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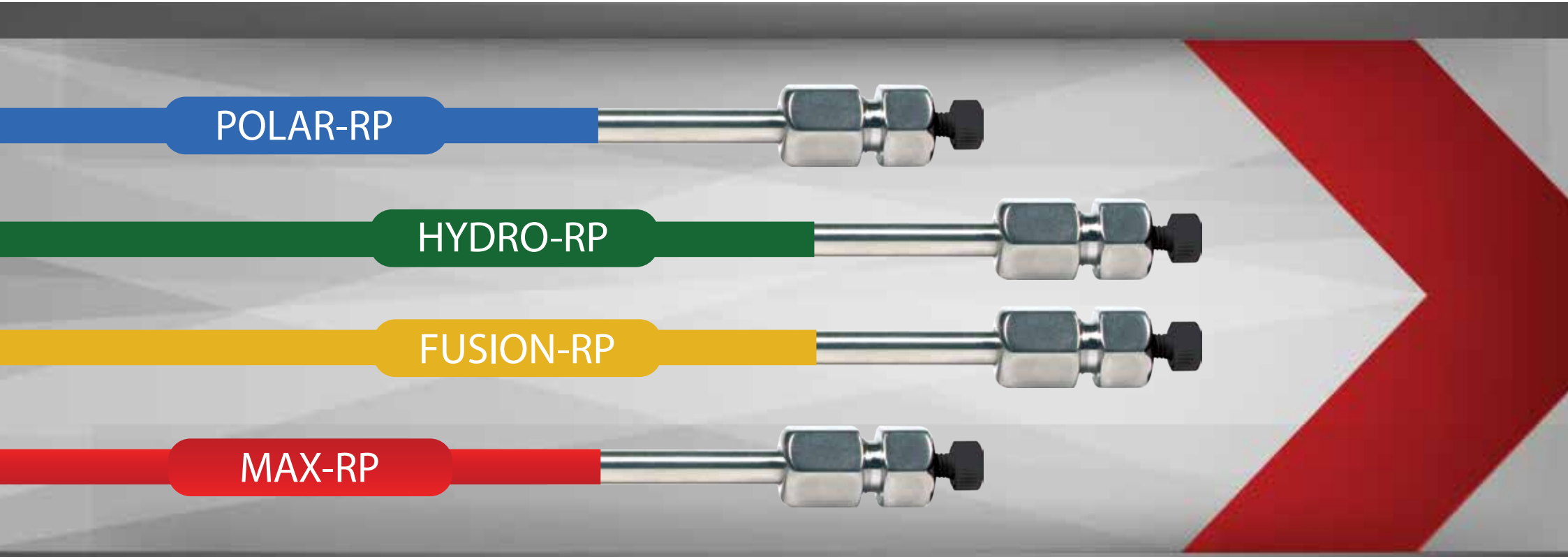
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# synergi™




**FULL RANGE SELECTIVITY FOR REVERSED PHASE SEPARATION**

phenomenex®
. . . breaking with tradition℠

www.phenomenex.com/Synergi

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## FULL RANGE SELECTIVITY FOR REVERSED PHASE SEPARATION

Many different mechanisms of retention are utilized within reserved phase chromatography in order to retain and separate target analytes. Whether your compounds are hydrophobic or polar, Synergi columns provide you with a full range of selectivity, ensuring separation of the most challenging and complex mixtures.



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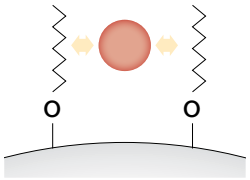

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## CHARACTERIZING SELECTIVITY

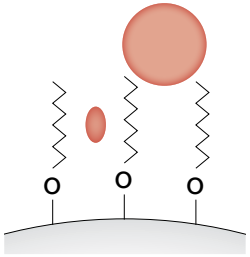
Phenomenex analyzes six different parameters to characterize the selectivity of our HPLC and UHPLC columns. Though hydrophobicity is a dominant retention mechanism in reversed phase chromatography, selectivity is strongly influenced by the other parameters described below.

### 6 Parameters Influencing Selectivity



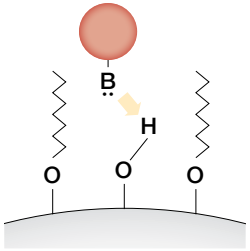

#### 1. Hydrophobicity

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



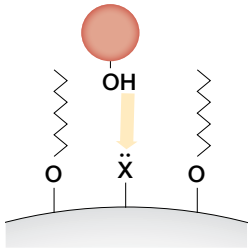

#### 2. Steric Influences

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.



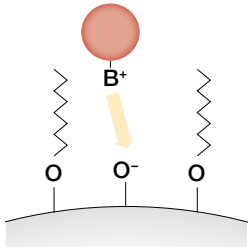

#### 3. Hydrogen Bond (H-bond) Donating Capacity

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).




#### 4. 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.




#### 5. Cation Selectivity at pH 2.8

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

#### 6. 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.



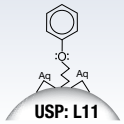
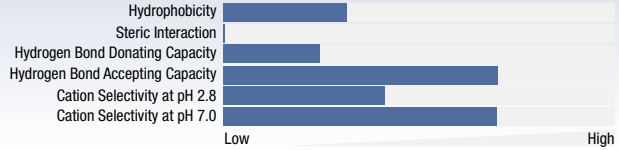
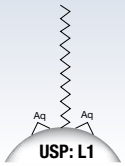
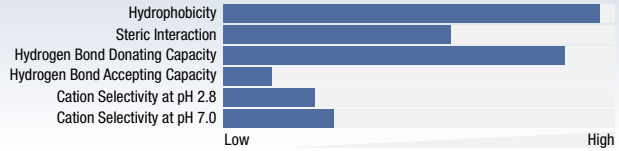
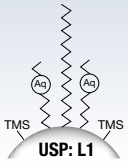
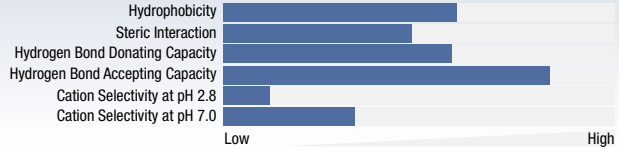
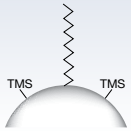
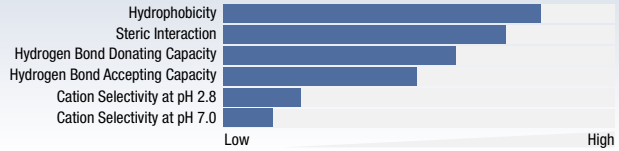
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## FULL RANGE SELECTIVITY

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

**Phases**

| Ligand | Description | Selectivity Profile |
|---|---|---|
|  | **Synergi Polar-RP**<br>(100 % Aqueous Stable)<br>This ether linked phenyl column is polar endcapped and offers high cation retention capabilities to improve retention for ionized bases. |  |
|  | **Synergi Hydro-RP**<br>(100 % Aqueous Stable)<br>Polar endcapped C18 column that provides very high hydrophobic interactions and hydrogen donating capabilities make this column ideal for retaining polar bases. |  |
|  | **Synergi Fusion-RP**<br>(100 % Aqueous Stable)<br>A low ligand density polar embedded C18, this unique phase contributes to hydrogen bonding and donating. It provides balanced selectivity for acids and bases. |  |
|  | **Synergi Max-RP**<br>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. |  |

**Material Characteristics**

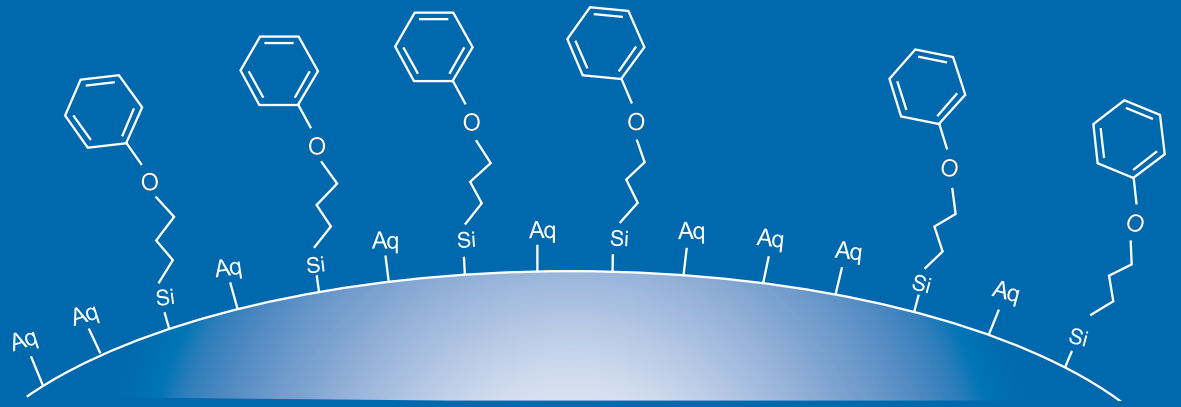
| Packing Material | Particle Shape/ Size (µm) | Pore Size (Å) | Surface Area ($m^2/g$) | Carbon Load % | Endcapping | pH Range |
|---|---|---|---|---|---|---|
| Synergi Max-RP | Spher. 2.5 | 100 | 400 | 17 | TMS | 1.5-9.0* |
| Synergi Hydro-RP | Spher. 2.5 | 100 | 400 | 19 | Hydrophilic | 1.5-7.5 |
| 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 range 1.5 - 10.0 under isocratic conditions. pH range is 1.5 - 9.0 under gradient conditions.

