

the
ULTIMATE
GUIDE to
HPLC/
UHPLC
Reversed Phase Selectivity

Revision: 0

PHEN-RUC-00058

 **phenomenex**[®]
...breaking with traditionSM



www.phenomenex.com

Follow this Step-by-Step Selectivity Guide

Contained within the following pages is an easy overview of the reversed phase HPLC/UHPLC options available to you. At a glance, you'll be able to quickly understand the differences between the columns available and select the right solution for your specific method and goals.



Select the Right Solid Support **4-5**



Determine the Right Selectivity **6-8**



Choose the Right Column **9-27**

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(High Productivity, High pH, High Aqueous, and Polar Compounds)



If product analytical columns do not provide at least equivalent separations to a competing column of the same phase, particle size, and dimensions, send in your comparative data within 45 days for a FULL REFUND.

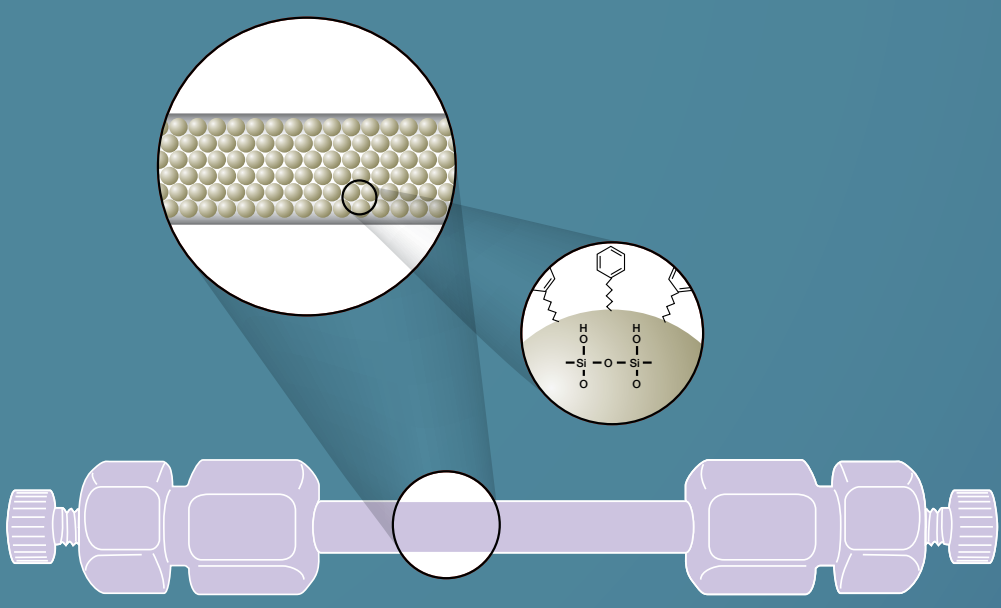
STEP 4

Learn More **28-41**

- ✓ Kinetex® - performance gains on ANY LC system **28-31**
 - Gemini® - the standard for pH method development..... **32-33**
 - Synergi™ - full range selectivity for challenging separations **34-35**
 - Luna® - one of the world's leading HPLC columns **36-37**
- ✓ Luna Omega - performance gains with ultra-high efficiencies **38-39**
 - SecurityGuard™ - LC column protection **40-41**

STEP 5

Order Now **42-51**



✓ Available for UHPLC

Select the Right Solid Support

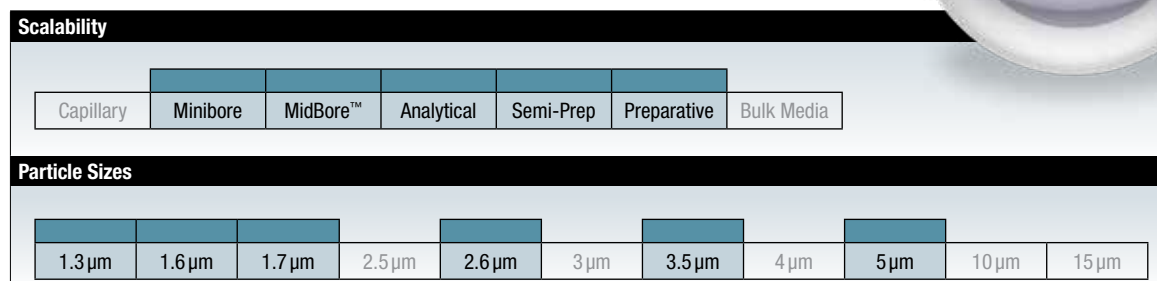
Phenomenex offers a full range of solid supports including core-shell, organo-silica fully porous and thermally modified fully porous. The morphology of the solid support has a significant impact on the resulting material characteristics and column performance.

Core-Shell and Organo-Silica Core-Shell

Unique solid silica core and porous shell that results in faster chromatography and higher efficiencies than conventional fully porous particles.

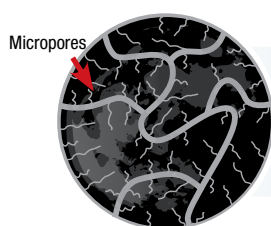
Well suited for:

- Performance gains on ANY LC system
- Easy system-to-system and lab-to-lab method transfer
- Methods where increased sensitivity is required
- Significantly improving the productivity of older, established methods



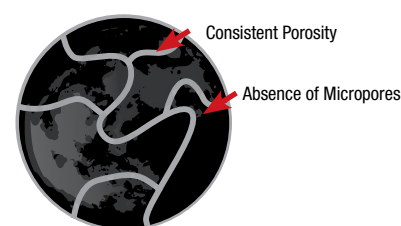
Fully Porous – Thermally Modified Silica

Unique high efficiency and extremely robust fully porous silica that offers astounding performance and inertness alongside versatile selectivities.



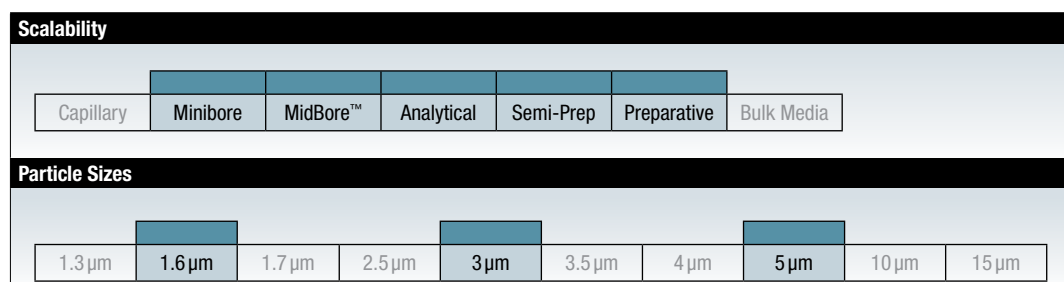
Thermal Modified Pore Structure

Most importantly, through our proprietary process, we eliminate micropores, further improving column efficiency, inertness, and reproducibility.



Well suited for:

- Astounding UHPLC, HPLC, and Preparative HPLC performance and efficiencies
- Greater separation muscle
- Better peak shape through an inert foundation
- Extreme ruggedness and dependability

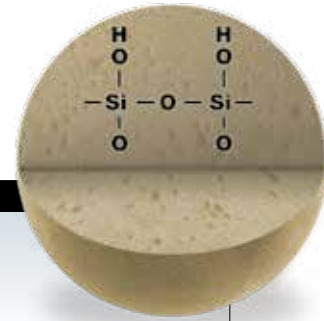


Fully Porous – Traditional Silica

Fully porous silica particles have higher surface area and provide excellent mechanical strength across a wide range of particle sizes and column dimensions.

Well suited for:

- Seamless scale-up from analytical to a preparative or process application
- Direct column equivalent to those used in established Pharmacopeia methods



Scalability

Capillary	Minibore	MidBore™	Analytical	Semi-Prep	Preparative	Bulk Media
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Particle Sizes

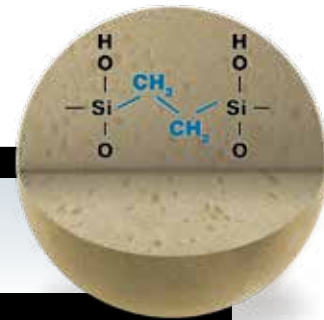
1.3 μm	1.6 μm	1.7 μm	2.5 μm	2.6 μm	3 μm	3.5 μm	4 μm	5 μm	10 μm	15 μm
--------	--------	--------	--------	--------	------	--------	------	------	-------	-------

Fully Porous – Organo-Silica

Organic groups are grafted into the layers of the silica particle making it more resistant to silica dissolution at higher pHs.

Well suited for:

- Extended column lifetime for methods run at pH extremes
- Premier bulk material product allowing for caustic washes for repeat use



Scalability

Capillary	Minibore	MidBore	Analytical	Semi-Prep	Preparative	Bulk Media
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Particle Sizes

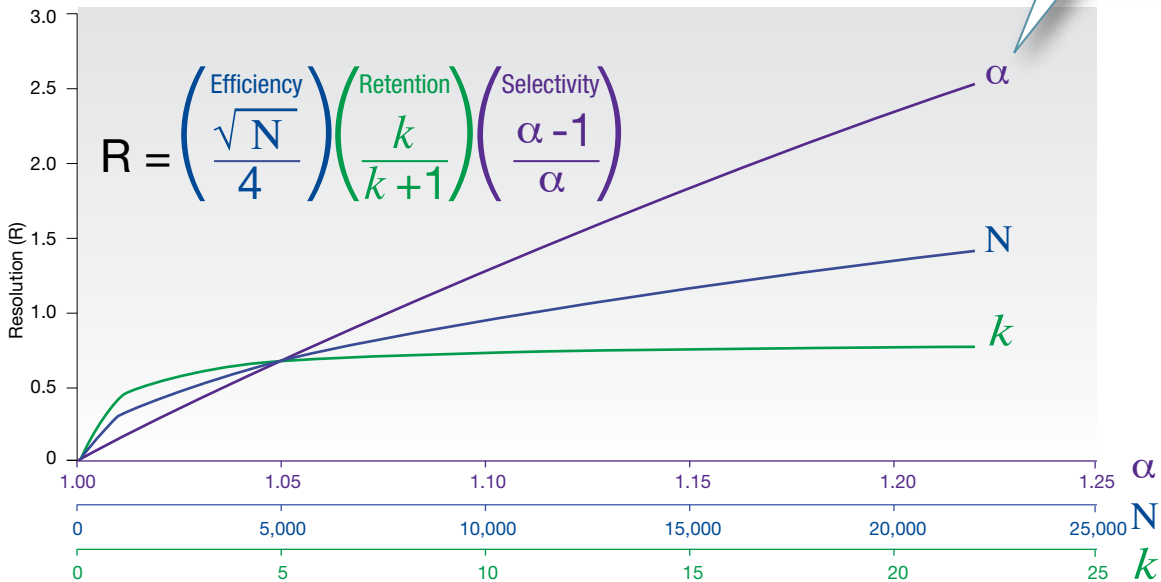
1.3 μm	1.6 μm	1.7 μm	2.5 μm	2.6 μm	3 μm	3.5 μm	4 μm	5 μm	10 μm	15 μm
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The Importance of Selectivity

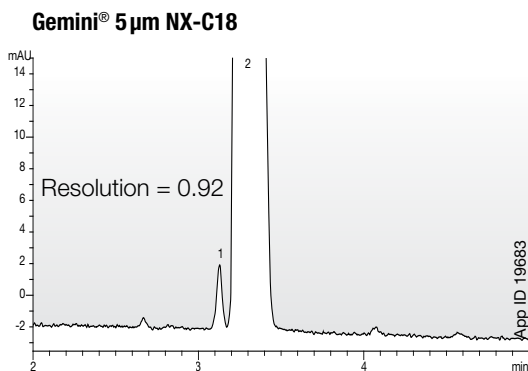
Selectivity (α) has the greatest impact on changing resolution (R), as compared to efficiency (N) and retention (k), and the easiest way to change your chromatographic results is to change your column phase. Phenomenex develops a wide breadth of phase chemistries across multiple solid supports for easier and faster method development and optimization.

Selectivity is the most important parameter for increasing resolution. Use the selectivity profiles (pp. 8-27) to find the right phase for your sample.

The Impact of Selectivity on Resolution

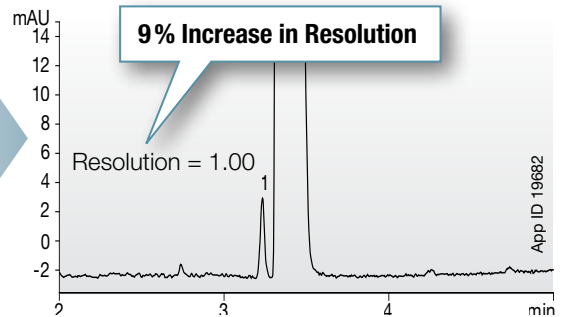


Change Your Selectivity, Dramatically Change Your Results



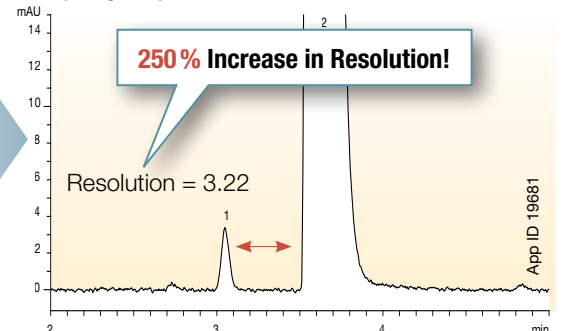
Option 1:
Increase Efficiency
(5 µm to 3 µm particle)

Gemini 3 µm NX-C18



Option 2:
Change Selectivity
(C18 to ether-linked phenyl)

Synergi™ 4 µm Polar-RP

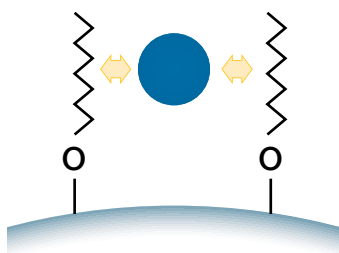


Conditions same for all columns:
Columns: as noted
Dimensions: 150 x 4.6 mm
Mobile Phase: A: 20 mM Potassium phosphate, pH 2.5
 B: Acetonitrile
Gradient: A/B (75:25) to (15:85) in 15 minutes
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV (ambient)
Sample: 1. Impurity A
 2. Oxymetazoline

Characterizing Selectivity

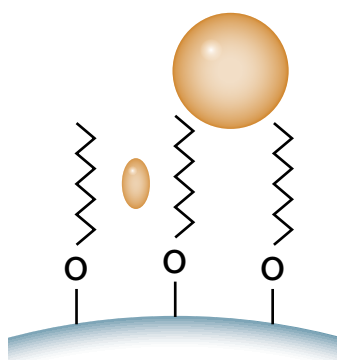
In this guide we've utilized the hydrophobic subtraction model which includes six different parameters to characterize the selectivity of our HPLC and UHPLC columns. Though hydrophobicity is a dominant retention mechanism in reversed phase chromatography, selectivity is strongly influenced by the other parameters described below.

6 Parameters Influencing Selectivity



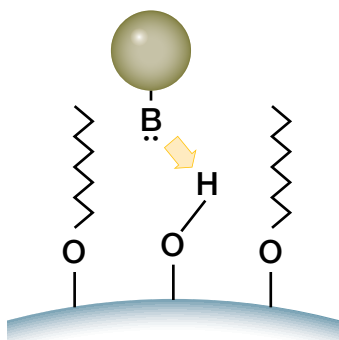
Hydrophobicity

These interactions occur with all analytes. They are always present and are dominant for neutral compounds.



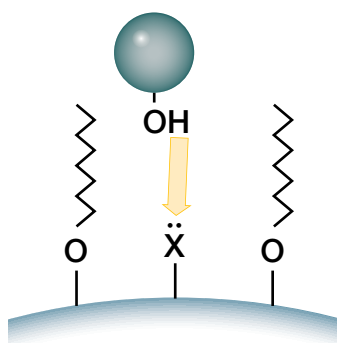
Steric Influences

A measurement of the accessibility of solutes to the stationary phase. Structural differences between compounds can lead to different retention characteristics due to shape selectivity.



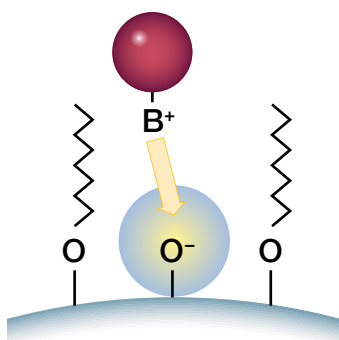
Hydrogen Bond (H-bond) Donating Capacity

This interaction can be attributed to an exposed silanol or an intentionally added polar functional group. Phenomenex employs the latter technique to create phases that have the ability to hydrogen bond with proton accepting groups like weak bases (amines and amides).



Hydrogen Bond (H-bond) Accepting Capacity

Like the hydrogen bond donating capacity parameter, Phenomenex engineers phases that have the ability to hydrogen bond and interact with proton donating acidic groups such as carboxylic acids or alcohols.



Cation Selectivity at pH 7.0

At neutral pH, residual silanols on the silica surface will be largely ionized, increasing the cation exchange component of selectivity.

Cation Selectivity at pH 2.8

At low pH, most residual silanols are neutral and the cation exchange component will be reduced.

Turn to the next page to see how we've developed unique selectivity profiles for our columns based on these parameters.

Column Selectivity Profiles

Measurements of the parameters described on page 7 were independently derived at a third party laboratory to develop unique selectivity profiles for each of our Kinetex®, Gemini®, Luna®, Synergi™, and Luna Omega phases. These profiles were developed so that chromatographers would have a dependable approach for comparing the Phenomenex phases and identifying which phase(s) would provide the best selectivity for their analytes.

Do you need?

1 Maximum retention

- High **hydrophobicity** values indicate strong retention characteristics for any carbon containing analyte
- Higher **hydrophobicity** phases: Synergi Hydro-RP, Luna C18(2), and Luna Omega C18

2 Separation of isobaric/isomeric compounds

- Stationary phases with high **steric interaction** values are best suited for the analysis of isomers and/or isobaric compounds
- Highest **steric interaction** phases: Luna C8(2), Synergi Max-RP, Kinetex F5, and Luna PFP(2)

3 Retention and/or separation of polar, nitrogen containing compounds

- Bonded phases with high **hydrogen bond donating capacity** may help increase retention and selectivity of bases such as amines and amides
- Highest **hydrogen bond donating capacity** phases: Synergi Hydro-RP, Gemini C18, Synergi Max-RP, and Luna C18(2)

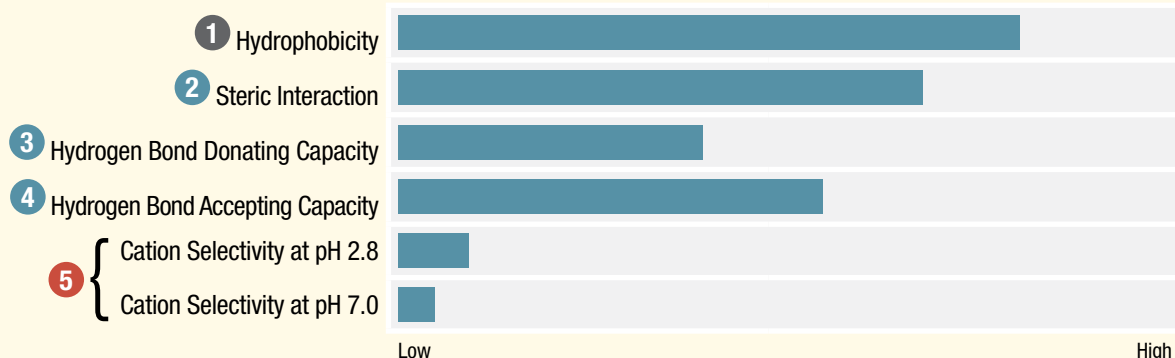
4 Retention and/or separation of polar compounds containing alcohol or carboxylic acid groups

- Bonded phases with high **hydrogen bond accepting capacity** will preferentially interact with oxygen containing compounds, such as phenols and carboxylic acids, and may offer increased retention and selectivity
- Highest **hydrogen bond accepting capacity** phases: Kinetex Biphenyl, Kinetex XB-C18, and Luna Omega Polar C18

5 Improved peak shape or better retention for charged bases

- Bonded phases with **high cation selectivity** values at low or neutral pH will show higher retention for ionized bases, but may show broad peaks
- Columns that have **low cation selectivity** values at low or neutral pH will have less interaction and less retention for charged bases, but may have very good peak shape
- **High cation selectivity** phases: Kinetex Biphenyl, Kinetex F5, and Luna Omega Polar C18
- **Low cation selectivity** phases: Gemini C6-Phenyl, Luna C18(2), and Luna Omega PS C18

Example: Luna C18(2)



Important!

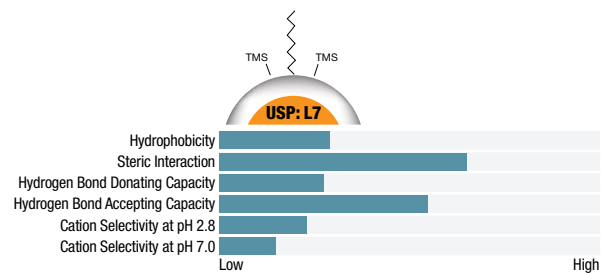
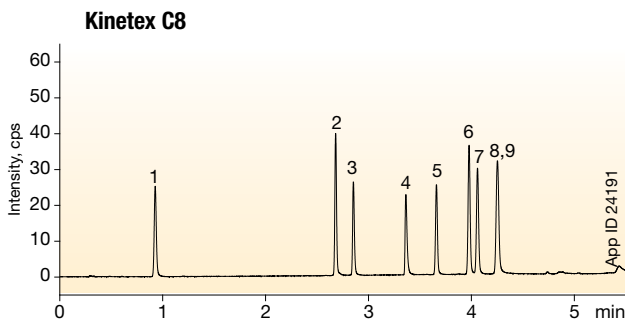
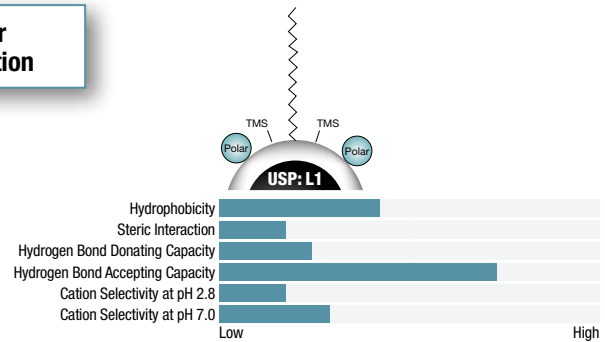
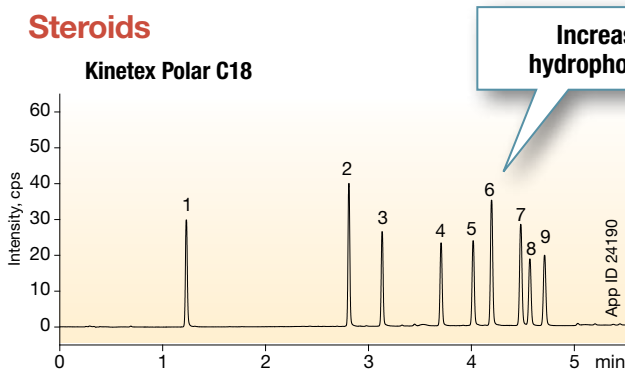
Measurements illustrated here are not absolute, but a relative measurement to other Phenomenex columns. In this display, the individual measurements cannot be compared to each other.

Hydrocarbon Compounds

How Much Retention is Enough?

Selecting the most appropriate liquid chromatography column for your unique hydrocarbon, or hydrophobic compound is easy! Simply compare the varying degrees of hydrophobicity that are offered within the Phenomenex portfolio of reversed phase columns to determine how much or how little retention you require. An increase in column hydrophobicity typically provides increased retention of hydrophobic compounds. For example, the more hydrophobic Kinetex® Polar C18 chemistry provides a longer retention time which successfully separates a panel of 9 steroids while the less hydrophobic Kinetex C8 column displays coelution of two steroid compounds.

