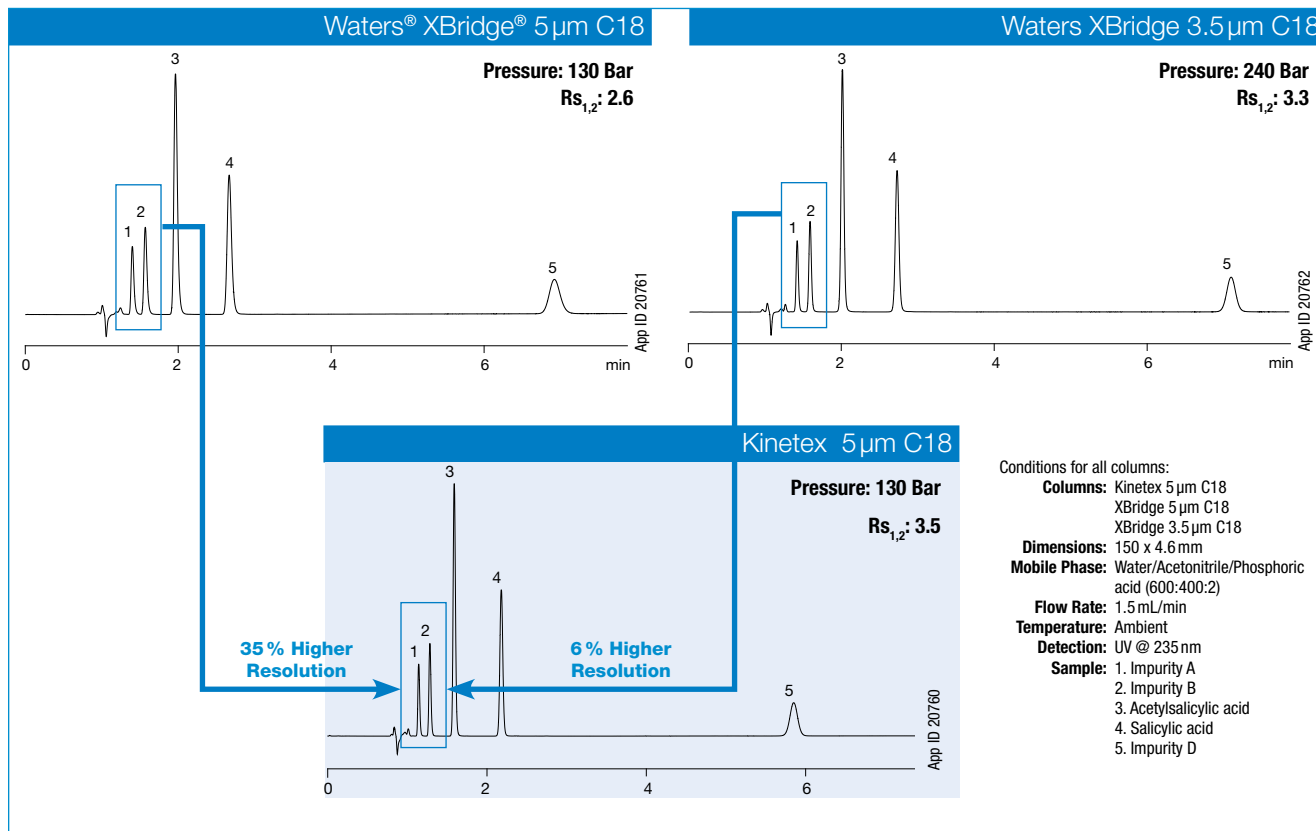
<sup>†</sup> Kinetex 2.6 $\mu$ m columns, 2.1 mm ID, are pressure rated to 1000 bar use on both HPLC and UHPLC instrumentation.

Comparative separations may not be representative of all applications.



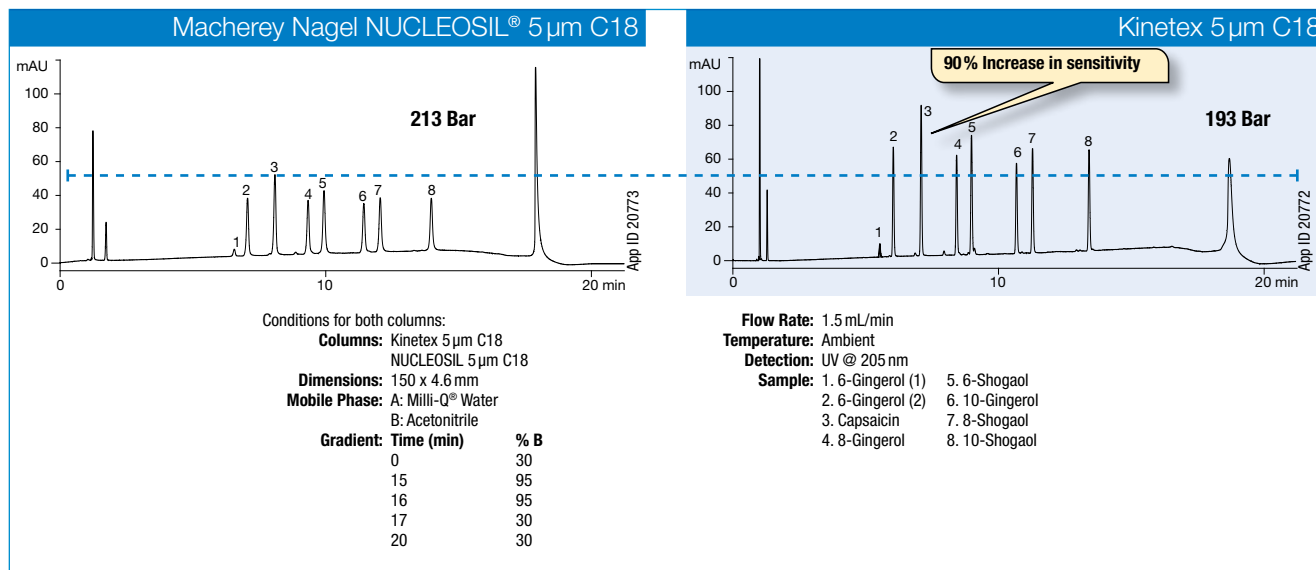
## Higher Resolution with No Pressure Increase

Replace traditional 3 and 5 μm columns with Kinetex 5 μm core-shell columns for immediate improvements in resolution, productivity, and sensitivity.



## 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.



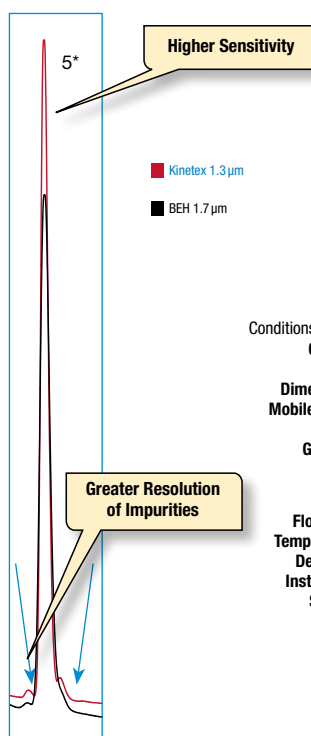
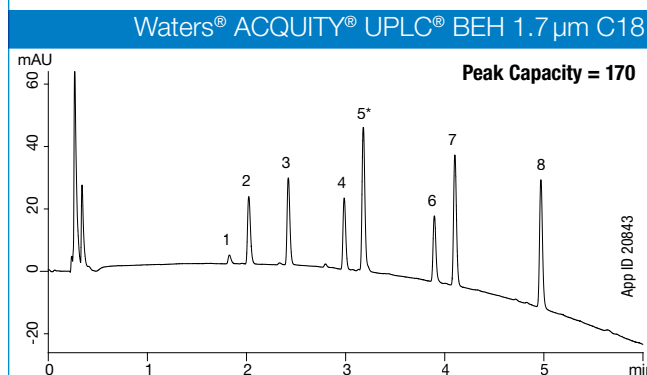
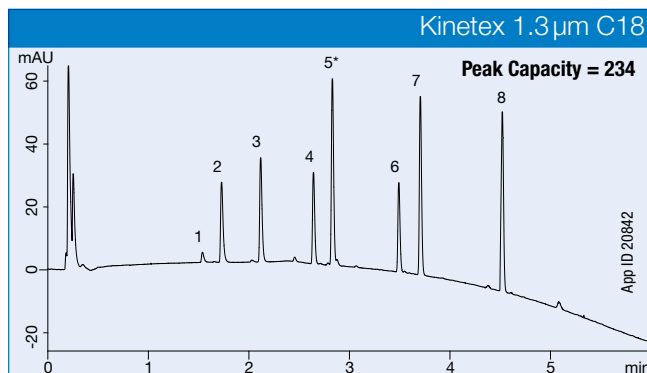
Comparative separations may not be representative of all applications.

## 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.



Conditions for both columns:

**Column:** Kinetex 1.3 μm C18  
ACQUITY UPLC BEH 1.7 μm C18

**Dimensions:** 50 x 2.1 mm

**Mobile Phase:** A: 0.1 % TFA in Water  
B: 0.1 % TFA in Acetonitrile

**Gradient:**

Time (min)	% B
0	30
5	95

**Flow Rate:** 0.5 mL/min

**Temperature:** Ambient

**Detection:** UV @ 214 nm

**Instrument:** Waters ACQUITY UPLC

**Sample:** 1. 6-Gingerol (1)  
2. 6-Gingerol (2)  
3. Capsaicin  
4. 8-Gingerol  
5. 6-Shogaol  
6. 10-Gingerol  
7. 8-Shogaol  
8. 10-Shogaol

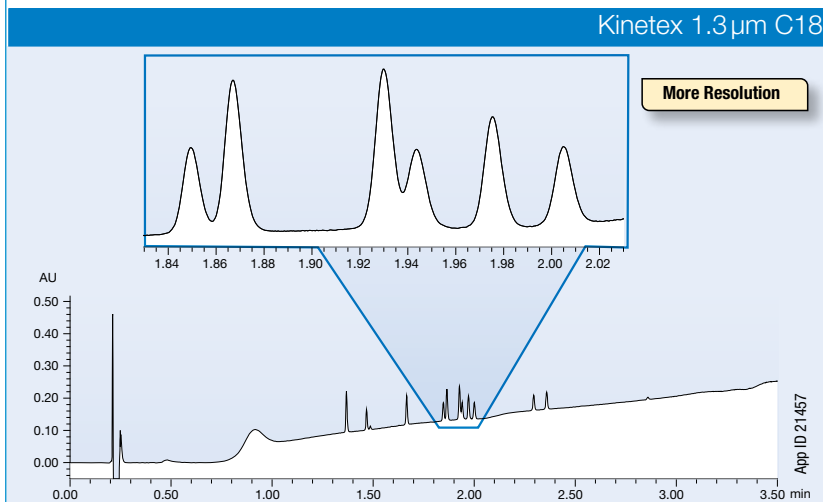
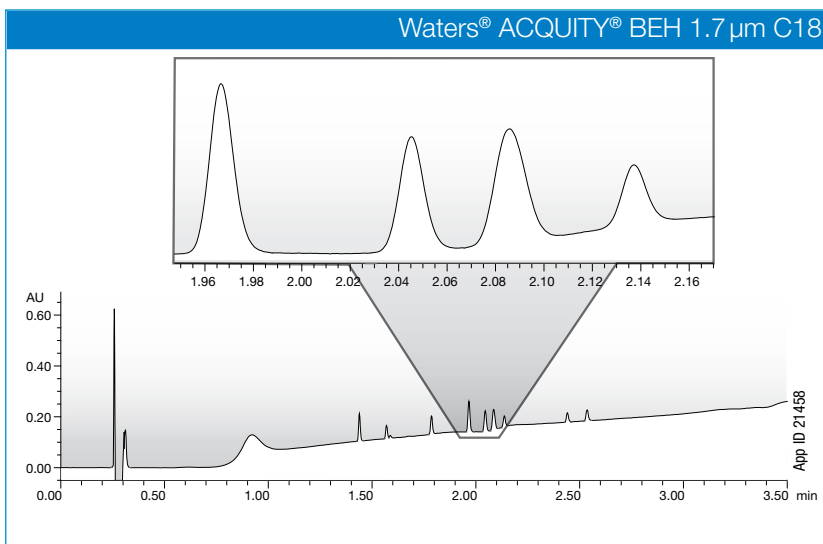
Comparative separations may not be representative of all applications.



for Kinetex 1.3µm UHPLC columns

## Our New Standard for UHPLC

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



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

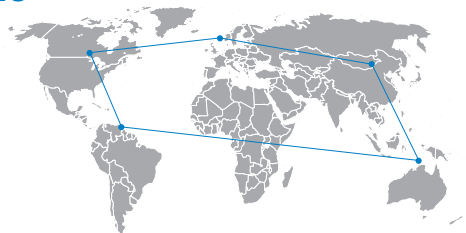
**Sample:**

1. Estriol
2. Hydrocortisone
3. Corticosterone
4. Cortisone acetate
5. 17-beta-estradiol
6. 17-alpha-estradiol
7. 21-OH-progesterone
8. 17-alpha-ethinylestradiol
9. Estrone
10. Deoxycorticosterone acetate
11. Progesterone

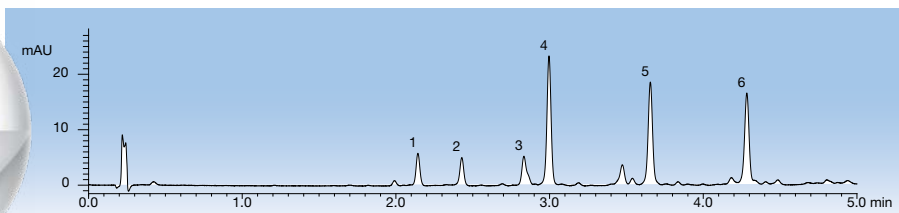
Comparative separations may not be representative of all applications.

## Analytical Scalability and Portability HPLC to UHPLC

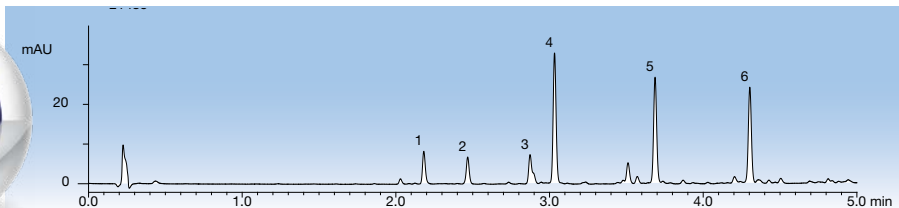
UHPLC methods developed with fully porous sub-2  $\mu\text{m}$  columns often generate backpressure higher than HPLC system limitations. With Kinetex 5  $\mu\text{m}$ , 2.6  $\mu\text{m}$ , 1.7  $\mu\text{m}$ , and 1.3  $\mu\text{m}$  core-shell technology, you are no longer restricted from developing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



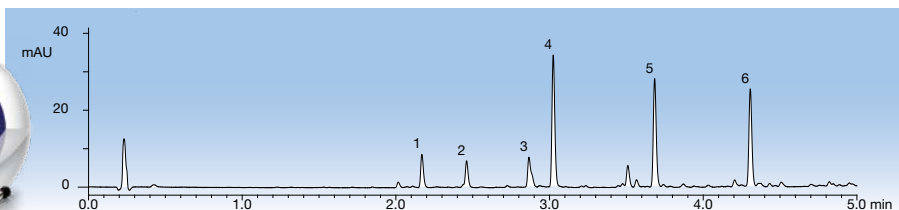
4 Kinetex particles give you full scalability HPLC  $\leftrightarrow$  UHPLC



**Kinetex 5  $\mu\text{m}$ :** 3  $\mu\text{m}$  or better efficiencies at 5  $\mu\text{m}$  pressures for HPLC and PREP LC methods



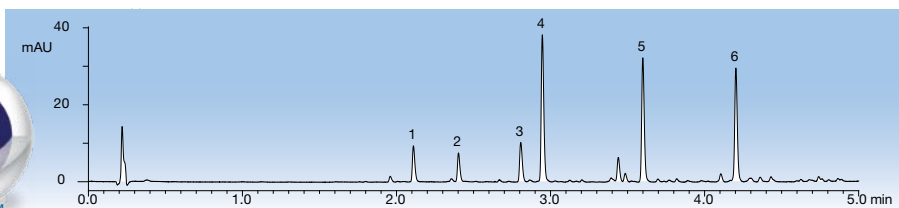
**Kinetex 2.6  $\mu\text{m}$ :** Achieve sub-2  $\mu\text{m}$  performance on HPLC and UHPLC systems



**Kinetex 1.7  $\mu\text{m}$ :** 20% higher efficiency than fully porous 1.7  $\mu\text{m}$  columns



for Kinetex 1.3  $\mu\text{m}$  UHPLC columns



**Kinetex 1.3  $\mu\text{m}$ :** Incredible UHPLC efficiency and performance gains

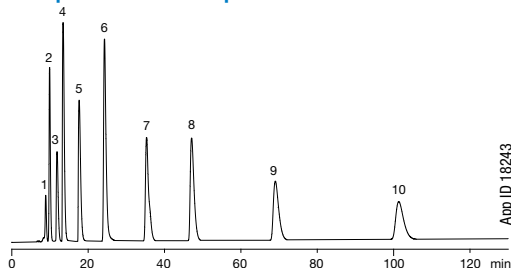
\*Gingerols analyzed on 50x2.1 mm columns

## Improve Performance, Save Solvent

When chromatographic column performance improves you can not only decrease your analysis time but also decrease your overall solvent consumption without compromising your separations. Use Kinetex core-shell technology to dramatically decrease the solvent consumption in your laboratory and increase sample throughput.