**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 eachother

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# Polar-RP

Reversed Phase

# Ether-Linked Phenyl Column

## Polar and Aromatic Reversed Phase Selectivity

- Increased retention of highly polar and aromatic compounds
- Stable in 100 % buffer mobile phases
- Highly reproducible



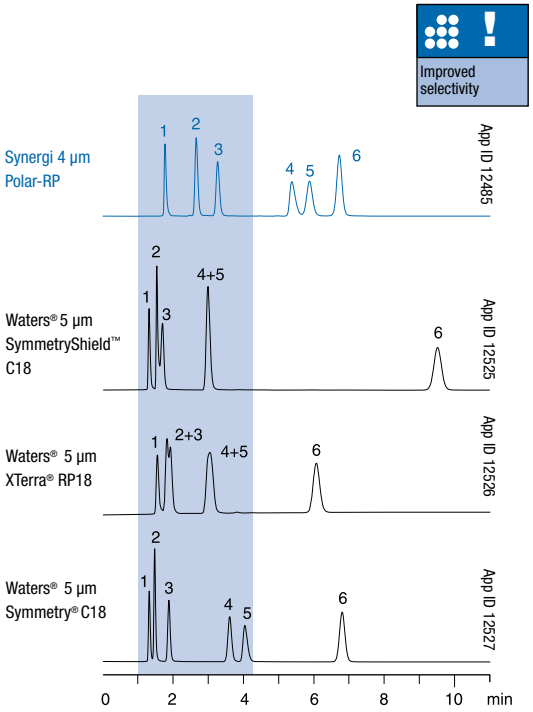
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# synergi™ POLAR-RP

## ENHANCED SELECTIVITY FOR POLAR AROMATICS

Synergi Polar-RP is an ether-linked phenyl phase with proprietary hydrophilic endcapping designed specifically to maximize retention and selectivity for polar and aromatic analytes. Aromatic selectivity can be further enhanced by the addition of methanol to the mobile phase. Methanol facilitates the π-π interactions between the aromatic rings of the analyte and the phenyl functional group of Synergi Polar-RP. This feature allows for improved polar retention that complements the more conventional C18 column chemistries, as well as provides improved peak shape and an alternative selectivity compared to other polar phases.

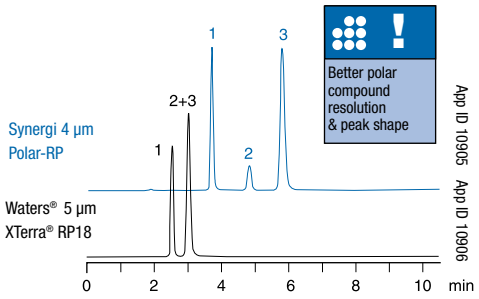
### INCREASED RESOLUTION OF POLAR COMPOUNDS

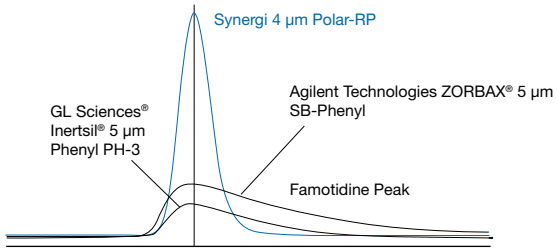



Conditions for all columns:

**Dimensions:** 150 x 4.6 mm
**Mobile Phase:** 20 mM Potassium phosphate pH 3 / Methanol (50:50)
**Flow Rate:** 1.0 mL/min
**Detection:** UV @ 230 nm
**Injection:** 2 µL
**Temperature:** 22 °C
**Sample:**
1. Metaproterenol (0.4 µg)
2. Pindolol (0.6 µg)
3. Metoprolol (0.15 µg)
4. Alprenolol (0.3 µg)
5. Propranolol (0.04 µg)
6. Ethylparaben (0.4 µg)

### IMPROVED RESOLUTION AND PEAK SHAPE

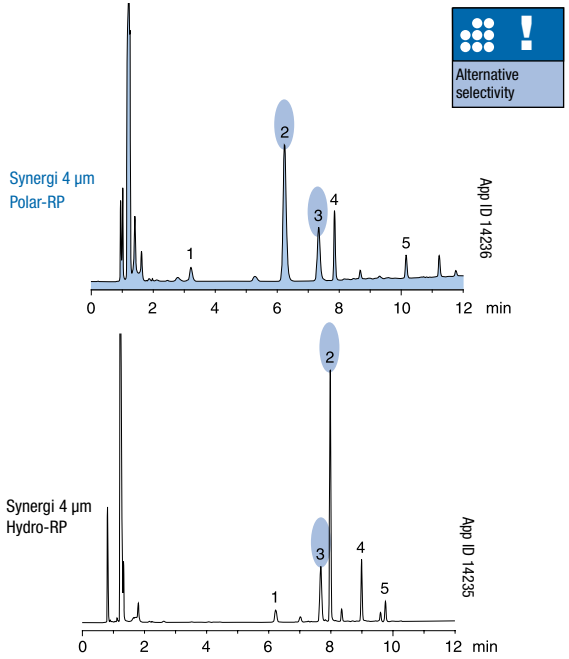



Conditions for all columns:

**Columns:** Synergi 4 µm Polar-RP
Waters 5 µm XTerra RP18
Agilent 5 µm ZORBAX SB-Phenyl
GL Sciences 5 µm Inertsil Phenyl PH-3
**Dimensions:** 150 x 4.6 mm
**Mobile Phase:** 20 mM Potassium phosphate pH 7.0/Acetonitrile (80:20)
**Flow Rate:** 1 mL/min
**Detection:** UV @ 254 nm
**Temperature:** 25 °C
**Sample:**
1. Famotidine
2. Cimetidine
3. Ranitidine

### SYNERGI POLAR-RP VS. SYNERGI HYDRO-RP




Conditions for both columns:

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

Comparative separations may not be representative of all applications.

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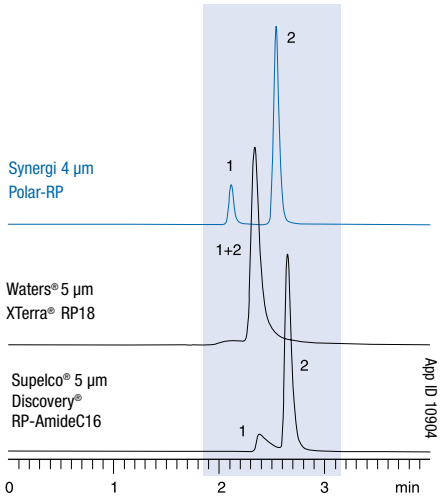
# synergi™ POLAR-RP

## 100 % BUFFER MOBILE PHASE STABILITY

The ether-linkage on the Synergi 4 µm Polar-RP phase contributes to not only sharp peak shape for acidic and basic analytes, but also ensures stability under highly aqueous mobile phase conditions. Very polar analytes, like formic acid, are typically poorly retained on alkyl-bonded phases. However, using a 100 % buffer mobile phase, the formic acid impurity is easily resolved from acetic acid. Other polar-embedded phases typically use a nitrogen-containing amide linkage or carbamate group; this can interfere with the resolution of highly acidic polar compounds. Since Synergi Polar-RP uses an ether-linkage as the polar embedded group, the result is improved peak shape and resolution of the highly acidic polar compound, formic acid.

## BETTER ACIDIC COMPOUND RESOLUTION UNDER 100 % BUFFER CONDITIONS

### FORMIC AND ACETIC ACIDS

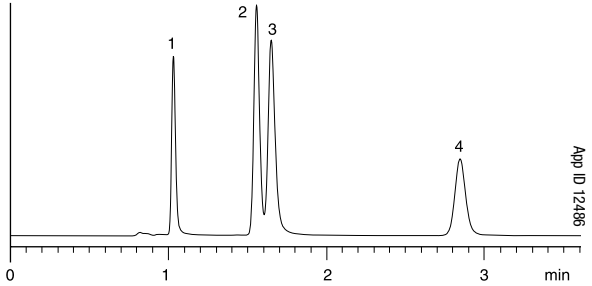



Conditions for all columns:

Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium phosphate pH 2.5/ Methanol (97:3)
Flow Rate: 1.0 mL/min
Detection: UV @ 220 nm
Temperature: 25 °C
Sample: 1. Formic acid
2. Acetic acid

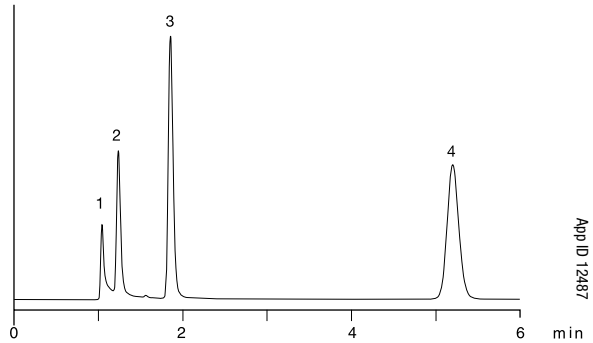
## RESOLUTION UNDER 100 % BUFFER CONDITIONS

### NUCLEIC ACID BASES




Column: Synergi 4 µm Polar-RP
Dimensions: 150 x 4.6 mm
Part No.: 00F-4336-E0
Mobile Phase: 20 mM Potassium phosphate pH 2.7
Flow Rate: 2.0 mL/min
Detection: UV @ 254 nm
Injection: 5 µL
Temperature: 22 °C
Sample: 1. Cytosine (0.125 µg)
2. Uracil (0.125 µg)
3. Adenine (0.125 µg)
4. Thymine (0.125 µg)

### THYMIDINE NUCLEOTIDES




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

Comparative separations may not be representative of all applications.

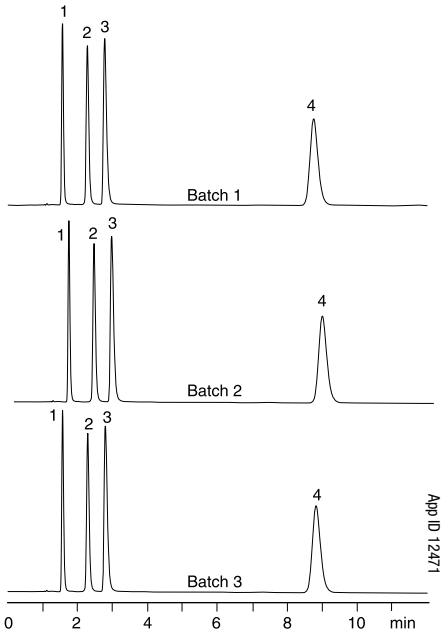


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## A REPRODUCIBLE AND STABLE POLAR COLUMN

Synergi Polar-RP is highly reproducible. As indicated by the chromatograms from three separate batches of bonded stationary phase, Synergi Polar-RP exhibits almost no variation between batches. In addition, the ether-linkage is extremely resistant to hydrolysis, even at pH 1.5, thus enabling separations even under relatively harsh 0.1 % TFA running conditions for thousands of column volumes. At the other end of the pH spectrum, Synergi Polar-RP is stable to a pH of 7.0.