Steroids



Conditions for all columns:

Columns: Kinetex 2.6 μ m Polar C18

Kinetex 2.6 μ m C8

Dimension: 50 x 4.6 mm

Mobile Phase: A: Water

B: Acetonitrile

Gradient Time (min)	% B
0	10
6	70
6.5	70
6.51	10
10	10

Flow Rate: 1.85 mL/min

Temperature: Ambient

Detection: UV @ 220 nm

Sample:

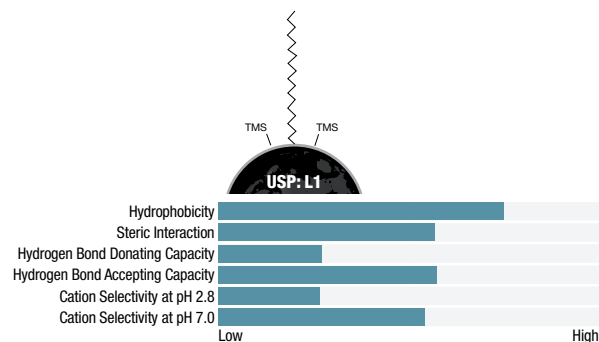
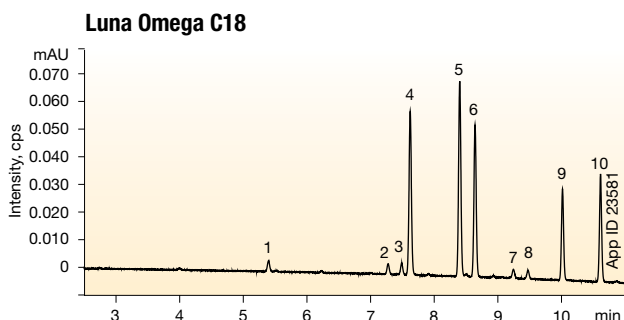
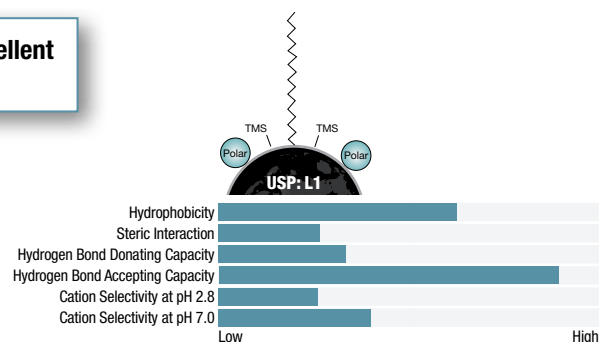
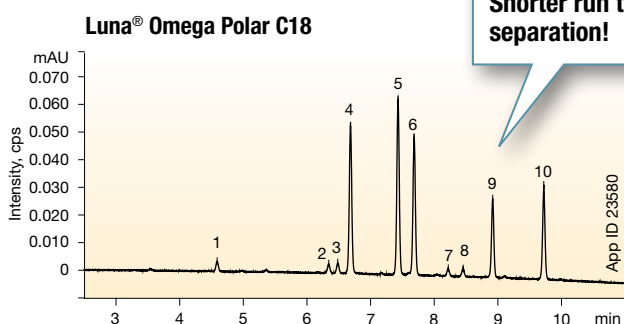
1. Caffeine	5. 11-alpha-Hydroxyprogesterone
2. Estriol	6. Beta-Estradiol
3. Hydrocortisone	7. 11-alpha-Ketoprogesterone
4. Corticosterone	8. Esterone
	9. 17-alpha-Hydroxyprogesterone

Hydrocarbon Compounds

A Traditional C18 May Not Always Be the Best Option

A traditional C18 phase is typically recommended as the first choice for the separation of hydrocarbon, or hydrophobic compounds. However, in some cases, less hydrophobicity paired with a different selectivity may be required to successfully achieve the separation of your hydrophobic compounds as well as to shorten run times. With so many C18 phases to choose from, it is important to note the hydrophobic properties of each phase. For example, the more hydrophobic Luna Omega C18 chemistry provides a longer retention time for 10 cannabinoids while the less hydrophobic Luna Omega Polar C18, which contains a polar modified surface, provides less retention and therefore a shorter run time, without negatively affecting the overall separation of the analytes.

Natural Cannabinoids



Conditions for all columns:

Columns: Luna Omega 1.6µm Polar C18
Luna Omega 1.6µm C18

Dimension: 100 x 2.1 mm

Mobile Phase: A: 20 mM Ammonium Formate pH 3.2

B: Acetonitrile

Gradient	Time (min)	% B
	0	60
	12	95
	13	95
	13.01	60
	15	60

Flow Rate: 0.4 mL/min

Temperature: 40 °C

Detection: UV @ 256 nm

Sample:

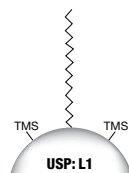
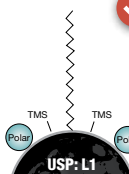
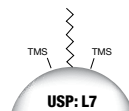
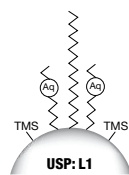
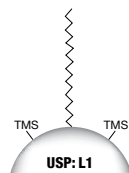
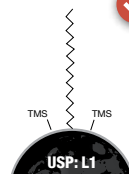
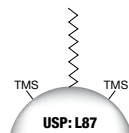
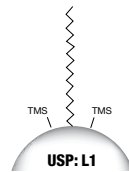
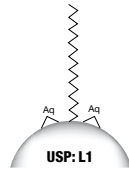
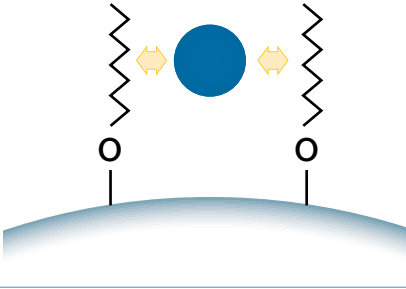
1. CBDV
2. Cannabidiol
3. CBG
4. Cannabidiolic Acid
5. CBG-A
6. Cannabinol
7. Delta 9 THC
8. Delta 8 THC
9. CBC
10. THCA-A

Column Portfolio: Hydrocarbon Compounds

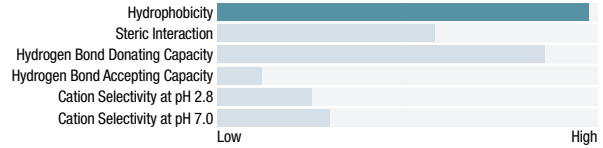
Find the right amount of hydrophobicity for your separations. Our large assortment of HPLC and UHPLC columns that are best suited for the analysis of hydrocarbon compounds are listed in order of hydrophobicity with the highest hydrophobicity columns at the top of the list.

Hydrophobicity

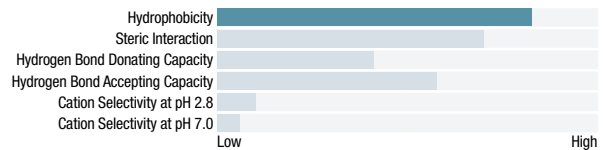
High column hydrophobicity values indicate greater retention of carbon-containing analytes.



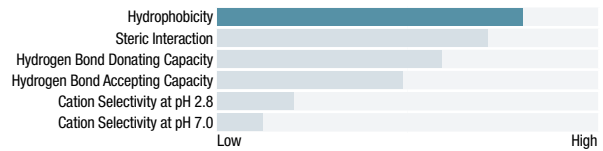
Synergi™ Hydro-RP



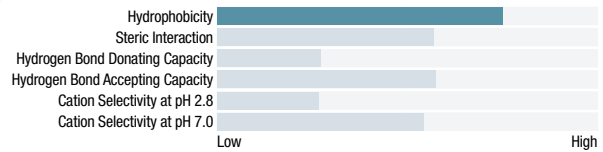
Luna® C18(2)



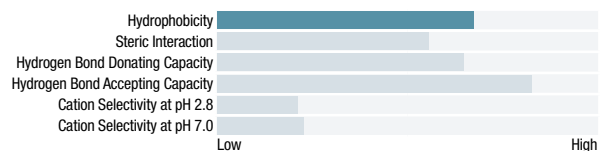
Synergi Max-RP



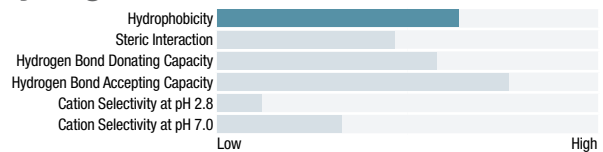
✓ Luna Omega C18



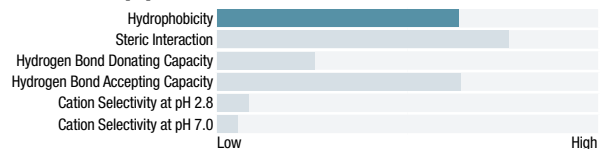
Gemini® C18



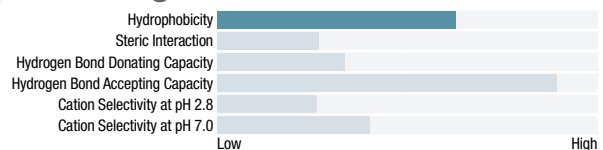
Synergi Fusion-RP



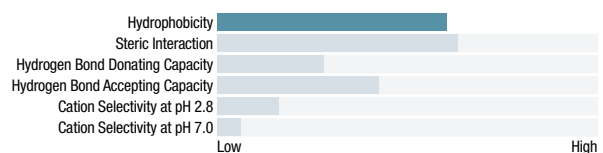
Luna C8(2)



✓ Luna Omega Polar C18



Gemini NX-C18



✓ Available for UHPLC

Find Ordering Information on Pages 42-51!

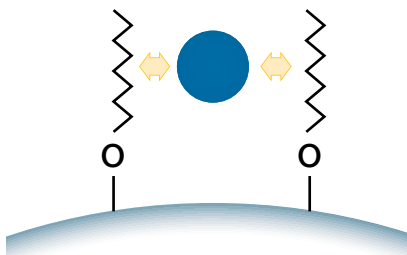
See more
➔

Column Portfolio (cont'd): Hydrocarbon Compounds

Find the right amount of hydrophobicity for your separations. Our large assortment of HPLC and UHPLC columns that are best suited for the analysis of hydrocarbon compounds are listed in order of hydrophobicity with the highest hydrophobicity columns at the top of the list.

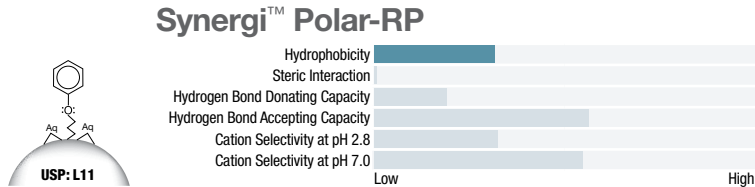
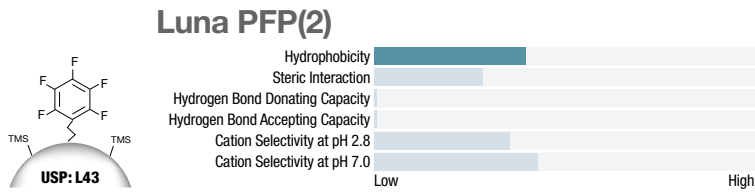
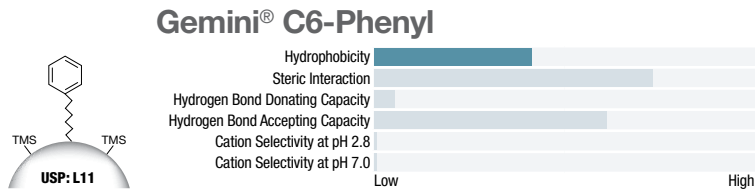
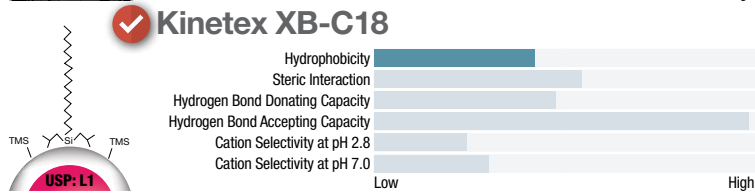
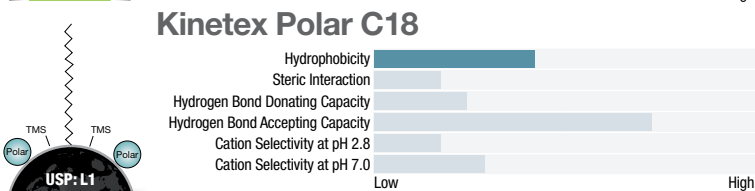
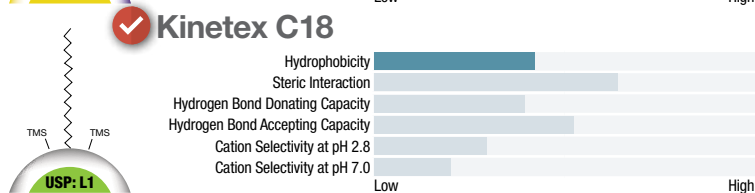
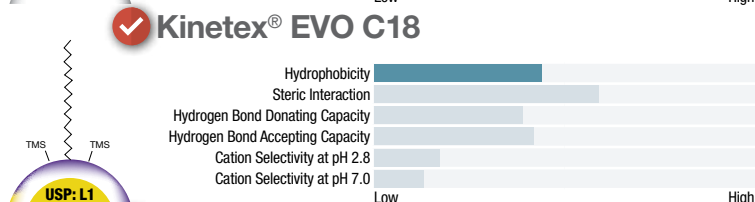
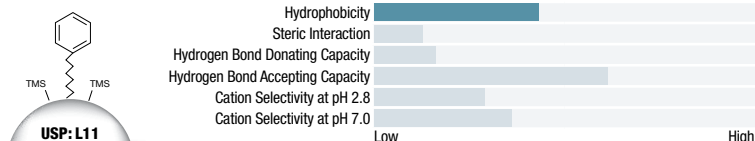
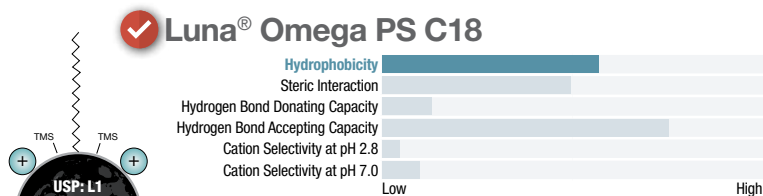
Hydrophobicity

High column hydrophobicity values indicate greater retention of carbon-containing analytes.



✓ Available for UHPLC

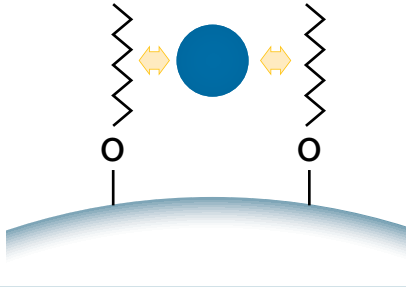
Find Ordering Information on Pages 42-51!



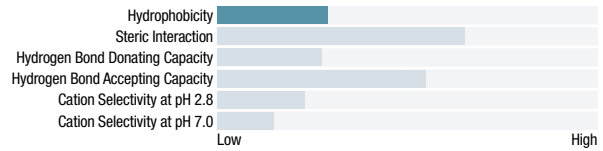
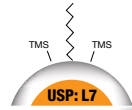
Column Portfolio (cont'd): Hydrocarbon Compounds

Lower Hydrophobicity

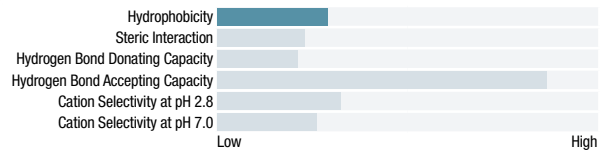
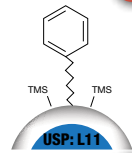
Recommended for extremely hydrophobic compounds that may be retained too tightly on traditional C18 phases.



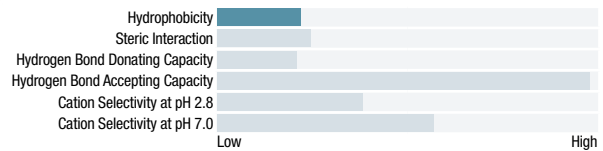
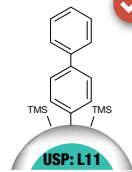
✓ Kinetex C8



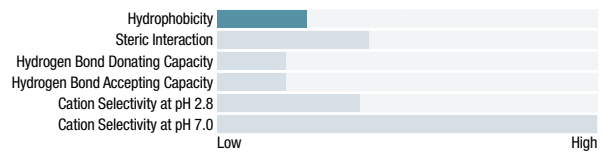
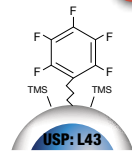
✓ Kinetex Phenyl-Hexyl



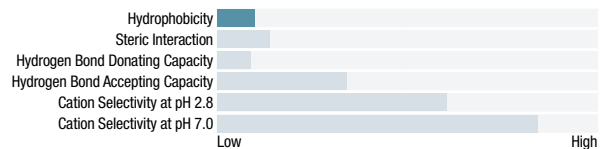
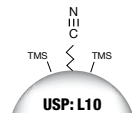
✓ Kinetex Biphenyl



✓ Kinetex F5



Luna CN



✓ Available for UHPLC

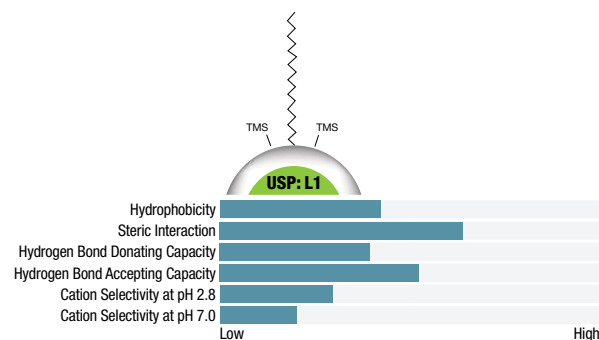
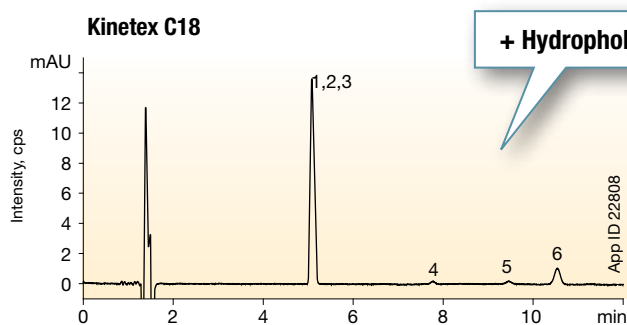
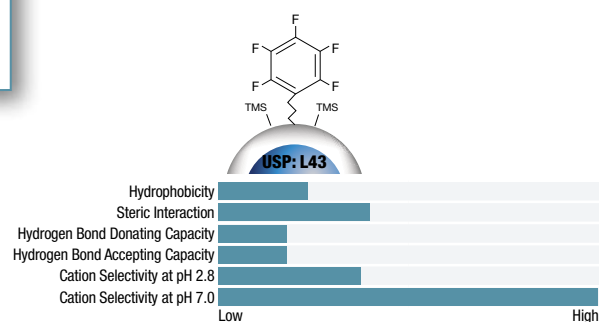
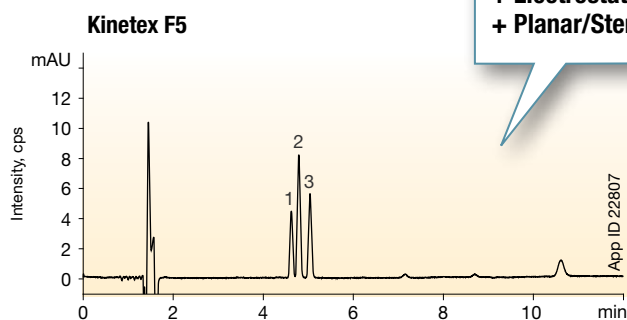
Find Ordering Information on Pages 42-51!

Isomers and Isobaric Compounds

Take Advantage of Multiple Interactive Mechanisms

The multiple interactive mechanisms of the Kinetex® F5 (pentafluorophenyl) column successfully separate methoxybenzene isomers, while the Kinetex C18 column, which has minimal bonding interactions, cannot separate the methoxybenzene isomers. This demonstrates that columns that rely primarily on hydrophobic interactions may not be the first choice for the separation of isomeric compounds and a column with multiple interactive mechanisms may be required.

Methoxybenzene Isomers



Conditions for all columns:

Column: Kinetex 2.6 μ m F5
Kinetex 2.6 μ m C18

Dimensions: 150 x 4.6 mm

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

Isocratic: A/B (65:35)

Flow Rate: 1 mL/min

Temperature: Ambient

Detection: UV @ 254 nm

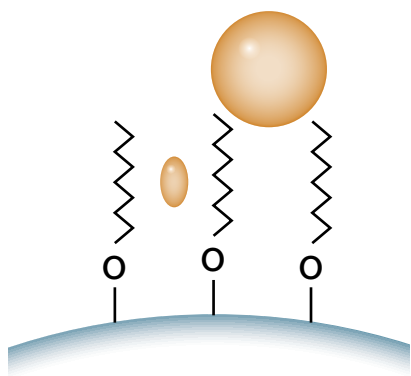
Sample: 1. 1,2,3-Trimethoxybenzene
2. 1,2-Dimethoxybenzene
3. 1,2,4-Trimethoxybenzene
4. 1,4-Dimethoxybenzene
5. Methoxybenzene
6. 1,3-Dimethoxybenzene

Column Portfolio: Isomers and Isobaric Compounds

Phenomenex has developed HPLC and UHPLC columns for the successful high resolution separation of compounds based on size and shape. These columns have either high column steric interaction values or multiple interaction mechanisms which are best suited for the analysis of isomers and isobaric compounds.

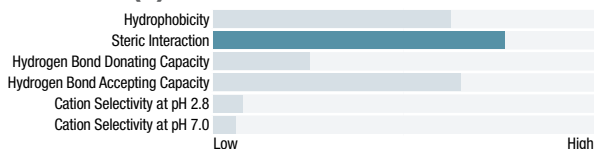
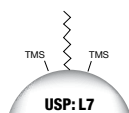
Steric Interactions

High column steric interaction values are best suited for the analysis of analytes that require separation based on size and shape differences.

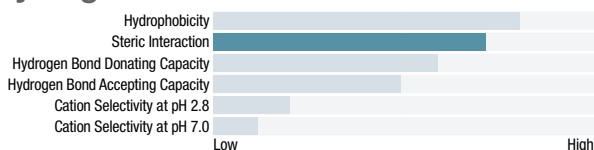
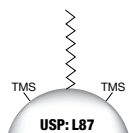


Identify Differences in Shape Selectivity

Luna[®] C8(2)

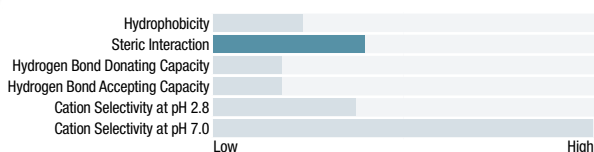
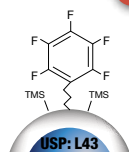


Synergi[™] Max-RP

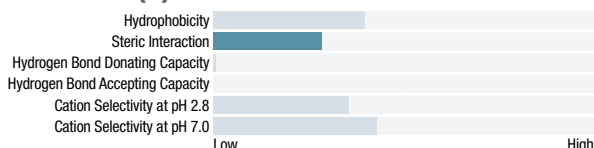
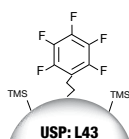


Positional Isomers - Polar/Neutral Functionalities

✓ Kinetex[®] F5



Luna PFP(2)



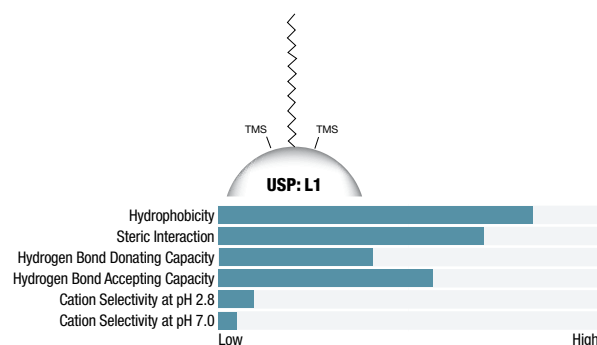
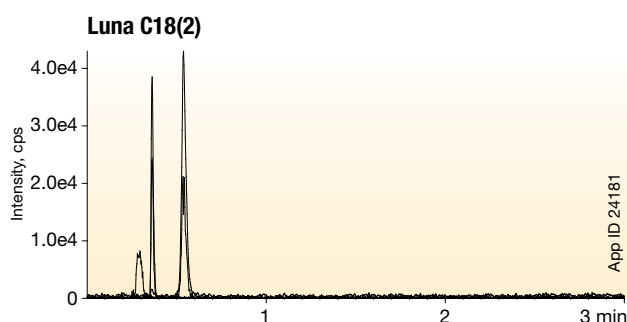
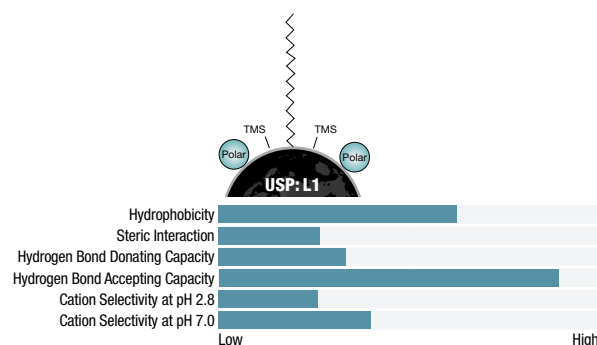
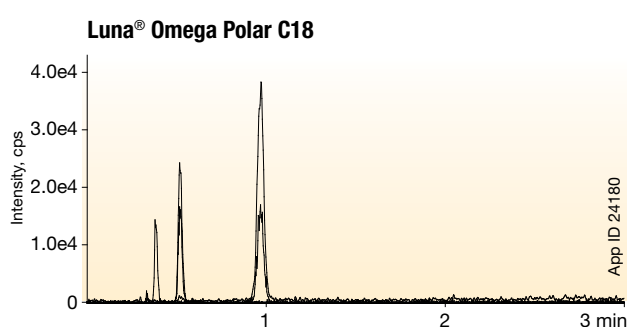
✓ Available for UHPLC

Find Ordering Information on Pages 42-51!