**Column:** Traditional 5 µm C18  
**Dimensions:** 250 x 4.6 mm  
**Flow Rate:** 1.0 mL/min

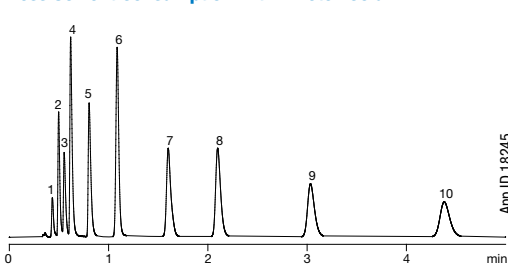
### Example Method Consumption



110 mL solvent per run!

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

### Less Solvent Consumption with Kinetex Column



< 4 mL solvent per run!

Conditions for both columns:

**Mobile Phase:** A: 20 mM Potassium phosphate pH 7  
 B: Methanol / Acetonitrile (50:50)  
 A/B (48:52)

**Temperature:** 40 °C

**Detection:** UV @ 254 nm

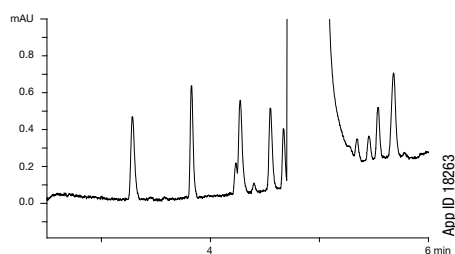
**Sample:**

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

## Reach Lower Levels of Detection and Quantitation

The combination of the small particle size, narrow particle size distribution, and the significantly shorter diffusion path results in much higher column efficiencies and increased chromatographic resolution. The increased efficiencies provide an immediate benefit on sensitivity since higher chromatographic efficiencies translate into significantly narrower and taller peaks, making it easier to detect low level impurities.

### Agilent Technologies® ZORBAX® 3.5 µm SB-C18



Conditions for both columns:

**Dimensions:** 150 x 4.6 mm

**Mobile Phase:** A: Water  
 B: Acetonitrile

**Gradient:** (95:5) A/B for 1.16 min, then to (5:95) A/B

**Flow Rate:** 1.5 mL/min

**Temperature:** 45 °C

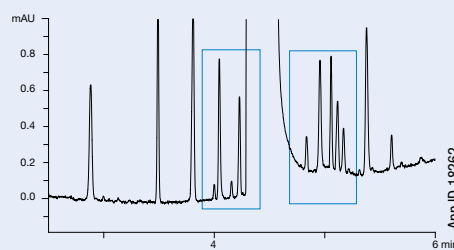
**Detection:** UV @ 254 nm

**Instrument:** Agilent 1200

**Sample:**

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

### Kinetex 2.6 µm C18

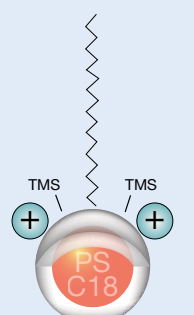
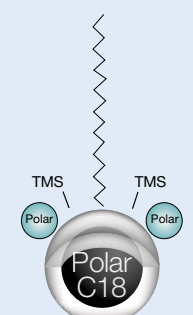
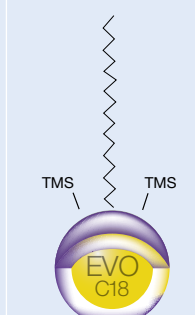
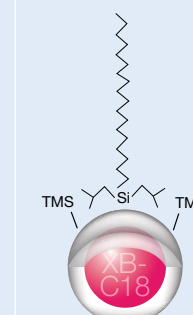
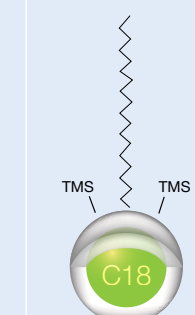
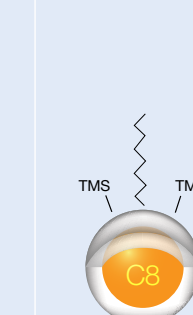


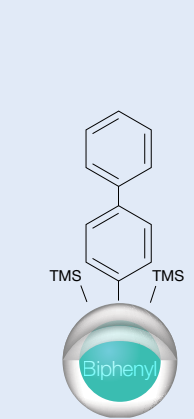
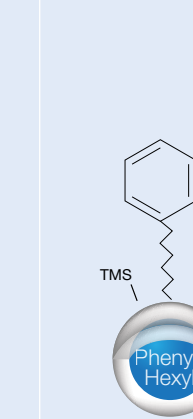
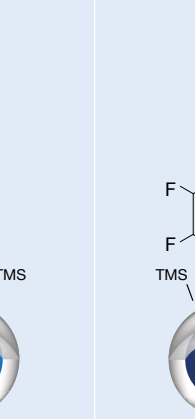
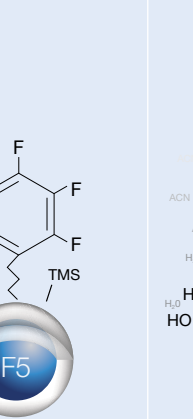
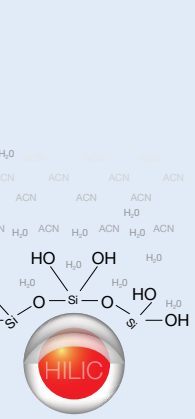
Comparative separations may not be representative of all applications.



## Complementary and Orthogonal Selectivities

To provide alternative and orthogonal selectivity phases, Kinetex columns are available in 11 selectivities: Polar C18, PS C18, EVO C18, XB-C18, C18, C8, Biphenyl, Phenyl-Hexyl, F5, PAH, and HILIC (Hydrophilic Interaction Liquid Chromatography), for resolution of a wide range of compounds from polar to hydrophobic, aromatic, and isomers.

Kinetex PS C18	Kinetex Polar C18	Kinetex EVO C18	Kinetex XB-C18	Kinetex C18	Kinetex C8
					
A multi-modal, 100% aqueous C18 column with a positive surface modification that demonstrates unique selectivity and improved peak shape for basic compounds	Combined C18 and polar modified surface that provides polar and non-polar retention alongside 100% aqueous stability	Novel pH 1-12 stable C18 that delivers robust methods and improved peak shape for bases	This unique C18 phase yields increased hydrogen bonding with hydrophobic selectivity, resulting in improved peak shape for basic compounds and increased retention of acidic compounds	Balanced C18 phase that provides the highest degree of hydrophobic selectivity relative to the other Kinetex phases	Moderate hydrophobic and steric selectivity is offered, bringing ultra-high performance to USP L7 and other octyl silane methods
<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L1 <b>Effective Carbon Load:</b> 9%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L1 <b>Effective Carbon Load:</b> 9%	<b>pH Range:</b> 1 – 12 <b>USP Classification:</b> L1 <b>Effective Carbon Load:</b> 11%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L1 <b>Effective Carbon Load:</b> 10%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L1 <b>Effective Carbon Load:</b> 12%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L7 <b>Effective Carbon Load:</b> 8%

Kinetex Biphenyl	Kinetex Phenyl-Hexyl	Kinetex F5	Kinetex HILIC	Kinetex PAH
				
100% aqueous stable reversed phase chemistry with hydrophobic, aromatic, and enhanced polar selectivity	Aromatic and moderate hydrophobic selectivity results in the great retention and separation of aromatic hydrocarbons	Highly reproducible pentafluorophenylpropyl phase, exceptional for halogenated, conjugated, isomeric, or highly polar compounds	Used under HILIC running conditions, this phase provides the highest polar selectivity for retention and separation of hydrophilic compounds	Polymerically bonded C18 phase specifically developed for the separation of EU and EPA priority PAHs
<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L11 <b>Effective Carbon Load:</b> 11%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L11 <b>Effective Carbon Load:</b> 11%	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L43 <b>Effective Carbon Load:</b> 9%	<b>pH Range:</b> 2.0 – 7.5 <b>USP Classification:</b> L3 <b>Carbon Load:</b> –	<b>pH Range:</b> 1.5 – 8.5* <b>USP Classification:</b> L118 <b>Effective Carbon Load:</b> 12%

\*Columns are pH stable from 1.5-10 under isocratic conditions. Columns are pH stable 1.5-8.5 under gradient conditions.

## Selecting The Right Chemistry

Use the charts below to determine the best Kinetex core-shell chemistry for your work.

### Recommended Selectivities By Compound Classes

Acids	Bases	Neutrals	Aromatics	Acids, Bases, and Neutrals	Highly Polar Compounds	High pH	Isomers
Polar C18	PS C18	C18	Biphenyl	EVO C18	Polar C18	EVO C18	F5
F5	XB-C18	C8	Phenyl-Hexyl	Polar C18	F5		
HILIC		Biphenyl	F5	PS C18 XB-C18	Biphenyl HILIC		

### Column Characteristics

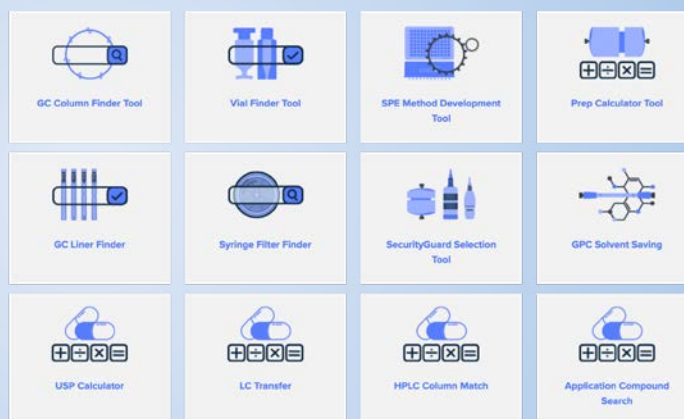
Kinetex Phases	Shipping Solvent†	Particle Sizes (µm)	Pore Size (Å)	Effective Surface Area (m²/g)	Effective Carbon Load (%)	pH Stability	Reversed Phase	Normal Phase	HILIC	100% Aqueous Stable
Polar C18	Acetonitrile/Water (50:50)	2.6	100	200	9	1.5-8.5*				
PS C18	Acetonitrile/Water (50:50)	2.6	100	200	9	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.

## Find Products and Develop Your Methods Faster

Develop an SPE method. Find the right HPLC column and guard system or the perfect vials and syringe filters for your application. Optimize your HPLC methods in minutes with our easy to use interactive tools, developed by scientists for scientists. So take a minute and try our tools for your chromatography methods. They are designed to help you do what you need to do faster so you can do the things that matter most, like walking your dog and spending time with your family.

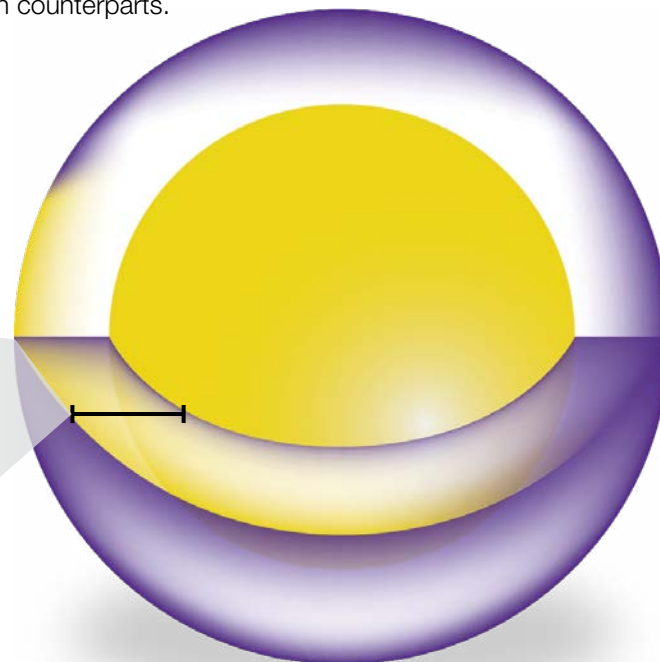
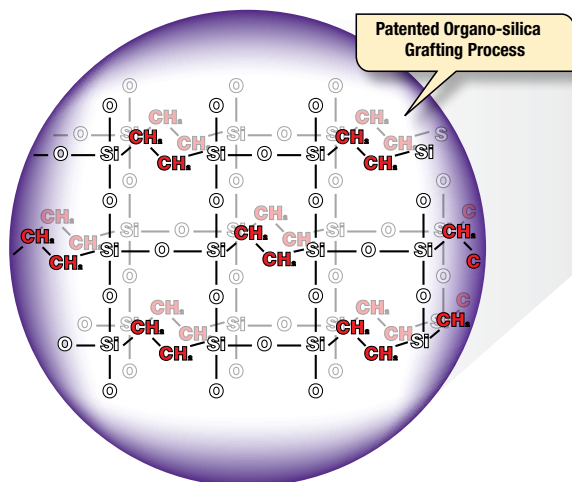
[www.phenomenex.com/tools](http://www.phenomenex.com/tools)



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

## Kinetex EVO C18

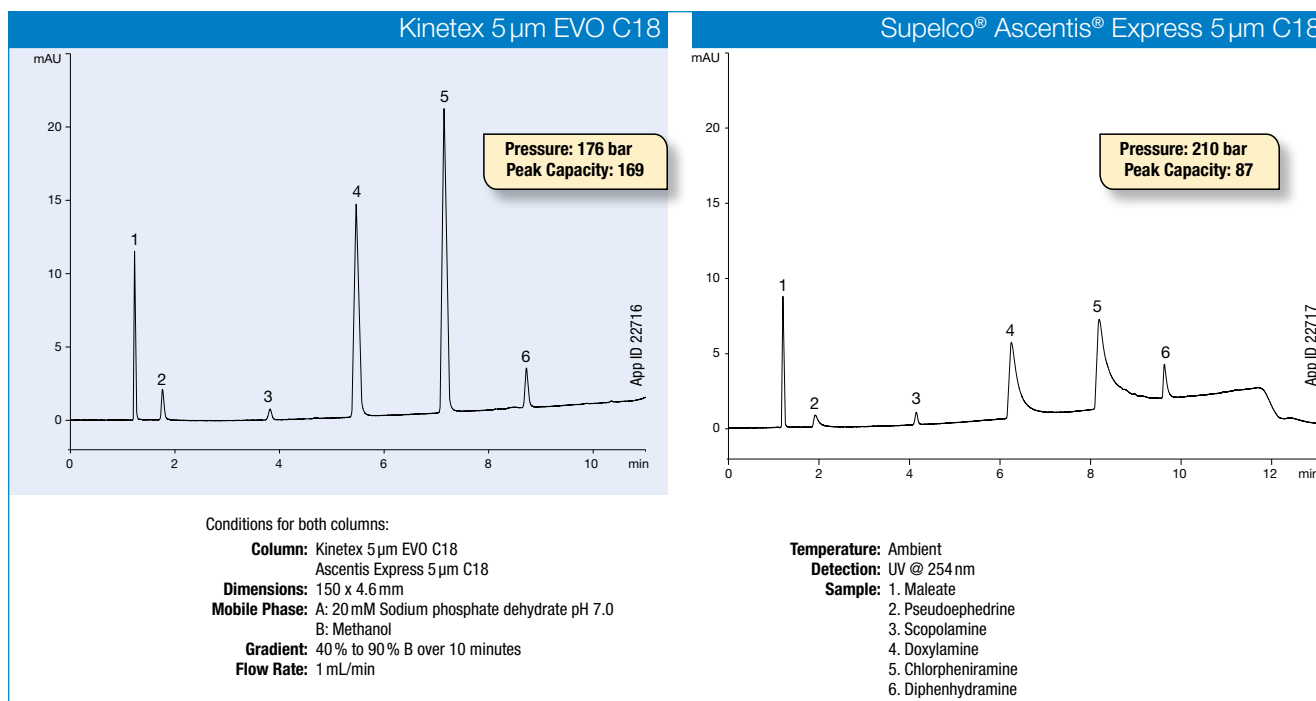
- Develop robust methods from pH 1-12
- Get improved peak shape for bases
- Easily reduce run times and increase sensitivity



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.