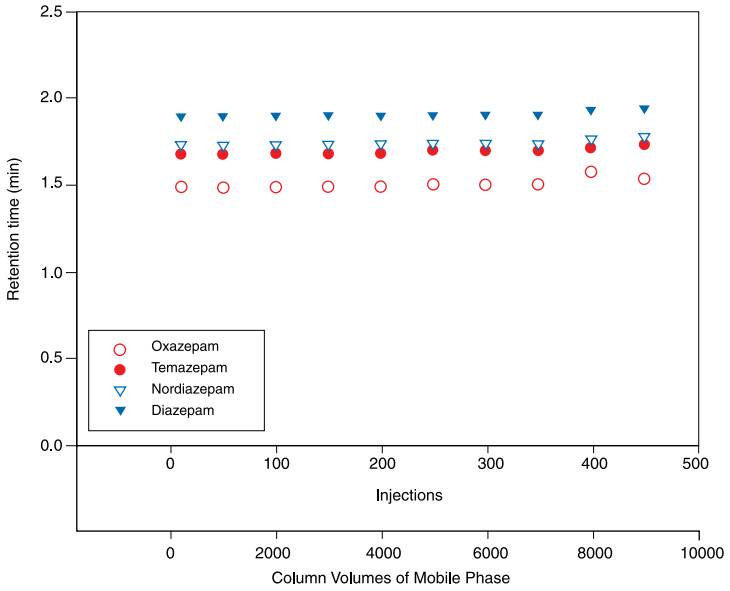
### BATCH REPRODUCIBLITY




Conditions for all columns:

**Column:** Synergi 4 µm Polar-RP
**Dimensions:** 150 x 4.6 mm
**Part No.:** 00F-4336-E0
**Mobile Phase:** Methanol/20 mM Potassium phosphate pH 6.5 (35:65)
**Flow Rate:** 1.5 mL/min
**Detection:** UV @ 210 nm
**Injection:** 1 µL
**Temperature:** 22 °C
**Sample:**
1. Phenylephrine (1 µg)
2. Phenylpropanolamine (1 µg)
3. Pseudoephedrine (1 µg)
4. Methylparaben (1 µg)

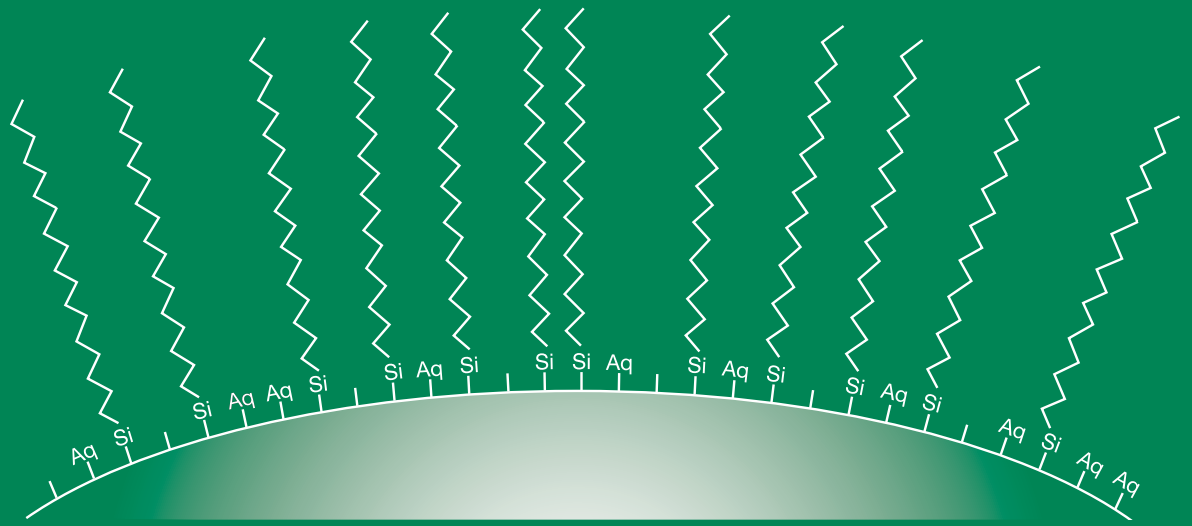
### AQUEOUS STABILITY




**Column:** Synergi 4 µm Polar-RP
**Dimensions:** 30 x 2.0 mm
**Part No.:** 00A-4336-B0
**Mobile Phase:** A: Water with 0.1 % TFA
B: Acetonitrile with 0.1 % TFA
**Gradient:** A/B (95:5) to A/B (5:95) in 3 min
**Flow Rate:** 1.0 mL/min
**Detection:** UV @ 254 nm
**Injection:** 1 µL
**Temperature:** 30 °C
**Sample:** Precipitated porcine serum (2:1 Acetonitrile: serum) containing:
1. Oxazepam (50 ng)
2. Temazepam (50 ng)
3. Nordiazepam (50 ng)
4. Diazepam (50 ng)

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# Hydro-RP

Polar Endcapped

**C18** Column

## Hydro-phobic/philic Reversed Phase Retention

- Extreme retention of hydrophobic compounds
- Stable in 100 % aqueous mobile phase
- Improved polar selectivity



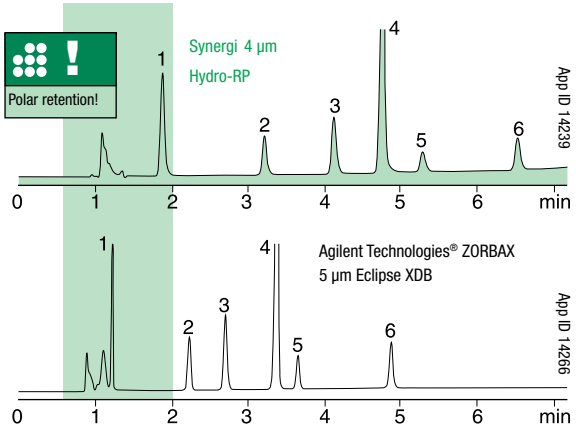
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# synergi™ HYDRO-RP

## A C18 WITH ENHANCED RETENTION OF POLAR COMPOUNDS UNDER 100 % AQUEOUS CONDITIONS

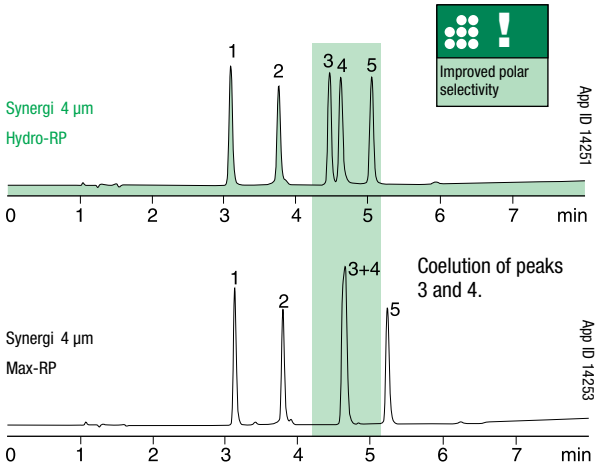
Extremely polar analytes are not always retained and often do not separate well on conventional C18 columns. Synergi Hydro-RP is a C18 bonded phase endcapped with a unique proprietary polar group to provide extreme retention of both hydrophobic as well as polar compounds under 100 % aqueous conditions. The high (475 $m^2/g$) 4 µm silica surface area combined with a dense bonded phase coverage allows for substantial interaction between the sample analyte and the bonded phase. The net result is a very retentive C18 phase well suited to separating extremely polar analytes.

### SYNERGI HYDRO-RP VS. ZORBAX® ECLIPSE XDB®



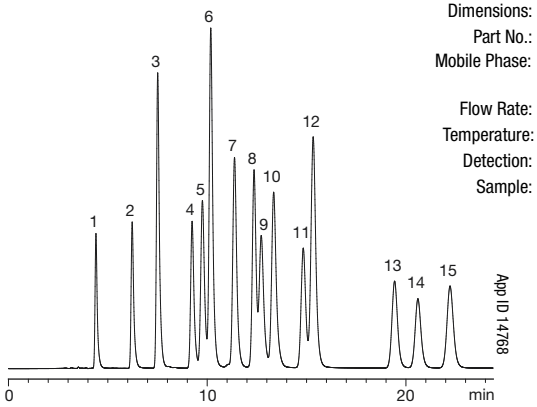

Conditions for both columns:
- **Dimensions:** 150 x 4.6 mm
- **Mobile Phase:** A: 10 mM Triethylammonium formate pH 6.0
  B: Acetonitrile with 10 mM Triethylammonium formate
- **Gradient:** A/B (85:15) to A/B (35:65) in 15 minutes
- **Flow Rate:** 1.5 mL/min
- **Temperature:** Ambient
- **Detection:** UV @ 230 nm
- **Injection:** 1 µL of beta-blockers mix each at 0.8 µg/µL
- **Sample:** 1. Atenolol
  2. Pindolol
  3. Nadolol
  4. Acebutolol
  5. Metoprolol
  6. Labetalol

### SYNERGI HYDRO-RP VS. SYNERGI MAX-RP



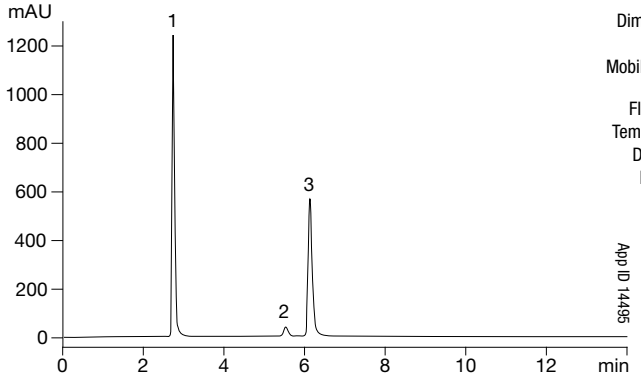

Conditions for both columns:
- **Dimensions:** 150 x 4.6 mm
- **Mobile Phase:** A: 20 mM Potassium dihydrogen phosphate
  B: Acetonitrile
- **Gradient:** A/B (95:5) to A/B (65:35) in 15 minutes
- **Flow Rate:** 1.5 mL/min
- **Temperature:** 22 °C
- **Detection:** UV @ 210 nm
- **Sample:** 1. Morphine
  2. Hydromorphone
  3. Codeine
  4. Nalorphine
  5. Oxycodone