Hydroxyl- or Amine-Containing Compounds

Utilizing Hydrogen Bond Capacity to Increase Retention

Compounds that contain hydroxyl groups, amines, or the combination of those two types of functional groups, typically display the ability to interact with LC stationary phases through hydrogen bonding. This interaction can take place at the silica surface with silanols, endcapping or other functional groups. Additionally, hydrogen bond interactions can take place between these analyte groups and any corresponding polar groups on or within the stationary phase. By utilizing a column selectivity that contains a combined hydrophobic and hydrogen bond capacity, one can gain greater improvement in resolution versus just focusing on manipulation of hydrophobic retention. This can be especially true when analyzing compounds that are very polar in nature.



Conditions for all columns:

Column: Luna Omega 3µm Polar C18
Luna 3µm C18(2)

Dimensions: 50 x 2.1 mm

Mobile Phase: A: Water with 0.1 % Formic Acid
B: Methanol with 0.1 % Formic Acid

Gradient Time (min)	% B
0	5
3	100

Flow Rate: 0.7 mL/min

Temperature: 22 °C

Detection: MS/MS (SCIEX API 4000™)

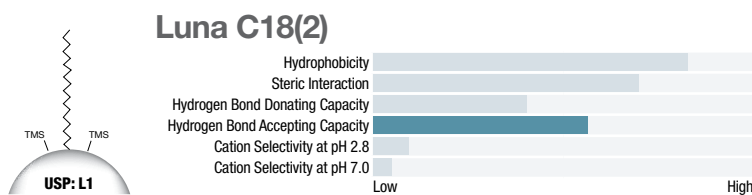
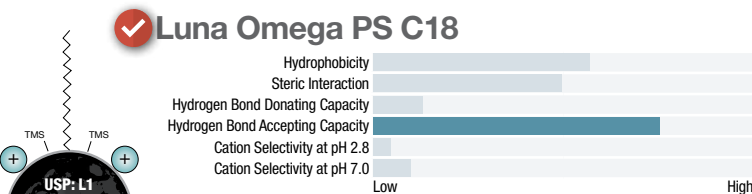
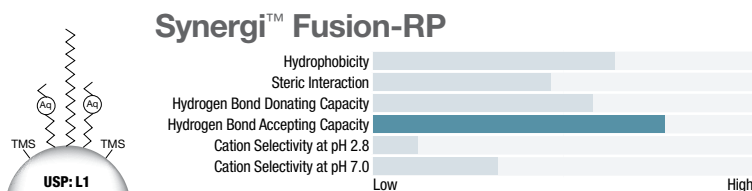
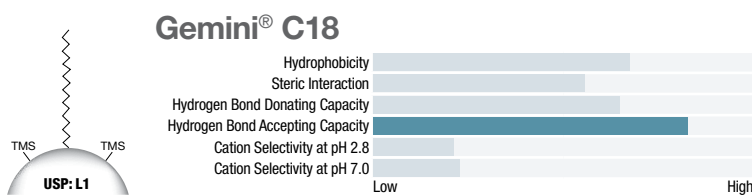
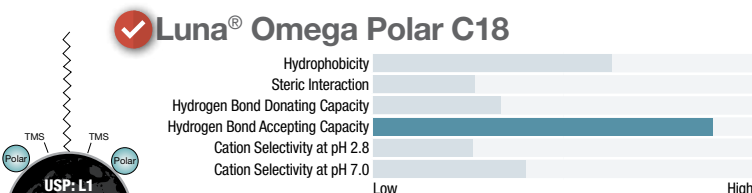
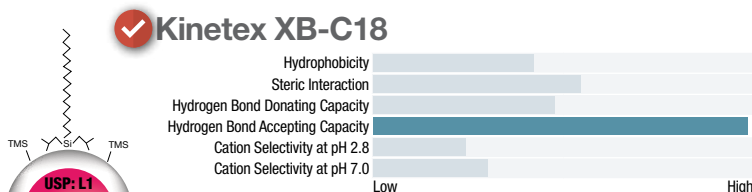
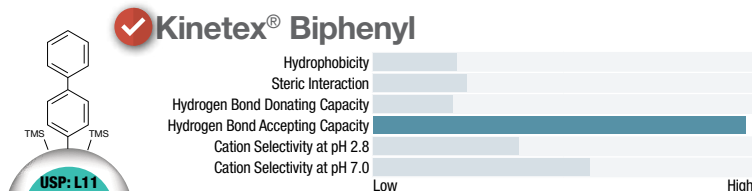
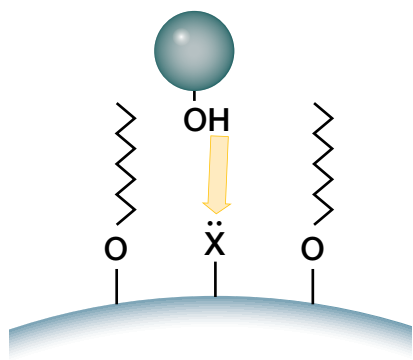
Sample: 1. Metanephrine
2. Normetanephrine
3. 3-Methoxytyramine

Column Portfolio: Hydroxyl- or Amine- Containing Compounds

Our HPLC and UHPLC column recommendations for the analysis of hydroxyl- or amine-containing compounds are listed by hydrogen bond accepting capacity (below) and aromaticity (pg. 18).

Hydrogen Bond Accepting Capacity

Hydrogen bond accepting groups on the silica surface interact with hydrogen bond donating functionalities on analytes.



✓ Available for UHPLC

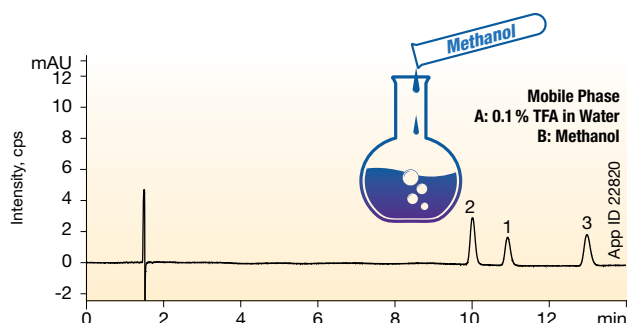
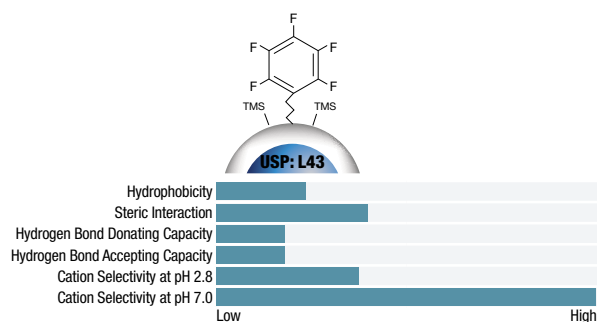
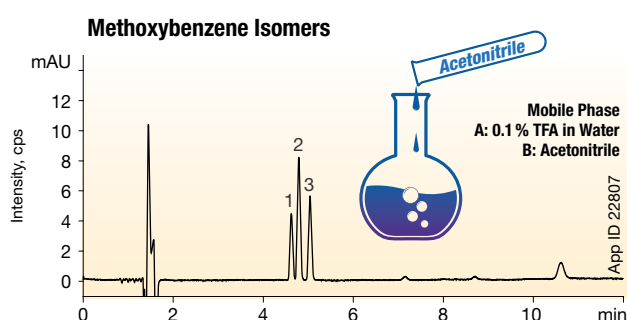
Find Ordering Information on Pages 42-51!

Aromatic or Ring Containing Compounds

Depending on Pi-Pi Stacking Interactions to Gain Greater Retention and Resolution

Every industry in the world that uses chromatography has most likely at some point analyzed compounds that contain carbon based ring structures. While these rings increase the hydrophobicity of a compound, they also provide a source of pi electrons which can directly interact with the pi electrons found within a stationary phase. While these aromatic, pi-pi interactions are not as strong as hydrophobic interactions, they can represent an easy way to increase retention and resolution. When choosing a mobile phase to use with aromatic stationary phases that contain a phenyl group, it's incredibly useful to keep in mind that acetonitrile disrupts pi-pi interactions, while methanol helps to promote them.

Methoxybenzene Isomers



Conditions for all columns:

Column: Kinetex 2.6 μ m F5

Dimensions: 150 x 4.6 mm

Part No.: 00F-4723-E0

Mobile Phase: as noted

Isocratic: A/B (65:35)

Flow Rate: 1 mL/min

Temperature: Ambient

Detection: UV @ 254 nm

Sample: 1. 1,2,3-Trimethoxybenzene

2. 1,2-Dimethoxybenzene

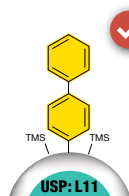
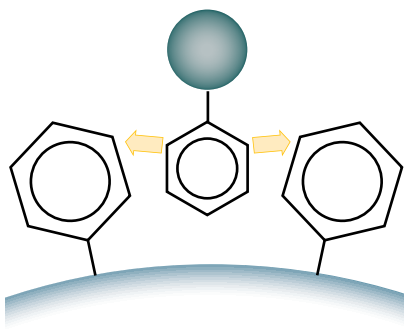
3. 1,2,4-Trimethoxybenzene

Complete Portfolio: Aromatic or Ring Containing Compounds

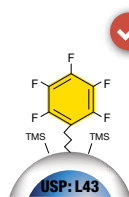
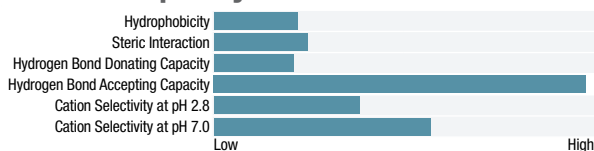
Our selection of HPLC and UHPLC columns that promote pi-pi interactions are listed by aromaticity.

Aromaticity

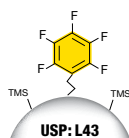
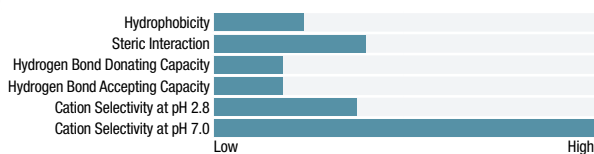
Column chemistries that contain ring structures interact with aromatic or ring containing compounds via pi-pi interactions (π stacking)



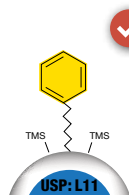
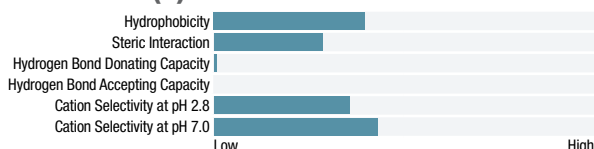
✓ Kinetex® Biphenyl



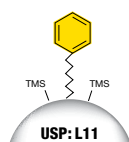
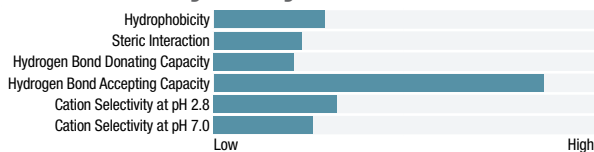
✓ Kinetex F5



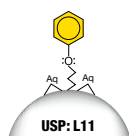
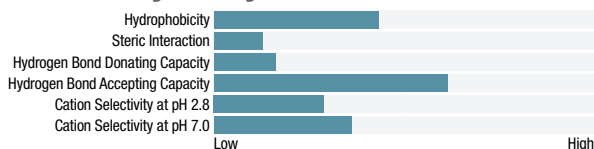
Luna® PFP(2)



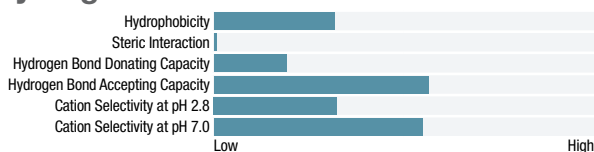
✓ Kinetex Phenyl-Hexyl



Luna Phenyl-Hexyl



Synergi™ Polar-RP



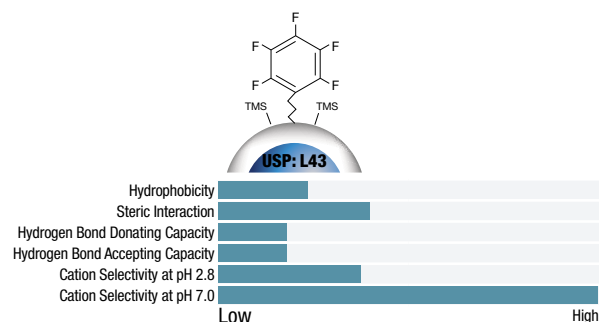
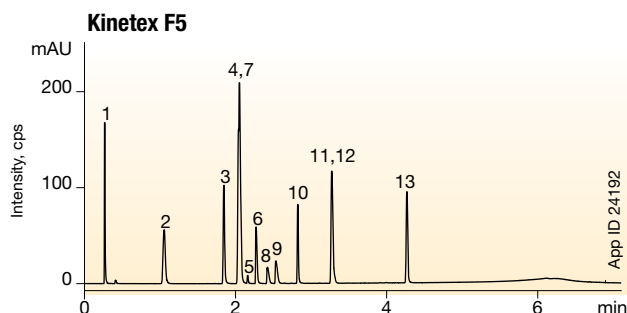
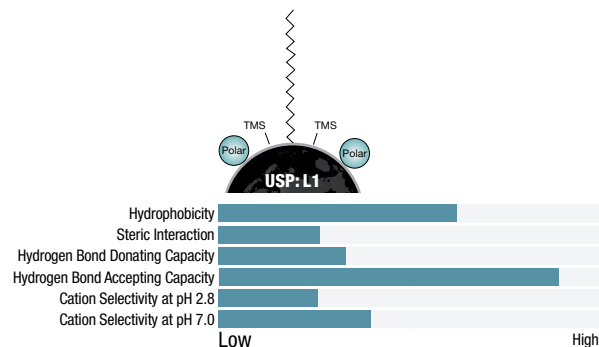
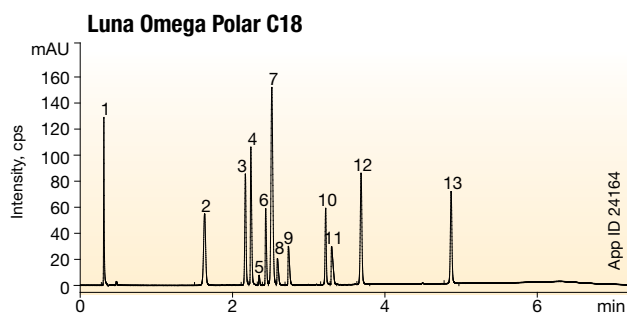
✓ Available for UHPLC

Find Ordering Information on Pages 42-51!

Non-ionized Bases and Oxygen- or Halogen-Containing Compounds

Hydrogen Bond Donating Capacity and Its Effect on Retention

Liquid chromatography columns with high hydrogen bond donating capacity provide higher retention of non-ionized bases and oxygen- or halogen-compounds while lower hydrogen bond donating capacity columns will result in less retention. For example, the higher hydrogen bond donating capacity of the Luna® Omega Polar C18 column provides longer retention times which successfully separates a suite of 8 acidic, basic, and neutral compounds while the lower hydrogen bond donating capacity of the Kinetex® F5 column has less retention and displays coelution of several compounds.



Conditions for all columns:

Column: Luna Omega 3µm Polar C18
Kinetex 2.6µm F5

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

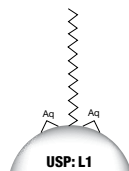
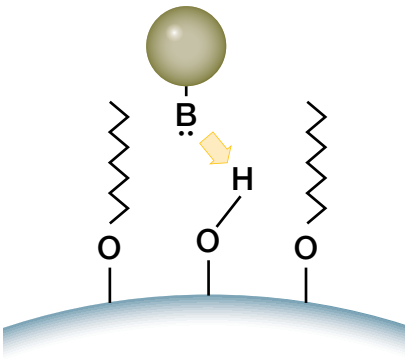
Sample:	1. Pyridine	8. Chlorpheniramine
	2. Acetaminophen	9. Triprolidine
	3. Sulfathiazole	10. Prednisolone
	4. Quinidine	11. Nortriptyline
	5. Quinidine Impurity	12. 5MSA
	6. Acebutolol	13. Hexanophenone
	7. Phenol	

Column Portfolio: Non-ionized Bases and Oxygen- or Halogen-Containing Compounds

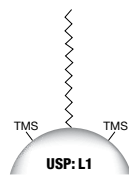
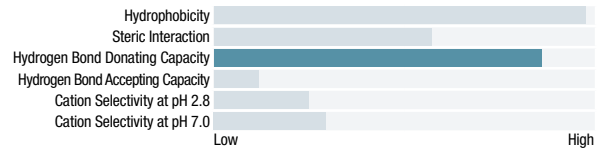
We recommend the following columns for the separation of non-ionized bases and oxygen- or halogen-containing compounds. Use the charts below to compare the hydrogen bond donating capacity, keeping in mind that a higher hydrogen bond donating capacity will result in greater retention of non-ionized bases and oxygen- or halogen-containing compounds.

Hydrogen Bond Donating Capacity

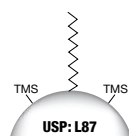
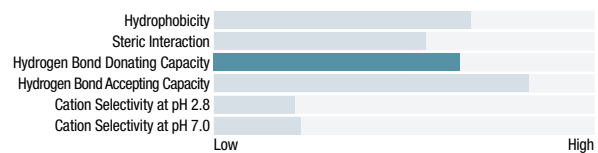
Hydrogen bond donating groups on the silica surface interact with accessible functionalities containing a lone pair of electrons.



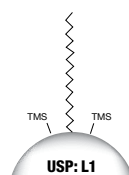
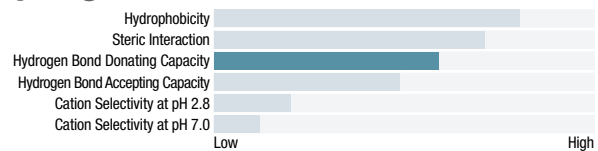
Synergi™ Hydro-RP



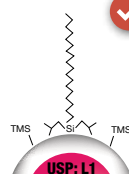
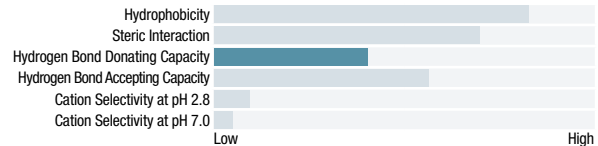
Gemini® C18



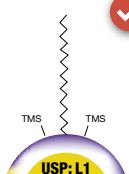
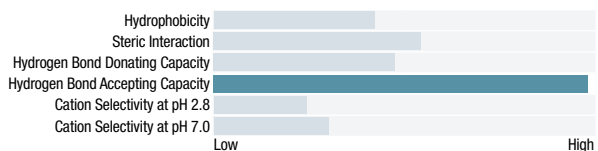
Synergi Max-RP



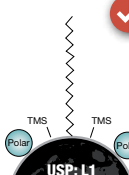
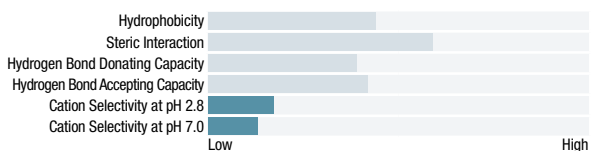
Luna® C18(2)



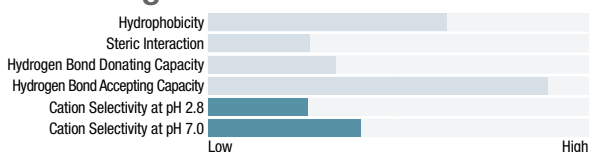
✓ Kinetex® XB-C18



✓ Kinetex EVO C18



✓ Luna Omega Polar C18



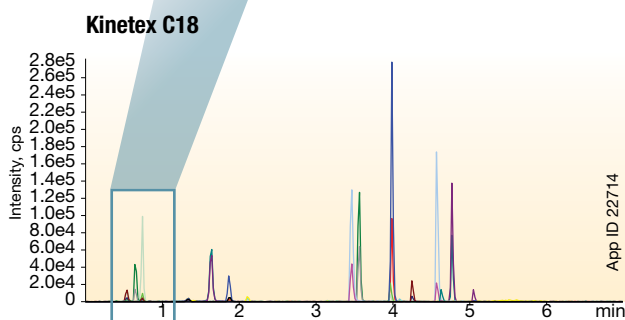
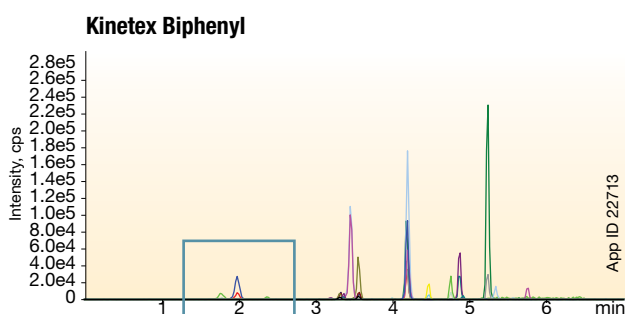
✓ Available for UHPLC

Find Ordering Information on Pages 42-51!

Polar Basic Compounds

Utilize the Cationic Selectivity of Your Column

A liquid chromatography column's cation selectivity can determine its affinity for ionized bases. High column cation selectivity will provide higher affinity or longer retention of ionized bases while lower column cation selectivity will result in less retention of ionized bases, but may have very good peak shapes. For example, the higher cation selectivity properties of the Kinetex® Biphenyl column provide longer retention of opiates as compared to the Kinetex C18 column which has a lower cation selectivity rating. This can be extremely helpful when needing to move compounds away from early suppression regions.



Conditions for all columns:

Column: Kinetex 5 μm Biphenyl
Kinetex 5 μm C18

Dimensions: 50 x 2.1 mm

Mobile Phase: A: 0.1 % Formic Acid in Water
B: 0.1 % Formic Acid in Methanol

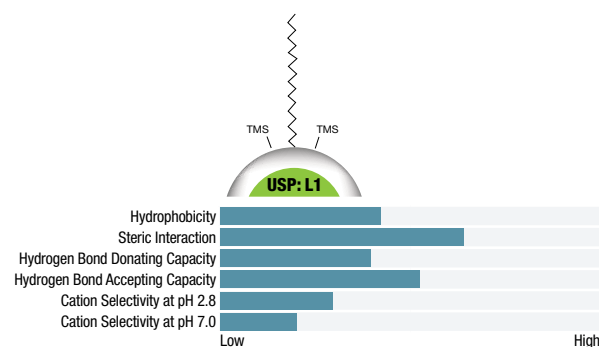
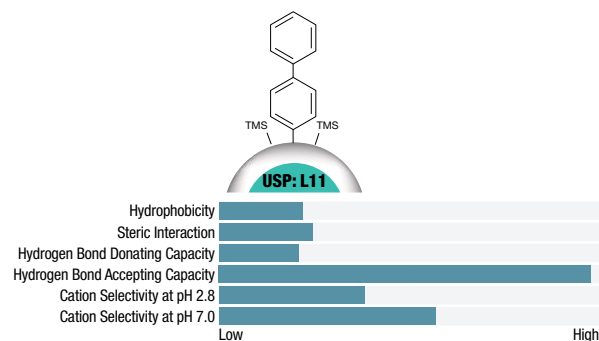
Gradient: Time (min)	% B
0	10
0.5	10
2	25
4.5	80
4.51	85
5.5	85
5.51	10
7	10

Flow Rate: 0.5 mL/min

Temperature: 40 °C

Detection: MS/MS (SCIEX API 4000™)

1. Meprobamate	9. Hydrocodone
2. Normeperidine	10. Oxycodone
3. Mepiridine	11. Methadone
4. Carisprodol	12. Oxycodone
5. Tramadol	13. 6-MAM
6. Hydromorphone	14. Norbuprenorphine
7. Morphine	15. Buprenorphine
8. Codeine	



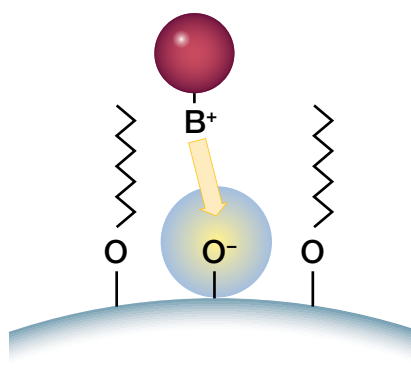
Column Portfolio: Analysis of Polar Basic Compounds

Columns with high column cation selectivity values will show higher retention for ionized bases while columns with low column cation selectivity values will have less interaction and retention for ionized bases, but may have very good peak shape for bases. We've organized our recommendations for polar basic compounds by increased retention and improved peak shape.

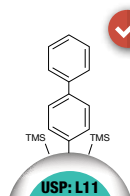
Cation Selectivity

High column cation selectivity values will show higher retention for ionized bases.

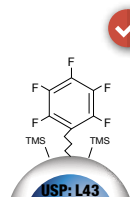
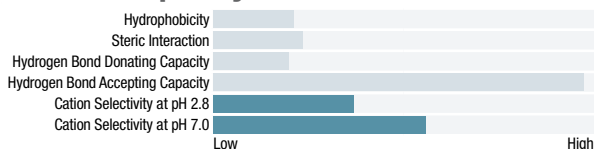
Low column cation selectivity values will have less interaction and retention for ionized bases, but may have very good peak shape.