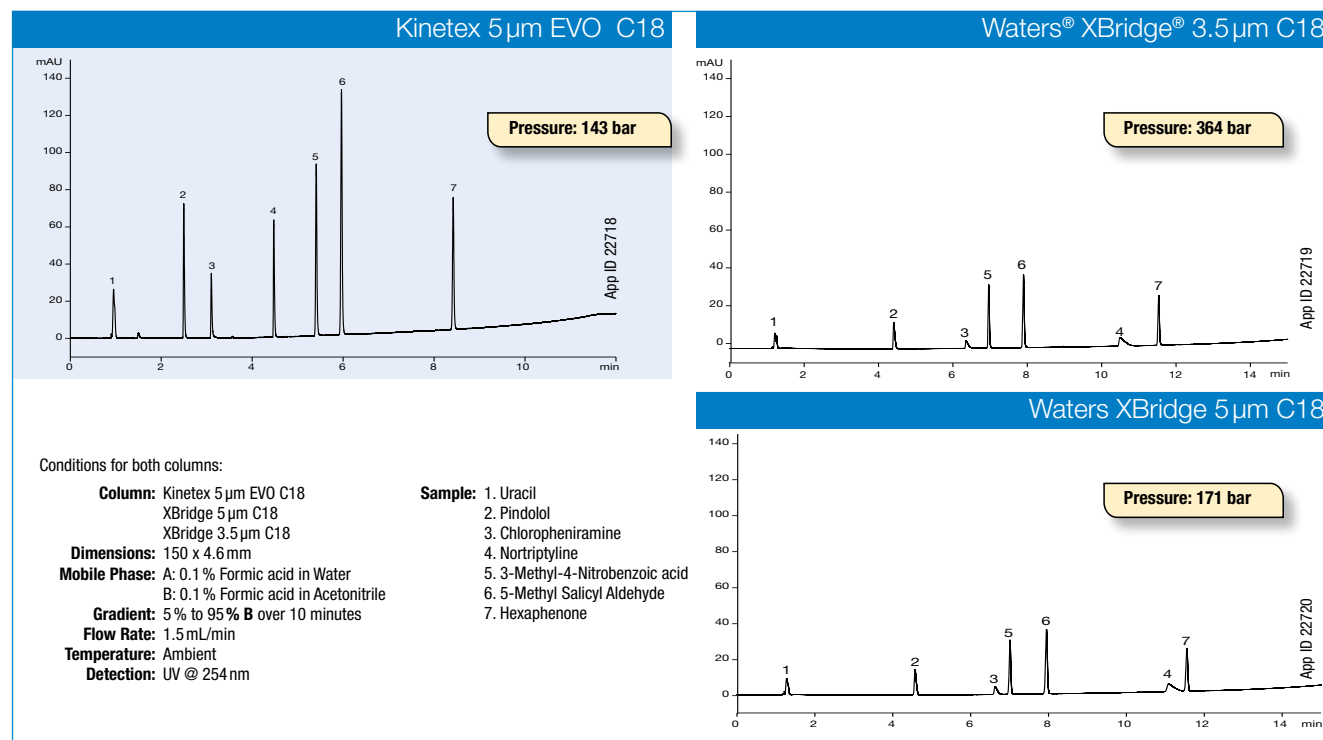
Comparative separations may not be representative of all applications.

# Kinetex™ Core-Shell LC Columns

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

## Drop in a Kinetex EVO 5µm Column to Start Smiling

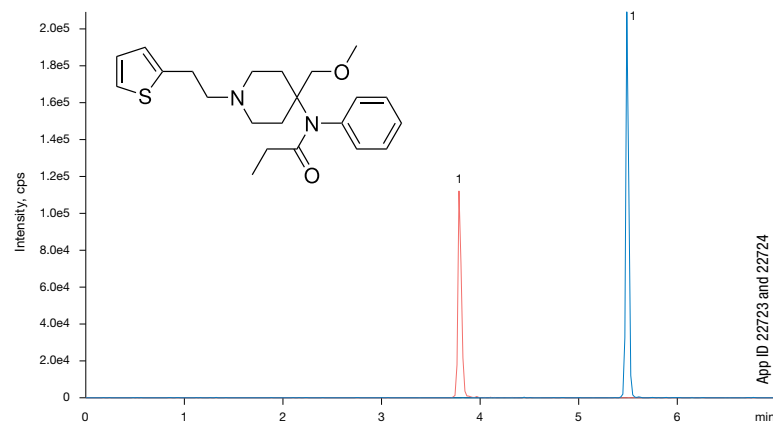
With the combination of rugged pH stability from 1-12 and the core-shell performance advantage, you can easily replace old hybrid silica columns and gain immediate method improvements without increasing backpressure.



Comparative separations may not be representative of all applications.

## Increased Sensitivity for LC-MS Applications

Alongside LC-UV analyses, the high performance and low pressure of the Kinetex EVO 5µm make it a tremendous tool for LC-MS and LC-MS/MS. Increased polar basic retention provided by the Kinetex EVO allows for greater use of organic within the mobile phase, subsequently leading to improved ionization and increased sensitivity.



**Column:** Kinetex 5µm EVO C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4633-AN](#)

**Mobile Phase:** A: 0.1% Formic acid in Water, B: 0.1% Formic acid in Methanol

**Mobile Phase:** A: 10 mM Ammonium Bicarbonate (pH 8.2), B: Methanol

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

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

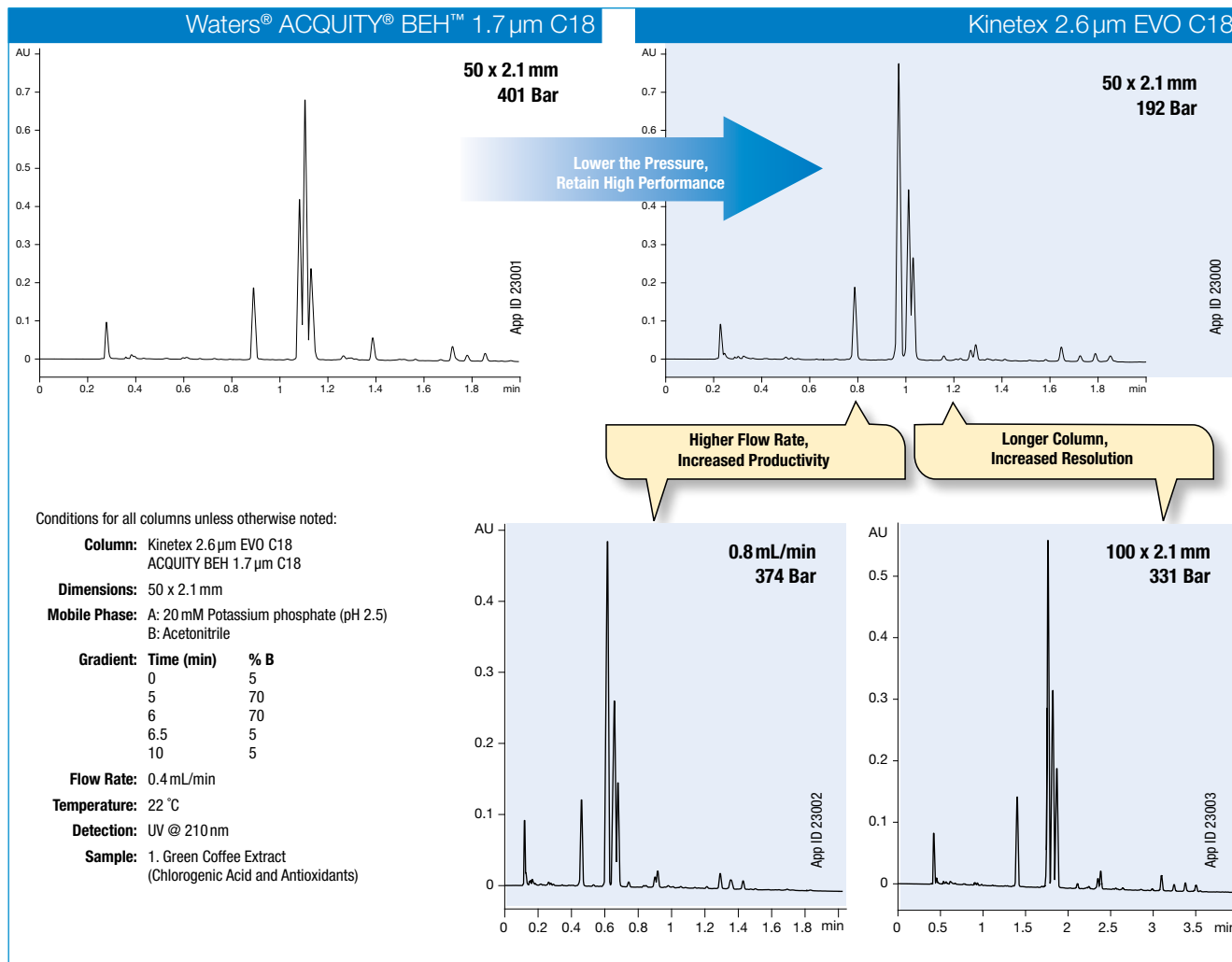
# Kinetex™ Core-Shell LC Columns

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

## A Simple Upgrade for Potential Greater Performance!

For scientists who are interested in high performance and fast run times, 2.6µm Kinetex EVO C18 columns are an amazing UHPLC solution. Start by matching a Kinetex 2.6µm column to the sub-2µm column you're currently using. With lower backpressure

and similar or better performance, you'll then have three options: keep the lower pressure for less system strain, increase the flow for higher productivity, or utilize a longer column length to increase potential resolving power.



Comparative separations may not be representative of all applications.



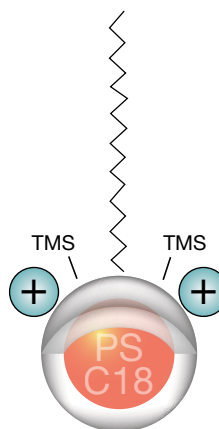
## Kinetex PS C18

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

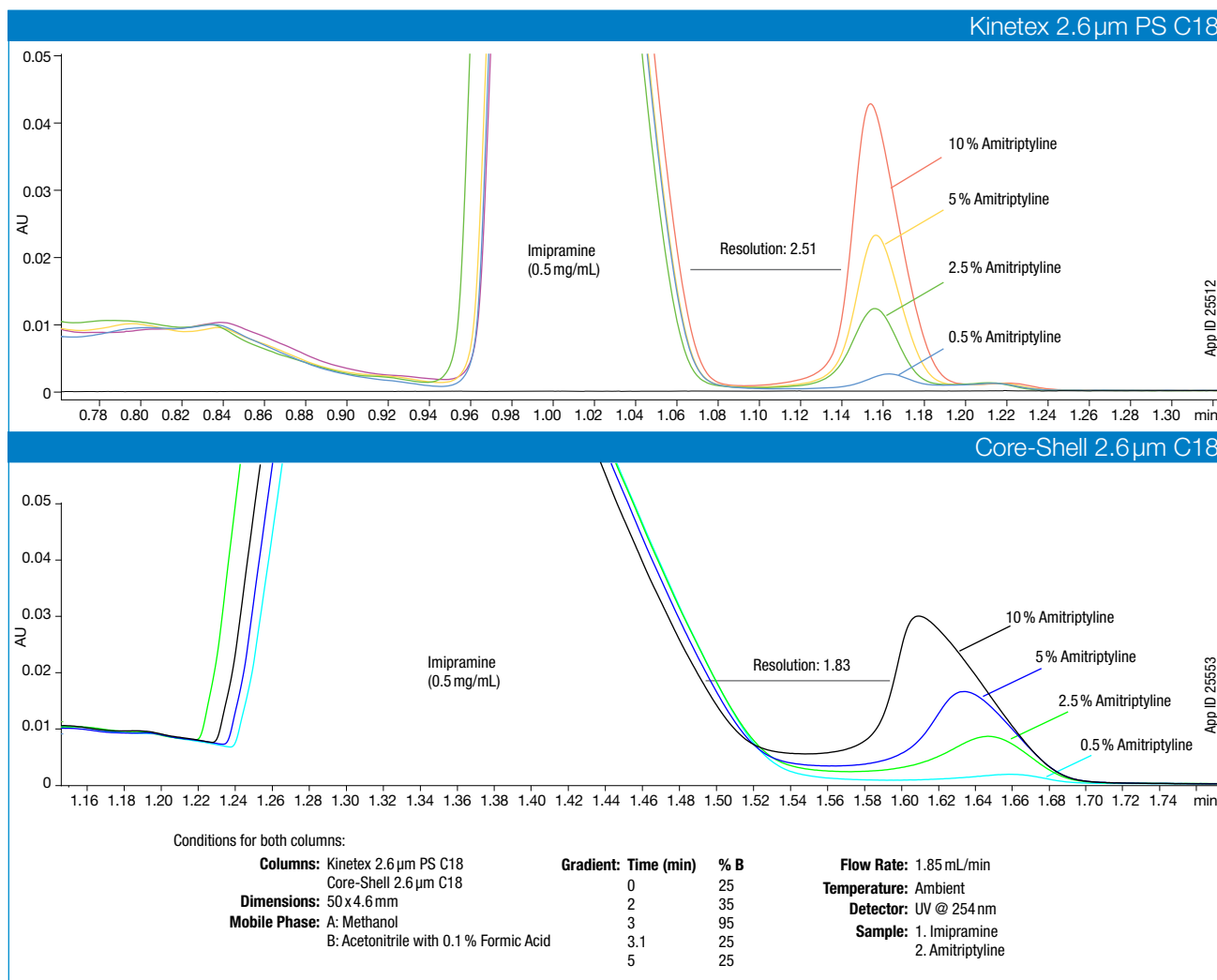
### A Versatile C18

A multi-modal, 100% aqueous C18 column with a positive surface modification that demonstrates unique selectivity and improved peak shape for basic compounds.

### Kinetex PS C18



### Enhanced Peak Shape for Basic Compounds



Comparative separations may not be representative of all applications.