### EXPLOSIVES MIX: EPA METHOD 8330




- **Column:** Synergi 4 µm Hydro-RP
- **Dimensions:** 250 x 4.6 mm
- **Part No.:** 00G-4375-E0
- **Mobile Phase:** Water/Methanol/Acetonitrile (51:45:4)
- **Flow Rate:** 0.8 mL/min
- **Temperature:** 35 °C
- **Detection:** UV @ 254 nm
- **Sample:** 1. HMX
  2. RDX
  3. 1,3,5-Trinitrobenzene
  4. 1,2-Dinitrobenzene (Int Std)
  5. Tetryl
  6. 1,3-Dintrobenzene
  7. Nitrobenzene
  8. 2,4,6-Trinitrotoluene
  9. 4-Amino-2,6-dinitrotoluene
  10. 2-Amino-4,6-dinitrotoluene
  11. 2,6-Dinitrotoluene
  12. 2,4-Dinitrotoluene
  13. 2-Nitrotoluene
  14. 4-Nitrotoluene
  15. 3-Nitrotoluene

### ACRYLAMIDE, ACRYLONITRILE, & ACROLEIN: EPA METHOD 8316




- **Column:** Synergi 4 µm Hydro-RP
- **Dimensions:** 250 x 4.6 mm
- **Part No.:** 00G-4375-E0
- **Mobile Phase:** Water with 0.1 % TFA / Acetonitrile with 0.1 % TFA (98:2)
- **Flow Rate:** 2.0 mL/min
- **Temperature:** Ambient
- **Detection:** UV @ 254 nm
- **Injection:** 1 µL of glutathione oxidized and reduced at 1 mg/mL each in buffer
- **Sample:** 1. Acrylamide
  2. Acrylonitrile
  3. Acrolein

Comparative separations may not be representative of all applications.



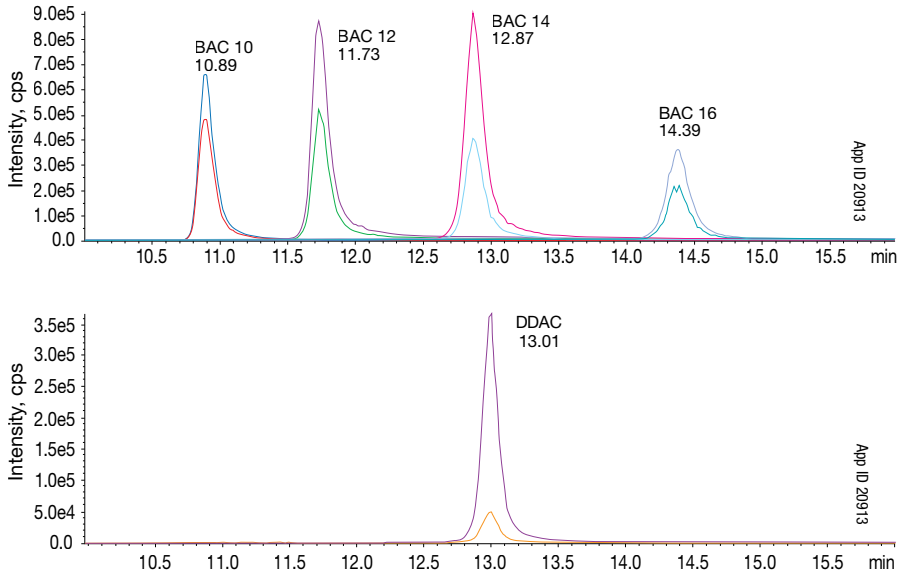
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# synergi™ HYDRO-RP

## EXTREME HYDROPHOBIC RETENTION

Synergi Hydro-RP shows significantly higher hydrophobic retention when compared to other C18 phases. Greater hydrophobicity is useful for many applications because higher percentage organic mobile phase can be used resulting in shorter run and re-equilibration times. For LC/MS applications this enhanced hydrophobicity results in analytes eluting at higher percentage organic mobile phase, resulting in improved sensitivity. Dense bonding and endcapping make Synergi Hydro-RP compatible with a variety of MS-compatible mobile phase modifiers such as formic acid, ammonium formate, TEAA, and acetic acid. Through a combination of greater retention, excellent efficiency, and stability to MS-compatible buffers, Synergi Hydro-RP is ideal for LC/MS applications.

### QUANTITATIVE ANALYSIS OF QUATERNARY AMMONIUM COMPOUNDS (QAC) BY LC/MS/MS




**Column:** Synergi 4 µm Hydro-RP
**Dimensions:** 150 x 2.0 mm
**Part No.:** 00F-4375-B0
**Mobile Phase:** A: Water with 5 mM Ammonium formate purified Water
B: Methanol with 5 mM Ammonium formate

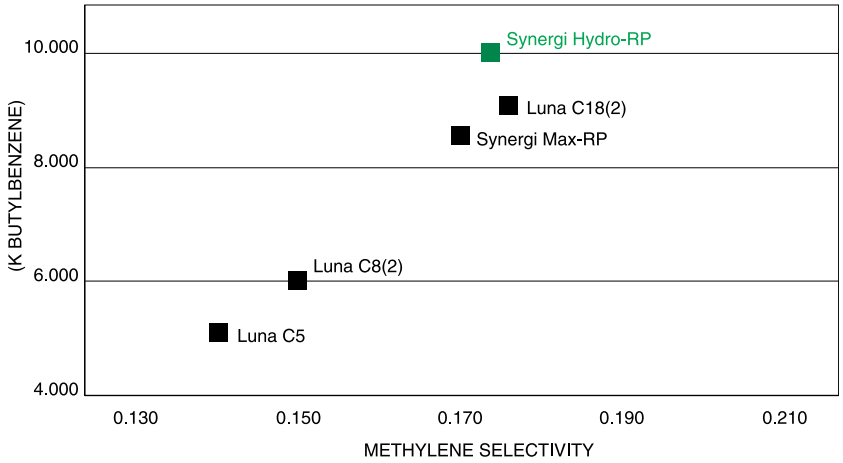
**Gradient:**

| Time (min) | % B |
|---|---|
| 0 | 0 |
| 3 | 70 |
| 6 | 85 |
| 9 | 90 |
| 20.5 | 90 |
| 21 | 0 |
| 32 | 0 |

**Flow Rate:** 100 µL/min
**Detection:** MS/MS at 425 °C (SCIEX API 4000™)
**Temperature:** 40 °C
**Sample:** 1. BAC 10 276/184 (Quantifier) / 276/91 (Qualifier)
2. BAC 12 304/212 (Quantifier) / 304/91 (Qualifier)
3. BAC 14 332/240 (Quantifier) / 332/91 (Qualifier)
4. BAC 16 360/268 (Quantifier) / 360/91 (Qualifier)
5. DDAC 326/186 (Quantifier) / 326/41 (Qualifier)

Courtesy of the Laboratory CVUA Stuttgart
(Schaflandstr. 3/2, 70736 Fellbach, Germany)

### HYDROPHOBIC RETENTIVITY COMPARED




Conditions for all columns:
**Dimensions:** 150 x 4.6 mm
**Mobile Phase:** Acetonitrile/20 mM Potassium phosphate pH 7.0 (65:35)
**Flow Rate:** 1.5 mL/min
**Temperature:** Ambient
**Sample:** 1. Butylbenzene
2. Amylbenzene

The chart was obtained by plotting hydrophobic retention (k for butylbenzene vs. methylene selectivity (log k for amylbenzene vs the number of methyl groups) under the stated conditions. A column with high hydrophobicity will better resolve two analytes which subtly differ in their overall hydrophobicity than a column with lower hydrophobic selectivity.

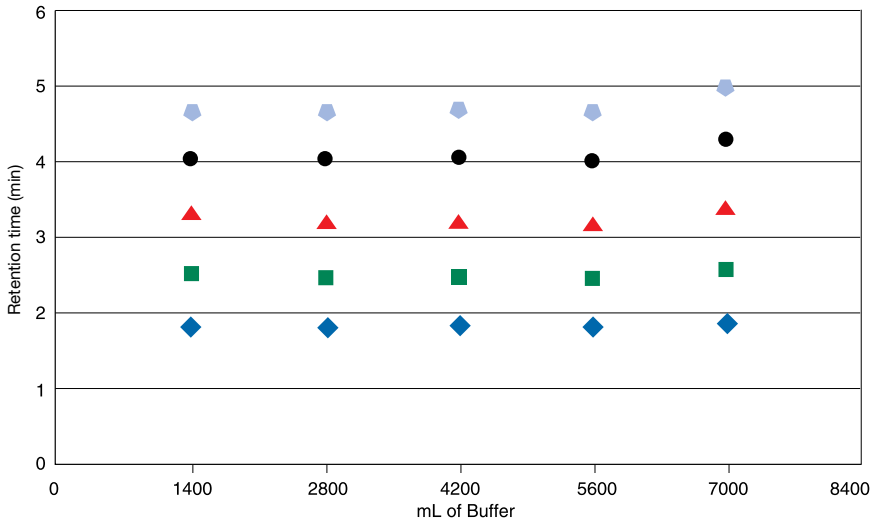
Comparative separations may not be representative of all applications.

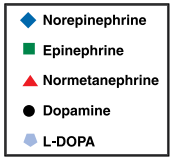

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## STABLE IN 100 % AQUEOUS MOBILE PHASE

Running a 100 % aqueous mobile phase on a C18 column can provide improved retention of extremely polar compounds. However, conventional C18 phases are poorly wetted by highly aqueous mobile phases causing the C18 ligands to mat down on the surface of the silica and, over time, retention is completely lost. Organic acids and catecholamines are often difficult to separate analyze as their polarity hinders interaction with conventional C18 ligands, but this is easily accomplished using Synergi Hydro-RP under 100 % aqueous conditions. Synergi Hydro-RP utilizes this versatility for method development while providing superior column ruggedness.