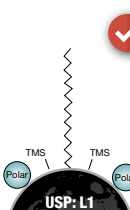
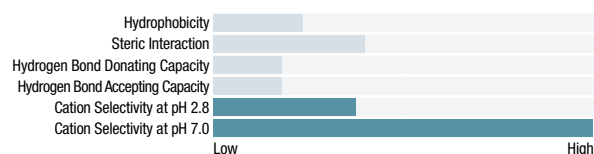
Increased Retention of Polar Bases



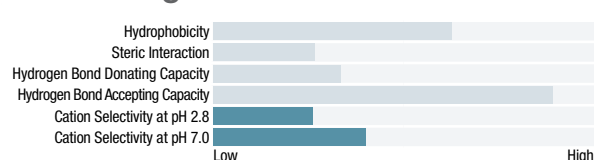
✓ Kinetex[®] Biphenyl



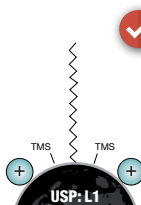
✓ Kinetex F5



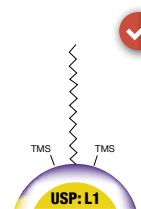
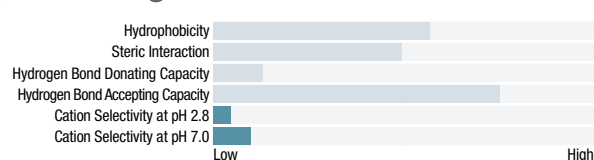
✓ Luna[®] Omega Polar C18



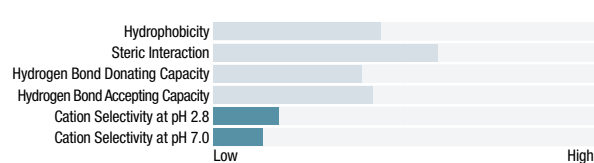
Improved Peak Shape for Bases



✓ Luna Omega PS C18



✓ Kinetex EVO C18



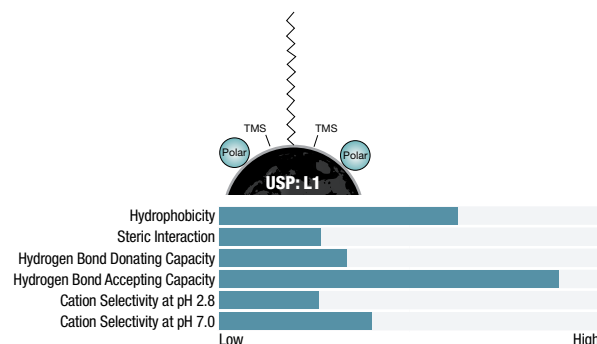
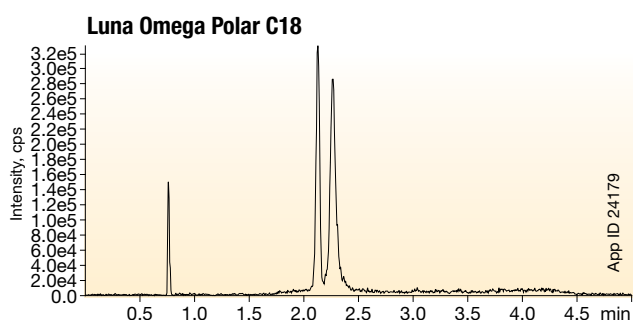
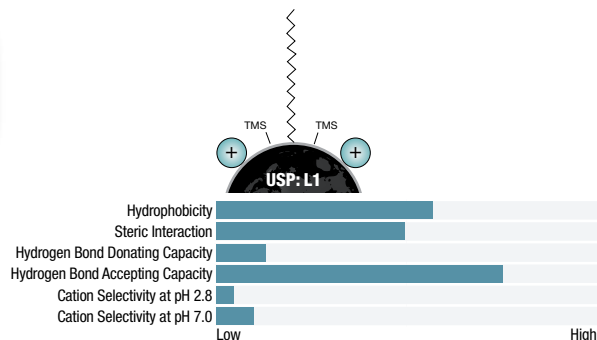
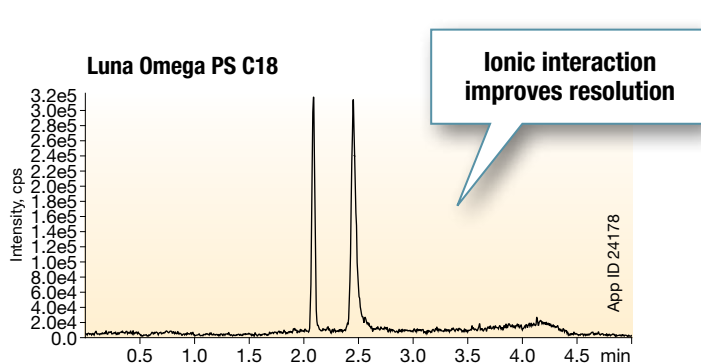
✓ Available for UHPLC

Find Ordering Information on Pages 42-51!

Polar Acidic Compounds

Think Positively

Charged polar groups on the surface of a particle or within the column's key functional group can play a large role in the separation of polar acidic compounds. Chemistries such as Luna® Omega PS C18 have been fine-tuned to provide a mixed mode selectivity that includes positively charged groups on the silica's surface. These groups increase the retention of polar acidic compounds, resulting in improved separation power as compared to chemistries that do not contain these properties.



Conditions for all columns:

Column: Luna Omega 5µm PS C18
Luna Omega 5µm Polar 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 0
3 90

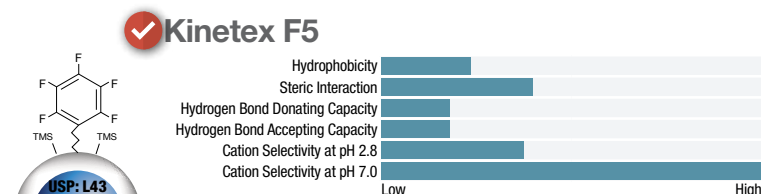
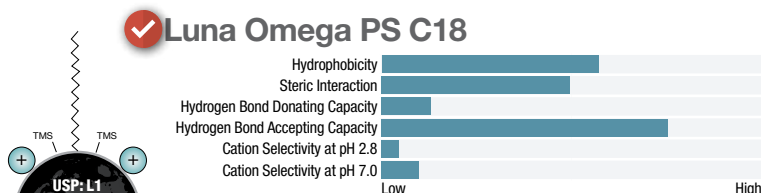
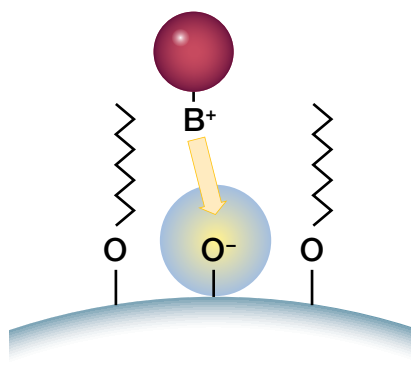
Flow Rate: 0.7 mL/min
Temperature: Ambient
Detection: MS/MS (SCIEX API 4000™)
Sample: 1. MMA
2. Succinic acid

Complete Portfolio: Analysis of Polar Acidic Compounds

Phenomenex has optimized the silica surface (in the case of Luna Omega PS C18) as well as functional groups (Kinetex® F5) to provide various interaction mechanisms for the successful separation of polar acidic compounds.

Positive Functionality

Positive groups on the silica surface or in the column's functional group interact with polar acidic compounds, increasing the retention time.



Available for UHPLC

Find Ordering Information on Pages 42-51!

The Right Column: Quick Selection Guide

Both the solid support and the bonded phase should be taken into consideration when selecting the most appropriate reversed phase HPLC or UHPLC column. Though the chart below depicts several similar bonded ligand types, no two columns are the same. View the selectivity profiles of each phase, pages 28-38, to see how each column can provide you with a truly different selectivity.

Variety of Selectivities and Solid Supports for RP-HPLC Methods



	Core-Shell	Fully Porous- Thermally Modified Silica	Fully Porous Silica	Fully Porous
C18 with nonpolar endcapping	Kinetex C18 Kinetex XB-C18	Luna Omega C18	Luna C18(2)	
C18 with di-isobutyl side chains	Kinetex XB-C18			
C18 with organo-silica	Kinetex EVO C18			Gemini C18 Gemini NX-C18
C18 with polar modified surface	Kinetex Polar C18	Luna Omega Polar C18		Gemini C18
C18 with polar embedded groups			Synergi Fusion-RP	
C18 with polar endcapping			Synergi Hydro-RP	
C18 with positive ionic groups		Luna Omega PS C18		
C12 with nonpolar endcapping			Synergi Max-RP	
C8 with nonpolar endcapping	Kinetex C8		Luna C8(2)	
C5 with nonpolar endcapping			Luna C5	
Phenyl with ether linkage and polar endcapping			Synergi Polar-RP	
Phenyl with nonpolar endcapping	Kinetex Biphenyl Kinetex Phenyl-Hexyl		Luna Phenyl-Hexyl	Gemini C6-Phenyl
PFP	Kinetex F5		Luna PFP(2)	
CN			Luna CN	



Core-Shell for Proteins/Peptides

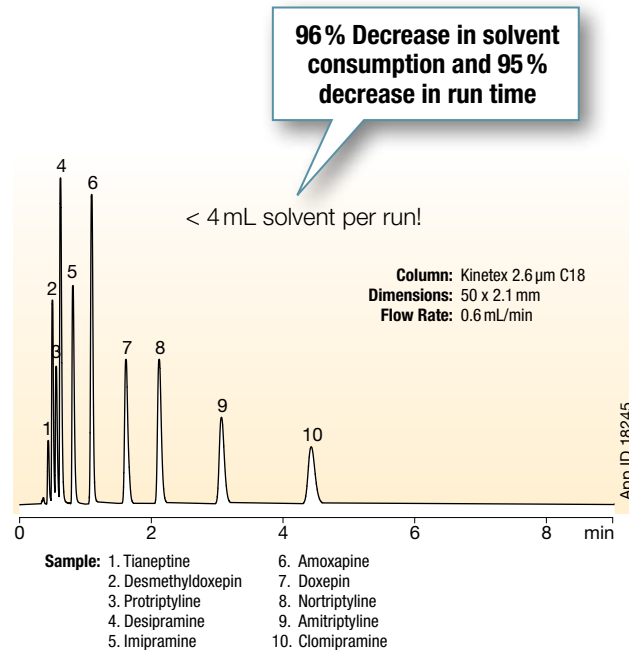
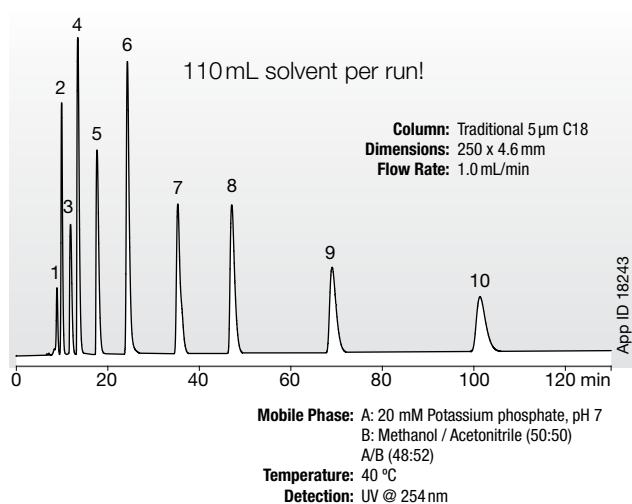
Aeris WIDEPORÉ and Aeris PEPTIDE columns were specifically developed for the analysis of biomolecules. Find more information on these exclusive 3.6 µm and 1.7 µm core-shell particles in XB-C18, XB-C8, and XB-C4 phases at www.phenomenex.com/aeris

Column Recommendations for Special Cases

Based on experience and customer feedback, we've found that particular solid support/selectivity combinations work very well for specific application types. We recommend the following columns as starting points for those applications outlined below. The selectivity profiles located in the specific product pages can also be utilized to identify a suitable column based on analyte characteristics.

High Productivity

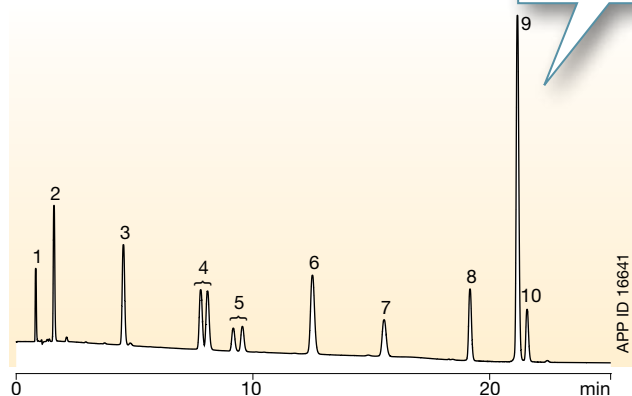
Recommended Columns: Kinetex® (all phases)



Conditions same for both columns except where noted. Comparative separations may not be representative of all applications.

High pH

Recommended Columns: Gemini® (all phases)



Polar Bases (Beta Blockers) at High pH

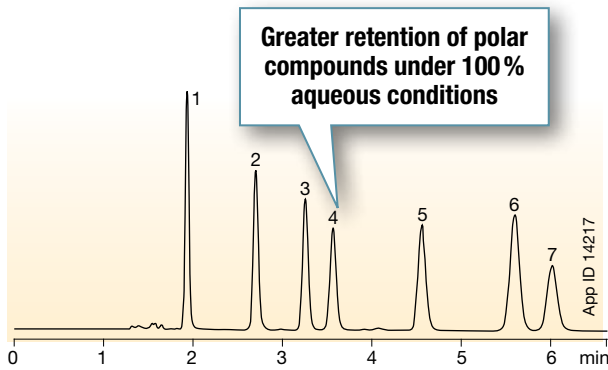
Column: Gemini 5 µm NX-C18
Dimensions: 150 x 4.6 mm
Mobile Phase: A: 10 mM Ammonium Bicarbonate pH 10.5
 B: Acetonitrile
Gradient: A/B (85:15) to (70:30) in 15 min
 to (50:50) in 5 min, Hold for 5 min
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detection: UV @ 230 nm
Sample: 1. Bisoprolol Contaminant
 2. Sotalol
 3. Atenolol
 4. Labetolol (Diastereoisomeric Pair)
 5. Nadolol (Diastereoisomeric Pair)
 6. Pindolol
 7. Metoprolol
 8. Bisoprolol
 9. Propranolol
 10. Alprenalol

Kinetex EVO C18 is also an excellent choice for high pH work with its combined core-shell performance and excellent particle robustness.

High Aqueous

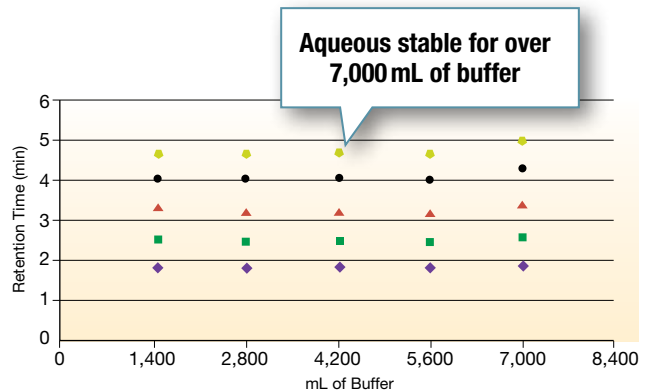
Recommended Columns: Synergi™ Hydro-RP, Synergi Polar-RP, Synergi Fusion-RP, Luna® Omega Polar C18, Luna Omega PS C18, and Kinetex® Polar C18

Catecholamines



Column: Synergi 4 µm Hydro-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4375-E0
Mobile Phase: 20 mM Potassium phosphate, pH 2.5
Flow Rate: 1.0 mL/min
Temperature: 22 °C
Detection: UV @ 210 nm
Sample: 1. Norepinephrine 5. Dopamine
 2. Epinephrine 6. L-DOPA
 3. 6-Hydroxydopamine 7. Epinine
 4. Normetanephrine

Aqueous Stability

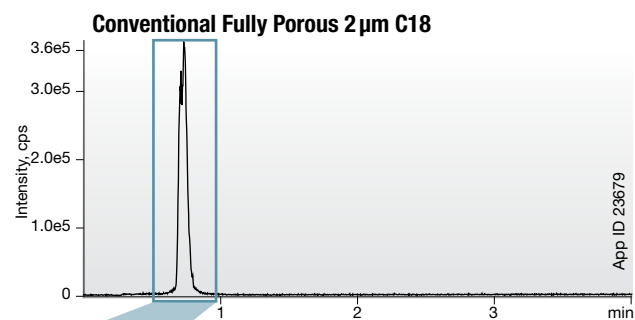
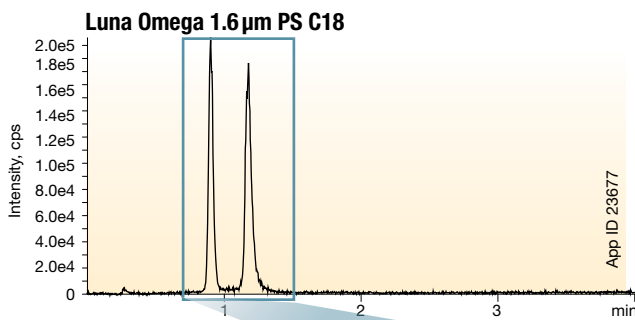


Column: Synergi 4 µm Hydro-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4375-E0
Mobile Phase: 20 mM Potassium phosphate, pH 2.5
Flow Rate: 1.0 mL/min
Temperature: 35 °C
Detection: UV @ 210 nm
Injection: 5 µL
Sample: 1. Norepinephrine (0.8 mg/mL)
 2. Epinephrine (0.5 mg/mL)
 3. Normetanephrine (0.6 mg/mL)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

Higher Retention and Resolution for Polar Compounds

Recommended Columns: Luna Omega Polar C18, Luna Omega PS C18, and Kinetex Polar C18

MMA and Succinic Acid



Greater retention and resolution

Conditions for all columns:

Columns: Luna Omega 1.6 µm PS C18
 Conventional Fully Porous 2 µm C18

Dimension: 50 x 2.1 mm

Mobile Phase: A: Water with 0.1 % Formic Acid
 B: Acetonitrile with 0.1 % Formic Acid

Gradient: Time (min)	% B
0	0
5	50
5.1	0
7	0

Flow Rate: 0.5 mL/min

Temperature: 22 °C

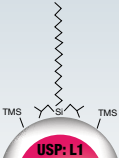
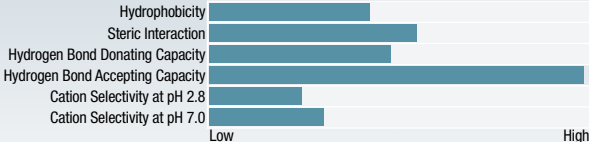
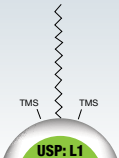
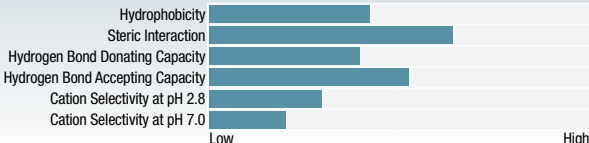
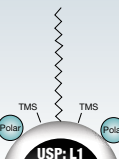
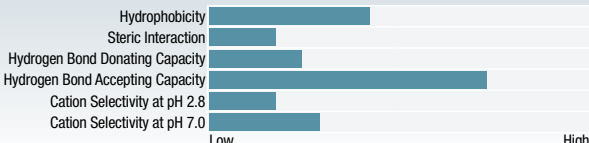
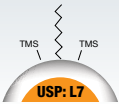
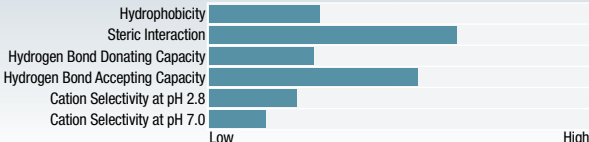
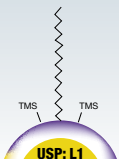
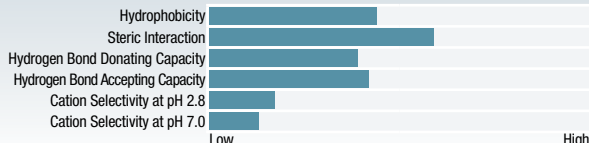
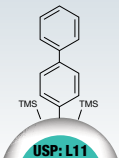
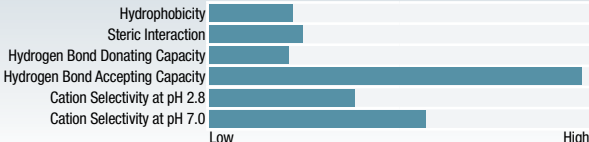

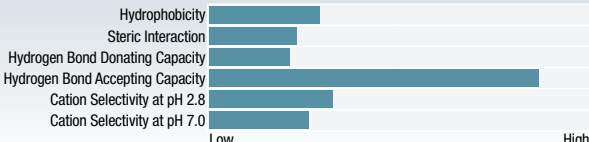
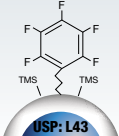
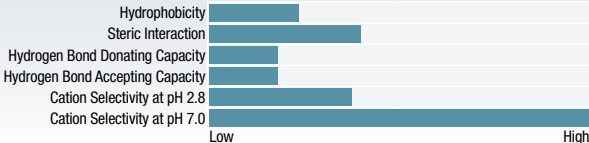
Detection: MS/MS (SCIEX API 4000™)

Sample: 1. Succinic acid
 2. MMA

Comparative separations may not be representative of all applications.

Performance Gains on ANY LC System

Kinetex core-shell particles were engineered to make improved results, increased productivity, easy transferrability, and cost savings accessible to everyone. You can leverage the power of Kinetex 5 μm to improve 5 and 3 μm methods. Use Kinetex 2.6 μm as a versatile upgrade for both HPLC and UHPLC methods and get the most performance out of your UHPLC with Kinetex 1.3 μm and 1.7 μm .

Phases		
Ligand	Description	Selectivity Profile
	Kinetex XB-C18 Di-isobutyl side chains differentiate this C18 column. Low ligand density and an inactive surface make this column a great hydrogen acceptor. This phase will demonstrate improved peak shape for basic compounds and increased retention of acids.	
	Kinetex C18 Very well balanced column providing some selectivity through steric, hydrogen, and cationic pathways. This is a great starting point for ultra-high efficiency separations.	
	Kinetex Polar C18 Combined C18 and polar modified surface that provide polar and non-polar retention alongside 100% aqueous stability.	
	Kinetex C8 Brings the benefits of core-shell technology to USP L7 methods. The phase will provide moderate hydrophobicity and good steric and hydrogen donating selectivity.	
	Kinetex EVO C18 Novel pH 1-12 stable C18 that delivers robust methods and improved peak shape for bases.	
	Kinetex Biphenyl 100% aqueous stable reversed phase chemistry with hydrophobic, aromatic, and enhanced polar selectivity.	
	Kinetex Phenyl-Hexyl Aromatic and moderate hydrophobic selectivity result in the great retention and separation of aromatic hydrocarbons.	
	Kinetex F5 This pentafluorophenyl propyl column provides a very high degree of steric selectivity to separate structural isomers. The electronegative fluorine groups offer high selectivity for cationic compounds.	

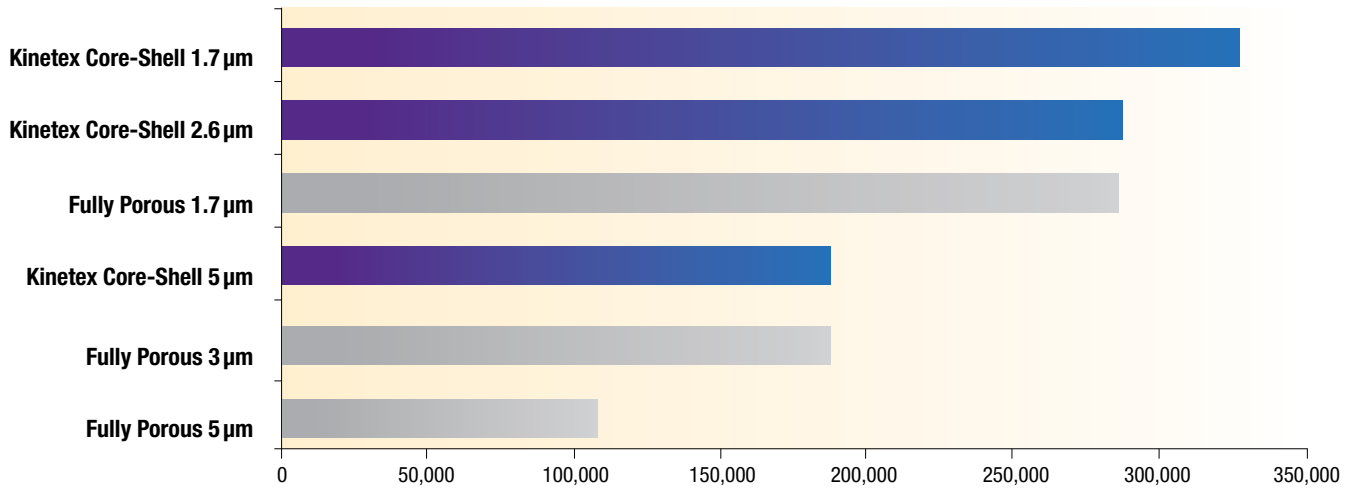
Important!

Measurements illustrated here are not absolute, but a relative measurement to other Phenomenex columns. In this display, the individual measurements cannot be compared to each other.