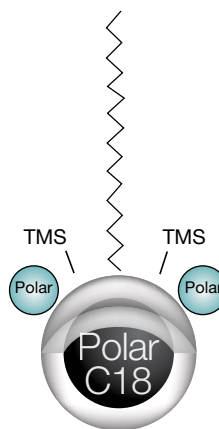
## Kinetex Polar C18

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

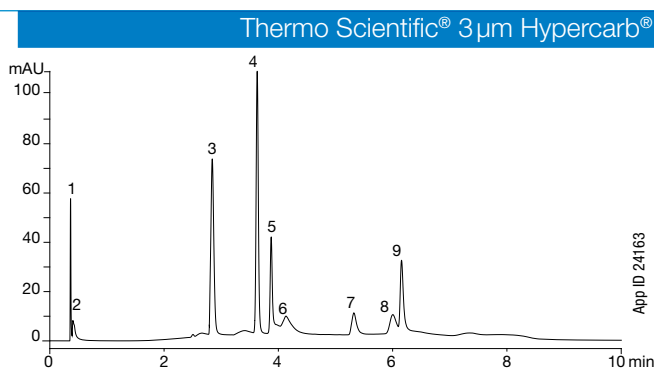
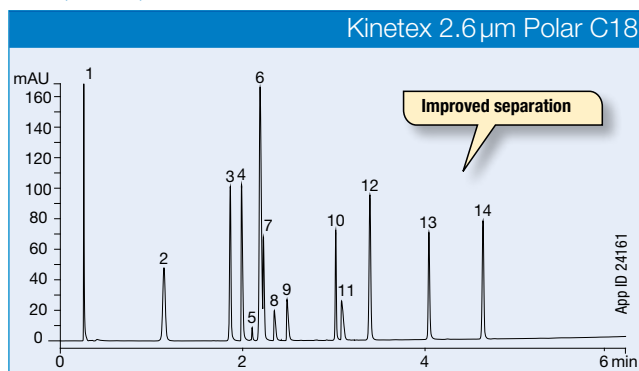
### A Versatile C18

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

## Kinetex Polar C18



### Acids, Bases, and Neutrals



Conditions for both columns:

**Columns:** Kinetex 2.6 μm Polar C18  
Thermo Scientific 3 μm Hypercarb

**Dimensions:** 50 x 4.6 mm

**Mobile Phase:** A: 0.1% Formic acid in Water  
B: 0.1% Formic acid in Acetonitrile

Gradient:	Time (min)	% B
	0	5
	0.5	5
	5.5	95
	7.51	5
	10	5

**Flow Rate:** 1.85 mL/min

**Temperature:** Ambient

**Detection:** UV @ 254 nm

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

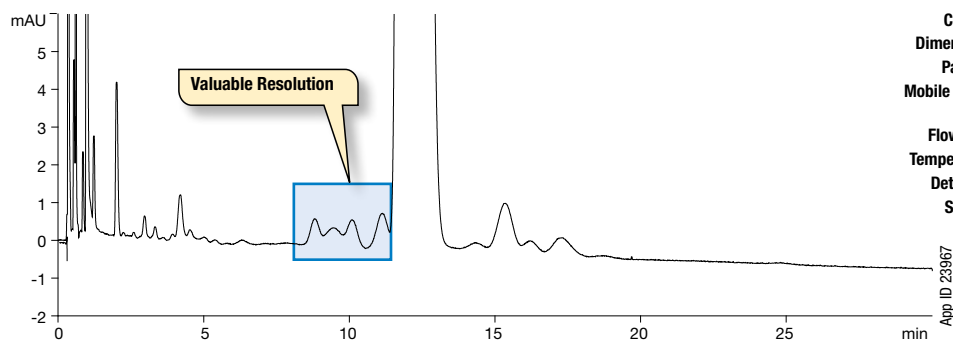
Comparative separations may not be representative of all applications.

## Enhanced Polar Selectivity

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

This is an excellent all purpose phase for use with multi-compound mixes that contain polar and nonpolar compounds, or even single class methods that have closely related compounds, impurities, or metabolites.

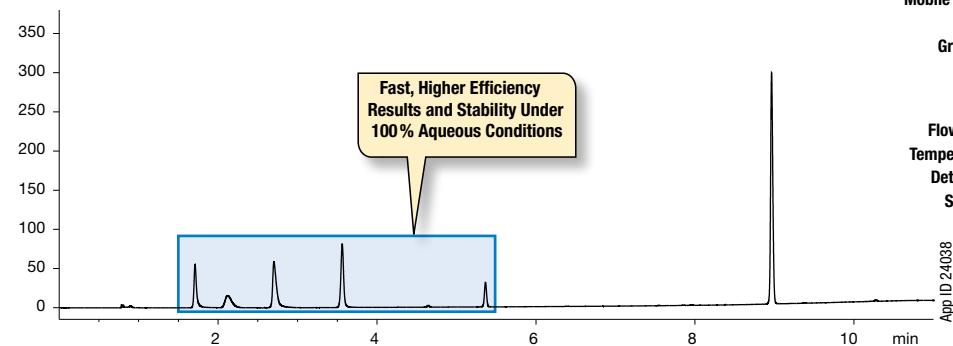
### UHPLC Analysis of Cyclosporine and Impurities



**Column:** Kinetex 2.6 μm Polar C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4759-AN](#)  
**Mobile Phase:** Acetonitrile/Tert-butyl methyl ether/  
 Water/Phosphoric acid (430:50:520:1)  
**Flow Rate:** 0.30 mL/min  
**Temperature:** 80 °C  
**Detection:** UV @ 210 nm  
**Sample:** Cyclosporine

App ID 23967

### Water Soluble Vitamins



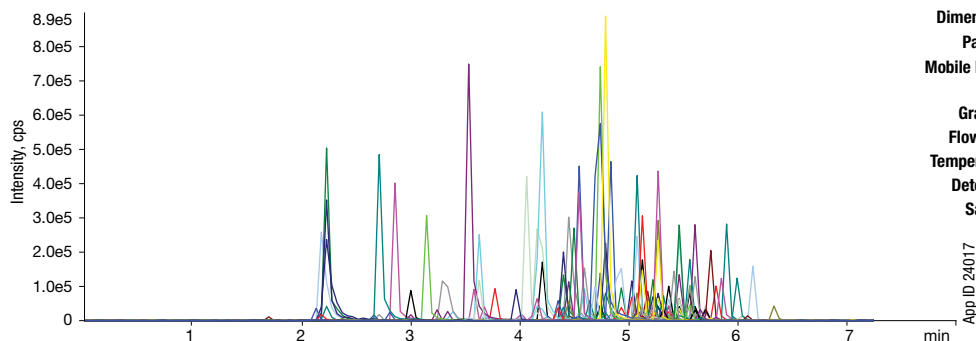
**Column:** Kinetex 2.6 μm Polar C18  
**Dimensions:** 100 x 4.6 mm  
**Part No.:** [00D-4759-E0](#)  
**Mobile Phase:** A: 20 mM Potassium Phosphate  
 B: Methanol  

Gradient:	Time (min)	% B
	0	0
	1	0
	10	60

**Flow Rate:** 1.2 mL/min  
**Temperature:** Ambient  
**Detection:** UV @ 210 nm  
**Sample:** 1. Thiamine  
 2. Nicotinamide  
 3. Pyridoxal  
 4. Pyridoxine  
 5. Pantothenic Acid  
 6. Riboflavin

App ID 24038

### Multi-Class 206 Pesticide Panel Screen



**Column:** Kinetex 2.6 μm Polar C18  
**Dimensions:** 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

App ID 24017

## Kinetex Biphenyl

- Remarkable separation power
- Rugged and reliable
- 100% aqueous stable

### Selectivity That a C18 Just Can't Give You!

Think high performance, enhanced retention, and the ability to go where a traditional C18 can't. The Kinetex Biphenyl offers the high performance benefits of a core-shell particle with a unique stationary phase capable of becoming the go-to selectivity for reversed phase method development. Use Kinetex Biphenyl columns to get enhanced retention, higher sensitivity, and overall better results; especially for aromatic compounds.

#### Aromatic Pi-Pi Interactions

Between aromatic rings and pi electrons of target molecule and the double aromatic rings of the Biphenyl ligand

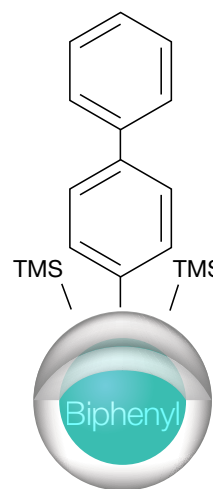
#### Hydrophobic Interactions

Between carbon skeleton of Biphenyl ligand and target analytes

#### Weak Ionic or Dipole-Dipole Interactions

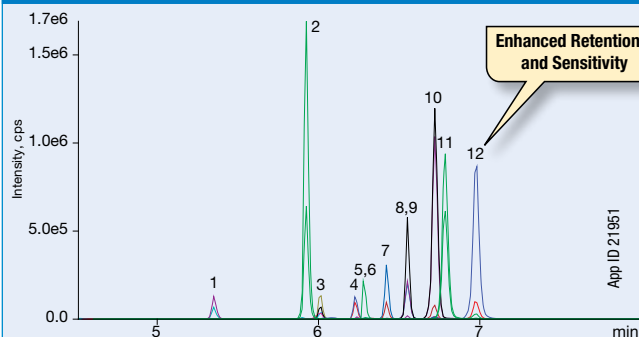
High electron density created by dual ring structure behaves similar to a weak cation exchanger, giving enhanced retention for basic analytes

## Kinetex Biphenyl

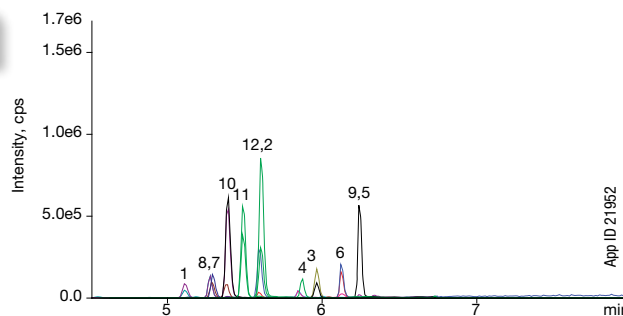


### Mycotoxins

#### Kinetex 2.6 μm Biphenyl



#### Waters® SunFire® 3.5 μm C18



Conditions for both columns:

<b>Column:</b>	Kinetex 2.6 μm Biphenyl	
	Waters SunFire 3.5 μm C18	
<b>Dimensions:</b>	50 x 2.1 mm	
<b>Mobile Phase:</b>	A: 5 mM Ammonium acetate with 0.1 % Acetic acid	
	B: Methanol with 5 mM Ammonium acetate with 0.1 % Acetic acid	
<b>Gradient:</b>	<b>Time (min)</b>	<b>% B</b>
	0	2
	2	2
	5	80
	5.2	98
	8	98
	8.01	2
	11	2

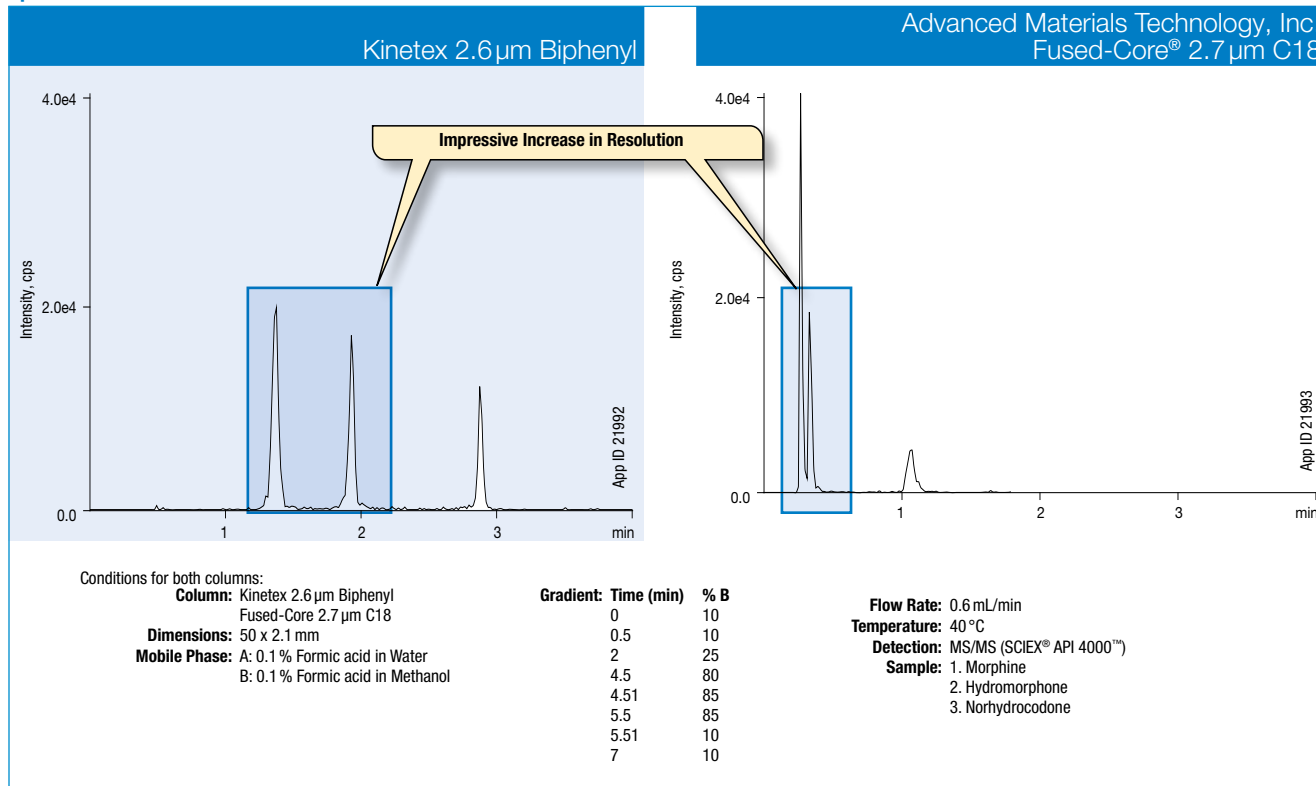
<b>Flow Rate:</b>	0.45 mL/min
<b>Temperature:</b>	40 °C
<b>Detection:</b>	MS/MS (SCIEX® API 4000™)
<b>Sample:</b>	1. 15-Acetyldeoxynivalenol
	2. DAS
	3. FB1
	4. HT-2 Toxin
	5. FB2
	6. T-2 Toxin
	7. Aflatoxin M1
	8. Aflatoxin G2
	9. Ochratoxin A
	10. Aflatoxin G1
	11. Aflatoxin B2
	12. Aflatoxin B1

Comparative separations may not be representative of all applications.

## Enhanced Separation Power

Kinetex Biphenyl is a high efficiency core-shell product capable of adding extra separation power to your analysis of non-polar and polar compounds.

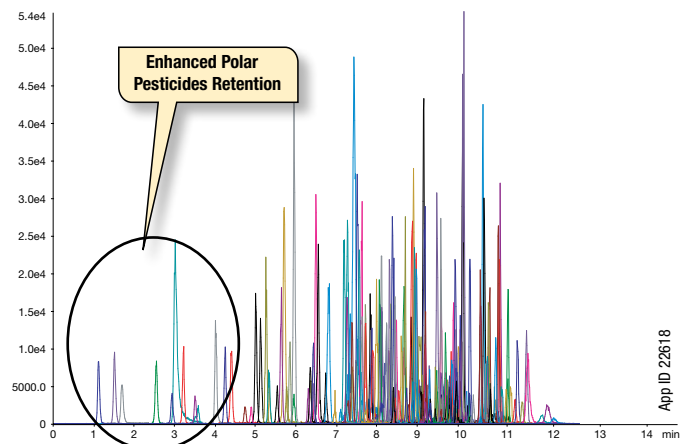
### Opiate Isomers



Comparative separations may not be representative of all applications.

## Excel With Your Multi-Compound, Multi-Class Screening

Increase the separation and analytical power of your HPLC/UHPLC compound screens with the multi-functional Kinetex Biphenyl stationary phase.