### AQUEOUS STABILITY FOR OVER 7000 ML OF BUFFER

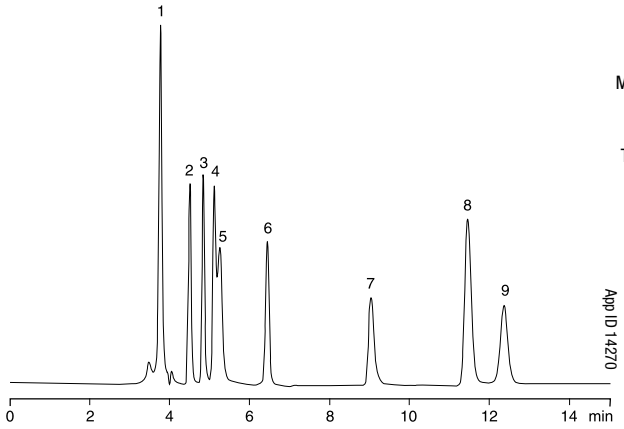



**Column:** Synergi 4 µm Hydro-RP
**Dimensions:** 150 x 4.6 mm
**Part No.:** 00F-4375-E0
**Mobile Phase:** 20 mM Potassium phosphate, pH 2.5
**Flow Rate:** 1.0 mL/min
**Temperature:** 35 °C
**Detection:** UV @ 210 nm
**Injection:** 5 µL
**Sample:** 1. Norepinephrine (0.8 mg/mL)
2. Epinephrine (0.5 mg/mL)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

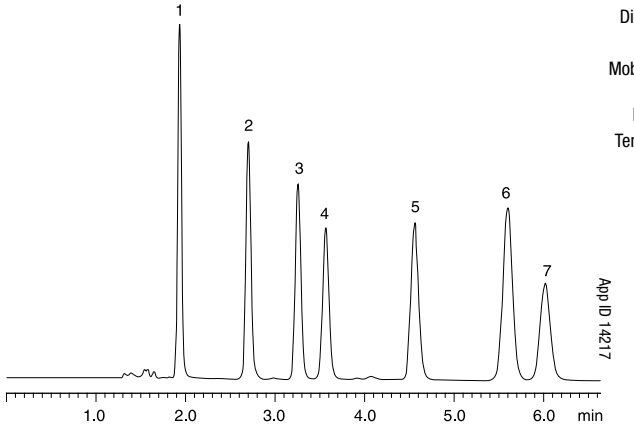
## POLAR RETENTION UNDER 100 % AQUEOUS CONDITIONS

### ORGANIC ACIDS




**Column:** Synergi 4 µm Hydro-RP
**Dimensions:** 250 x 4.6 mm
**Part No.:** 00G-4375-E0
**Mobile Phase:** 20 mM Potassium phosphate, pH 2.9
**Flow Rate:** 0.7 mL/min
**Temperature:** 22 °C
**Detection:** UV @ 220 nm
**Sample:** 1. Oxalic acid
2. Tartaric acid
3. Glycolic acid
4. Formic acid
5. Pyruvic acid
6. Malonic acid
7. Acetic acid
8. Maleic acid
9. Citric acid

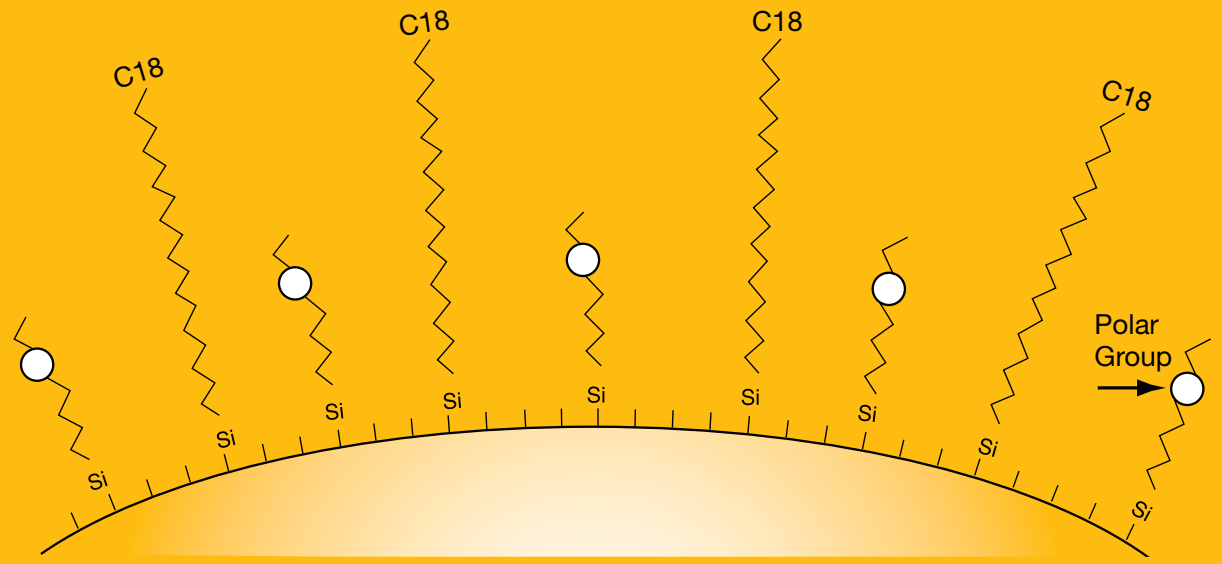
### CATECHOLAMINES




**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 mL/min
**Temperature:** 22 °C
**Detection:** UV @ 210 nm
**Sample:** 1. Norepinephrine
2. Epinephrine
3. 6-Hydroxydopamine
4. Normetanephrine
5. Dopamine
6. L-DOPA
7. Epinine

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synergi™




# Fusion-RP

## Polar Embedded
## C18 Column

### Improved Polar Selectivity with Reduced Run Times

- Enhanced polar retention under organic conditions
- Low MS bleed
- 100 % aqueous stable



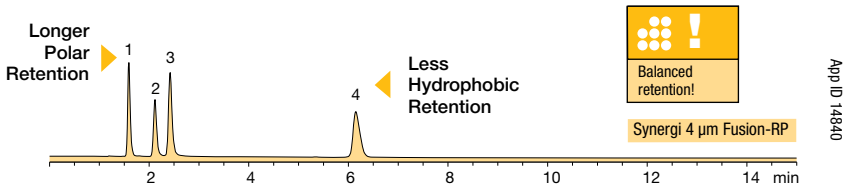
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# synergi™ FUSION-RP

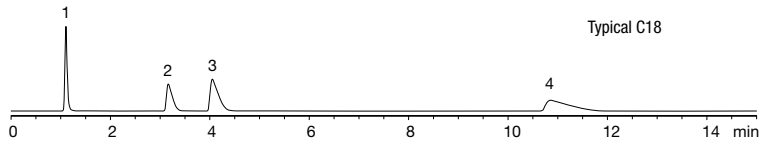
## IMPROVED POLAR SELECTIVITY WITH REDUCED RUN TIMES

Synergi Fusion-RP uses a polar embedded and a hydrophobic ligand to achieve improved selectivity. The C18 ligand gives Synergi Fusion-RP good hydrophobic retention and selectivity, while the polar embedded group provides enhanced polar retention. This dual-phase selectivity allows balanced polar, acidic, basic and hydrophobic compound retention and resolution. If you are working with mixtures of compounds with polar and non-polar characteristics, and having difficulties finding that perfect mix of selectivity, then you should try Synergi Fusion-RP.

### INCREASED POLAR RETENTION WITH REDUCED HYDROPHOBIC INTERACTION




App ID 14840

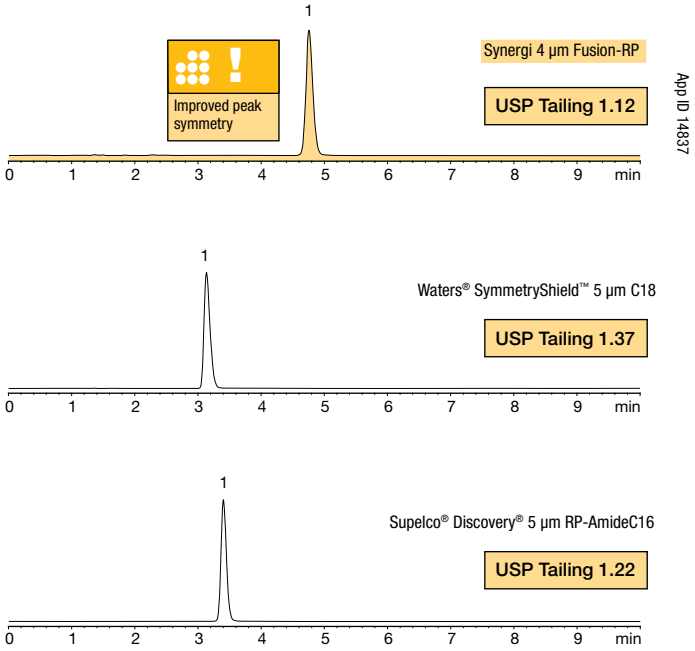



Conditions for both columns:

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

Comparative separations may not be representative of all applications.

### PEAK SHAPE COMPARISON USING PROPRANOLOL




App ID 14837

Conditions for all columns:

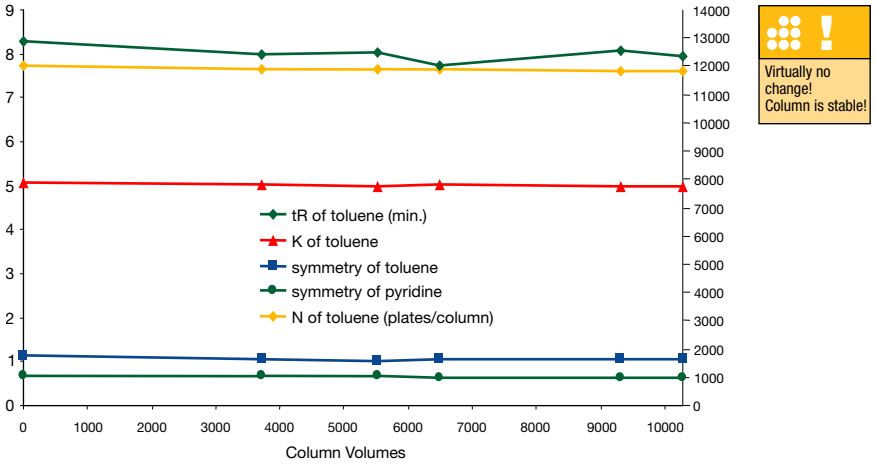
Columns: Synergi 4 µm Fusion-RP
Waters SymmetryShield™ 5 µm C18
Supelco Discovery® 5 µm RP AmideC16
Dimensions: 150 x 4.6 mm
Mobile Phase: 20 mM Potassium Phosphate, pH 2.5 / Acetonitrile (75:25)
Flow Rate: 1.0 mL/min
Detection: UV @ 230 nm
Sample: 1. Propranolol