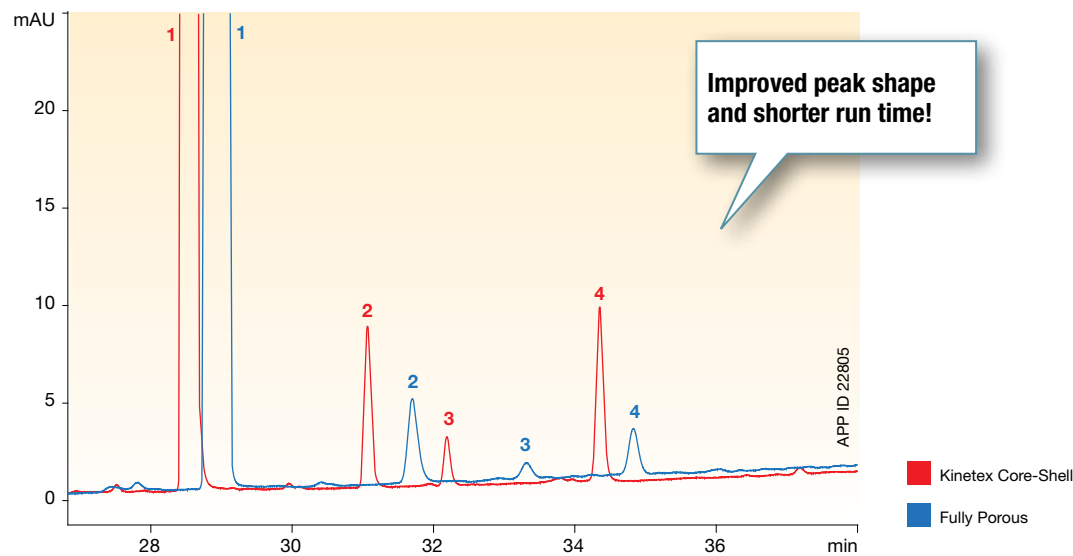
Better Performance than Fully Porous Particles

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 plate counts.

Core-Shell vs. Fully Porous Efficiency Levels (plates/m)



Core-Shell Performance Gains



Material Characteristics

Packing Material	Total Particle Size (μm)	Pore Size (\AA)	Effective Surface Area (m^2/g)	Effective Carbon Load %	pH Stability	Pressure Stability
Polar C18	2.6	100	200	9	1.5-8.5*	1,000/600 [†] bar
EVO C18	1.7, 2.6, 5	100	200	11	1.0-12.0	
C18	1.3, 1.7, 2.6, 5	100	200	12	1.5-8.5*	
XB-C18	1.7, 2.6, 3.5, 5	100	200	10	1.5-8.5*	
C8	1.7, 2.6, 5	100	200	8	1.5-8.5*	
F5	1.7, 2.6, 5	100	200	9	1.5-8.5	
Biphenyl	1.7, 2.6, 5	100	200	11	1.5-8.5*	
Phenyl-Hexyl	1.7, 2.6, 5	100	200	11	1.5-8.5*	
HILIC	1.7, 2.6, 5	100	200	0	2.0-7.5	

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

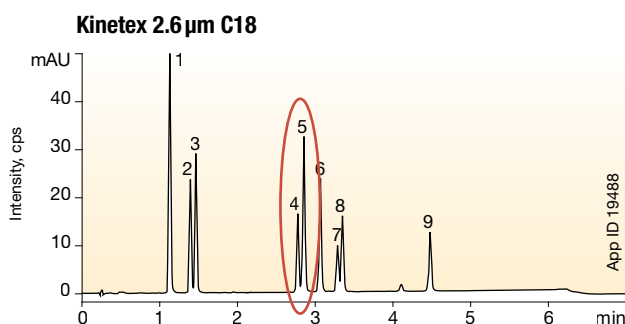
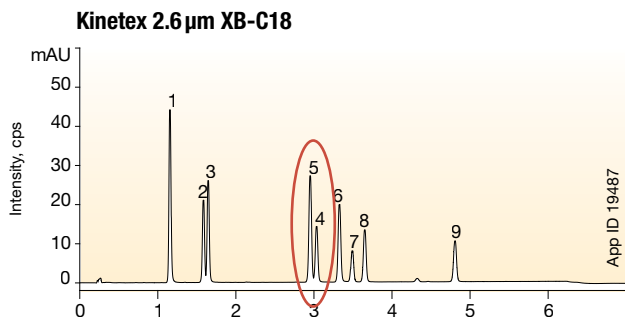
[†] 2.1 mm ID Kinetex columns are pressure stable up to 1000 bar.

When using Kinetex 1.3 μm or 1.7 μm , increased performance can be achieved, however high pressure-capable instrumentation is required.

Complementary Selectivities Coupled with Ultra-High Efficiencies

Ultra-high performance columns like Kinetex® will give you very narrow peaks, but without the right selectivities you are left with very narrow, overlapping peaks. The phases offered in the Kinetex column line are complementary to one another, so the spectrum of selectivity your separations require is covered.

C18 Phases (C18 vs. XB-C18)



Dimensions: 50 x 2.1 mm
Mobile Phase: A: Water
 B: Acetonitrile
Gradient:

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

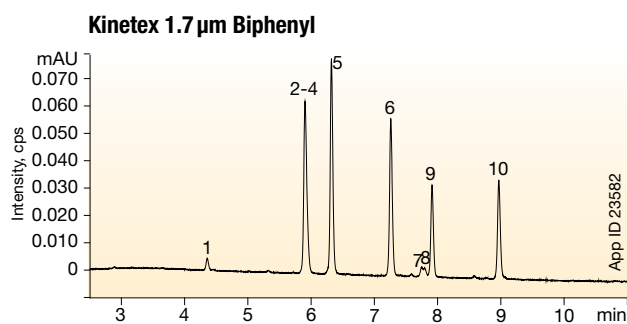
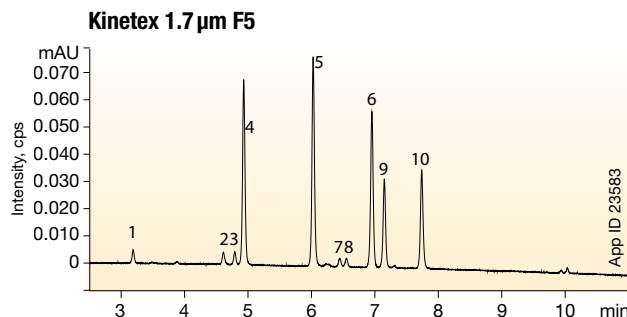
Flow Rate: 0.5 mL/min
Temperature: 30 °C

Detection: UV @ 220 nm (ambient)
Sample:

1. Estriol
2. Hydrocortisone
3. Cortisone
4. Estradiol
5. Cortisone-21-acetate
6. 21-Hydroxyprogesterone
7. Estrone
8. 17-Hydroxyprogesterone
9. Deoxycorticosterone acetate

Conditions same for both columns except where noted.

Phenyl Phases (F5 vs. Biphenyl)



Dimensions: 100 x 2.1 mm
Mobile Phase: A: 20 mM Ammonium Formate
 pH 3.2
 B: Acetonitrile
Gradient:

Time (min)	% B
0	60
12	95
13	95
13.01	60
15	60

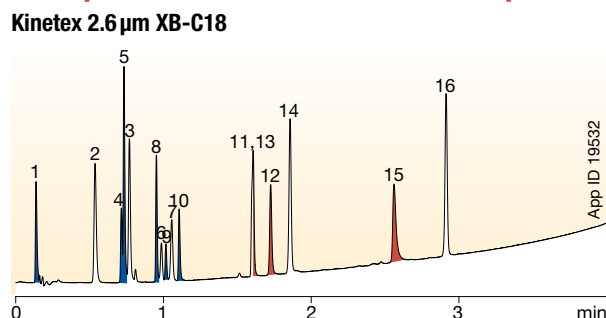
Flow Rate: 0.4 mL/min
Temperature: 40 °C

Detection: UV @ 256 nm
Sample:

1. CBDV
2. Cannabidiol
3. CBG
4. Cannabidiolic Acid
5. CBG-A
6. Cannabinol
7. Delta 9 THC
8. Delta 8 THC
9. CBC
10. THCA-A

Conditions same for both columns except where noted.

Manipulate Acidic and Basic Compound Retention



Dimensions: 50 x 2.1 mm
Mobile Phase: A: 0.1 % Formic acid in Water
 B: 0.1 % Formic acid in Acetonitrile
Gradient:

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

Flow Rate: 0.8 mL/min
Temperature: 30 °C
Detection: UV @ 245 nm (ambient)

Sample:

1. Pyridine
2. Acetaminophen
3. Pindolol
4. Quinidine
5. Sulfathiazole
6. Acetubolol
7. Benzyl alcohol
8. Chlorpheniramine
9. Phenol
10. Triprolidine
11. Nortriptyline
12. Prednisolone
13. 3-Methyl, 4-nitrobenzoic acid
14. 2-Hydroxy, 5-methylbenzaldehyde
15. Diflunisal
16. Hexanophenone

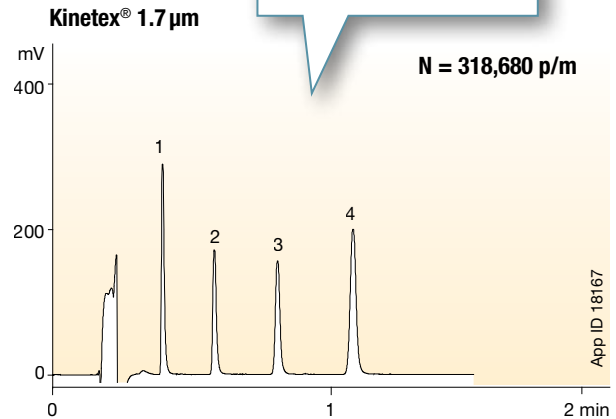
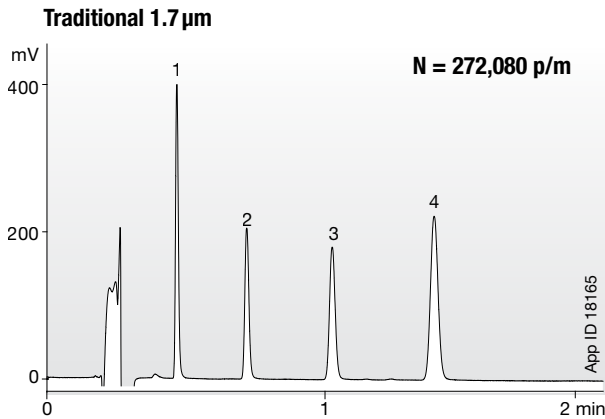
■ Base
 ■ Acid
 □ Neutral

Conditions same for both columns except where noted.

Find Ordering Information on Page 42-45!

Upgrading from Conventional Fully Porous to Core-Shell

1.7 μm Fully Porous vs. 1.7 μm Core-Shell



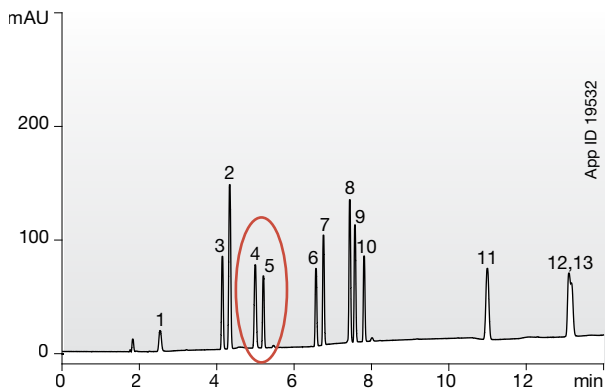
Conditions for both columns:

Column: Kinetex 1.7 μm C18
Traditional 1.7 μm C18
Dimensions: 50 x 2.1 mm
Mobile Phase: Acetonitrile / Water (50:50)
Flow Rate: 0.6 mL/min
Temperature: 25 °C

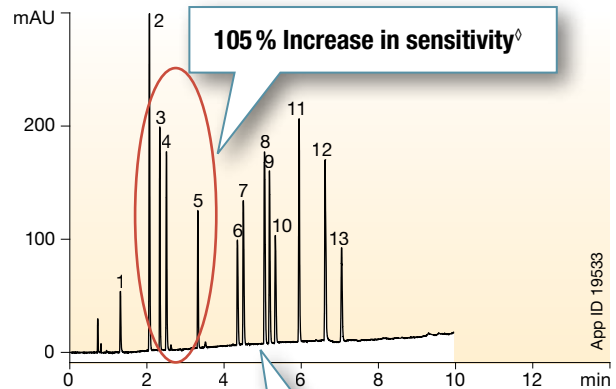
Detection: UV @ 254 nm
Instrument: Waters® ACQUITY® UPLC®
Sample: 1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene

Fully Porous vs. Core-Shell

Traditional 5 μm ODS-3 250 x 4.6 mm



Kinetex 2.6 μm C18 150 x 4.6 mm



Columns: Kinetex 2.6 μm C18 100 Å
Traditional 5 μm ODS-3 100 Å
Dimensions: Kinetex: 150 x 4.6 mm
Traditional: 250 x 4.6 mm
Mobile Phase: A: 0.1 % Phosphoric acid in Water
B: 0.1 % Phosphoric acid in Acetonitrile
Gradient: 5% to 95 % B in 9 min (150 x 4.6 mm)
5% to 95 % B in 15 min (250 x 4.6 mm)
Flow Rate: 1.8 mL/min
Temperature: 50 °C
Detection: UV @ 215 nm (22 °C)

Sample: 1. Procainamide
2. Acetaminophen
3. Folic acid
4. Sulfathiazole
5. Acetubolol
6. Dextromethorphan
7. Diphenhydramine

8. Propafenone
9. Amitriptyline
10. Fluoxetine
11. Naproxen
12. Diflunisal
13. Indomethacin

◇ Signal-to-noise ratio of peak 2

△ Based on average peak widths

*Waters, ACQUITY, and UPLC are registered trademarks of Waters Corporation. Phenomenex is not affiliated with Waters Corporation. Comparative separations may not be representative of all applications. Conditions same for both columns except where noted.

Find Ordering Information on Page 42-45!

The Standard for pH Method Development



Rugged HPLC columns that offer extended lifetime under extreme pH conditions (pH 1-12) and excellent stability for reproducible, high efficiency separations.

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

Phases		
Ligand	Description	Selectivity Profile
<p>USP: L1</p>	<h3>Gemini NX-C18</h3> <p>New generation of organo-silane material incorporates ethylene bridges to provide pH stability from 1-12 and 5x the durability of earlier hybrids. The homogenous surface offers some steric selectivity.</p>	
<p>USP: L1</p>	<h3>Gemini C18</h3> <p>This is a high loading, organo-silane particle column with pH stability 1-12. The patented procedure creates a surface that is a strong hydrogen donor and acceptor. It is ideal for acids and bases.</p>	
<p>USP: L11</p>	<h3>Gemini C6-Phenyl</h3> <p>This is a very inert phase for great peak shapes of ionized compounds. The planar phenyl rings offer moderate hydrophobic retention and high steric selectivity for structural isomer selectivity.</p>	

Important!

Measurements illustrated here are not absolute, but a relative measurement to other Phenomenex columns. In this display, the individual measurements cannot be compared to each other.

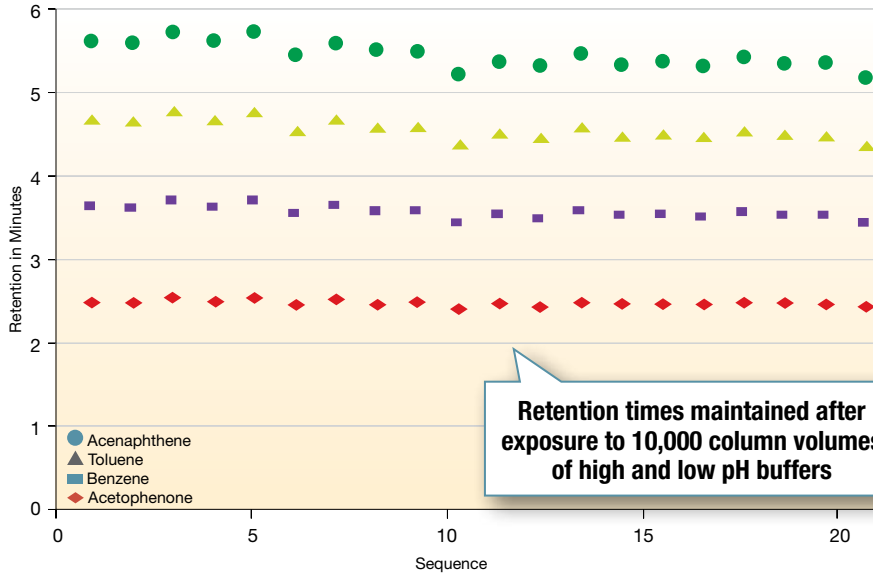
Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load %	Endcapping	pH Range
Gemini C18	Spherical 3, 5, 10	110	375	14	TMS	1.0 - 12.0
Gemini C6-Phenyl	Spherical 3, 5	110	375	12	TMS	1.0 - 12.0
Gemini NX-C18	Spherical 3, 5, 10	110	375	14	TMS	1.0 - 12.0

Rugged, Dependable Columns Under the Most Extreme Conditions

The harshest conditions for HPLC columns can be found in environments where columns are subjected to constant changes in pH, buffers, and temperature. A Gemini® column's ability to hold up under these challenging conditions is a testament to the long column lifetimes and reproducible performance you can expect.

Extend Column Lifetime Under Harsh pH Conditions



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

Step 1
24x High pH (10.5)
Gradient Flush

Step 2
High pH (10.5) Testing

Step 3
1x Neutral Flush Procedure

Step 4
Neutral pH Testing

Step 5
24x Low pH (2.0)
Gradient Flush

Step 6
Neutral pH Flush Repeats

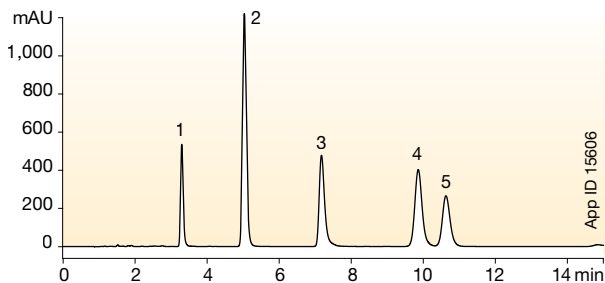
Repeats for 20 Cycles

For full procedure and parameters, visit www.phenomenex.com/gemini

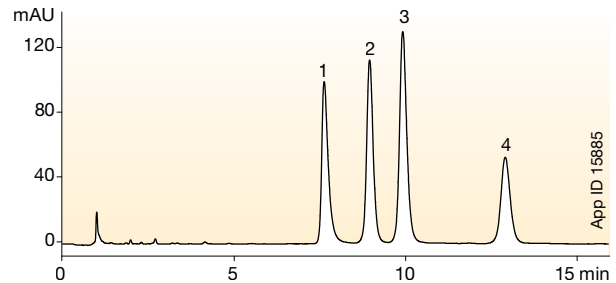
Complementary Selectivities at Extended pHs

Gemini C18 can provide a different selectivity to your current C18 column for better resolution.

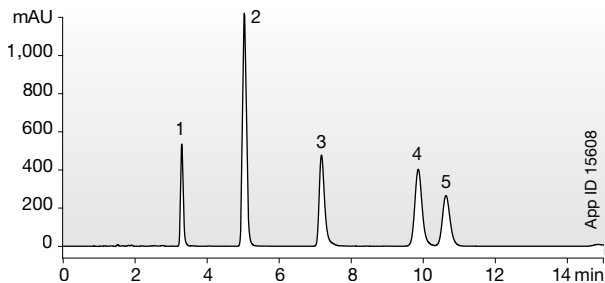
Gemini 5 µm C18



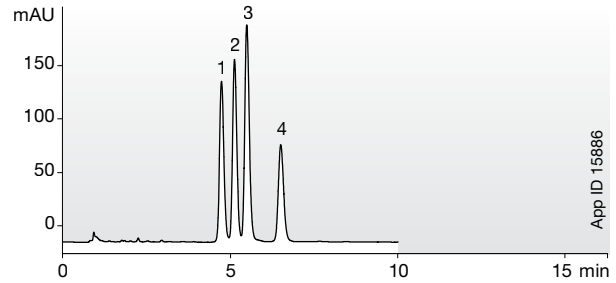
Gemini 5 µm C6-Phenyl



Traditional 5 µm C18



Traditional 5 µm Phenyl



Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Phosphate buffer, pH 2.5 / Acetonitrile (50:50)
Flow Rate: 1 mL/min
Temperature: Ambient
Detection: UV @ 230 nm (ambient)

Sample: 1. Ethyl paraben
2. Naproxen
3. Diflunisal
4. Indomethacin
5. Ibuprofen

Dimensions: 150 x 4.6 mm
Mobile Phase: 10 mM Ammonium bicarbonate, pH 10.5 / Acetonitrile / Methanol (30:35:35)
Flow Rate: 1 mL/min
Temperature: Ambient

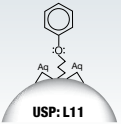
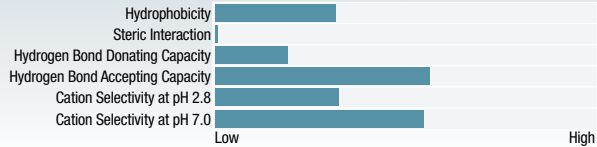
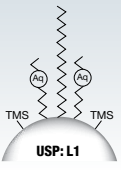
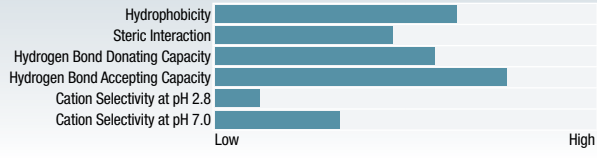
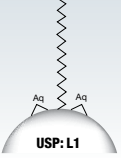
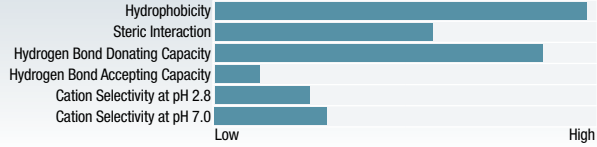
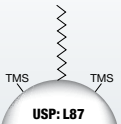
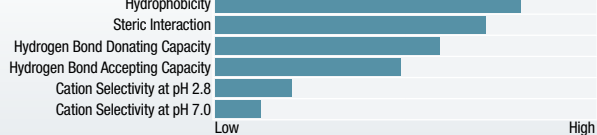
Detection: UV @ 254 nm (ambient)
Sample: 1. Imipramine
2. Nortriptyline
3. Amitriptyline
4. Clomipramine

Dimensions and chromatographic conditions are the same for all columns unless otherwise noted. Comparative separations may not be representative of all applications.

Find Ordering Information on Page 51!

Full Range Selectivity

Four unique phases developed to provide a different selectivity for successful separations of the most complex mixtures and challenging analytes.

Phases		
Ligand	Description	Selectivity Profile
 <p>Synergi Polar-RP (100 % Aqueous Stable) This ether linked phenyl column is polar endcapped and offers high cation retention capabilities to improve retention for ionized bases.</p>		
 <p>Synergi Fusion-RP (100 % Aqueous Stable) A low ligand density polar embedded C18, this unique phase contributes to hydrogen bonding and donating. It provides balanced selectivity for acids and bases.</p>		
 <p>Synergi Hydro-RP (100 % Aqueous Stable) Polar endcapped C18 column that provides very high hydrophobic interactions and hydrogen donating capabilities make this column ideal for retaining polar bases.</p>		
 <p>Synergi Max-RP Densely bonded C12 contributes a lot of hydrophobic retention and steric based selectivity. Combined characteristics of the base silica and the bonded phase will also provide hydrogen bonding benefits.</p>		

Important! Measurements illustrated here are not absolute, but a relative measurement to other Phenomenex columns. In this display, the individual measurements cannot be compared to each other.

Material Characteristics

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load %	Endcapping	pH Range
Synergi Max-RP	Spher. 2.5	100	400	17	TMS	1.5 - 9.0*
Synergi Hydro-RP	Spher. 2.5	100	400	19	Hydrophilic	1.5 - 7.5
Synergi Polar-RP	Spher. 2.5	100	400	11	Hydrophilic	1.5 - 7.0
Synergi Fusion-RP	Spher. 2.5	100	400	12	TMS	1.5 - 9.0*
Synergi Max-RP	Spher. 4, 10	80	475	17	TMS	1.5 - 9.0*
Synergi Hydro-RP	Spher. 4, 10	80	475	19	Hydrophilic	1.5 - 7.5
Synergi Polar-RP	Spher. 4, 10	80	475	11	Hydrophilic	1.5 - 7.0
Synergi Fusion-RP	Spher. 4, 10	80	475	12	TMS	1.5 - 9.0*

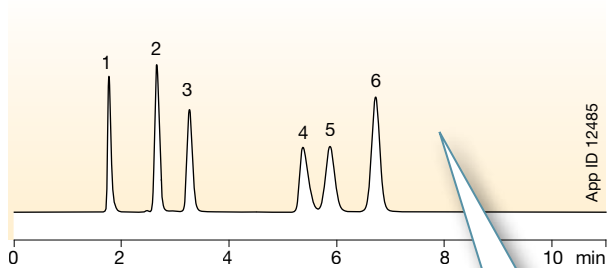
* pH stability under gradient conditions. pH stability is 1.5 - 10.0 under isocratic conditions.