**Column:** Kinetex 5 μm Biphenyl  
**Dimensions:** 100 x 2.1 mm  
**Part No.:** [00D-4627-AN](#)  
**Mobile Phase:** A: 5 mM Ammonium formate in Water  
 B: 5 mM Ammonium formate in Methanol

<b>Gradient:</b>	<b>Time (min)</b>	<b>% B</b>
	0.01	10
	1	10
	10	90
	15	90
	15.1	10
	20	10

**Flow Rate:** 0.5 mL/min  
**Temperature:** 35 °C  
**Detection:** Tandem Mass Spectrometer (MS/MS)  
**Detector:** SCIEX® 4500 QTRAP®  
**Sample:** 175+ Pesticide Mix



## Kinetex F5

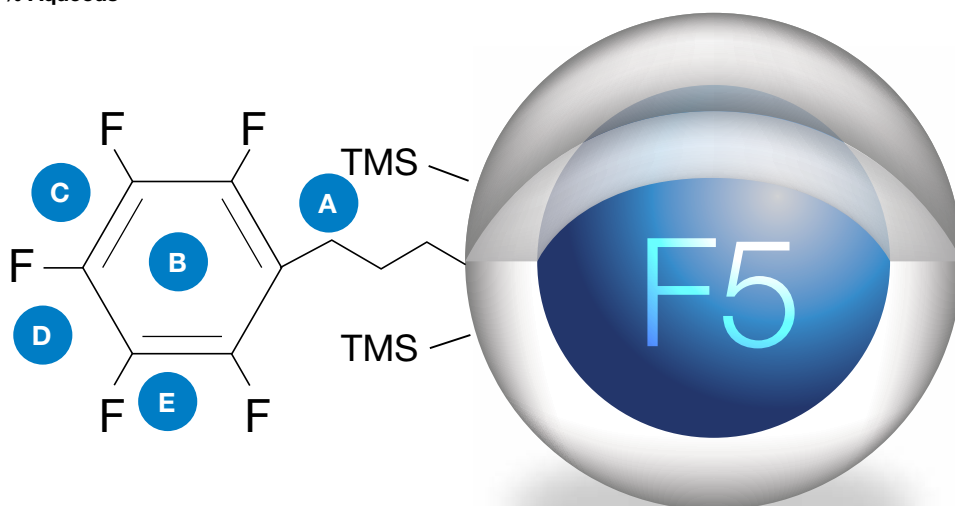
- Reduce method development time by days
- Greater reproducibility than other PFPs
- 5 interaction mechanisms
- 4 valuable LC separation modes

### 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— 4 Separation Modes

- Reversed Phase
- SFC
- 2D-LC
- 100% Aqueous



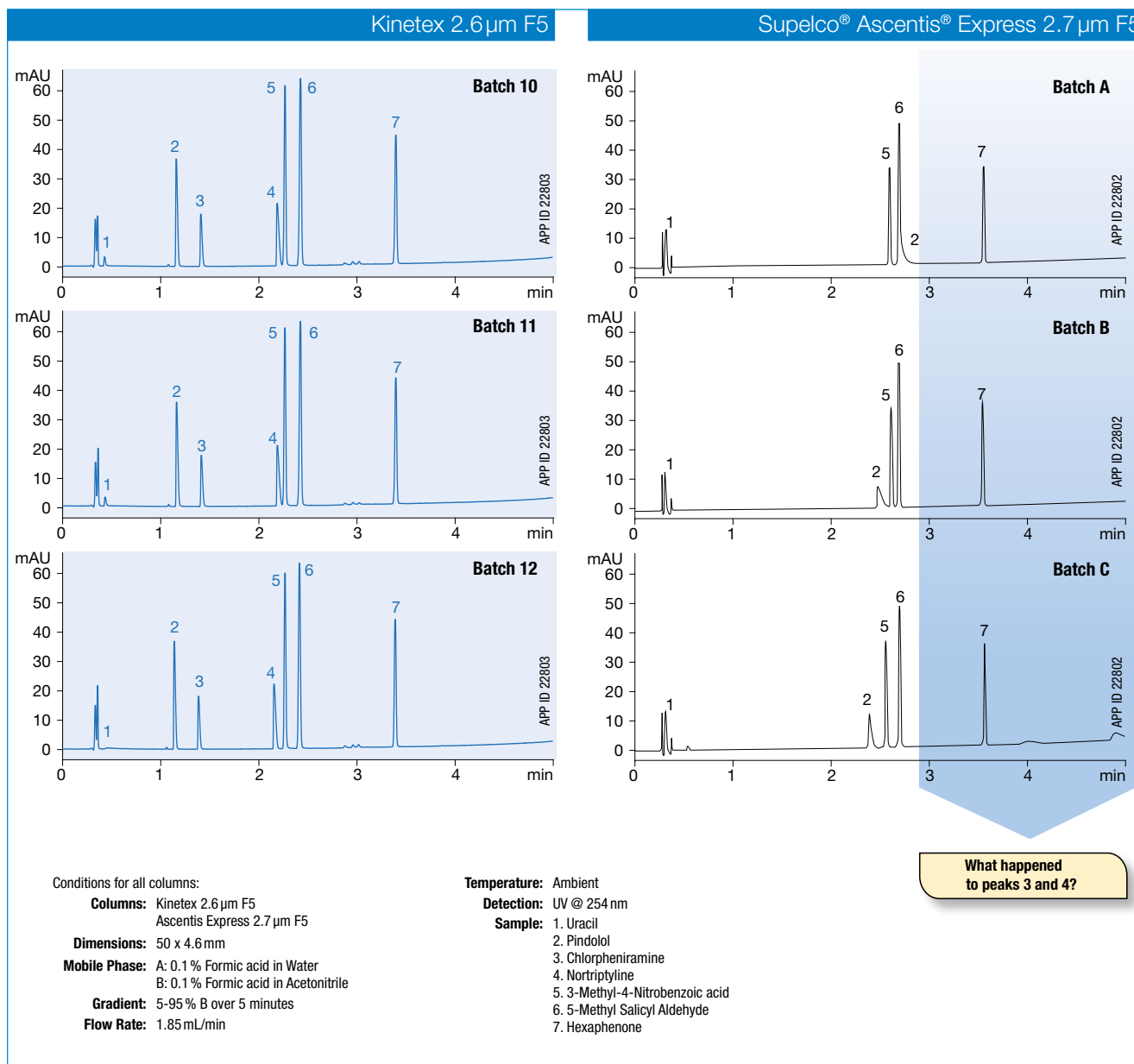
### 5 Interaction Mechanisms

- A Hydrophobic**  
Carbon skeleton of linker and ring encourage neutral/hydrophobic retention
- B Aromatic**  
In non-acetonitrile mobile phases,  $\pi$ - $\pi$  electrons of the carbon ring interact with analyte  $\pi$ - $\pi$  electrons and result in positive retention increase
- C Electrostatic**  
High electronegativity of the fluorine groups create dipole moments, aiding in polar compound retention. Induced dipole moments can also aid neutral compound retention.
- D Steric/Planar**  
Shape selectivity allows for isomeric separations that are otherwise impossible on traditional alkyl phases
- E Hydrogen Bonding**  
Extremely effective retention mechanism caused as polar functional groups of analyte interact with the electron greedy fluorine

## Dependability

### Batch-to-Batch, Column-to-Column

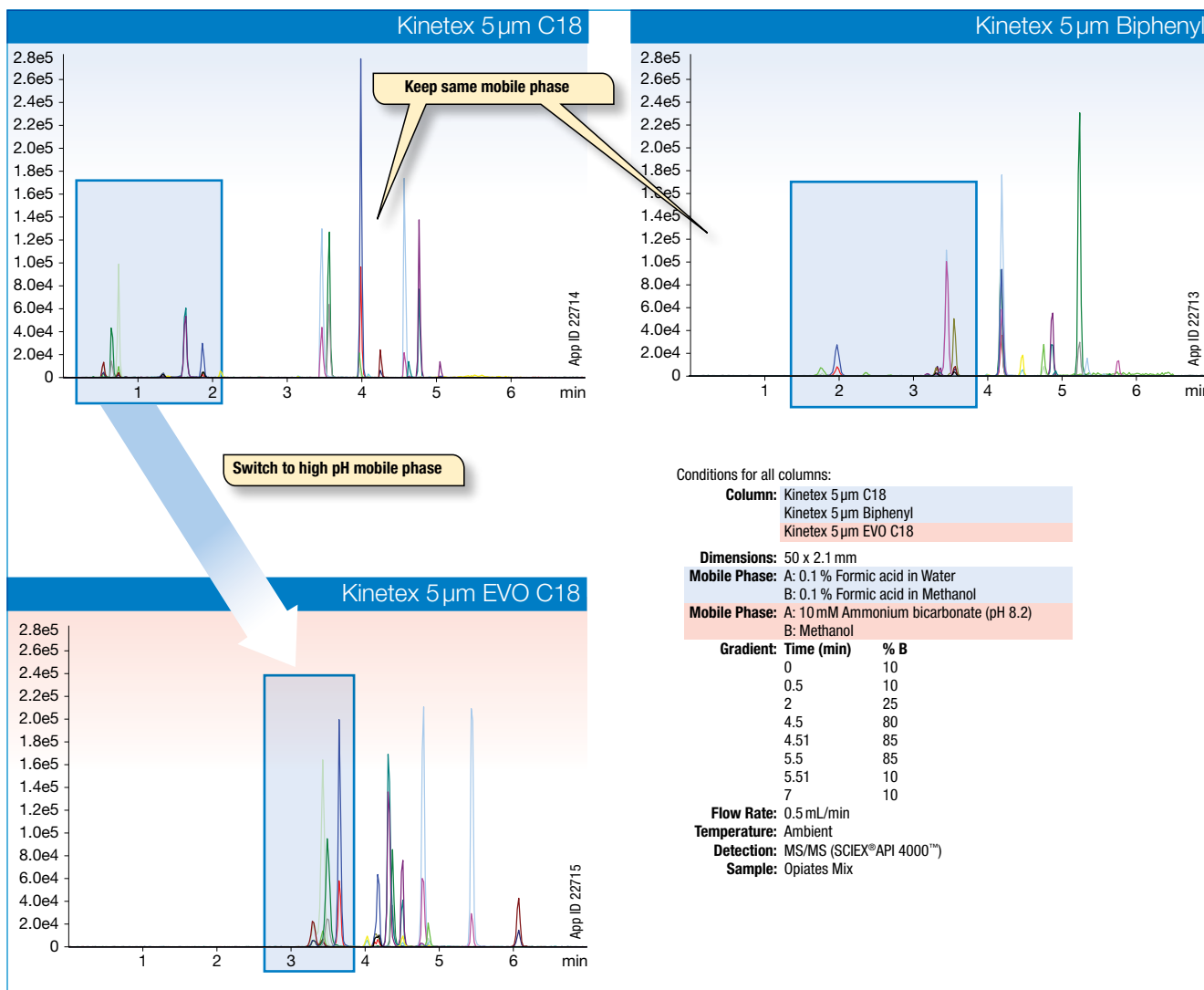
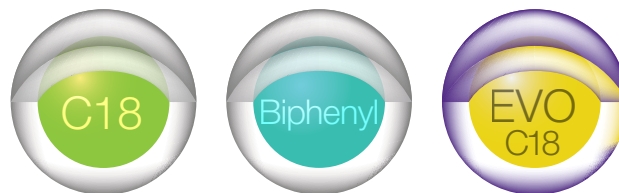
Conventional fully porous and core-shell PFP/F5 columns fail to reach the level of repeatability that you deserve. Inconsistencies in their base silica have led to data inaccuracies that waste your time and money. Kinetex F5 columns were specifically designed to avoid these past problems and provide a high degree of reproducibility.



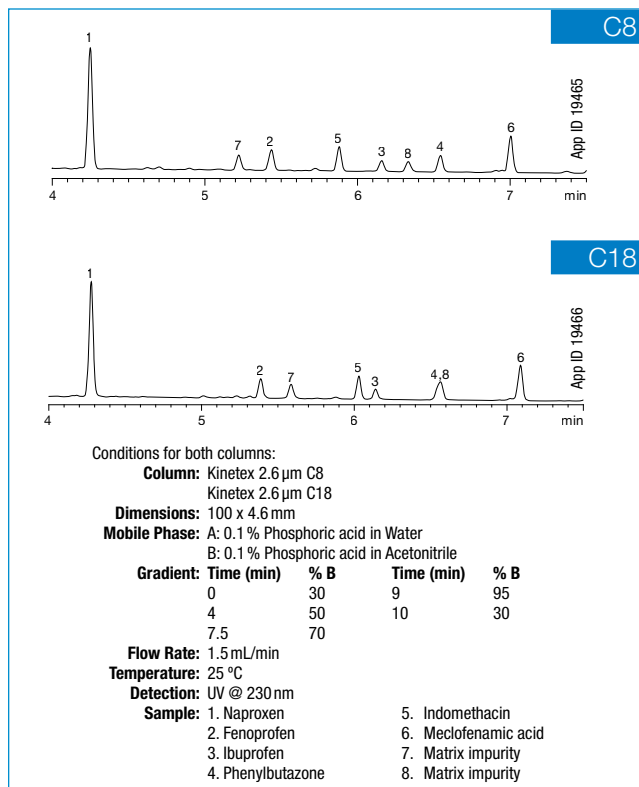
Comparative separations may not be representative of all applications.

## Selectivities Built for Your Needs

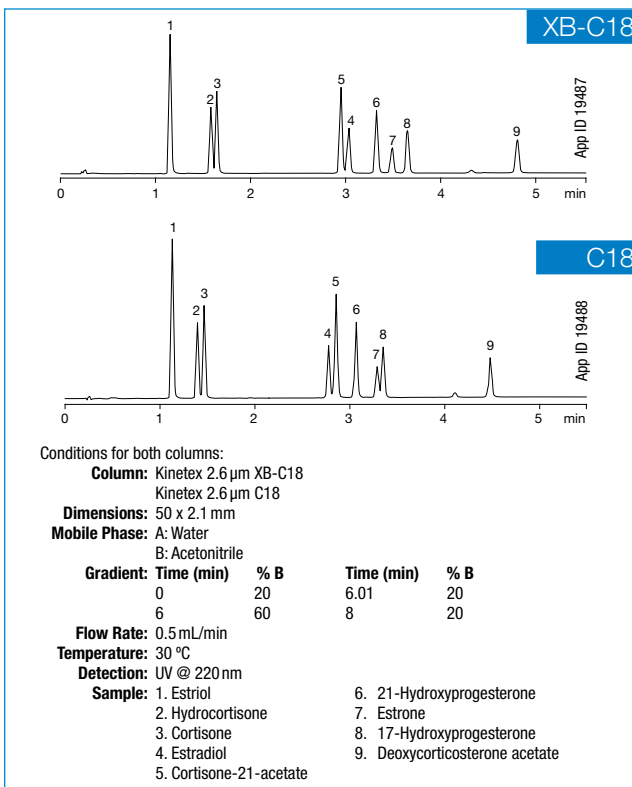
The extensive range of Kinetex stationary phases allows you to get retention enhancement without performance loss. Use the multi-functional Kinetex Biphenyl or pH stable Kinetex EVO C18 to reach the desired solution for your method.



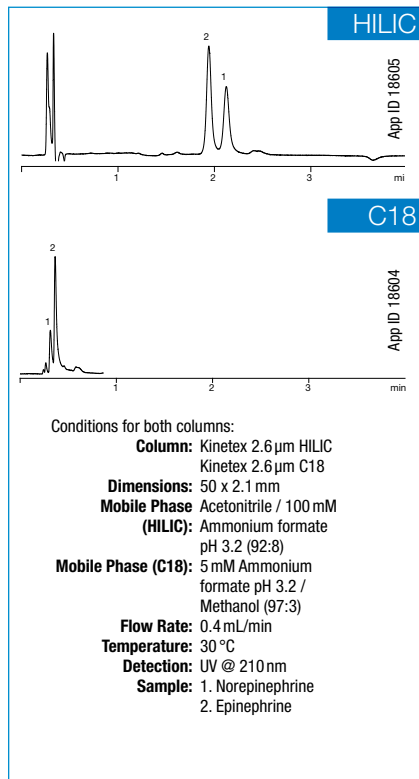
## Veterinary Drugs



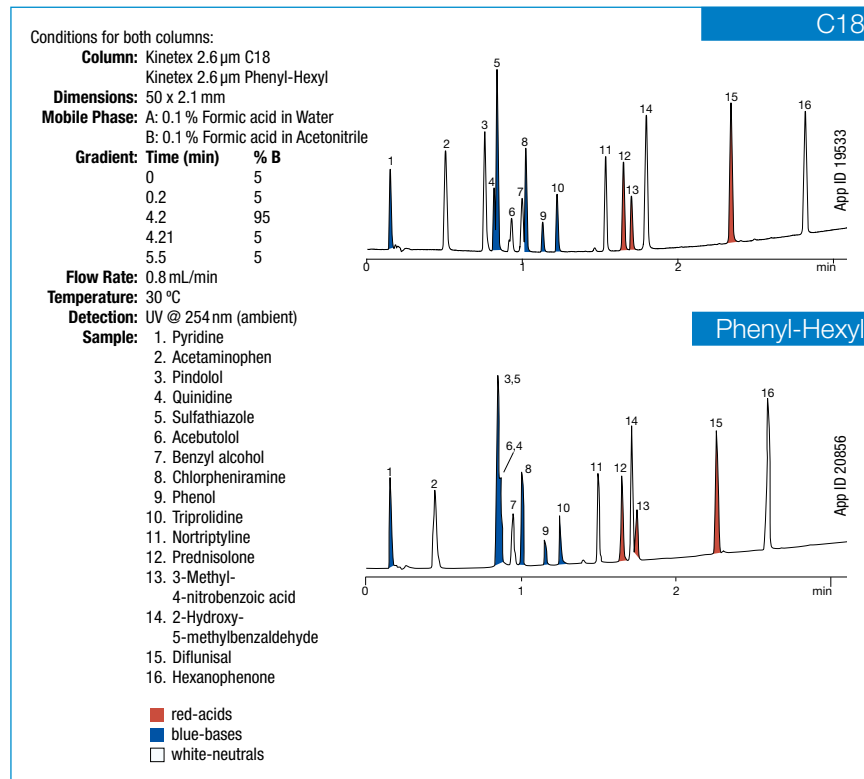
## Steroids



## Norepinephrine and Epinephrine



## Acids, Bases, and Neutrals Mix



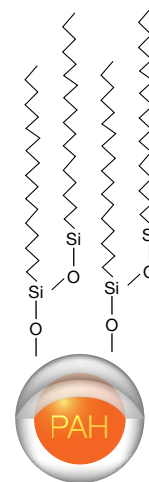
Comparative separations may not be representative of all applications.