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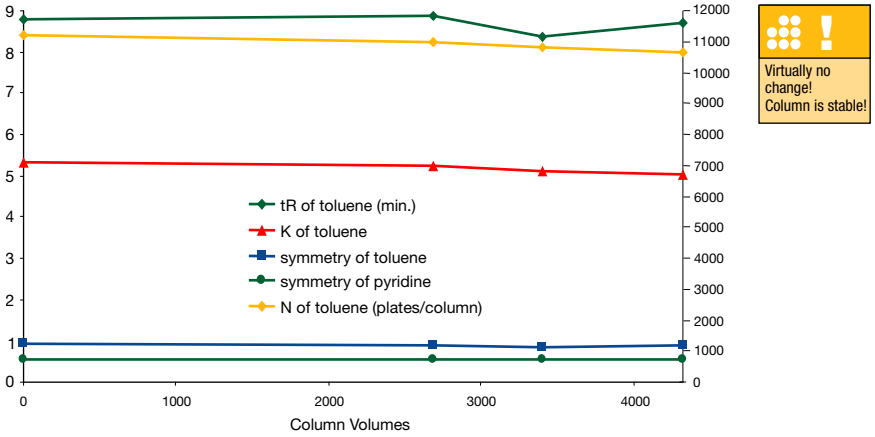
## 1.5-10 pH STABLE FOR RUGGED METHODS*

The ability of Synergi Fusion-RP to operate in an extended pH range of 1.5-10 (under isocratic elution conditions) is the direct result of an exhaustive endcapping procedure, which is highly protective of the silica surface. pH stability is an indication of column ruggedness. pH tested at the extremes (1.5 and 10), for more than 4000 column volumes, the results below clearly show how rugged Synergi Fusion-RP is. Imagine how well this column will work for your application.

### pH 10.0 STABILITY TEST



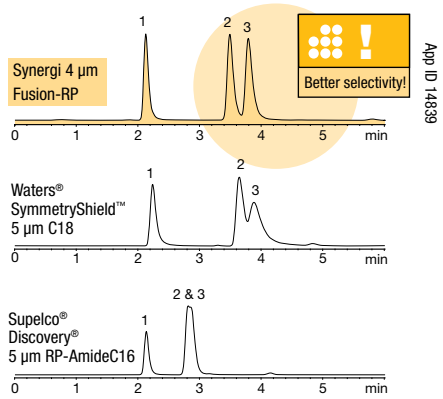

### pH 1.5 STABILITY TEST




*pH testing was done under isocratic conditions with phosphate buffer. Formic acid and ammonium formate were also used as test buffers.

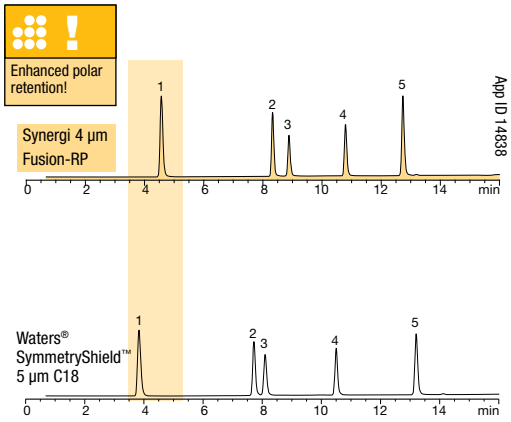
### ANTIHISTAMINES

Conditions for all columns:
- Columns: Synergi 4 µm Fusion-RP, Waters® SymmetryShield™ 5 µm C18, Supelco Discovery® 5 µm RP-AmideC16
- Dimensions: 150 x 4.6 mm
- Mobile Phase: 20 mm Potassium Phosphate, pH 7 / Methanol (70:30)
- Flow Rate: 1.0 mL/min
- Detection: UV @ 210 nm
- Sample: 1. Phenylephrine, 2. Phenylpropanolamine, 3. Pseudoephedrine




### SULFA DRUGS

Conditions for both columns:
- Columns: Synergi 4 µm Fusion-RP, Waters® SymmetryShield™ 5 µm C18
- Dimensions: 150 x 4.6 mm
- Mobile Phase: A: 20 mM Potassium Phosphate, pH 2.5; B: Methanol
- Gradient: A/B (95:5) for 0.5 min, A/B (20:80) in 15 min
- Flow Rate: 1.0 mL/min
- Detection: UV @ 254 nm
- Sample: 1. Sulfanilamide, 2. Sulfathiazole, 3. Sulfamerazine, 4. Sulfamethoxazole, 5. Sulfaquinoxaline




Comparative separations may not be representative of all applications.



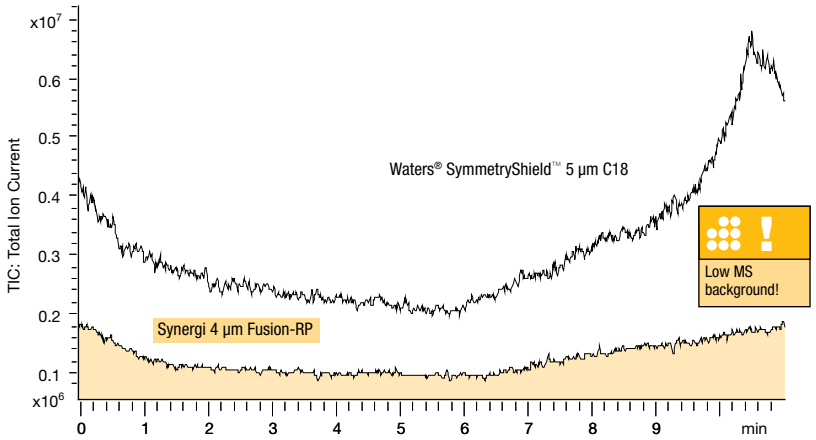
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## EXTREMELY LOW LC/MS COLUMN BLEED

A careful control of the endcapping process combined with the chemical nature of the polar embedded group results in high phase stability with minimal ligand cleavage. The excellent bleed profile compared to a competitor polar-embedded column in the figure below shows Synergi Fusion-RP is well suited for LC/MS work.

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

### LC/MS BLEED PROFILES




Conditions for both columns:

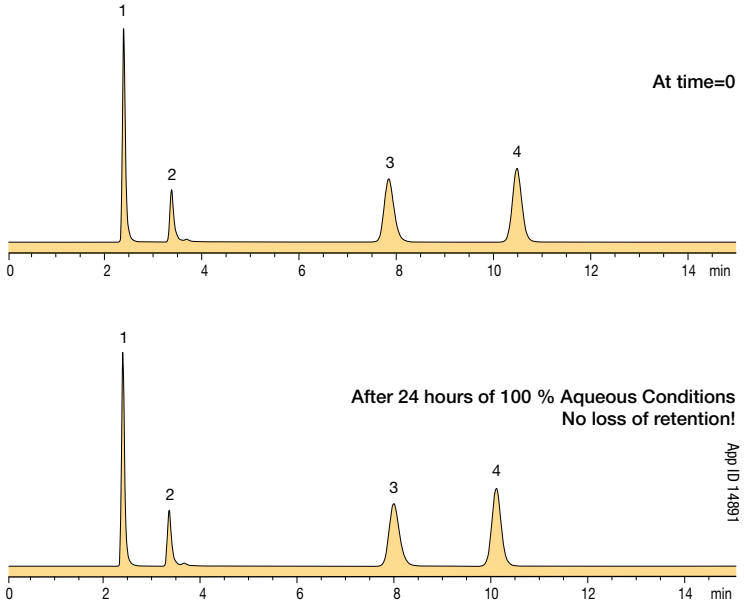
**Columns:** Synergi 4 µm Fusion-RP
Waters® SymmetryShield™ 5 µm C18
**Dimensions:** 150 x 4.6 mm
**Mobile Phase:** A: 0.1 % $CH_3COOH$ in Water
B: 0.1 % $CH_3COOH$ in Methanol
**Gradient:** 95:5 (A/B) linear to 5:95 over 8 min
hold for 5 min
**Flow Rate:** 0.5 mL/min
**Detection:** Bruker-Daltonics Esquire 2000 IT
Ion Source: ESI
Scan Rate: 13000 m/z/s
Scan Range: 50-1000

Comparative separations may not be representative of all applications.

## 100 % AQUEOUS FOR ADDED METHOD FLEXIBILITY

Use Synergi Fusion-RP for greater polar retention under 100 % aqueous conditions. The polar embedded group allows this phase to be run under 100 % aqueous conditions without loss of retentivity. Unlike typical C18 phases, the pores and the sorbent surface of Synergi Fusion-RP stay wet even after many hours of operation in 100 % aqueous mobile phase. This aqueous stability offers greater flexibility in application development.

### AQUEOUS STABILITY

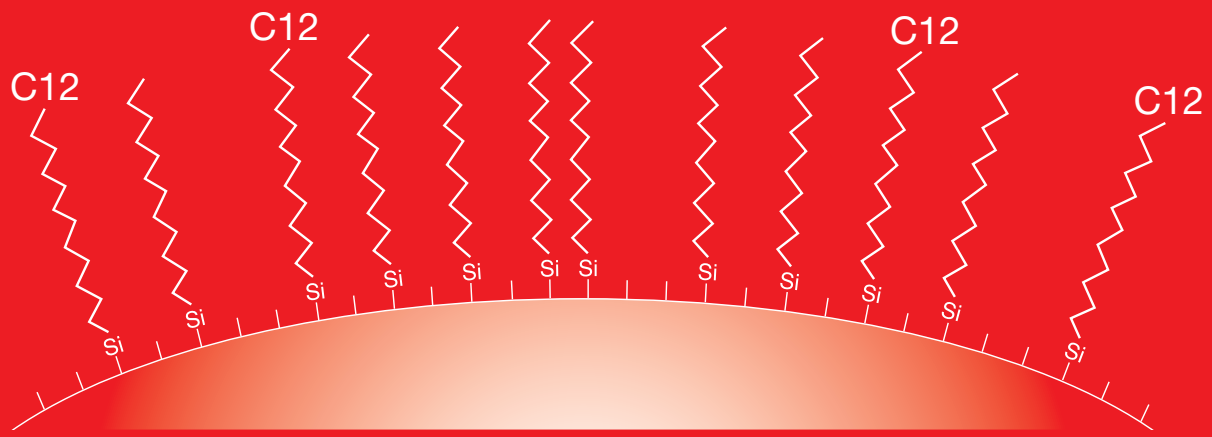



**Column:** Synergi 4 µm Fusion-RP
**Dimensions:** 150 x 4.6 mm
**Part No.:** 00F-4424-E0
**Mobile Phase:** 20 mM Potassium phosphate buffer pH 2.5
**Flow Rate:** 1.0 mL/min
**Detection:** UV @ 254 nm
**Injection:** 1 µL
**Temperature:** 30 °C
**Sample:** 1. Thiourea
2. Adenine
3. Guanosine-5-monophosphate
4. Thymine