Unique Phases for a Different Separation

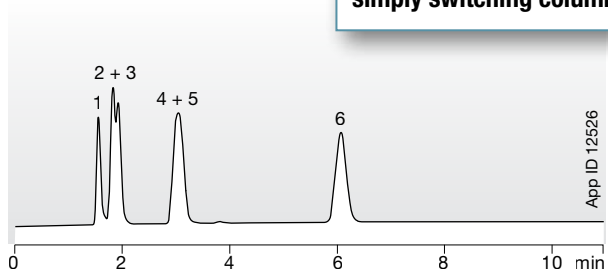
The Synergi™ phases offer the ability to achieve greater resolution and differing peak elution order while staying in reversed phase mode.

Ether-linked Phenyl vs. C18

Synergi 4 µm Polar-RP



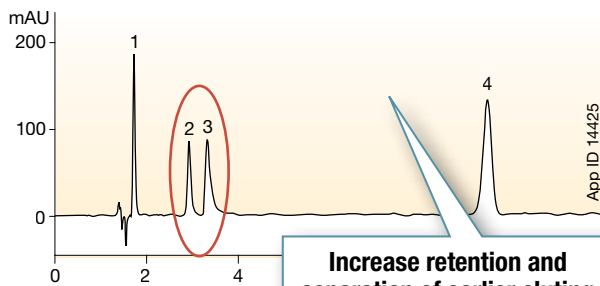
Traditional 5 µm C18



Achieve greater resolution by simply switching column phase

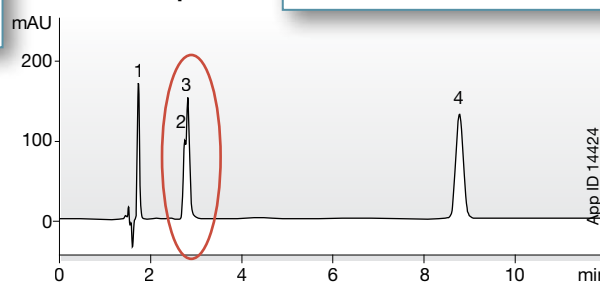
Polar Endcapping vs. Nonpolar Endcapping

Synergi 4 µm Hydro-RP



Increase retention and separation of earlier eluting polar compounds

Traditional 5 µm C18

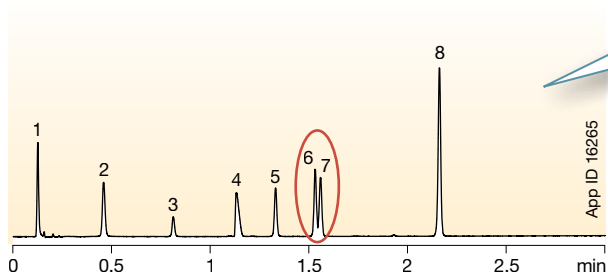


Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate, pH 3 / Methanol (50:50)
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detection: UV @ 230 nm (ambient)
Sample: 1. Metaproterenol
 2. Pindolol
 3. Metoprolol
 4. Alprenolol
 5. Propranolol
 6. Ethyl paraben

Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate, pH 7 / Methanol (60:40)
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detection: UV @ 210 nm (ambient)
Sample: 1. Phenylephrine
 2. Phenylpropanolamine
 3. Pseudoephedrine
 4. Methyl paraben

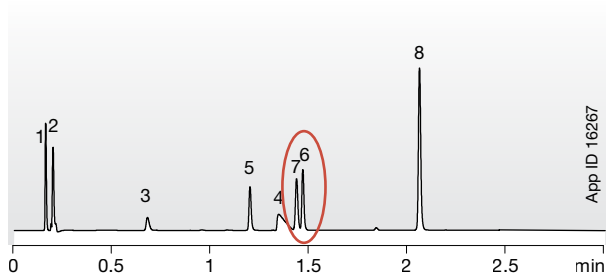
Polar Embedded C18 vs. Traditional C18

Synergi 2.5 µm Fusion-RP



Sharper peaks and alternate peak elution order

Traditional 1.9 µm C18



Dimensions: 50 x 2.0 mm
Mobile Phase: A: 0.1 % Formic acid in Water
 B: 0.1 % Formic acid in Acetonitrile
Gradient: A/B (95:5) to (5:95) in 2.9 minutes
Flow Rate: 1.1 mL/min
Temperature: 50 °C
Detection: UV @ 254 nm (ambient)
Instrument: Agilent™ 1200 SL
Sample: 1. Pyridine
 2. Acetaminophen
 3. Benzyl Alcohol
 4. Nortriptyline
 5. 3-Methyl-4-Nitrobenzoic Acid
 6. 4-Chlorocinnamic Acid
 7. 3-Hydroxy-3-Methylbenzaldehyde
 8. Hexanophenone

Comparative separations may not be representative of all applications. Conditions are the same for both columns except where noted.

Find Ordering Information on Page 46-47!

One of the World's Leading HPLC Columns



Dependable, ultra-pure silica-based HPLC columns that offer an extensive variety of selectivities which are scalable from micro-bore to preparative and purification scale solutions.

Phases														
Ligand	Description	Selectivity Profile												
<p>USP: L1</p>	<p>Luna C18(2) C18 phase is densely bonded to provide high hydrophobic retention and discriminating steric selectivity. High endcapping reduces electrostatic based selectivity to a minimum.</p>	<table border="1"> <tr><td>Hydrophobicity</td><td>High</td></tr> <tr><td>Steric Interaction</td><td>High</td></tr> <tr><td>Hydrogen Bond Donating Capacity</td><td>Low</td></tr> <tr><td>Hydrogen Bond Accepting Capacity</td><td>Low</td></tr> <tr><td>Cation Selectivity at pH 2.8</td><td>Low</td></tr> <tr><td>Cation Selectivity at pH 7.0</td><td>Low</td></tr> </table>	Hydrophobicity	High	Steric Interaction	High	Hydrogen Bond Donating Capacity	Low	Hydrogen Bond Accepting Capacity	Low	Cation Selectivity at pH 2.8	Low	Cation Selectivity at pH 7.0	Low
Hydrophobicity	High													
Steric Interaction	High													
Hydrogen Bond Donating Capacity	Low													
Hydrogen Bond Accepting Capacity	Low													
Cation Selectivity at pH 2.8	Low													
Cation Selectivity at pH 7.0	Low													
<p>USP: L7</p>	<p>Luna C8(2) C8 column provides less hydrophobic retention than our C18, but the density of the ligand bonding creates more steric based selectivity. The C8 columns are generally better hydrogen bond acceptors, and better for acidic compounds.</p>	<table border="1"> <tr><td>Hydrophobicity</td><td>Medium</td></tr> <tr><td>Steric Interaction</td><td>High</td></tr> <tr><td>Hydrogen Bond Donating Capacity</td><td>Low</td></tr> <tr><td>Hydrogen Bond Accepting Capacity</td><td>High</td></tr> <tr><td>Cation Selectivity at pH 2.8</td><td>Low</td></tr> <tr><td>Cation Selectivity at pH 7.0</td><td>Low</td></tr> </table>	Hydrophobicity	Medium	Steric Interaction	High	Hydrogen Bond Donating Capacity	Low	Hydrogen Bond Accepting Capacity	High	Cation Selectivity at pH 2.8	Low	Cation Selectivity at pH 7.0	Low
Hydrophobicity	Medium													
Steric Interaction	High													
Hydrogen Bond Donating Capacity	Low													
Hydrogen Bond Accepting Capacity	High													
Cation Selectivity at pH 2.8	Low													
Cation Selectivity at pH 7.0	Low													
<p>USP: L11</p>	<p>Luna Phenyl-Hexyl Our most hydrophobic phenyl column and it will also provide good hydrogen accepting functionality for acidic retention.</p>	<table border="1"> <tr><td>Hydrophobicity</td><td>High</td></tr> <tr><td>Steric Interaction</td><td>Low</td></tr> <tr><td>Hydrogen Bond Donating Capacity</td><td>Low</td></tr> <tr><td>Hydrogen Bond Accepting Capacity</td><td>High</td></tr> <tr><td>Cation Selectivity at pH 2.8</td><td>Low</td></tr> <tr><td>Cation Selectivity at pH 7.0</td><td>Low</td></tr> </table>	Hydrophobicity	High	Steric Interaction	Low	Hydrogen Bond Donating Capacity	Low	Hydrogen Bond Accepting Capacity	High	Cation Selectivity at pH 2.8	Low	Cation Selectivity at pH 7.0	Low
Hydrophobicity	High													
Steric Interaction	Low													
Hydrogen Bond Donating Capacity	Low													
Hydrogen Bond Accepting Capacity	High													
Cation Selectivity at pH 2.8	Low													
Cation Selectivity at pH 7.0	Low													
<p>USP: L43</p>	<p>Luna PFP(2) Pentafluorophenyl groups provide very little hydrogen bonding abilities, but the strongly electronegative fluorine groups will provide good charge based selectivity for cationic compounds, while the rigid bonded phase is a good steric selector.</p>	<table border="1"> <tr><td>Hydrophobicity</td><td>High</td></tr> <tr><td>Steric Interaction</td><td>High</td></tr> <tr><td>Hydrogen Bond Donating Capacity</td><td>Low</td></tr> <tr><td>Hydrogen Bond Accepting Capacity</td><td>Low</td></tr> <tr><td>Cation Selectivity at pH 2.8</td><td>High</td></tr> <tr><td>Cation Selectivity at pH 7.0</td><td>High</td></tr> </table>	Hydrophobicity	High	Steric Interaction	High	Hydrogen Bond Donating Capacity	Low	Hydrogen Bond Accepting Capacity	Low	Cation Selectivity at pH 2.8	High	Cation Selectivity at pH 7.0	High
Hydrophobicity	High													
Steric Interaction	High													
Hydrogen Bond Donating Capacity	Low													
Hydrogen Bond Accepting Capacity	Low													
Cation Selectivity at pH 2.8	High													
Cation Selectivity at pH 7.0	High													
<p>USP: L10</p>	<p>Luna CN Nitrile groups bound to the silica surface offer a unique polar selectivity under reversed phase or normal phase conditions.</p>	<table border="1"> <tr><td>Hydrophobicity</td><td>Low</td></tr> <tr><td>Steric Interaction</td><td>Low</td></tr> <tr><td>Hydrogen Bond Donating Capacity</td><td>Low</td></tr> <tr><td>Hydrogen Bond Accepting Capacity</td><td>High</td></tr> <tr><td>Cation Selectivity at pH 2.8</td><td>High</td></tr> <tr><td>Cation Selectivity at pH 7.0</td><td>High</td></tr> </table>	Hydrophobicity	Low	Steric Interaction	Low	Hydrogen Bond Donating Capacity	Low	Hydrogen Bond Accepting Capacity	High	Cation Selectivity at pH 2.8	High	Cation Selectivity at pH 7.0	High
Hydrophobicity	Low													
Steric Interaction	Low													
Hydrogen Bond Donating Capacity	Low													
Hydrogen Bond Accepting Capacity	High													
Cation Selectivity at pH 2.8	High													
Cation Selectivity at pH 7.0	High													

Important! Measurements illustrated here are not absolute, but a relative measurement to other Phenomenex columns. In this display, the individual measurements cannot be compared to each other.

Material Characteristics

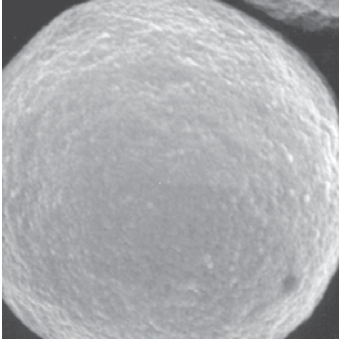
Packing Material	Particle Shape/ Size (µm)	Pore Size (Å)	Surface Area (m ² /g)	Carbon Load %	pH Stability
Luna C8(2)	Spher. 3, 5, 10, 10-PREP, 15	100	400	13.5	1.5 - 9.0*
Luna C18(2)	Spher. 2.5, 3, 5, 10, 10-PREP, 15	100	400	17.5	1.5 - 9.0*
Luna Phenyl-Hexyl	Spher. 3, 5, 10, 10-PREP, 15	100	400	17.5	1.5 - 9.0*
Luna CN	Spher. 3, 5, 10	100	400	7.0	1.5 - 7.0
Luna PFP(2)	Spher. 3, 5	100	400	11.5	1.5 - 9.0*

* pH stability under gradient conditions. pH stability is 1.5 - 10.0 under isocratic conditions.

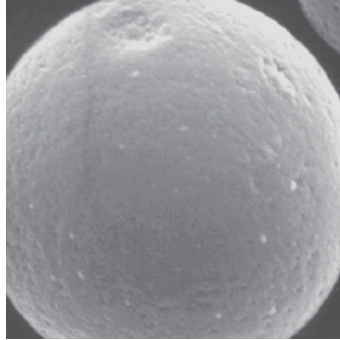
Long Column Lifetimes and Excellent Performance

Ultra-pure, metal-free silica (99.99 % purity) is the backbone of all Luna® material. The resulting high quality particles have a surface smoothness, pore structure, and pore consistency to ensure a more uniform particle shape and greater reproducibility.

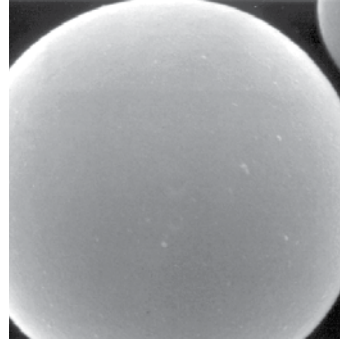
Superior Particle Smoothness



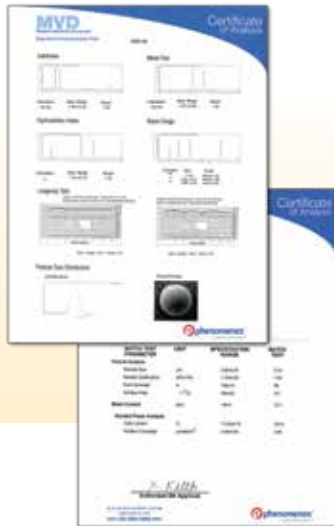
Agilent Technologies®
ZORBAX® 5 µm SB-C18



Waters®
Symmetry® 5 µm C18



Phenomenex
Luna 5 µm C18



Batch Quality and Reproducibility

For over 20 years, Luna has been manufactured and tested to ensure quality and reproducibility. The Phenomenex Quality Management System is meticulous, validating every batch of material according to 16 different test parameters before it is ever packed into an HPLC column.

**QUALITY
MANAGEMENT SYSTEM
CERTIFIED BY DNV GL**
= 9001:2008 =

Breadth of Formats



ZORBAX is a registered trademark of Agilent Technologies, Inc. Symmetry is a registered trademark of Waters Corporation. Phenomenex is in no way affiliated with Waters Corporation or Agilent Technologies.

Find Ordering Information on Page 48-49!

Performance Gains with Ultra-High Efficiencies



Luna Omega columns build upon the Luna legacy to provide enhanced and incredible HPLC and UHPLC performance and selectivity. With the unique Luna Omega fully porous, thermally modified silica particles you gain outstanding performance and efficiencies with better peak shapes through an inert foundation.

Phases		
Ligand	Description	Selectivity Profile
<p>Luna Omega C18 Rugged and highly efficient C18 with strong focus on hydrophobic retention of non-polar and polar compounds</p>		
<p>Luna Omega Polar C18 100% aqueous stability and enhanced selectivity/retention for polar analytes without diminishing useful non-polar retention. The C18 ligand provides general hydrophobic interactions while a polar modified particle surface provides enhanced polar compound retention.</p>		
<p>Luna Omega PS C18 Unique, 100% aqueous stable mixed-mode phase that provides both polar and non-polar retention. The surface contains a positive charged ligand which aids in the retention of acidic compounds through ionic interactions, while the C18 ligand promotes general reversed phase hydrophobic retention. The positively charged surface also improves basic compound peaks shape through ionic repulsion.</p>		

Important! Measurements illustrated here are not absolute, but a relative measurement to other Phenomenex columns. In this display, the individual measurements cannot be compared to each other.

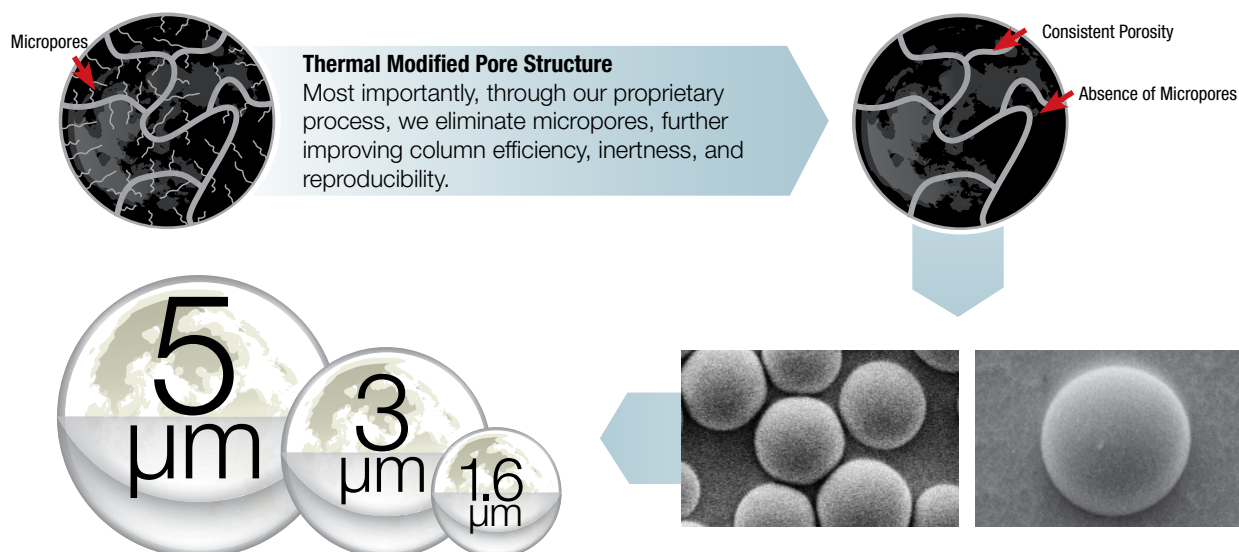
Material Characteristics

Luna® Omega Phases	Particle Sizes (µm)	Pore Size (Å)	Surface Area (m²/g)	Carbon Load (%)	pH Stability
C18	1.6	100	260	11	1.5 - 8.5*
Polar C18	1.6, 3, 5	100	260	9	1.5 - 8.5*
PS C18	1.6, 3, 5	100	260	9	1.5 - 8.5*

* pH stability under gradient conditions. pH stability is 1.5 - 10.0 under isocratic conditions.

Novel Design and Manufacturing Process

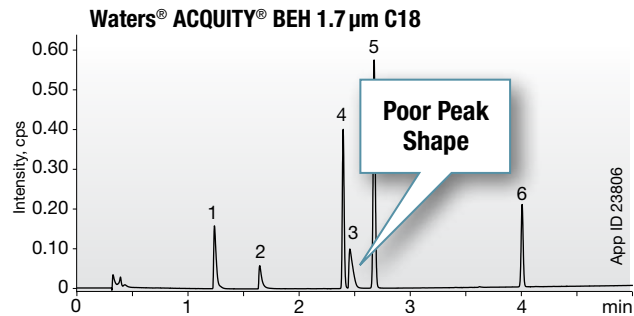
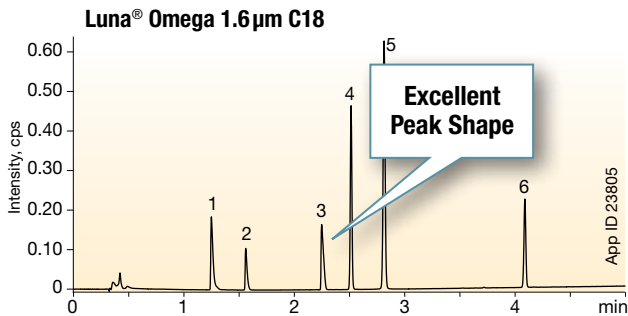
Within the novel manufacturing process of Luna Omega silica, we implement a proprietary processing technique to gain greater particle inertness, a stronger particle morphology, and more consistent porosity.



Performance Gains with Ultra-High Efficiencies

Luna Omega 1.6 μm , 3 μm , and 5 μm particle columns provide higher efficiencies compared to other silica C18 columns with fully porous particles of the same size due to the absence of micropores within the particles.

Higher Efficiency Compared to Other Silica C18 Columns with Fully Porous Particles!



Conditions for all columns:

Columns: Luna Omega 1.6 μm C18

ACQUITY BEH 1.7 μm C18

Dimension: 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

5 95

6 95

6.1 5

8 5

Flow Rate: 0.4 mL/min

Temperature: Ambient

Detection: UV @ 254 nm

Sample: 1. Pindolol

2. Chlorpheniramine

3. Nortriptyline

4. 3-Methyl-4-nitrobenzoic acid

5. 5-Methyl salicylaldehyde

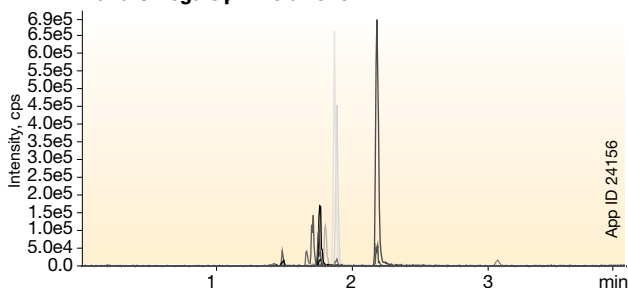
6. Hexanophenone

Gain Retention and Resolution with Enhanced Polar Phases

The polar modified functionalities of the Luna Omega Polar C18 and PS C18 stationary phases provide greater retention for polar compounds, resulting in higher resolution values. Additionally, the advanced proprietary bonding technology used for both Polar C18 and PS C18 ensures 100% aqueous stability as well as balanced retention for non-polar compounds.

Workplace Drug Screen

Luna Omega 5 μm Polar C18



Columns: Luna Omega 5 μm Polar C18

Dimension: 50 x 2.1 mm

Part No.: 00B-4754-AN

Mobile Phase: A: 0.1% Formic Acid in Water

B: 0.1% Formic Acid in Acetonitrile

Gradient: Time (min) % B

0 0

4 100

Flow Rate: 0.5 mL/min

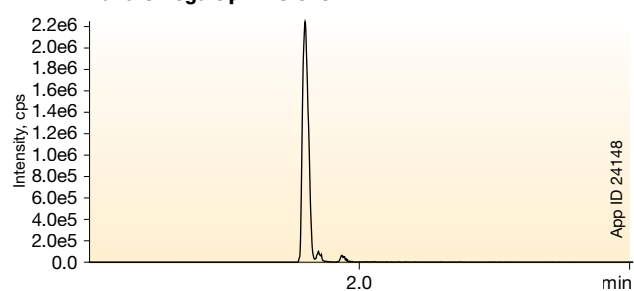
Temperature: Ambient

Detection: MS/MS (SCIEX API 4000™)

Sample: 1. Morphine 7. MDMA
2. Amphetamine 8. MDEA
3. Codeine 9. BZE
4. MDA 10. PCP
5. Methamphetamine 11. THC-OH
6. 6-MAM

Angiotensin II with Isobaric Interferences

Luna Omega 3 μm PS C18



Columns: Luna Omega 3 μm PS C18

Dimension: 50 x 2.1 mm

Part No.: 00B-4758-AN

Mobile Phase: A: 0.1% Formic Acid in Water

B: 0.1% Formic Acid in Acetonitrile

Gradient: Time (min) % B

0 0

4 100

Flow Rate: 0.5 mL/min

Temperature: Ambient

Detection: MS/MS (SCIEX API 4000™)

Sample: 1. Angiotensin
2. Isobaric Interference 1
3. Isobaric Interference 2

Comparative applications may not be representative of all applications. Phenomenex is not affiliated with Waters Corp.

Find Ordering Information on Page 50!

Column Protection

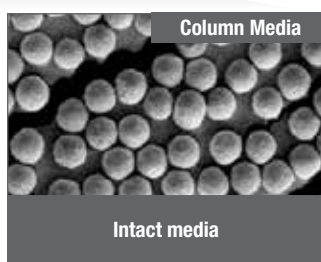
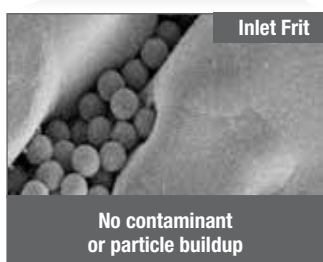
Save Time and Money

It's a fact! Chemical contaminants and particulates are a natural part of any chromatographic analysis. The easiest way to extend column performance is to remove these contaminants and particulates with the SecurityGuard™ Cartridge System before they reach your column and degrade your chromatography.