## Kinetex PAH

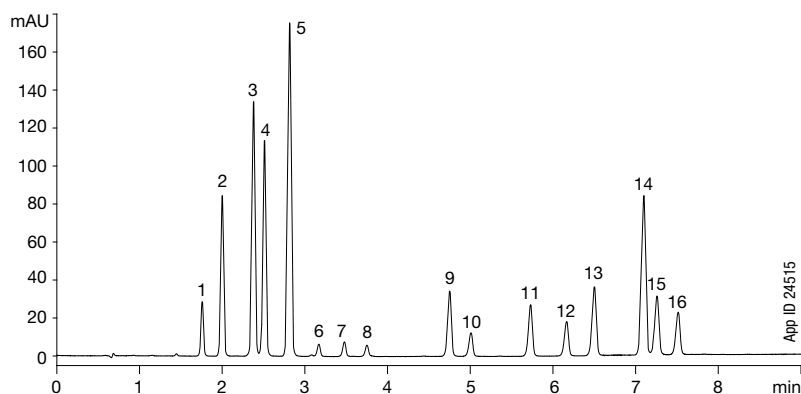
- Expanded resolution with chemical selectivity specifically for PAHs
- Increased throughput and sensitivity with core-shell technology for HPLC/UHPLC

### Designed and QC Tested for PAH Analysis by HPLC/UHPLC

Kinetex PAH columns were specifically built for the analysis of PAHs. Controlled pore size processing and a proprietary polymerically bonded stationary phase were developed for this product to ensure excellent resolution between priority polycyclic aromatic hydrocarbons (PAHs). Combined with core-shell particle technology, incredibly high efficiency and sensitivity at comfortable LC pressures is very achievable.



#### EPA 610 – PAH Analysis



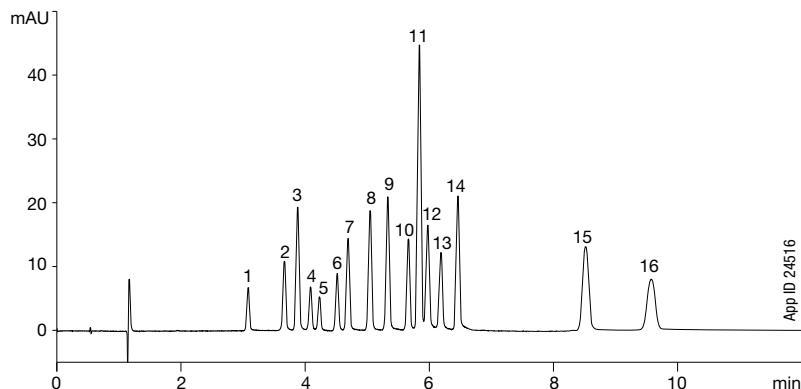
**Column:** Kinetex 3.5µm PAH  
**Dimensions:** 100 x 4.6 mm  
**Part No.:** [00D-4764-E0](#)  
**Mobile Phase:** A: Water  
 B: Acetonitrile  
**Gradient:**

Time (min)	% B
0	50
7	100
8	100
9	50
12	50

**Flow Rate:** 1.2 mL/min  
**Temperature:** 35 °C  
**Detection:** UV @ 292 nm  
**Sample:**

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

#### EU 15+1 PAH Analysis



**Column:** Kinetex 3.5µm 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  
**Temperature:** 35 °C  
**Detection:** UV @ 292 nm  
**Sample:**

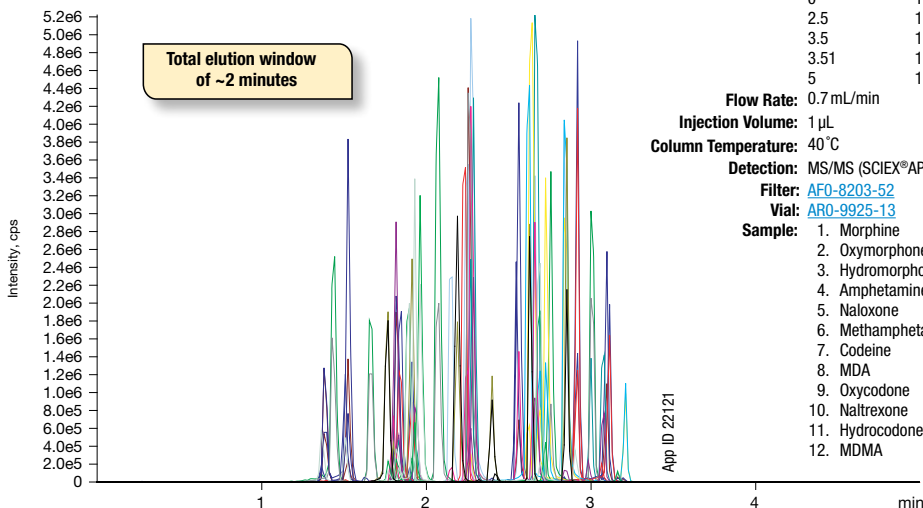
1. Benzo[c]fluorene	9. Benzo[a]pyrene
2. Cyclopenta[c,d]pyrene	10. Dibenzo[a,l]pyrene
3. Benz[a]anthracene	11. Dibenzo[a,h]anthracene
4. Chrysene	12. Benzo[g,h,i]perylene
5. 5-Methylchrysene	13. Indeno[1,2,3-cd]pyrene
6. Benzo[j]fluoranthene	14. Dibenzo[a,e]pyrene
7. Benzo[b]fluoranthene	15. Dibenzo[a,i]pyrene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



## Applications

### Clinical Research and Toxicology

#### Comprehensive Drug Research Panel



**Column:** Kinetex 2.6µm Biphenyl  
**Dimensions:** 50 x 3.0mm  
**Part No.:** [00B-4622-Y0](#)  
**Guard Cartridge:** [AJO-9208](#)  
**Guard Holder:** [AJO-9000](#)  
**Mobile Phase:** A: 0.1% Formic acid in Water  
 B: 0.1% Formic acid in Methanol

Gradient	Time (min)	% B
	0	10
	2.5	100
	3.5	100
	3.51	10
	5	10

**Flow Rate:** 0.7 mL/min  
**Injection Volume:** 1 µL  
**Column Temperature:** 40°C  
**Detection:** MS/MS (SCIEX®API 5000™)  
**Filter:** [AFO-8203-52](#)  
**Vial:** [ARO-9925-13](#)  
**Sample:**

13. MDEA
14. Norfentanyl
15. Tramadol
16. Benzoylcegonine
17. Meperidine
18. Meprobamate
19. Norbuprenorphine
20. Fentanyl
21. Buprenorphine
22. Flurazepam
23. Carisoprodol
24. PCP
25. Propoxyphene
26. Sufentanil
27. 6-MAM
28. Midazolam
29. Normeperidine
30. EDDP
31. Methadone
32. Lorazepam
33. Clonazepam
34. Norpropoxyphene
35. Oxazepam
36. Hydroxalprazolam
37. Nordiazepam
38. Flunitrazepam
39. Temazepam
40. Alprazolam
41. Diazepam

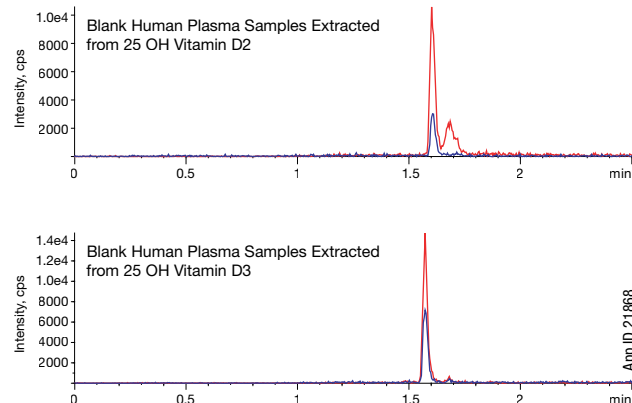
#### Vitamin D

**Column:** Kinetex 2.6µm C18  
**Dimensions:** 30 x 3.0mm  
**Guard Cartridge:** [AJO-8775](#)  
**Guard Holder:** [AJO-9000](#)  
**Part No.:** [00A-4462-Y0](#)  
**Mobile Phase:** A: 0.1% Formic acid in Water  
 B: 0.1% Formic acid in Methanol

Gradient	Time (min)	% B
	0	60
	0.5	95
	2	95
	2.01	60
	3.5	60

**Flow Rate:** 0.6 mL/min  
**Temperature:** 22°C  
**Detection:** Tandem Mass Spectrometer (MS/MS) (22°C)  
**Detector:** SCIEX API 5000™ System  
**Filter:** [AFO-8203-52](#)  
**Vial:** [ARO-9925-13](#)  
**Sample:**

1. 25-Hydroxy Vitamin D2 (25-OH D2)
2. 25-Hydroxy Vitamin D3-2H3
3. 25-Hydroxy Vitamin D3-d6 (25-OH D3-d6)



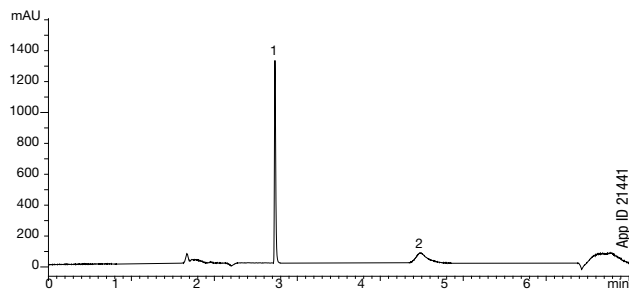
#### Human Plasma Vitamin C

**Column:** Kinetex 5µm XB-C18  
**Dimensions:** 150 x 4.6mm  
**Guard Cartridge:** [AJO-8768](#)  
**Guard Holder:** [AJO-9000](#)  
**Part No.:** [00F-4605-E0](#)  
**Mobile Phase:** A: 0.1% Formic acid in Water  
 B: Acetonitrile

Gradient	Time (min)	% B
	0	0
	3.5	0
	3.6	100
	5	100
	5.1	0
	7	0

**Flow Rate:** 0.8 mL/min  
**Temperature:** 22°C  
**Detection:** UV @ 245 nm  
**Filter:** [AFO-8103-52](#)  
**Vial:** [ARO-9925-13](#)  
**Sample:**

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



## Applications

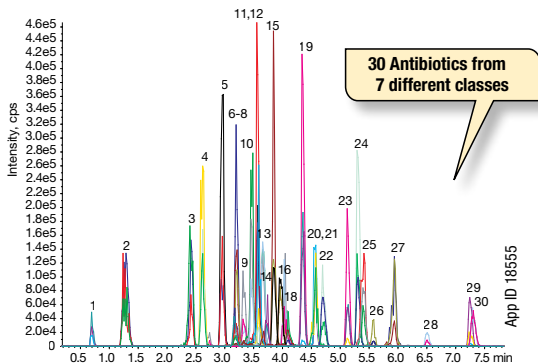
### Food Testing

#### Multi-Class Antibiotics Screening of Meat

**Column:** Kinetex 2.6 µm C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4462-AN](#)  
**Mobile Phase:** A: 0.1 % Formic acid in Water  
 B: 0.1 % Formic acid in Methanol

Gradient	Time (min)	% B	Time (min)	% B
	0	2	7.37	99
	0.3	2	8.27	99
	7.27	80	13	2

**Flow Rate:** 0.5 mL/min  
**Temperature:** 40 °C  
**Detection:** Mass Spectrometer (MS) (300 °C)  
**Detector:** SCIEX® API 4000™ System  
**Note:** Analytes spiked at 100 ng/mL  
**Sample:** See full list of analytes at [www.phenomenex.com](http://www.phenomenex.com)



### Azo Dyes

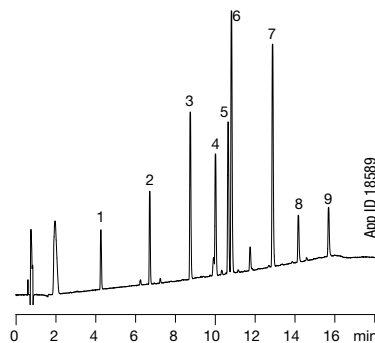
**Column:** Kinetex 2.6 µm C18  
**Dimensions:** 150 x 4.6 mm  
**Part No.:** [00F-4462-E0](#)  
**Mobile Phase:** A: 0.1 % Phosphoric acid in Water  
 B: 0.1 % Phosphoric acid in Acetonitrile

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	6. Sudan I
2. Sudan Orange G	7. Sudan II
3. Fast Garnet GBC	8. Sudan III
4. Dimethyl yellow	9. Sudan IV
5. Sudan Red G	



### Multi-Toxin Screen

**Column:** Kinetex 2.6 µm XB-C18 100 Å  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4496-AN](#)  
**Mobile Phase:** A: Water with 5 mM Ammonium acetate and 0.5 % Acetic acid  
 B: Methanol with 5 mM Ammonium acetate and 0.5 % Acetic acid

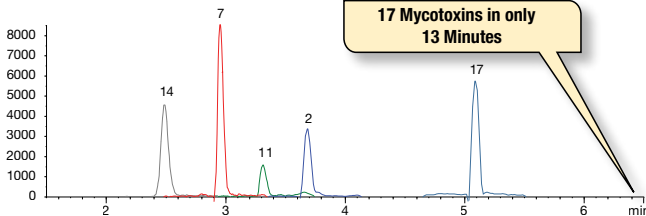
Gradient	Time (min)	% B	Time (min)	% B
	0	2	5.2	98
	2	2	8	98
	5	80		

**Flow Rate:** 0.45 mL/min  
**Temperature:** Ambient (22 °C)  
**Detection:** Tandem Mass Spectrometer (MS/MS) (550 °C)  
**Detector:** SCIEX API 5500™

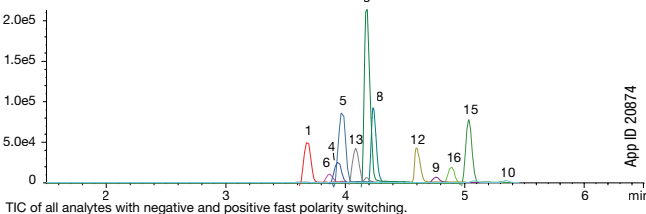
**Sample:**

1. 15-Acetyldeoxynivalenol	7. Deoxynivalenol	13. Monoacetoxyscirpenol
2. 3-Acetyldeoxynivalenol	8. Diacetoxyscirpenol	14. Nivalenol
3. Aflatoxin B1	9. Fumonisin B1	15. Ochratoxin
4. Aflatoxin B2	10. Fumonisin B2	16. T-2 toxin
5. Aflatoxin G1	11. Fusarenon X	17. Zearalenon
6. Aflatoxin G2	12. HT-2 toxin	

#### Negative Polarity



#### Positive Polarity



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

### Pharmaceutical

#### Tricyclic Antidepressants

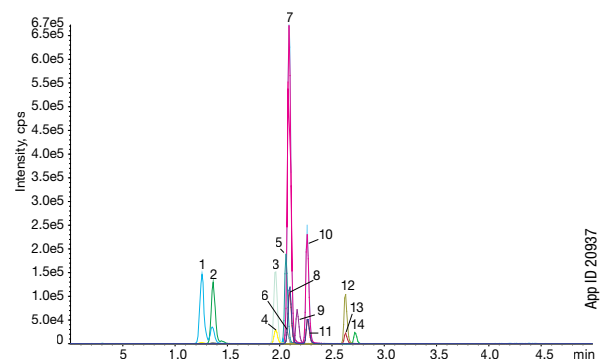
**Column:** Kinetex 2.6 µm C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4462-AN](#)  
**Mobile Phase:** A: 0.1 % Formic acid in Water  
 B: 0.1 % Formic acid in Methanol