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synergi™




# Max-RP

Reversed Phase

**C12** Column

## Maximum Reversed Phase Performance

- Hydrophobic retention similar to a C18 with improved results
- 25 % more free silanol coverage than most C18 columns
- Sharper peaks for basic and tailing compounds



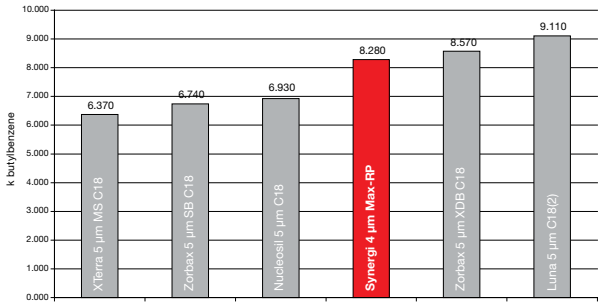
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# synergi™ MAX-RP

## HYDROPHOBIC RETENTION SIMILAR TO A C18 - WITH IMPROVED RESULTS

The bulky nature of C18 ligands results in relatively low coverage of surface silanols which cause peak tailing. Nevertheless, C18 columns have the hydrophobic selectivity chromatographers rely on. To reduce peak tailing and still offer the preferred hydrophobic selectivity, we engineered Synergi Max-RP with a C12 bonded phase. A C12 ligand is sterically less hindered than a C18 and can be bonded to result in 25 % more of the silica surface being covered than a C18, shielding more free silanols from non-specific interaction. When bonded to our high (475 $m^2/g$) surface area silica, Synergi Max-RP gives the hydrophobic retention and methylene selectivity you would expect from a C18 column, but with sharper peaks, less tailing, and improved reproducibility.

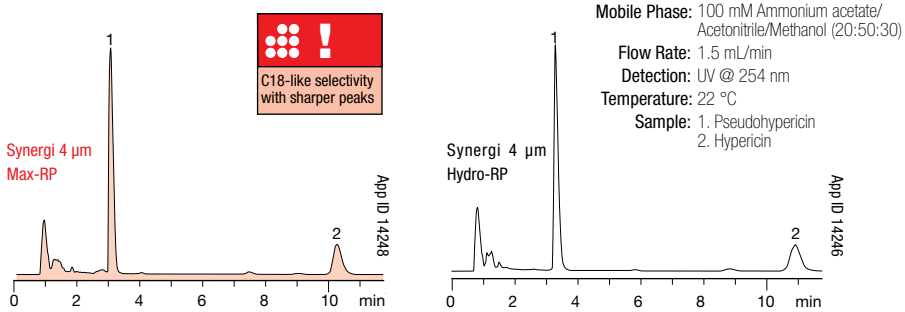
### HYDROPHOBIC RETENTION: SYNERGI MAX-RP (C12) PERFORMS LIKE A C18




Conditions for all columns:

**Columns:** Waters® XTerra 5 µm MS C18
Agilent Technologies ZORBAX 5 µm SB C18
Macherey Nagel Nucleosil 5 µm C18
Synergi 4 µm Max-RP
Agilent Technologies ZORBAX 5 µm XDB C18
Luna 5 µm C18(2)
**Dimensions:** 150 x 4.6 mm
**Mobile Phase:** Acetonitrile/ Water (80:20)
**Flow Rate:** 1 mL/min
**Detection:** UV @ 254 nm
**Injection:** 1 µL
**Temperature:** Ambient
**Sample:** Butylbenzene

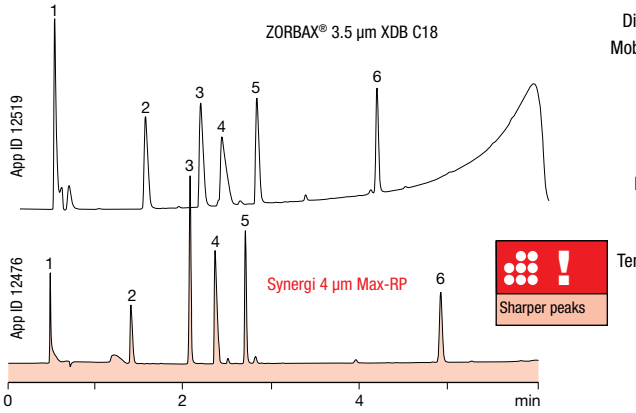
### SYNERGI MAX-RP VS. SYNERGI HYDRO-RP




Conditions for both columns:

**Dimensions:** 150 x 4.6 mm
**Mobile Phase:** 100 mM Ammonium acetate/ Acetonitrile/Methanol (20:50:30)
**Flow Rate:** 1.5 mL/min
**Detection:** UV @ 254 nm
**Temperature:** 22 °C
**Sample:** 1. Pseudohypericin
2. Hypericin

### SYNERGI MAX-RP VS. ZORBAX® 3.5 µm XDB C18

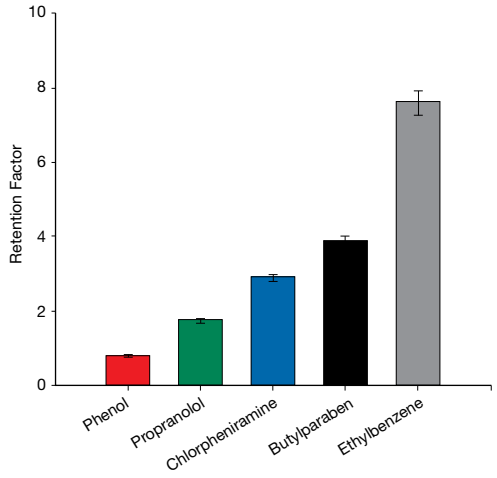



Conditions for both columns:

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

Comparative separations may not be representative of all applications.

### BATCH REPRODUCIBILITY OF SYNERGI MAX-RP




**Column:** Synergi 4 µm Max-RP
**Dimensions:** 150 x 4.6 mm
**Part No.:** 00F-4337-E0
**Mobile Phase:** Methanol/Acetonitrile/20 mM Potassium phosphate pH 7.0 (40:30:30)
**Flow Rate:** 1.5 mL/min
**Detection:** UV @ 254 nm
**Injection:** 5 µL
**Temperature:** Ambient
**Sample:** 1. Phenol (2 µg)
2. Propranolol (15 µg)
3. Chlorpheniramine (1 µg)
4. Butylparaben (0.25 µg)
5. Ethylbenzene (5 µg)

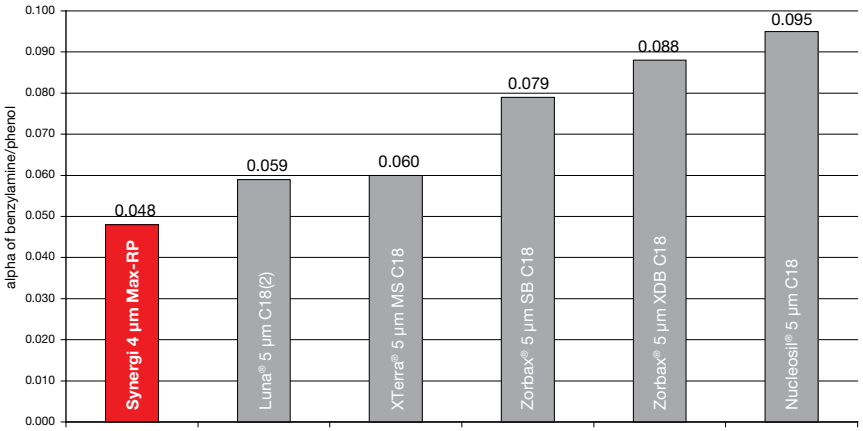
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# synergi™ MAX-RP

## SHARPER PEAKS FOR BASIC COMPOUNDS

Ionic interactions created by free silanols also can contribute to peak tailing. Low pH mobile phases (~2.5) are often employed in order to protonate free silanols. Un-protonated free silanols can lead to poor peak shape for basic drugs. Utilizing a C12 bonded phase, a 25 % greater bonded phase density is achieved compared to typical C18 bonding, covering more free silanols. Benzylamine and phenol are used to probe for active silanol sites at pH 2.5; Synergi Max-RP shows lower silanol activity as compared to other C18 columns.

### SILANOL ACTIVITY AT LOW pH: C12 VS. C18 PHASES

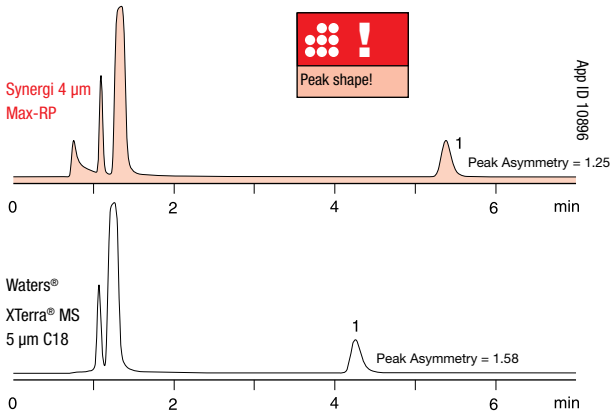



Conditions for all columns:

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

Comparative separations may not be representative of all applications.