With SecurityGuard, you will experience:

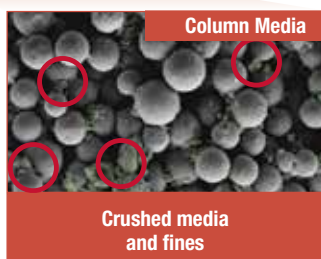
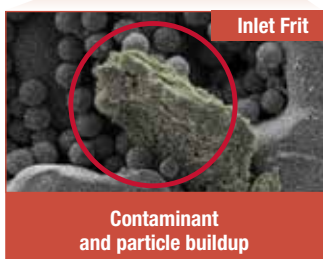
- Increased column lifetime
- Higher column performance
- More reproducible chromatography
- Fewer wasted columns

With SecurityGuard ULTRA



(24000 times magnification)

Without SecurityGuard ULTRA



(24000 times magnification)



UHPLC
Ultra-High Performance
Liquid Chromatography

**SecurityGuard
ULTRA**

All core-shell and/or
< 3 µm particle columns
(< 20,000 psi / 1,378 bar)



HPLC
High Performance Liquid
Chromatography

**SecurityGuard
Standard**

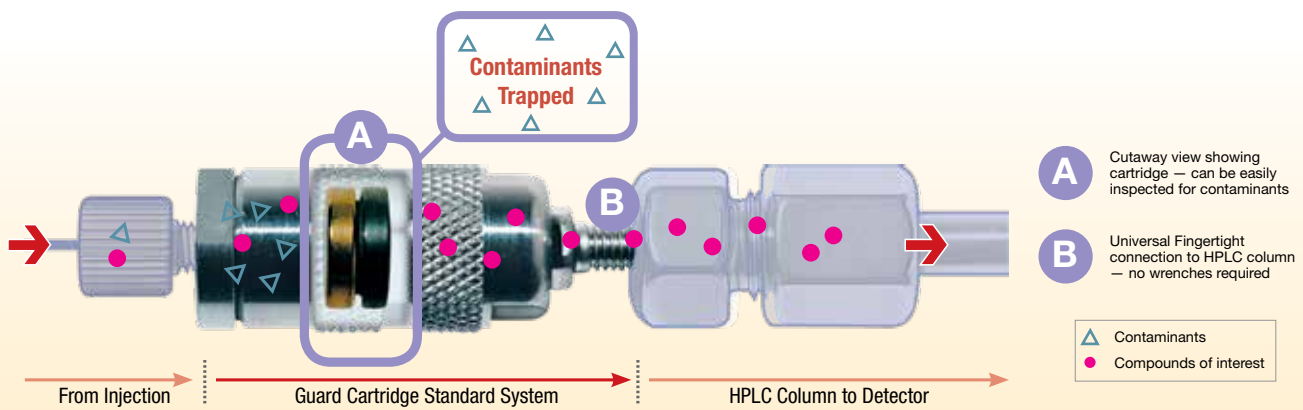
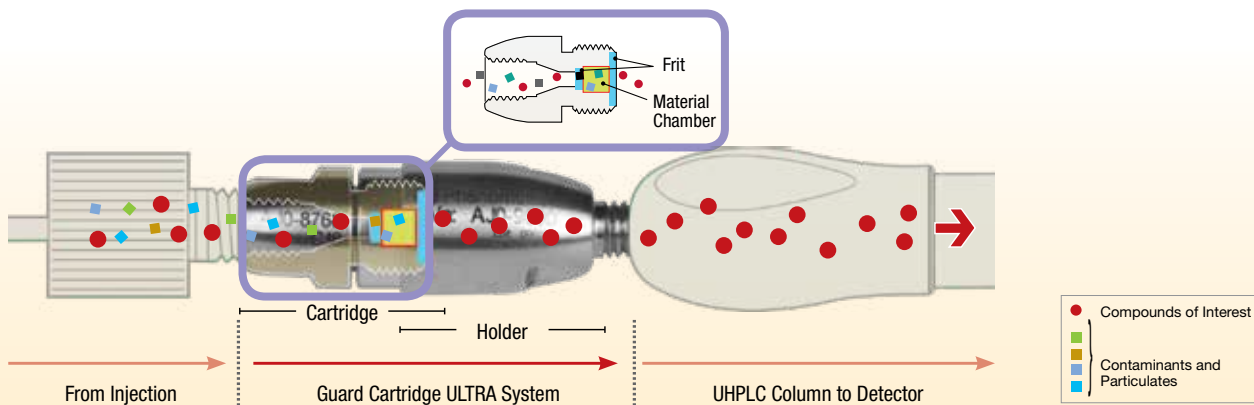
All non core-shell and
≥ 3 µm particle columns
(< 3,500 psi / 241 bar)



“We used to have to change out our columns every 2 to 3 months and ever since we started using the SecurityGuard cartridges we can do at least 6 months before changing a column out.”

T. Serviss

Total Column Protection

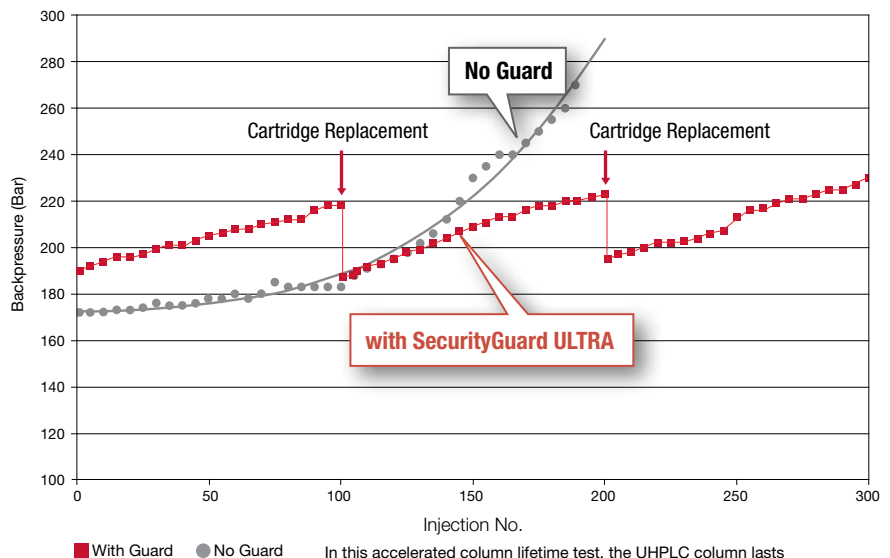


SecurityGuard Keeps Columns Performing at Their Best

When contaminants and particulates build up at the head of the column or on the guard cartridges, system pressures dramatically increase.

By simply replacing the SecurityGuard ULTRA cartridge instead of your < 3 μm and/or core-shell UHPLC column, you are able to regain normal operating conditions and reclaim original column performance.

SecurityGuard ULTRA Performance
 Accelerated lifetime test using endogenous biological matrix on Kinetex® 2.6 μm C18 50 x 4.6 mm ID

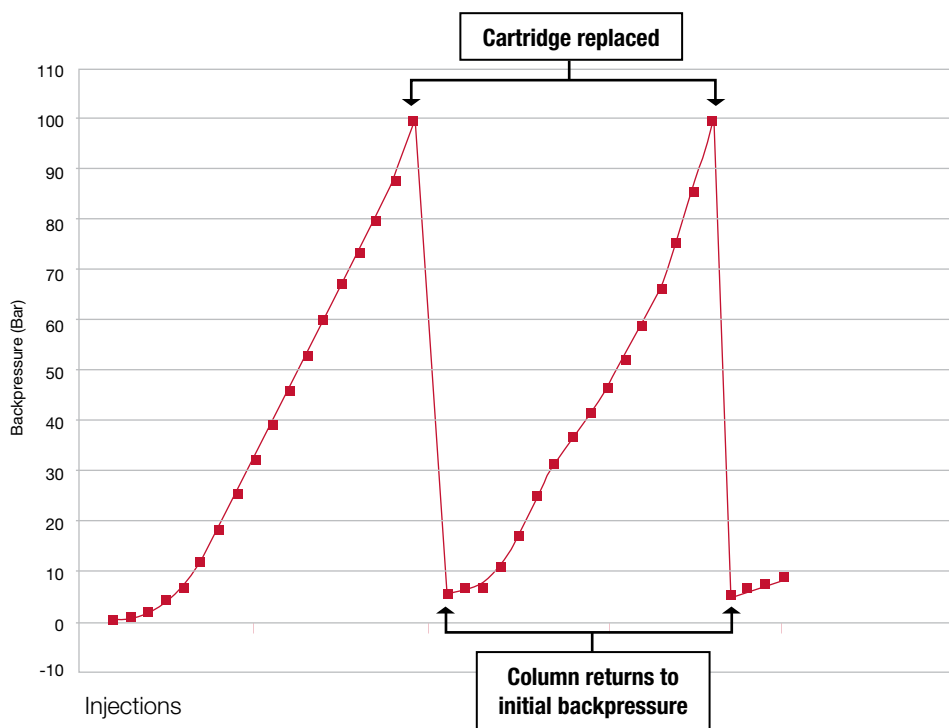


In this accelerated column lifetime test, the UHPLC column lasts substantially longer with SecurityGuard ULTRA guard cartridge system.

Don't Forget Column Protection UHPLC, HPLC, and Prep

Increases HPLC Column Lifetime, Guaranteed!

Simply replace SecurityGuard Standard cartridges instead of your expensive HPLC columns. In this graph, once the expired SecurityGuard Standard cartridge was replaced, the pressure immediately dropped and the column performance was restored allowing for extended column use.



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



Ordering is easy.

Once you find the column part number, select the appropriate SecurityGuard cartridges found to the right of the column part number.

5 µm MidBore™ Columns (mm)				SecurityGuard ULTRA Cartridges ²
Phases	50 x 3.0	100 x 3.0	150 x 3.0	3/pk
EVO C18	00B-4633-Y0	00D-4633-Y0	00F-4633-Y0	AJ0-9297
F5	00B-4724-Y0	00D-4724-Y0	00F-4724-Y0	AJ0-9321
Biphenyl	00B-4627-Y0	00D-4627-Y0	00F-4627-Y0	AJ0-9208
XB-C18	00B-4605-Y0	00D-4605-Y0	00F-4605-Y0	AJ0-8775
C18	00B-4601-Y0	00D-4601-Y0	00F-4601-Y0	AJ0-8775
C8	00B-4608-Y0	00D-4608-Y0	—	AJ0-8777
Phenyl-Hexyl	00B-4603-Y0	00D-4603-Y0	—	AJ0-8781

for 3.0 mm ID



Kinetex UHPLC Columns

1.7 µm Minibore Columns (mm)					SecurityGuard™ ULTRA Cartridges [†]
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	—	00B-4726-AN	00D-4726-AN	00F-4726-AN	AJO-9298
F5	—	00B-4722-AN	00D-4722-AN	00F-4722-AN	AJO-9322
Biphenyl	—	00B-4628-AN	00D-4628-AN	00F-4628-AN	AJO-9209
XB-C18	00A-4498-AN	00B-4498-AN	00D-4498-AN	00F-4498-AN	AJO-8782
C18	00A-4475-AN	00B-4475-AN	00D-4475-AN	00F-4475-AN	AJO-8782
C8	00A-4499-AN	00B-4499-AN	00D-4499-AN	00F-4499-AN	AJO-8784
HILIC	00A-4474-AN	00B-4474-AN	00D-4474-AN	—	AJO-8786
Phenyl-Hexyl	—	00B-4500-AN	00D-4500-AN	00F-4500-AN	AJO-8788

for 2.1 mm ID

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

for 3.0 mm ID

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

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

Kinetex Analytical Columns

2.6 µm Minibore Columns (mm)						SecurityGuard™ ULTRA Cartridges [†]
Phases	30 x 2.1	50 x 2.1	75 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	00A-4725-AN	00B-4725-AN	—	00D-4725-AN	00F-4725-AN	AJO-9298
Polar C18	00A-4759-AN	00B-4759-AN	—	00D-4759-AN	00F-4759-AN	AJO-9532
F5	00A-4723-AN	00B-4723-AN	—	00D-4723-AN	00F-4723-AN	AJO-9322
Biphenyl	00A-4622-AN	00B-4622-AN	—	00D-4622-AN	00F-4622-AN	AJO-9209
XB-C18	00A-4496-AN	00B-4496-AN	00C-4496-AN	00D-4496-AN	00F-4496-AN	AJO-8782
C18	00A-4462-AN	00B-4462-AN	00C-4462-AN	00D-4462-AN	00F-4462-AN	AJO-8782
C8	00A-4497-AN	00B-4497-AN	00C-4497-AN	00D-4497-AN	00F-4497-AN	AJO-8784
HILIC	00A-4461-AN	00B-4461-AN	00C-4461-AN	00D-4461-AN	00F-4461-AN	AJO-8786
Phenyl-Hexyl	00A-4495-AN	00B-4495-AN	00C-4495-AN	00D-4495-AN	00F-4495-AN	AJO-8788

for 2.1 mm ID

2.6 µm MidBore™ Columns (mm)						SecurityGuard™ ULTRA Cartridges [†]
Phases	30 x 3.0	50 x 3.0	75 x 3.0	100 x 3.0	150 x 3.0	3/pk
EVO C18	—	00B-4725-YO	—	00D-4725-YO	00F-4725-YO	AJO-9297
Polar C18	—	00B-4759-YO	—	00D-4759-YO	00F-4759-YO	AJO-9531
F5	—	00B-4723-YO	—	00D-4723-YO	00F-4723-YO	AJO-9321
Biphenyl	—	00B-4622-YO	—	00D-4622-YO	00F-4622-YO	AJO-9208
XB-C18	00A-4496-YO	00B-4496-YO	00C-4496-YO	00D-4496-YO	00F-4496-YO	AJO-8775
C18	00A-4462-YO	00B-4462-YO	00C-4462-YO	00D-4462-YO	00F-4462-YO	AJO-8775
C8	00A-4497-YO	00B-4497-YO	00C-4497-YO	00D-4497-YO	00F-4497-YO	AJO-8777
HILIC	00A-4461-YO	—	—	—	00F-4461-YO	AJO-8779
Phenyl-Hexyl	—	00B-4495-YO	—	00D-4495-YO	00F-4495-YO	AJO-8781

for 3.0 mm ID

[†] SecurityGuard ULTRA Cartridges require holder, Part No.: AJO-9000

Kinetex Analytical Columns (cont'd)

2.6µm Analytical Columns (mm)						SecurityGuard™ ULTRA Cartridges [‡]
Phases	30 x 4.6	50 x 4.6	75 x 4.6	100 x 4.6	150 x 4.6	3/pk
EVO C18	—	00B-4725-E0	—	00D-4725-E0	00F-4725-E0	AJO-9296
Polar C18	—	00B-4759-E0	—	00D-4759-E0	00F-4759-E0	AJO-9530
F5	—	00B-4723-E0	—	00D-4723-E0	00F-4723-E0	AJO-9320
Biphenyl	—	00B-4622-E0	—	00D-4622-E0	00F-4622-E0	AJO-9207
XB-C18	—	00B-4496-E0	00C-4496-E0	00D-4496-E0	00F-4496-E0	AJO-8768
C18	00A-4462-E0	00B-4462-E0	00C-4462-E0	00D-4462-E0	00F-4462-E0	AJO-8768
C8	—	00B-4497-E0	00C-4497-E0	00D-4497-E0	00F-4497-E0	AJO-8770
HILIC	—	00B-4461-E0	00C-4461-E0	00D-4461-E0	00F-4461-E0	AJO-8772
Phenyl-Hexyl	—	00B-4495-E0	00C-4495-E0	00D-4495-E0	00F-4495-E0	AJO-8774

for 4.6 mm ID

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

3.5µm Analytical Columns (mm)			SecurityGuard™ ULTRA Cartridges [‡]
Phases	100 x 4.6	150 x 4.6	3/pk
XB-C18	00D-4744-E0	00F-4744-E0	AJO-8768

for 4.6 mm ID

5µm Minibore Columns (mm)					SecurityGuard™ ULTRA Cartridges [‡]
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
EVO C18	00A-4633-AN	00B-4633-AN	00D-4633-AN	00F-4633-AN	AJO-9298
F5	00A-4724-AN	00B-4724-AN	00D-4724-AN	00F-4724-AN	AJO-9322
Biphenyl	00A-4627-AN	00B-4627-AN	00D-4627-AN	—	AJO-9209
XB-C18	00A-4605-AN	00B-4605-AN	00D-4605-AN	—	AJO-8782
C18	00A-4601-AN	00B-4601-AN	00D-4601-AN	00F-4601-AN	AJO-8782
C8	—	00B-4608-AN	00D-4608-AN	—	AJO-8784
Phenyl-Hexyl	—	00B-4603-AN	—	—	AJO-8788

for 2.1 mm ID

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

for 3.0 mm ID

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

for 4.6 mm ID

[‡] SecurityGuard ULTRA Cartridges require holder, Part No.: AJO-9000

Kinetex Semi-Preparative and Preparative Columns



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

for 10 mm ID

5 µm Axia™ Packed Preparative Columns (mm)					SecurityGuard™ PREP Cartridges*
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	15 x 21.2
					/ea
EVO C18	00B-4633-P0-AX	00D-4633-P0-AX	00F-4633-P0-AX	00G-4633-P0-AX	AJO-9304
					/ea
F5	—	—	00F-4724-P0-AX	00G-4724-P0-AX	AJO-9324
Biphenyl	00B-4627-P0-AX	00D-4627-P0-AX	00F-4627-P0-AX	00G-4627-P0-AX	AJO-9272
XB-C18	00B-4605-P0-AX	00D-4605-P0-AX	00F-4605-P0-AX	00G-4605-P0-AX	AJO-9145
C18	00B-4601-P0-AX	00D-4601-P0-AX	00F-4601-P0-AX	00G-4601-P0-AX	AJO-9145
C8	00B-4608-P0-AX	00D-4608-P0-AX	00F-4608-P0-AX	00G-4608-P0-AX	AJO-9205
Phenyl-Hexyl	00B-4603-P0-AX	00D-4603-P0-AX	00F-4603-P0-AX	00G-4603-P0-AX	AJO-9147
HILIC	—	00D-4606-P0-AX	00F-4606-P0-AX	00G-4606-P0-AX	AJO-9277

for 21.2 mm ID

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

for 30 mm ID

* PREP SecurityGuard Cartridges require holder, Part No.: AJO-8223
 ** PREP SecurityGuard Cartridges require holder, Part No.: AJO-8277
 *** SemiPrep SecurityGuard Cartridges require holder, Part No.: AJO-9281

Synergi Capillary Columns

4 µm Synergi Capillary Columns (mm)					Guard Columns (mm)
Phases	50 x 0.30	150 x 0.30	150 x 0.50	250 x 0.50	20 x 0.30
Max-RP	00B-4337-AC	—	—	—	03M-4337-AC
Hydro-RP	00B-4375-AC	00F-4375-AC	—	00G-4375-AF	03M-4375-AC
Fusion-RP	00B-4424-AC	00F-4424-AC	00F-4424-AF	—	03M-4424-AC

Synergi Analytical Columns

2.5 µm High Speed Technology (HST) Columns (mm)						
Phases	30 x 2.0	50 x 2.0	100 x 2.0	50 x 3.0	100 x 3.0	50 x 4.6
Max-RP	00A-4372-B0	00B-4372-B0	00D-4372-B0	—	00D-4372-Y0	00B-4372-E0
Hydro-RP	00A-4387-B0	00B-4387-B0	00D-4387-B0	00B-4387-Y0	00D-4387-Y0	00B-4387-E0
Polar-RP	00A-4371-B0	00B-4371-B0	00D-4371-B0	00B-4371-Y0	00D-4371-Y0	00B-4371-E0
Fusion-RP	00A-4423-B0	00B-4423-B0	00D-4423-B0	00B-4423-Y0	00D-4423-Y0	00B-4423-E0

2.5 µm MercuryMS LC-MS Cartridges (mm)					Columns (mm)	
Phases	10 x 2.0	10 x 4.0	20 x 2.0	20 x 4.0	20 x 2.0	20 x 4.0
Max-RP	00N-4372-B0-CE	—	00M-4372-B0-CE	00M-4372-D0-CE	—	—
Hydro-RP	00N-4387-B0-CE	00N-4387-D0-CE	00M-4387-B0-CE	—	—	—
Polar-RP	00N-4371-B0-CE	—	00M-4371-B0-CE	—	—	—
Fusion-RP	—	—	00M-4423-B0-CE	00M-4423-D0-CE	00M-4423-B0	00M-4423-D0

MercuryMS™ Cartridge Holders

Direct-Connect Cartridge Holders

Part No.	Description
CHO-7187	10 mm direct-connect holder
CHO-7188	20 mm direct-connect holder



Direct-Connect Holder

Standard Cartridge Holders

CHO-5846	10 mm standard holder
CHO-5845	20 mm standard holder



Standard Holder

4 µm Microbore and Minibore Columns (mm)								SecurityGuard™ Cartridges (mm)
Phases	50 x 1.0	150 x 1.0	30 x 2.0	50 x 2.0	75 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0'
Max-RP	00B-4337-A0	00F-4337-A0	00A-4337-B0	00B-4337-B0	00C-4337-B0	00F-4337-B0	00G-4337-B0	AJO-6073
Hydro-RP	00B-4375-A0	00F-4375-A0	00A-4375-B0	00B-4375-B0	00C-4375-B0	00F-4375-B0	00G-4375-B0	AJO-7510
Polar-RP	00B-4336-A0	00F-4336-A0	00A-4336-B0	00B-4336-B0	00C-4336-B0	00F-4336-B0	00G-4336-B0	AJO-6075
Fusion-RP	00B-4424-A0	00F-4424-A0	00A-4424-B0	00B-4424-B0	00C-4424-B0	00F-4424-B0	00G-4424-B0	AJO-7556

for ID: 2.0-3.0 mm

4 µm MidBore™ Columns (mm)					SecurityGuard Cartridges (mm)
Phases	30 x 3.0	50 x 3.0	150 x 3.0	250 x 3.0	4 x 2.0'
Max-RP	—	00B-4337-Y0	00F-4337-Y0	00G-4337-Y0	/10pk AJO-6073
Hydro-RP	—	00B-4375-Y0	00F-4375-Y0	00G-4375-Y0	AJO-7510
Polar-RP	00A-4336-Y0	00B-4336-Y0	00F-4336-Y0	00G-4336-Y0	AJO-6075
Fusion-RP	—	00B-4424-Y0	00F-4424-Y0	00G-4424-Y0	AJO-7556

for ID: 2.0-3.0 mm

4 µm Analytical Columns (mm)						SecurityGuard Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	75 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0'
Max-RP	00A-4337-E0	00B-4337-E0	00C-4337-E0	00F-4337-E0	00G-4337-E0	AJO-6074
Hydro-RP	00A-4375-E0	00B-4375-E0	00C-4375-E0	00F-4375-E0	00G-4375-E0	AJO-7511
Polar-RP	00A-4336-E0	00B-4336-E0	00C-4336-E0	00F-4336-E0	00G-4336-E0	AJO-6076
Fusion-RP	—	00B-4424-E0	00C-4424-E0	00F-4424-E0	00G-4424-E0	AJO-7557

for ID: 3.2-8.0 mm

Synergi Preparative Columns

4 µm Semi-Prep Columns (mm)		SecurityGuard™ Cartridges (mm)
Phases	250 x 10	10 x 10 [†]
		/3pk
Max-RP	00G-4337-NO	AJO-7275
Hydro-RP	00G-4375-NO	AJO-7512
Polar-RP	00G-4336-NO	AJO-7276
Fusion-RP	00G-4424-NO	AJO-7558

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	15 x 21.2 ^{**}
4 µm					/ea
Max-RP	—	—	00F-4337-P0-AX	00G-4337-P0-AX	AJO-7842
Hydro-RP	00B-4375-P0-AX	—	00F-4375-P0-AX	00G-4375-P0-AX	AJO-7843
Polar-RP	00B-4336-P0-AX	00D-4336-P0-AX	00F-4336-P0-AX	00G-4336-P0-AX	AJO-7845
Fusion-RP	—	00D-4424-P0-AX	00F-4424-P0-AX	00G-4424-P0-AX	AJO-7844
10 µm					/ea
Hydro-RP	—	—	—	00G-4376-P0-AX	AJO-7843
Polar-RP	—	—	—	00G-4351-P0-AX	AJO-7845
Fusion-RP	—	—	—	00G-4425-P0-AX	AJO-7844

for ID: 18-29 mm

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

for ID: 30-49 mm

Pilot Scale Columns and Bulk Material

10 µm Analytical and Semi-Prep Columns (mm)			SecurityGuard Cartridges (mm)	
Phases	250 x 4.6	250 x 10	4 x 3.0 [*]	10 x 10 [†]
			/10pk	/3pk
Hydro-RP	00G-4376-E0	00G-4376-NO	AJO-7511	AJO-7512
Polar-RP	00G-4351-E0	00G-4351-NO	AJO-6076	AJO-7276
Fusion-RP	00G-4425-E0	00G-4425-NO	AJO-7557	AJO-7558

for ID: 3.2-8.0 mm 9-16 mm

10 µm Bulk Packings		
Phases	100 g	1 kg
Max-RP	04G-4350	04K-4350
Hydro-RP	04G-4376	04K-4376
Polar-RP	04G-4351	04K-4351
Fusion-RP	04G-4425	04K-4425

Synergi Bulk Media

Beyond our largest preparative column dimensions, Synergi phases are available in bulk quantities for HPLC purification at the process, pilot, and commercial scale. These medias offer a complementary selectivity to the standard C18, C8, or Silica phases traditionally employed in larger scale HPLC. Additionally, due to the diverse chemical properties of each of the Synergi phases, dramatic differences in chromatographic parameters such as retention time, selectivity, and resolution are often observed. For those challenging purifications where chromatography still makes the most sense, the Synergi family offers an excellent alternative to evaluate! Get your Synergi preparative scout column(s) and evaluate these phases today!