Gradient	Time (min)	% B	Time (min)	% B
	0	40	4.01	40
	3.5	80	5	40
	4	80		

**Flow Rate:** 0.4 mL/min  
**Temperature:** 22 °C  
**Detection:** MS/MS  
**Detector:** SCIEX® API 4000™ System

**Sample:**

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



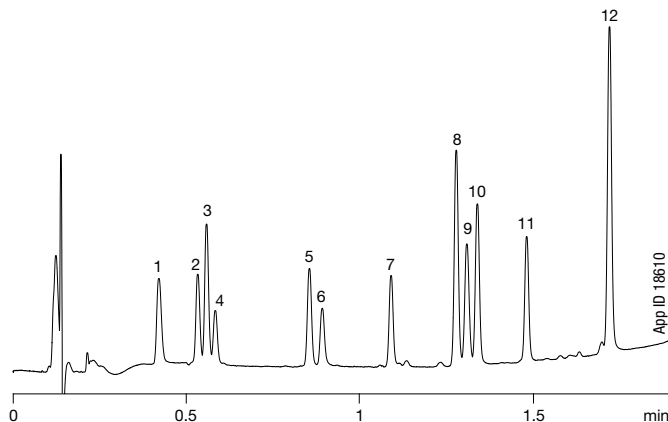
## Applications

### Environmental

#### Carbamate Pesticides: EPA Method 531.1

**Column:** Kinetex 2.6 μm C18  
**Dimensions:** 50 x 2.1 mm  
**Part No.:** [00B-4462-AN](#)  
**Guard Cartridge:** [AJ0-8782](#)  
**Guard Holder:** [AJ0-9000](#)  
**Mobile Phase:** A: 0.1 % Phosphoric acid in Water  
 B: 0.1 % Phosphoric acid in Acetonitrile  
**Gradient:** (95:5) A/B to (5:95) A/B over 3 min  
**Flow Rate:** 1.0 mL/min  
**Temperature:** 40 °C  
**Detection:** UV @ 210 nm  
**Filter:** [AF0-8203-52](#)  
**Vial:** [AR0-9925-13](#)

**Sample:** 1. Aldicarb sulfoxide 7. Aldicarb  
 2. Oxamyl 8. Baygon® (Propoxur)  
 3. Aldicarb sulfone 9. Carbofuran  
 4. Methomyl 10. Carbaryl  
 5. 3-OH-Carbofuran 11. 1-Naphthol  
 6. Aldicarb sulfone-related impurity 12. Methiocarb



App ID 18610

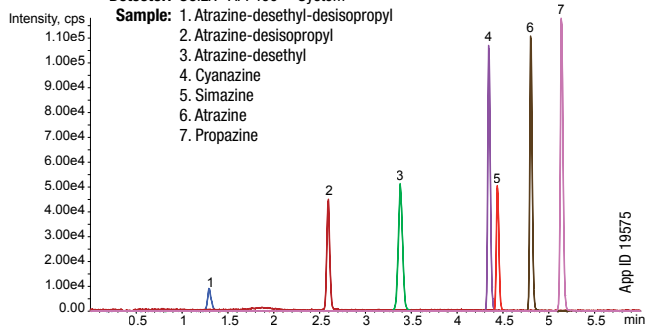
#### Triazine Pesticides: EPA Method 536

**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



App ID 19575

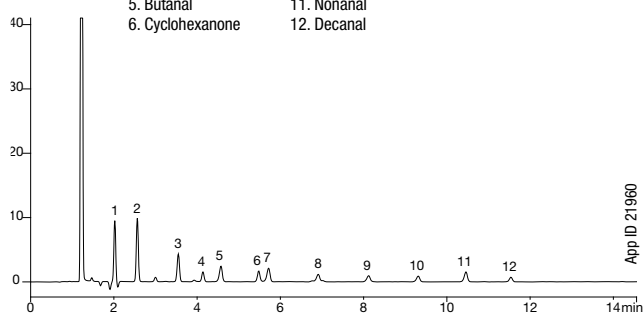
#### Carbonyl Compounds in Drinking Water

**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 7. Pentanal  
 2. Acetaldehyde 8. Hexanal  
 3. Propanal 9. Heptanal  
 4. Crotonaldehyde 10. Octanal  
 5. Butanal 11. Nonanal  
 6. Cyclohexanone 12. Decanal



App ID 21960

# Kinetex™ Core-Shell LC Columns

## Material Characteristics

Packing Material	pH Stability	Particle Sizes (µm)	Pore Size (Å)	Effective Surface Area (m <sup>2</sup> /g)	Effective Carbon Load (%)	USP Classification	Pressure Stability (bar)
Polar C18	1.5-8.5*	2.6	100	200	9	L1	1000/600*
PS C18	1.5-8.5*	2.6	100	200	9	L1	1000/600*
EVO C18	1-12	5, 2.6, 1.7	100	200	11	L1	1000/600*
C18	1.5-8.5**	5, 2.6, 1.7, 1.3	100	200	12	L1	1000/600*
XB-C18	1.5-8.5**	5, 3.5, 2.6, 1.7	100	200	10	L1	1000/600*
C8	1.5-8.5**	5, 2.6, 1.7	100	200	8	L7	1000/600*
Biphenyl	1.5-8.5**	5, 2.6, 1.7	100	200	11	L11	1000/600*
Phenyl-Hexyl	1.5-8.5**	5, 2.6, 1.7	100	200	11	L11	1000/600*
F5	1.5-8.5**	5, 2.6, 1.7	100	200	9	L43	1000/600*
HILIC	2.0-7.5	5, 2.6, 1.7	100	200	0	L3	1000/600*
PAH	1.5-8.5*	3.5	100	200	12	L118	1000/600*

\*Columns are pH stable from 1.5-10 under isocratic conditions. Columns are pH stable 1.5-8.5 under gradient conditions.

\*\*2.1 mm ID Kinetex columns are pressure stable up to 1000 bar. 3.0 mm and 4.6 mm ID Kinetex 2.6 µm columns are stable up to 600 bar. When using Kinetex 1.3 µm or 1.7 µm, increased performance can be achieved, however high pressure-capable instrumentation is required.



2010 R&D 100 Award Recipient

## Ordering Information

5 µm Minibore Columns (mm)					SecurityGuard™ ULTRA Cartridges <sup>‡</sup>
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	<a href="#">00A-4633-AN</a>	<a href="#">00B-4633-AN</a>	<a href="#">00D-4633-AN</a>	<a href="#">00F-4633-AN</a>	<a href="#">AJ0-9298</a>
F5	—	<a href="#">00B-4724-AN</a>	<a href="#">00D-4724-AN</a>	<a href="#">00F-4724-AN</a>	<a href="#">AJ0-9322</a>
Biphenyl	<a href="#">00A-4627-AN</a>	<a href="#">00B-4627-AN</a>	<a href="#">00D-4627-AN</a>	—	<a href="#">AJ0-9209</a>
XB-C18	<a href="#">00A-4605-AN</a>	<a href="#">00B-4605-AN</a>	<a href="#">00D-4605-AN</a>	—	<a href="#">AJ0-8782</a>
C18	<a href="#">00A-4601-AN</a>	<a href="#">00B-4601-AN</a>	<a href="#">00D-4601-AN</a>	<a href="#">00F-4601-AN</a>	<a href="#">AJ0-8782</a>
C8	—	<a href="#">00B-4608-AN</a>	<a href="#">00D-4608-AN</a>	—	<a href="#">AJ0-8784</a>
Phenyl-Hexyl	—	<a href="#">00B-4603-AN</a>	—	—	<a href="#">AJ0-8788</a>
HILIC	—	<a href="#">00B-4606-AN</a>	—	—	<a href="#">AJ0-8786</a>

for 2.1 mm ID

5 µm MidBore™ Columns (mm)					SecurityGuard™ ULTRA Cartridges <sup>‡</sup>
Phases	30 x 3.0	50 x 3.0	100 x 3.0	150 x 3.0	3/pk
EVO C18	<a href="#">00A-4633-Y0</a>	<a href="#">00B-4633-Y0</a>	<a href="#">00D-4633-Y0</a>	<a href="#">00F-4633-Y0</a>	<a href="#">AJ0-9297</a>
F5	—	—	<a href="#">00D-4724-Y0</a>	<a href="#">00F-4724-Y0</a>	<a href="#">AJ0-9321</a>
Biphenyl	—	<a href="#">00B-4627-Y0</a>	<a href="#">00D-4627-Y0</a>	<a href="#">00F-4627-Y0</a>	<a href="#">AJ0-9208</a>
XB-C18	—	<a href="#">00B-4605-Y0</a>	<a href="#">00D-4605-Y0</a>	<a href="#">00F-4605-Y0</a>	<a href="#">AJ0-8775</a>
C18	<a href="#">00A-4601-Y0</a>	<a href="#">00B-4601-Y0</a>	<a href="#">00D-4601-Y0</a>	<a href="#">00F-4601-Y0</a>	<a href="#">AJ0-8775</a>
C8	—	<a href="#">00B-4608-Y0</a>	<a href="#">00D-4608-Y0</a>	—	<a href="#">AJ0-8777</a>
Phenyl-Hexyl	—	<a href="#">00B-4603-Y0</a>	<a href="#">00D-4603-Y0</a>	—	<a href="#">AJ0-8781</a>

for 3.0 mm ID

5 µm Semi-Preparative Columns (mm)				SecurityGuard™ SemiPrep Cartridges <sup>***</sup>
Phases	100 x 10	150 x 10	250 x 10	10 x 10 /3pk
EVO C18	—	<a href="#">00F-4633-N0</a>	<a href="#">00G-4633-N0</a>	<a href="#">AJ0-9306</a>
F5	—	—	<a href="#">00G-4724-N0</a>	<a href="#">AJ0-9323</a>
C18	<a href="#">00D-4601-N0</a>	<a href="#">00F-4601-N0</a>	<a href="#">00G-4601-N0</a>	<a href="#">AJ0-9278</a>
Biphenyl	—	<a href="#">00F-4627-N0</a>	<a href="#">00G-4627-N0</a>	<a href="#">AJ0-9280</a>
XB-C18	—	<a href="#">00F-4605-N0</a>	<a href="#">00G-4605-N0</a>	<a href="#">AJ0-9278</a>

for ID: 9-12 mm

5 µm Analytical Columns (mm)					SecurityGuard™ ULTRA Cartridges <sup>‡</sup>
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
EVO C18	<a href="#">00B-4633-E0</a>	<a href="#">00D-4633-E0</a>	<a href="#">00F-4633-E0</a>	<a href="#">00G-4633-E0</a>	<a href="#">AJ0-9296</a>
F5	<a href="#">00B-4724-E0</a>	<a href="#">00D-4724-E0</a>	<a href="#">00F-4724-E0</a>	<a href="#">00G-4724-E0</a>	<a href="#">AJ0-9320</a>
Biphenyl	<a href="#">00B-4627-E0</a>	<a href="#">00D-4627-E0</a>	<a href="#">00F-4627-E0</a>	<a href="#">00G-4627-E0</a>	<a href="#">AJ0-9207</a>
XB-C18	<a href="#">00B-4605-E0</a>	<a href="#">00D-4605-E0</a>	<a href="#">00F-4605-E0</a>	<a href="#">00G-4605-E0</a>	<a href="#">AJ0-8768</a>
C18	<a href="#">00B-4601-E0</a>	<a href="#">00D-4601-E0</a>	<a href="#">00F-4601-E0</a>	<a href="#">00G-4601-E0</a>	<a href="#">AJ0-8768</a>
C8	<a href="#">00B-4608-E0</a>	<a href="#">00D-4608-E0</a>	<a href="#">00F-4608-E0</a>	<a href="#">00G-4608-E0</a>	<a href="#">AJ0-8770</a>
Phenyl-Hexyl	<a href="#">00B-4603-E0</a>	<a href="#">00D-4603-E0</a>	<a href="#">00F-4603-E0</a>	<a href="#">00G-4603-E0</a>	<a href="#">AJ0-8774</a>
HILIC	—	—	<a href="#">00F-4606-E0</a>	<a href="#">00G-4606-E0</a>	<a href="#">AJ0-8772</a>

for 4.6 mm ID

5 µm Axia™ 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	<a href="#">00B-4633-P0-AX</a>	<a href="#">00D-4633-P0-AX</a>	<a href="#">00F-4633-P0-AX</a>	<a href="#">00G-4633-P0-AX</a>	<a href="#">AJ0-9304</a>
F5	—	—	<a href="#">00F-4724-P0-AX</a>	<a href="#">00G-4724-P0-AX</a>	<a href="#">AJ0-9324</a>
Biphenyl	<a href="#">00B-4627-P0-AX</a>	<a href="#">00D-4627-P0-AX</a>	<a href="#">00F-4627-P0-AX</a>	<a href="#">00G-4627-P0-AX</a>	<a href="#">AJ0-9272</a>
XB-C18	<a href="#">00B-4605-P0-AX</a>	<a href="#">00D-4605-P0-AX</a>	<a href="#">00F-4605-P0-AX</a>	<a href="#">00G-4605-P0-AX</a>	<a href="#">AJ0-9145</a>
C18	<a href="#">00B-4601-P0-AX</a>	<a href="#">00D-4601-P0-AX</a>	<a href="#">00F-4601-P0-AX</a>	<a href="#">00G-4601-P0-AX</a>	<a href="#">AJ0-9145</a>
C8	<a href="#">00B-4608-P0-AX</a>	<a href="#">00D-4608-P0-AX</a>	<a href="#">00F-4608-P0-AX</a>	<a href="#">00G-4608-P0-AX</a>	<a href="#">AJ0-9205</a>
Phenyl-Hexyl	<a href="#">00B-4603-P0-AX</a>	<a href="#">00D-4603-P0-AX</a>	<a href="#">00F-4603-P0-AX</a>	<a href="#">00G-4603-P0-AX</a>	<a href="#">AJ0-9147</a>
HILIC	—	<a href="#">00D-4606-P0-AX</a>	<a href="#">00F-4606-P0-AX</a>	<a href="#">00G-4606-P0-AX</a>	<a href="#">AJ0-9277</a>

for ID: 18-29 mm

<sup>‡</sup>SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

<sup>\*\*\*</sup>SemiPrep SecurityGuard Cartridges require holder, Part No.: [AJ0-9281](#)

\*PREP SecurityGuard Cartridges require holder, Part No.: [AJ0-8223](#)

# Kinetex™ Core-Shell LC Columns

## 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	<a href="#">00B-4633-UO-AX</a>	<a href="#">00D-4633-UO-AX</a>	<a href="#">00F-4633-UO-AX</a>	<a href="#">00G-4633-UO-AX</a>	<a href="#">AJ0-9305</a>
F5	<a href="#">00B-4724-UO-AX</a>	<a href="#">00D-4724-UO-AX</a>	<a href="#">00F-4724-UO-AX</a>	—	<a href="#">AJ0-9325</a>
Biphenyl	—	—	<a href="#">00F-4627-UO-AX</a>	<a href="#">00G-4627-UO-AX</a>	<a href="#">AJ0-9273</a>
XB-C18	<a href="#">00B-4605-UO-AX</a>	<a href="#">00D-4605-UO-AX</a>	<a href="#">00F-4605-UO-AX</a>	<a href="#">00G-4605-UO-AX</a>	<a href="#">AJ0-9204</a>
C18	<a href="#">00B-4601-UO-AX</a>	<a href="#">00D-4601-UO-AX</a>	<a href="#">00F-4601-UO-AX</a>	<a href="#">00G-4601-UO-AX</a>	<a href="#">AJ0-9204</a>
C8	<a href="#">00B-4608-UO-AX</a>	<a href="#">00D-4608-UO-AX</a>	<a href="#">00F-4608-UO-AX</a>	<a href="#">00G-4608-UO-AX</a>	<a href="#">AJ0-9217</a>
Phenyl-Hexyl	<a href="#">00B-4603-UO-AX</a>	<a href="#">00D-4603-UO-AX</a>	<a href="#">00F-4603-UO-AX</a>	<a href="#">00G-4603-UO-AX</a>	<a href="#">AJ0-9216</a>
HILIC	—	—	<a href="#">00F-4606-UO-AX</a>	—	—

for ID: 30-49 mm

3.5 µm Minibore and MidBore™ Columns (mm)		SecurityGuard™ ULTRA Cartridges†	
Phases	50 x 2.1	100 x 2.1	3/pk
PAH	<a href="#">00B-4764-AN</a>	<a href="#">00D-4764-AN</a>	<a href="#">AJ0-9535</a>
			<a href="#">AJ0-9534</a>
			for 2.1 mm ID
			for 3.0 mm ID

3.5 µm Analytical Columns (mm)				SecurityGuard™ ULTRA Cartridges†	2.6 µm Microbore Columns (mm)			
Phases	100 x 4.6	150 x 4.6	250 x 4.6	3/pk	Phases	50 x 1.0	100 x 1.0	150 x 1.0
XB-C18	<a href="#">00D-4744-E0</a>	<a href="#">00F-4744-E0</a>	—	<a href="#">AJ0-8768</a>	XB-C18	<a href="#">00B-4496-A0</a>	<a href="#">00D-4496-A0</a>	<a href="#">00F-4496-A0</a>
PAH	<a href="#">00D-4764-E0</a>	<a href="#">00F-4764-E0</a>	<a href="#">00G-4764-E0</a>	<a href="#">AJ0-9533</a>	C18	<a href="#">00B-4462-A0</a>	—	—

for 4.6 mm ID

2.6 µm Micro LC Columns (mm)						
Phases	30 x 0.3	50 x 0.3	100 x 0.3	150 x 0.3	50 x 0.5	150 x 0.5
XB-C18	<a href="#">00A-4496-AC</a>	<a href="#">00B-4496-AC</a>	<a href="#">00D-4496-AC</a>	<a href="#">00F-4496-AC</a>	<a href="#">00B-4496-AF</a>	<a href="#">00F-4496-AF</a>
Biphenyl	—	<a href="#">00B-4622-AC</a>	—	<a href="#">00F-4622-AC</a>	<a href="#">00B-4622-AF</a>	—
C18	<a href="#">00A-4462-AC</a>	<a href="#">00B-4462-AC</a>	—	<a href="#">00F-4462-AC</a>	<a href="#">00B-4462-AF</a>	—
EVO C18	—	<a href="#">00B-4725-AC</a>	—	<a href="#">00F-4725-AC</a>	<a href="#">00B-4725-AF</a>	—
F5	—	<a href="#">00B-4723-AC</a>	<a href="#">00D-4723-AC</a>	<a href="#">00F-4723-AC</a>	<a href="#">00B-4723-AF</a>	—



For information on Micro LC Columns, Traps, and Fittings, see pp. 359-361

2.6 µm MercuryMS™ LC-MS Cartridges (mm)	
Phases	20 x 4.0
Biphenyl	<a href="#">00M-4622-DO-CE</a>

MercuryMS Cartridge Holders		
Part No.	Description	Unit
<a href="#">CHO-7188</a>	Direct-Connect Cartridge Holder, 20 mm	ea
<a href="#">CHO-5845</a>	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	<a href="#">00A-4725-AN</a>	<a href="#">00B-4725-AN</a>	—	<a href="#">00D-4725-AN</a>	<a href="#">00F-4725-AN</a>	<a href="#">AJ0-9298</a>
PS C18	<a href="#">00A-4780-AN</a>	<a href="#">00B-4780-AN</a>	—	<a href="#">00D-4780-AN</a>	<a href="#">00F-4780-AN</a>	<a href="#">AJ0-8951</a>
Polar C18	<a href="#">00A-4759-AN</a>	<a href="#">00B-4759-AN</a>	—	<a href="#">00D-4759-AN</a>	<a href="#">00F-4759-AN</a>	<a href="#">AJ0-9532</a>
Biphenyl	<a href="#">00A-4622-AN</a>	<a href="#">00B-4622-AN</a>	—	<a href="#">00D-4622-AN</a>	<a href="#">00F-4622-AN</a>	<a href="#">AJ0-9209</a>
XB-C18	<a href="#">00A-4496-AN</a>	<a href="#">00B-4496-AN</a>	<a href="#">00C-4496-AN</a>	<a href="#">00D-4496-AN</a>	<a href="#">00F-4496-AN</a>	<a href="#">AJ0-8782</a>
C18	<a href="#">00A-4462-AN</a>	<a href="#">00B-4462-AN</a>	<a href="#">00C-4462-AN</a>	<a href="#">00D-4462-AN</a>	<a href="#">00F-4462-AN</a>	<a href="#">AJ0-8782</a>
C8	<a href="#">00A-4497-AN</a>	<a href="#">00B-4497-AN</a>	<a href="#">00C-4497-AN</a>	<a href="#">00D-4497-AN</a>	<a href="#">00F-4497-AN</a>	<a href="#">AJ0-8784</a>
HILIC	<a href="#">00A-4461-AN</a>	<a href="#">00B-4461-AN</a>	<a href="#">00C-4461-AN</a>	<a href="#">00D-4461-AN</a>	<a href="#">00F-4461-AN</a>	<a href="#">AJ0-8786</a>
Phenyl-Hexyl	<a href="#">00A-4495-AN</a>	<a href="#">00B-4495-AN</a>	<a href="#">00C-4495-AN</a>	<a href="#">00D-4495-AN</a>	<a href="#">00F-4495-AN</a>	<a href="#">AJ0-8788</a>
F5	<a href="#">00A-4723-AN</a>	<a href="#">00B-4723-AN</a>	—	<a href="#">00D-4723-AN</a>	<a href="#">00F-4723-AN</a>	<a href="#">AJ0-9322</a>

for 2.1 mm ID

2.6 µm MidBore™ 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	<a href="#">00A-4725-Y0</a>	<a href="#">00B-4725-Y0</a>	—	<a href="#">00D-4725-Y0</a>	<a href="#">00F-4725-Y0</a>	<a href="#">AJ0-9297</a>
PS C18	<a href="#">00A-4780-Y0</a>	<a href="#">00B-4780-Y0</a>	—	<a href="#">00D-4780-Y0</a>	<a href="#">00F-4780-Y0</a>	<a href="#">AJ0-8950</a>
Polar C18	—	<a href="#">00B-4759-Y0</a>	—	<a href="#">00D-4759-Y0</a>	<a href="#">00F-4759-Y0</a>	<a href="#">AJ0-9531</a>
Biphenyl	—	<a href="#">00B-4622-Y0</a>	—	<a href="#">00D-4622-Y0</a>	<a href="#">00F-4622-Y0</a>	<a href="#">AJ0-9208</a>
XB-C18	<a href="#">00A-4496-Y0</a>	<a href="#">00B-4496-Y0</a>	<a href="#">00C-4496-Y0</a>	<a href="#">00D-4496-Y0</a>	<a href="#">00F-4496-Y0</a>	<a href="#">AJ0-8775</a>
C18	<a href="#">00A-4462-Y0</a>	<a href="#">00B-4462-Y0</a>	<a href="#">00C-4462-Y0</a>	<a href="#">00D-4462-Y0</a>	<a href="#">00F-4462-Y0</a>	<a href="#">AJ0-8775</a>
C8	<a href="#">00A-4497-Y0</a>	<a href="#">00B-4497-Y0</a>	<a href="#">00C-4497-Y0</a>	<a href="#">00D-4497-Y0</a>	<a href="#">00F-4497-Y0</a>	<a href="#">AJ0-8777</a>
HILIC	<a href="#">00A-4461-Y0</a>	—	—	<a href="#">00D-4461-Y0</a>	<a href="#">00F-4461-Y0</a>	<a href="#">AJ0-8779</a>
Phenyl-Hexyl	—	<a href="#">00B-4495-Y0</a>	—	<a href="#">00D-4495-Y0</a>	<a href="#">00F-4495-Y0</a>	<a href="#">AJ0-8781</a>
F5	—	<a href="#">00B-4723-Y0</a>	—	<a href="#">00D-4723-Y0</a>	<a href="#">00F-4723-Y0</a>	<a href="#">AJ0-9321</a>

for 3.0 mm ID

†SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

\*\*PREP SecurityGuard Cartridges require holder, Part No. [AJ0-8277](#)



## Ordering Information (continued)

2.6 µm Analytical Columns (mm)							SecurityGuard™ ULTRA Cartridges <sup>‡</sup>
Phases	30 x 4.6	50 x 4.6	75 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	3/pk
EVO C18	<a href="#">00A-4725-E0</a>	<a href="#">00B-4725-E0</a>	—	<a href="#">00D-4725-E0</a>	<a href="#">00F-4725-E0</a>	<a href="#">00G-4725-E0</a>	<a href="#">AJ0-9296</a>
PS C18	<a href="#">00A-4780-E0</a>	<a href="#">00B-4780-E0</a>	—	<a href="#">00D-4780-E0</a>	<a href="#">00F-4780-E0</a>	<a href="#">00G-4780-E0</a>	<a href="#">AJ0-8949</a>
Polar C18	<a href="#">00A-4759-E0</a>	<a href="#">00B-4759-E0</a>	—	<a href="#">00D-4759-E0</a>	<a href="#">00F-4759-E0</a>	—	<a href="#">AJ0-9530</a>
Biphenyl	—	<a href="#">00B-4622-E0</a>	—	<a href="#">00D-4622-E0</a>	<a href="#">00F-4622-E0</a>	—	<a href="#">AJ0-9207</a>
XB-C18	—	<a href="#">00B-4496-E0</a>	<a href="#">00C-4496-E0</a>	<a href="#">00D-4496-E0</a>	<a href="#">00F-4496-E0</a>	—	<a href="#">AJ0-8768</a>
C18	<a href="#">00A-4462-E0</a>	<a href="#">00B-4462-E0</a>	<a href="#">00C-4462-E0</a>	<a href="#">00D-4462-E0</a>	<a href="#">00F-4462-E0</a>	—	<a href="#">AJ0-8768</a>
C8	—	<a href="#">00B-4497-E0</a>	<a href="#">00C-4497-E0</a>	<a href="#">00D-4497-E0</a>	<a href="#">00F-4497-E0</a>	—	<a href="#">AJ0-8770</a>
HILIC	—	<a href="#">00B-4461-E0</a>	<a href="#">00C-4461-E0</a>	<a href="#">00D-4461-E0</a>	<a href="#">00F-4461-E0</a>	—	<a href="#">AJ0-8772</a>
Phenyl-Hexyl	—	<a href="#">00B-4495-E0</a>	<a href="#">00C-4495-E0</a>	<a href="#">00D-4495-E0</a>	<a href="#">00F-4495-E0</a>	—	<a href="#">AJ0-8774</a>
F5	<a href="#">00A-4723-E0</a>	<a href="#">00B-4723-E0</a>	—	<a href="#">00D-4723-E0</a>	<a href="#">00F-4723-E0</a>	—	<a href="#">AJ0-9320</a>

for 4.6 mm ID

1.7 µm Microbore Columns (mm)			
Phases	50 x 1.0	100 x 1.0	150 x 1.0
EVO C18	<a href="#">00B-4726-A0</a>	<a href="#">00D-4726-A0</a>	<a href="#">00F-4726-A0</a>
Biphenyl	<a href="#">00B-4628-A0</a>	<a href="#">00D-4628-A0</a>	—

1.7 µm Minibore Columns (mm)					SecurityGuard ULTRA Cartridges <sup>‡</sup>
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	—	<a href="#">00B-4726-AN</a>	<a href="#">00D-4726-AN</a>	<a href="#">00F-4726-AN</a>	<a href="#">AJ0-9298</a>
Biphenyl	<a href="#">00A-4628-AN</a>	<a href="#">00B-4628-AN</a>	<a href="#">00D-4628-AN</a>	<a href="#">00F-4628-AN</a>	<a href="#">AJ0-9209</a>
XB-C18	<a href="#">00A-4498-AN</a>	<a href="#">00B-4498-AN</a>	<a href="#">00D-4498-AN</a>	<a href="#">00F-4498-AN</a>	<a href="#">AJ0-8782</a>
C18	<a href="#">00A-4475-AN</a>	<a href="#">00B-4475-AN</a>	<a href="#">00D-4475-AN</a>	<a href="#">00F-4475-AN</a>	<a href="#">AJ0-8782</a>
C8	<a href="#">00A-4499-AN</a>	<a href="#">00B-4499-AN</a>	<a href="#">00D-4499-AN</a>	<a href="#">00F-4499-AN</a>	<a href="#">AJ0-8784</a>
HILIC	<a href="#">00A-4474-AN</a>	<a href="#">00B-4474-AN</a>	<a href="#">00D-4474-AN</a>	—	<a href="#">AJ0-8786</a>
Phenyl-Hexyl	—	<a href="#">00B-4500-AN</a>	<a href="#">00D-4500-AN</a>	<a href="#">00F-4500-AN</a>	<a href="#">AJ0-8788</a>
F5	—	<a href="#">00B-4722-AN</a>	<a href="#">00D-4722-AN</a>	<a href="#">00F-4722-AN</a>	<a href="#">AJ0-9322</a>

for 2.1 mm ID



For Column Heater, see p. 416



1.7 µm MidBore™ Columns (mm)				SecurityGuard ULTRA Cartridges <sup>‡</sup>
Phases	30 x 3.0	50 x 3.0	100 x 3.0	3/pk
XB-C18	<a href="#">00A-4498-Y0</a>	<a href="#">00B-4498-Y0</a>	<a href="#">00D-4498-Y0</a>	<a href="#">AJ0-8775</a>
C18	—	<a href="#">00B-4475-Y0</a>	<a href="#">00D-4475-Y0</a>	<a href="#">AJ0-8775</a>
C8	<a href="#">00A-4499-Y0</a>	<a href="#">00B-4499-Y0</a>	<a href="#">00D-4499-Y0</a>	<a href="#">AJ0-8777</a>
HILIC	—	<a href="#">00B-4474-Y0</a>	—	<a href="#">AJ0-8779</a>
Phenyl	—	—	<a href="#">00D-4500-Y0</a>	<a href="#">AJ0-8781</a>

for 3.0 mm ID

<sup>‡</sup>SecurityGuard ULTRA Cartridges require holder, Part No.: [AJ0-9000](#)

1.3 µm Minibore Columns (mm)		
Phases	30 x 2.1	50 x 2.1
C18	<a href="#">00A-4515-AN</a>	<a href="#">00B-4515-AN</a>

## Core-Shell Performance Enhancement Kit

### Ordering Information

Part No.	Unit
<a href="#">AQ0-8892</a>	ea

## 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

## SecurityGuard ULTRA Cartridge Holder



### Ordering Information

Part No.	Description	Unit
<a href="#">AJ0-9000</a>	SecurityGuard ULTRA Cartridge Holder	ea



For Core-Shell Performance Enhancement Kit description, see p. 421

For more information on the SecurityGuard ULTRA Cartridge System, see p. 335

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

Increase lab safety with HPLC / UHPLC solvent protection, see SecurityCAP™ products on pp. 417-418

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

### Ordering Information

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

See p. 420 for more information.



For Ultra-High Performance Stainless Steel Nut and Ferrule Set, see p. 420

# LiChrosorb®

- **Quality-packed columns by Phenomenex**

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

### Ordering Information

5 µm Columns (mm)		SecurityGuard Cartridges (mm)		
Phases	125 x 4.0	250 x 4.0	250 x 4.6	4 x 3.0
				/10pk
RP-8	<a href="#">00E-0233-D0</a>	<a href="#">00G-0233-D0</a>	<a href="#">00G-0233-E0</a>	<a href="#">AJ0-4290</a>

for ID: 3.2-8.0 mm

SecurityGuard™ Analytical Cartridges require universal holder Part No.: [KJO-4282](#)

# 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

4 µm (Superspher) Columns (mm)		SecurityGuard Cartridges (mm)	
Phases	250 x 4.0	4 x 2.0	4 x 3.0
		/10pk	/10pk
RP-8	<a href="#">00G-3042-D0</a>	<a href="#">AJ0-4289</a>	<a href="#">AJ0-4290</a>

for ID: 2.0-3.0 mm      3.2-8.0 mm

SecurityGuard™ Analytical Cartridges require universal holder Part No.: [KJO-4282](#)

5 µm Columns (mm)					SecurityGuard Cartridges (mm)	
Phases	125 x 4.0	250 x 4.0	150 x 4.6	250 x 4.6	4 x 2.0	4 x 3.0
					/10pk	/10pk
RP-8	<a href="#">00E-3049-D0</a>	<a href="#">00G-3049-D0</a>	—	<a href="#">00G-3049-E0</a>	<a href="#">AJ0-4289</a>	<a href="#">AJ0-4290</a>
RP-18	<a href="#">00E-3050-D0</a>	<a href="#">00G-3050-D0</a>	—	<a href="#">00G-3050-E0</a>	<a href="#">AJ0-4286</a>	<a href="#">AJ0-4287</a>
RP-8 endcapped	—	—	—	<a href="#">00G-3051-E0</a>	<a href="#">AJ0-4289</a>	<a href="#">AJ0-4290</a>
RP-18 endcapped	<a href="#">00E-3052-D0</a>	<a href="#">00G-3052-D0</a>	<a href="#">00F-3052-E0</a>	<a href="#">00G-3052-E0</a>	<a href="#">AJ0-4286</a>	<a href="#">AJ0-4287</a>
RP-Select B	<a href="#">00E-3156-D0</a>	<a href="#">00G-3156-D0</a>	—	<a href="#">00G-3156-E0</a>	—	—

for ID: 2.0-3.0 mm      3.2-8.0 mm



Other column dimensions available upon request.