* 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

Luna Capillary Columns

3 µm and 5 µm Capillary Columns (mm)						Guard Columns (mm)	
Phases	50 x 0.30	150 x 0.30	50 x 0.50	150 x 0.50	250 x 0.50	20 x 0.30	20 x 0.50
3 µm C8(2)	—	—	00B-4248-AF	00F-4248-AF	—	—	—
3 µm C18(2)	00B-4251-AC	00F-4251-AC	00B-4251-AF	00F-4251-AF	—	03M-4251-AC	03M-4251-AF
5 µm C8(2)	—	00F-4249-AC	—	—	—	—	—
5 µm C18(2)	00B-4252-AC	00F-4252-AC	—	00F-4252-AF	00G-4252-AF	—	—
5 µm Phenyl-Hexyl	00B-4257-AC	—	00B-4257-AF	00F-4257-AF	—	—	—

Luna Analytical Columns

2.5 µm High Speed Technology (HST) Columns (mm)					
Phase	30 x 2.0	50 x 2.0	100 x 2.0	50 x 3.0	100 x 3.0
Luna 2.5 µm C18(2)-HST	00A-4446-B0	00B-4446-B0	00D-4446-B0	00B-4446-Y0	00D-4446-Y0

MercuryMS™ LC-MS Cartridges (mm)						Columns (mm)	
3 µm	Phase	10 x 2.0	10 x 4.0	20 x 2.0	20 x 4.0	20 x 2.0	20 x 4.0
Luna	C18(2)	00N-4251-B0-CE	00N-4251-D0-CE	00M-4251-B0-CE	00M-4251-D0-CE	00M-4251-B0	00M-4251-D0
Luna	C8(2)	00N-4248-B0-CE	—	00M-4248-B0-CE	00M-4248-D0-CE	00M-4248-B0	—
5 µm	Phase	10 x 2.0	10 x 4.0	20 x 2.0	20 x 4.0		
Luna	C18(2)	00N-4252-B0-CE	00N-4252-D0-CE	00M-4252-B0-CE	00M-4252-D0-CE	—	—
Luna	C8(2)	00N-4249-B0-CE	—	00M-4249-B0-CE	—	—	—

MercuryMS™ Cartridge Holders

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

Standard Holders	
Part No.	Description
CHO-7187	10 mm direct-connect holder
CHO-7188	20 mm direct-connect holder



Direct-Connect Holder



Standard Holder

3 µm Microbore and Minibore Columns (mm)							SecurityGuard™ Cartridges (mm)
Phases	50 x 1.0	150 x 1.0	30 x 2.0	50 x 2.0	100 x 2.0	150 x 2.0	4 x 2.0 [*]
Silica(2)	—	00F-4162-A0	00A-4162-B0	00B-4162-B0	00D-4162-B0	00F-4162-B0	/10pk
C8(2)	00B-4248-A0	00F-4248-A0	00A-4248-B0	00B-4248-B0	00D-4248-B0	00F-4248-B0	AJO-4347
C18(2)	00B-4251-A0	00F-4251-A0	00A-4251-B0	00B-4251-B0	00D-4251-B0	00F-4251-B0	AJO-4289
CN	—	—	00A-4254-B0	00B-4254-B0	00D-4254-B0	00F-4254-B0	AJO-4286
Phenyl-Hexyl	00B-4256-A0	—	00A-4256-B0	00B-4256-B0	00D-4256-B0	00F-4256-B0	AJO-4304
NH2	—	00F-4377-A0	00A-4377-B0	00B-4377-B0	00D-4377-B0	00F-4377-B0	AJO-4350
HILIC	—	—	00A-4449-B0	00B-4449-B0	00D-4449-B0	00F-4449-B0	AJO-4301
PPFP(2)	—	00F-4447-A0	00A-4447-B0	00B-4447-B0	00D-4447-B0	00F-4447-B0	AJO-8328
							AJO-8326

for ID: 2.0-3.0 mm

3 µm MidBore™ and Analytical Columns (mm)									SecurityGuard™ Cartridges (mm)	
Phases	30 x 3.0	50 x 3.0	150 x 3.0	30 x 4.6	50 x 4.6	75 x 4.6	100 x 4.6	150 x 4.6	4 x 2.0 [*]	4 x 3.0 [*]
Silica(2)	—	00B-4162-Y0	00F-4162-Y0	00A-4162-E0	00B-4162-E0	00C-4162-E0	00D-4162-E0	00F-4162-E0	/10pk	/10pk
C8(2)	00A-4248-Y0	00B-4248-Y0	00F-4248-Y0	00A-4248-E0	00B-4248-E0	00C-4248-E0	00D-4248-E0	00F-4248-E0	AJO-4347	AJO-4348
C18(2)	00A-4251-Y0	00B-4251-Y0	00F-4251-Y0	00A-4251-E0	00B-4251-E0	00C-4251-E0	00D-4251-E0	00F-4251-E0	AJO-4289	AJO-4290
CN	—	00B-4254-Y0	00F-4254-Y0	00A-4254-E0	00B-4254-E0	00C-4254-E0	00D-4254-E0	00F-4254-E0	AJO-4286	AJO-4287
Phenyl-Hexyl	—	00B-4256-Y0	00F-4256-Y0	00A-4256-E0	00B-4256-E0	00C-4256-E0	00D-4256-E0	00F-4256-E0	AJO-4304	AJO-4305
NH2	—	00B-4377-Y0	00F-4377-Y0	—	00B-4377-E0	—	00D-4377-E0	00F-4377-E0	AJO-4350	AJO-4351
HILIC	—	00B-4449-Y0	00F-4449-Y0	—	—	—	00D-4449-E0	00F-4449-E0	AJO-4301	AJO-4302
PPFP(2)	—	00B-4447-Y0	00F-4447-Y0	—	00B-4447-E0	—	00D-4447-E0	00F-4447-E0	AJO-8328	AJO-8329
									AJO-8326	AJO-8327

for ID: 2.0-3.0 mm 3.2-8.0 mm

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

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LUNA®

Luna Analytical Columns (cont'd)

5 µm Microbore and Minibore Columns (mm)								SecurityGuard™ Cartridges (mm)
Phases	50 x 1.0	150 x 1.0	250 x 1.0	30 x 2.0	50 x 2.0	150 x 2.0	250 x 2.0	4 x 2.0 [*]
Silica(2)	—	—	—	00A-4274-B0	00B-4274-B0	00F-4274-B0	00G-4274-B0	AJO-4347
C5	—	—	—	00A-4043-B0	00B-4043-B0	00F-4043-B0	—	AJO-4292
C8(2)	—	00F-4249-A0	—	00A-4249-B0	00B-4249-B0	00F-4249-B0	00G-4249-B0	AJO-4289
C18(2)	00B-4252-A0	00F-4252-A0	00G-4252-A0	00A-4252-B0	00B-4252-B0	00F-4252-B0	00G-4252-B0	AJO-4286
CN	—	—	—	—	00B-4255-B0	00F-4255-B0	—	AJO-4304
Phenyl-Hexyl	00B-4257-A0	—	—	00A-4257-B0	00B-4257-B0	00F-4257-B0	00G-4257-B0	AJO-4350
NH ₂	00B-4378-A0	00F-4378-A0	—	00A-4378-B0	00B-4378-B0	00F-4378-B0	00G-4378-B0	AJO-4301
PFP(2)	—	—	—	00A-4448-B0	00B-4448-B0	00F-4448-B0	—	AJO-8326

for ID: 2.0-3.0 mm

5 µm MidBore™ and Analytical Columns (mm)								SecurityGuard Cartridges (mm)	
Phases	30 x 3.0	50 x 3.0	150 x 3.0	250 x 3.0	30 x 4.6	50 x 4.6	75 x 4.6	4 x 2.0 [*]	4 x 3.0 [*]
Silica(2)	—	00B-4274-Y0	00F-4274-Y0	—	—	00B-4274-E0	—	AJO-4347	AJO-4348
C5	—	—	00F-4043-Y0	—	—	00B-4043-E0	—	AJO-4292	AJO-4293
C8(2)	00A-4249-Y0	00B-4249-Y0	00F-4249-Y0	00G-4249-Y0	00A-4249-E0	00B-4249-E0	00C-4249-E0	AJO-4289	AJO-4290
C18(2)	00A-4252-Y0	00B-4252-Y0	00F-4252-Y0	00G-4252-Y0	00A-4252-E0	00B-4252-E0	00C-4252-E0	AJO-4286	AJO-4287
CN	—	00B-4255-Y0	00F-4255-Y0	00G-4255-Y0	00A-4255-E0	00B-4255-E0	00C-4255-E0	AJO-4304	AJO-4305
Phenyl-Hexyl	—	00B-4257-Y0	00F-4257-Y0	00G-4257-Y0	00A-4257-E0	00B-4257-E0	—	AJO-4350	AJO-4351
NH ₂	—	00B-4378-Y0	00F-4378-Y0	00G-4378-Y0	00A-4378-E0	00B-4378-E0	—	AJO-4301	AJO-4302
SCX	—	—	00F-4398-Y0	—	—	00B-4398-E0	—	AJO-4307	AJO-4308
HILIC	—	—	00F-4450-Y0	—	—	—	—	AJO-8328	AJO-8329
PFP(2)	—	00B-4448-Y0	00F-4448-Y0	—	—	00B-4448-E0	—	AJO-8326	AJO-8327

for ID: 2.0-3.0 mm 3.2-8.0 mm

5 µm Analytical and Semi-Prep Columns (mm)					SecurityGuard Cartridges (mm)	
Phases	100 x 4.6	150 x 4.6	250 x 4.6	250 x 10	4 x 3.0 [*]	10 x 10 ^{**}
Silica(2)	00D-4274-E0	00F-4274-E0	00G-4274-E0	00G-4274-N0	AJO-4348	AJO-7223
C5	00D-4043-E0	00F-4043-E0	00G-4043-E0	00G-4043-N0	AJO-4293	AJO-7372
C8(2)	00D-4249-E0	00F-4249-E0	00G-4249-E0	00G-4249-N0	AJO-4290	AJO-7222
C18(2)	00D-4252-E0	00F-4252-E0	00G-4252-E0	00G-4252-N0	AJO-4287	AJO-7221
CN	00D-4255-E0	00F-4255-E0	00G-4255-E0	00G-4255-N0	AJO-4305	AJO-7313
Phenyl-Hexyl	00D-4257-E0	00F-4257-E0	00G-4257-E0	00G-4257-N0	AJO-4351	AJO-7314
NH ₂	00D-4378-E0	00F-4378-E0	00G-4378-E0	00G-4378-N0	AJO-4302	AJO-7364
SCX	00D-4398-E0	00F-4398-E0	00G-4398-E0	00G-4398-N0	AJO-4308	AJO-7369
HILIC	00D-4450-E0	00F-4450-E0	00G-4450-E0	00G-4450-N0	AJO-8329	AJO-8902
PFP(2)	00D-4448-E0	00F-4448-E0	00G-4448-E0	00G-4448-N0	AJO-8327	AJO-8376

for ID: 3.2-8.0 mm 9-16 mm



Luna Preparative Columns

5 µm Axia™ Packed Preparative Columns (mm)								SecurityGuard PREP Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	50 x 30	100 x 30	250 x 30	15 x 21.2 ^{**}	15 x 30 [*]
Silica(2)	—	00D-4274-P0-AX	00F-4274-P0-AX	00G-4274-P0-AX	—	—	00G-4274-U0-AX	AJO-7229	AJO-8312
C5	—	—	—	00G-4043-P0-AX	—	—	—	—	—
C8(2)	—	—	00F-4249-P0-AX	00G-4249-P0-AX	—	00D-4249-U0-AX	—	AJO-7840	AJO-8302
C18(2)	00B-4252-P0-AX	00D-4252-P0-AX	00F-4252-P0-AX	00G-4252-P0-AX	00B-4252-U0-AX	00D-4252-U0-AX	00G-4252-U0-AX	AJO-7839	AJO-8301
CN	—	—	—	00G-4255-P0-AX	—	—	00G-4255-U0-AX	AJO-8220	AJO-8311
Phenyl-Hexyl	—	—	00F-4257-P0-AX	00G-4257-P0-AX	—	—	00G-4257-U0-AX	AJO-7841	AJO-8303
NH ₂	—	—	00F-4378-P0-AX	00G-4378-P0-AX	—	—	—	AJO-8162	AJO-8309
PFP(2)	—	00D-4448-P0-AX	00F-4448-P0-AX	00G-4448-P0-AX	—	00D-4448-U0-AX	—	AJO-8377	AJO-8378
HILIC	—	00D-4450-P0-AX	00F-4450-P0-AX	00G-4450-P0-AX	—	—	00G-4450-U0-AX	AJO-8829	AJO-8830

for ID: 18-29 mm 30-49 mm

10 µm Axia™ Packed Preparative Columns (mm)						SecurityGuard PREP Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	250 x 21.2	250 x 30	250 x 50	15 x 21.2 ^{**}	15 x 30 [*]
Silica(2)	—	—	00G-4091-P0-AX	00G-4091-U0-AX	00G-4091-V0-AX	AJO-7229	AJO-8312
C5	—	00D-4092-P0-AX	00G-4092-P0-AX	—	00G-4092-V0-AX	—	—
C8(2)	—	—	00G-4250-P0-AX	—	00G-4250-V0-AX	AJO-7840	AJO-8302
C18(2)	00B-4253-P0-AX	00D-4253-P0-AX	00G-4253-P0-AX	00G-4253-U0-AX	00G-4253-V0-AX	AJO-7839	AJO-8301
CN	—	—	00G-4300-P0-AX	—	—	AJO-8220	AJO-8311
Phenyl-Hexyl	—	—	00G-4285-P0-AX	00G-4285-U0-AX	—	AJO-7841	AJO-8303
NH ₂	—	—	00G-4379-P0-AX	—	—	AJO-8162	AJO-8309

for ID: 18-29 mm 30-49 mm

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

† SemiPrep SecurityGuard Cartridges require holder, Part No.: AJO-9281

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

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

Luna Omega UHPLC Columns

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

1.6µm Minibore Columns (mm)					SecurityGuard™ ULTRA Cartridges [‡]
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	3/pk
Polar C18	00A-4748-AN	00B-4748-AN	00D-4748-AN	00F-4748-AN	AJO-9505
PS C18	00A-4752-AN	00B-4752-AN	00D-4752-AN	00F-4752-AN	AJO-9508
C18	00A-4742-AN	00B-4742-AN	00D-4742-AN	00F-4742-AN	AJO-9502

for 2.1 mm ID

Luna Omega Analytical Columns

3µm Minibore Columns (mm)					SecurityGuard Cartridges (mm)
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	4 x 2.0 [*]
Polar C18	00A-4760-AN	00B-4760-AN	00D-4760-AN	00F-4760-AN	AJO-7600
PS C18	00A-4758-AN	00B-4758-AN	00D-4758-AN	00F-4758-AN	AJO-7605

for ID: 2.0 - 3.0 mm

3µm MidBore™ Columns (mm)				SecurityGuard Cartridges (mm)
Phases	50 x 3.0	100 x 3.0	150 x 3.0	4 x 2.0 [*]
Polar C18	00B-4760-Y0	00D-4760-Y0	00F-4760-Y0	AJO-7600
PS C18	00B-4758-Y0	00D-4758-Y0	00F-4758-Y0	AJO-7605

for ID: 2.0 - 3.0 mm

3µm Analytical Columns (mm)					SecurityGuard Cartridges (mm)
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0 [*]
Polar C18	00B-4760-E0	00D-4760-E0	00F-4760-E0	00G-4760-E0	AJO-7601
PS C18	00B-4758-E0	00D-4758-E0	00F-4758-E0	00G-4758-E0	AJO-7606

for ID: 3.2-8.0 mm

5µm Minibore Columns (mm)					SecurityGuard Cartridges (mm)
Phases	30 x 2.1	50 x 2.1	100 x 2.1	150 x 2.1	4 x 2.0 [*] /10pk
Polar C18	00A-4754-AN	00B-4754-AN	00D-4754-AN	00F-4754-AN	AJO-7600
PS C18	00A-4753-AN	00B-4753-AN	00D-4753-AN	00F-4753-AN	AJO-7605

for ID: 2.0 - 3.0 mm

5µm MidBore™ Columns (mm)				SecurityGuard Cartridges (mm)
Phases	50 x 3.0	100 x 3.0	150 x 3.0	4 x 2.0 [*] /10pk
Polar C18	00B-4754-Y0	00D-4754-Y0	00F-4754-Y0	AJO-7600
PS C18	00B-4753-Y0	00D-4753-Y0	00F-4753-Y0	AJO-7605

for ID: 2.0 - 3.0 mm

5µm Analytical Columns (mm)					SecurityGuard Cartridges (mm)
Phases	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 2.0 [*] /10pk
Polar C18	00B-4754-E0	00D-4754-E0	00F-4754-E0	00G-4754-E0	AJO-7601
PS C18	00B-4753-E0	00D-4753-E0	00F-4753-E0	00G-4753-E0	AJO-7606

for ID: 3.2-8.0 mm

Luna Omega Preparative Columns

5µm Axia™ Packed Preparative Columns (mm)						SecurityGuard PREP Cartridges (mm)	
Phases	150 x 21.2	250 x 21.2	150 x 30	250 x 30	250 x 50	15 x 21.2 ^{**}	15 x 30.0 [*]
						/ea	/ea
Polar C18	00F-4754-P0-AX	00G-4754-P0-AX	00F-4754-U0-AX	00G-4754-U0-AX	00G-4754-V0-AX	AJO-7603	AJO-7604
PS C18	00F-4753-P0-AX	00G-4753-P0-AX	00F-4753-U0-AX	00G-4753-U0-AX	00G-4753-V0-AX	AJO-7608	AJO-7609

for ID: 18-29 mm for ID: 30-49 mm

[‡] SecurityGuard ULTRA Cartridges require holder, Part No.: AJO-9000

^{*} SecurityGuard Analytical Cartridges require holder, Part No.: KJO-4282

^{**} PREP SecurityGuard Cartridges require holder, Part No.: AJO-8223

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



Gemini Analytical Columns

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*
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	/10pk AJ0-7596
C6-Phenyl	00B-4443-A0	—	00A-4443-B0	00B-4443-B0	00D-4443-B0	00F-4443-B0	00B-4443-Y0	00D-4443-Y0	00F-4443-Y0	AJ0-7914 /10pk
NX-C18	00B-4453-A0	00M-4453-B0	00A-4453-B0	00B-4453-B0	00D-4453-B0	00F-4453-B0	00B-4453-Y0	00D-4453-Y0	00F-4453-Y0	AJ0-8367 for ID: 2.0-3.0 mm

3 µm Analytical Columns (mm)						SecurityGuard Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
C18	00A-4439-E0	00B-4439-E0	00D-4439-E0	00F-4439-E0	00G-4439-E0	/10pk AJ0-7597
C6-Phenyl	00A-4443-E0	00B-4443-E0	00D-4443-E0	00F-4443-E0	00G-4443-E0	AJ0-7915 /10pk
NX-C18	—	00B-4453-E0	00D-4453-E0	00F-4453-E0	00G-4453-E0	AJ0-8368 for ID: 3.2-8.0 mm



5 µm Minibore and MidBore Columns (mm)									SecurityGuard Cartridges (mm)
Phases	30 x 2.0	50 x 2.0	150 x 2.0	250 x 2.0	50 x 3.0	100 x 3.0	150 x 3.0	250 x 3.0	4 x 2.0*
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	/10pk AJ0-7596
C6-Phenyl	—	00B-4444-B0	00F-4444-B0	—	00B-4444-Y0	—	00F-4444-Y0	00G-4444-Y0	AJ0-7914 /10pk
NX-C18	00A-4454-B0	00B-4454-B0	00F-4454-B0	—	00B-4454-Y0	00D-4454-Y0	00F-4454-Y0	00G-4454-Y0	AJ0-8367 for ID: 2.0-3.0 mm

5 µm Analytical Columns (mm)						SecurityGuard Cartridges (mm)
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0*
C18	00A-4435-E0	00B-4435-E0	00D-4435-E0	00F-4435-E0	00G-4435-E0	/10pk AJ0-7597
C6-Phenyl	—	00B-4444-E0	00D-4444-E0	00F-4444-E0	00G-4444-E0	AJ0-7915 /10pk
NX-C18	—	00B-4454-E0	00D-4454-E0	00F-4454-E0	00G-4454-E0	AJ0-8368 for ID: 3.2-8.0 mm



Gemini Semi-Prep and Preparative Columns

5 µm Semi-Prep Columns (mm)			SecurityGuard Cartridges (mm)
Phases	150 x 10	250 x 10	10 x 10*
C18	00F-4435-N0	00G-4435-N0	/3pk AJ0-7598
C6-Phenyl	—	00G-4444-N0	AJ0-9156 /3pk
NX-C18	00F-4454-N0	00G-4454-N0	AJ0-8369 for ID: 9-16 mm

Axia™ Packed Preparative Columns (mm)							SecurityGuard PREP Cartridges (mm)	
Phases	50 x 21.2	100 x 21.2	150 x 21.2	250 x 21.2	50 x 30	75 x 30	15 x 21.2*	15 x 30.0*
5 µm							/ea	/ea
C18	00B-4435-PO-AX	00D-4435-PO-AX	00F-4435-PO-AX	00G-4435-PO-AX	00B-4435-U0-AX	—	AJ0-7846	AJ0-8308
C6-Phenyl	—	00D-4444-PO-AX	00F-4444-PO-AX	00G-4444-PO-AX	—	—	AJ0-9157	AJ0-9158
5 µm							/ea	/ea
NX-C18	00B-4454-PO-AX	00D-4454-PO-AX	00F-4454-PO-AX	00G-4454-PO-AX	00B-4454-U0-AX	00C-4454-U0-AX	AJ0-8370	AJ0-8371
10 µm							/ea	/ea
C18	—	00D-4436-PO-AX	00F-4436-PO-AX	00G-4436-PO-AX	—	—	AJ0-7846	AJ0-8308
10 µm							/ea	/ea
NX-C18	00B-4455-PO-AX	00D-4455-PO-AX	00F-4455-PO-AX	00G-4455-PO-AX	—	—	AJ0-8370	AJ0-8371
							for ID: 18-29 mm	30-49 mm

Axia™ Packed Preparative Columns (mm) continued							SecurityGuard PREP Cartridges (mm)
Phases	100 x 30	150 x 30	250 x 30	100 x 50	150 x 50	250 x 50	15 x 30.0*
5 µm							/ea
C18	00D-4435-U0-AX	00F-4435-U0-AX	00G-4435-U0-AX	—	—	—	AJ0-8308 /ea
5 µm							/ea
NX-C18	00D-4454-U0-AX	00F-4454-U0-AX	00G-4454-U0-AX	—	—	—	AJ0-8371 /ea
10 µm							/ea
C18	00D-4436-U0-AX	00F-4436-U0-AX	00G-4436-U0-AX	—	00F-4436-V0-AX	00G-4436-V0-AX	AJ0-8308 /ea
10 µm							/ea
NX-C18	00D-4455-U0-AX	00F-4455-U0-AX	00G-4455-U0-AX	00D-4455-V0-AX	00F-4455-V0-AX	00G-4455-V0-AX	AJ0-8371 for ID: 30-49 mm

* SecurityGuard Analytical Cartridges require holder, Part No.: KJ0-4282
 † SemiPrep SecurityGuard Cartridges require holder, Part No.: AJ0-9281
 ** PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8223
 • PREP SecurityGuard Cartridges require holder, Part No.: AJ0-8277

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Australia

t: +61 (0)2-9428-6444
auinfo@phenomenex.com

Austria

t: +43 (0)1-319-1301
anfrage@phenomenex.com

Belgium

t: +32 (0)2 503 4015 (French)
t: +32 (0)2 511 8666 (Dutch)
beinfo@phenomenex.com

Canada

t: +1 (800) 543-3681
info@phenomenex.com

China

t: +86 400-606-8099
cninfo@phenomenex.com

Denmark

t: +45 4824 8048
nordicinfo@phenomenex.com

Finland

t: +358 (0)9 4789 0063
nordicinfo@phenomenex.com

France

t: +33 (0)1 30 09 21 10
franceinfo@phenomenex.com

Germany

t: +49 (0)6021-58830-0
anfrage@phenomenex.com

India

t: +91 (0)40-3012 2400
indiainfo@phenomenex.com

Ireland

t: +353 (0)1 247 5405
eireinfo@phenomenex.com

Italy

t: +39 051 6327511
italiainfo@phenomenex.com

Luxembourg

t: +31 (0)30-2418700
nlinfo@phenomenex.com

Mexico

t: 01-800-844-5226
tecnicomx@phenomenex.com

The Netherlands

t: +31 (0)30-2418700
nlinfo@phenomenex.com

New Zealand

t: +64 (0)9-4780951
nzinfo@phenomenex.com

Norway

t: +47 810 02 005
nordicinfo@phenomenex.com

Portugal

t: +351 221 450 488
ptinfo@phenomenex.com

Singapore

t: +65 800-852-3944
sginfo@phenomenex.com

Spain

t: +34 91-413-8613
espinfo@phenomenex.com

Sweden

t: +46 (0)8 611 6950
nordicinfo@phenomenex.com

Switzerland

t: +41 61 692 20 20
swissinfo@phenomenex.com

United Kingdom

t: +44 (0)1625-501367
ukinfo@phenomenex.com

USA

t: +1 (310) 212-0555
info@phenomenex.com

All other countries Corporate Office USA

t: +1 (310) 212-0555
info@phenomenex.com



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SecurityGuard is patented by Phenomenex. U.S. Patent No. 6,162,362 CAUTION: this patent only applies to the analytical-sized guard cartridge holder, and does not apply to SemiPrep, PREP or ULTRA holders, or to any cartridges

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