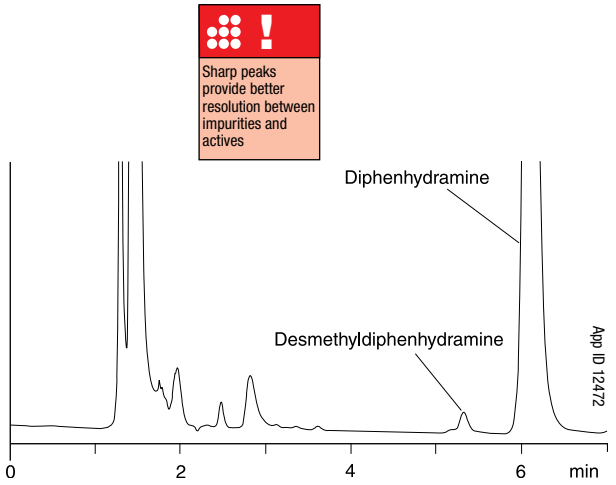
### SYNERGI MAX-RP VS. WATERS® XTERRA® MS




Conditions for both columns:

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

### BENADRYL®




**Column:** Synergi 4 µm Max-RP
**Dimensions:** 150 x 4.6 mm
**Part No.:** 00F-4337-E0
**Mobile Phase:** 20 mM Potassium phosphate pH 7/ Acetonitrile /Methanol (30:40:30)
**Flow Rate:** 1.0 mL/min
**Detection:** UV @ 210 nm
**Injection:** 10 µL
**Temperature:** Ambient
**Sample:** Methanol extract of Benadryl Allergy Chewables (Johnson & Johnson)
1. Desmethyldiphenhydramine
2. Diphenhydramine

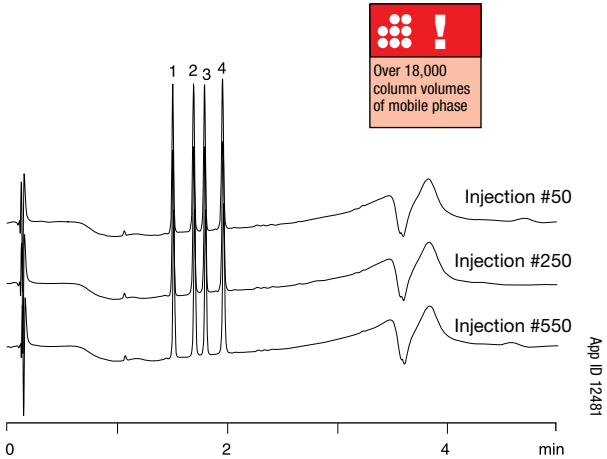

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# synergi™ MAX-RP

## REPRODUCIBLE PERFORMANCE FROM pH 1.5-10

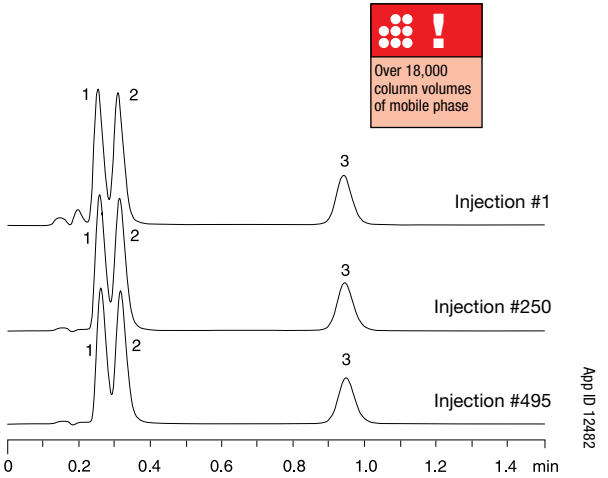
Our bonding and endcapping procedures give Synergi 4 µm Max-RP stability from pH 1.5 (0.1 % TFA) to 10. This robust pH range ensures that there will be little bleed at low pH's due to bonded phase hydrolysis and that a broad range of mobile phase modifiers can be used without damaging the column. It also allows analysts to use high pH's to overcome basic ionization and to overcome sample solubility issues.

### STABILITY AT pH 1.5



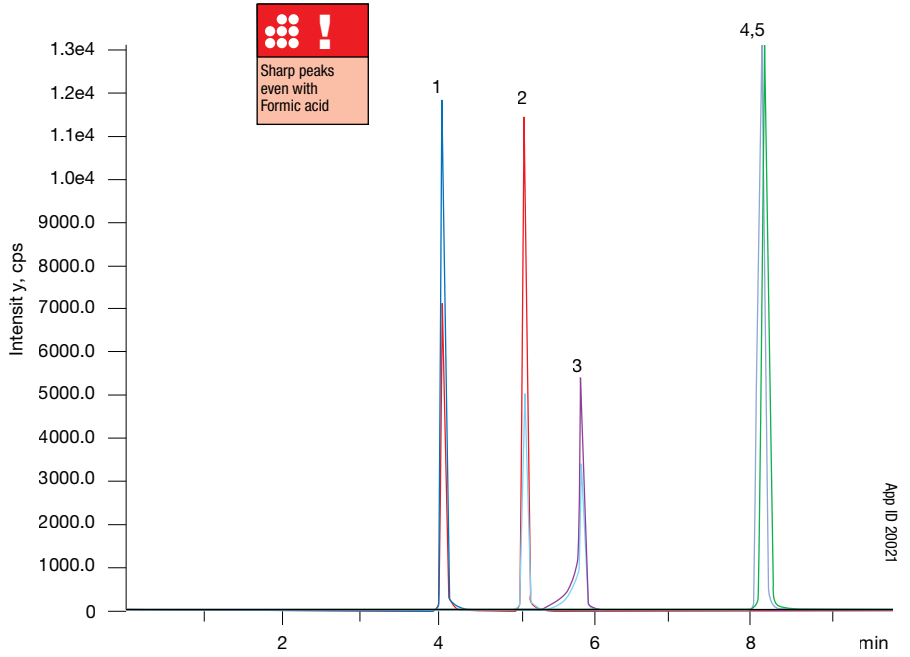

**Column:** Synergi 4 µm Max-RP
**Dimensions:** 30 x 2.0 mm
**Part No.:** 00A-4337-B0
**Mobile Phase:** A: Water with 0.1 % TFA
B: Acetonitrile with 0.1 % TFA
**Gradient:** A/B (95:5) to A/B (5:95) in 3 min
**Flow Rate:** 1.0 mL/min
**Detection:** UV @ 254 nm
**Injection:** 1 µL
**Temperature:** 30 °C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

### STABILITY AT pH 10.0




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

### MALACHITE GREEN AND RELATED TRIPHENYLMETHANE DYES




**Column:** Synergi 4 µm Max-RP
**Dimensions:** 50 x 2.0 mm
**Part No.:** 00B-4337-B0
**Mobile Phase:** A: 10 mM Ammonium acetate 0.1% Formic acid
B: Acetonitrile/Water (90:10) with 10 mM Ammonium acetate and 0.1% Formic acid
**Gradient:** A/B (70:30) to A/B (10:90) in 8 min
Hold A/B (10:90) for 6 min
A/B (10:90) to A/B (70:30) in 1 min
**Flow Rate:** 0.4 mL/min
**Detection:** MS/MS (SCIEX API 3000™)
**Injection:** 5 µL
**Temperature:** 30 °C
**Sample:** 1. Malachite Green (329.2 to 313.2/208.1)
2. Crystal Violet (372.3 to 356.3/340.3)
3. Brilliant Green (385.3 to 341.3/297.2)
4. Leucomalachite Green-d5 (336.3 to 239.2)
5. Leucomalachite Green (331.2 to 239.1/223.1)

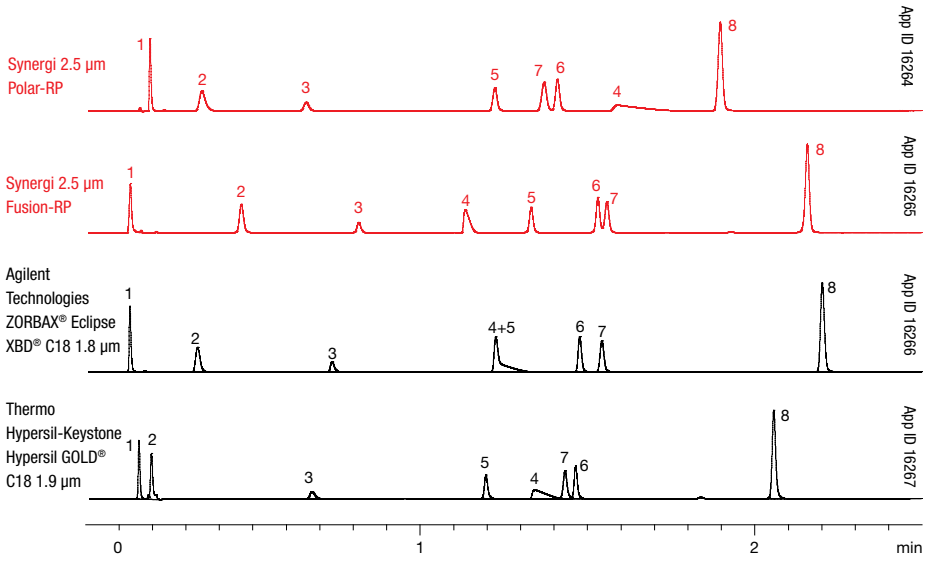
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synergi™ HST
High Speed Technology

## HST COLUMNS

- High efficiency similar to sub-2 µm columns
- Ultra-high performance on your current HPLC system
- Easy method transfer

With High Speed Technology (HST), a balance of speed and efficiency allows you to decrease analysis time while maintaining efficiency and resolution. Synergi HST utilizes the same high quality Synergi media trusted around the world for excellent reproducibility, loadability, and scalability. Also, Synergi HST can be used with both your current standard HPLC and newer high performance systems, so there is no need for time-consuming method revalidation!




Conditions for all columns:

Columns: Synergi 2.5 µm Polar-RP, 50 x 2.0 mm
Synergi 2.5 µm Fusion-RP, 50 x 2.0 mm
ZORBAX Eclipse XBD C18 1.8 µm 50 x 2.1 mm
Hypersil GOLD C18 1.9 µm, 50 x 2.1 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
Detection: UV @ 254 nm
Injection: 1 µL

Temperature: 50 °C
Sample: 1. Pyridine (0.22 mg/mL)
2. Acetaminophen (0.20 mg/mL)
3. Benzyl Alcohol (0.32 mg/mL)
4. Nortriptyline (0.5 mg/mL)
5. 3-Methyl-4-Nitrobenzoic Acid (0.25 mg/mL)
6. 4-Chlrorcinnamic Acid (0.20 mg/mL)
7. 3-Hydroxy-3-Methylbenzaldehyde (0.25 mg/mL)
8. Hexanophenone (1.2 mg/mL)

Comparative separations may not be representative of all applications.

## MercuryMS™
## EXCELLENT EFFICIENCY FOR HIGH-THROUGHPUT

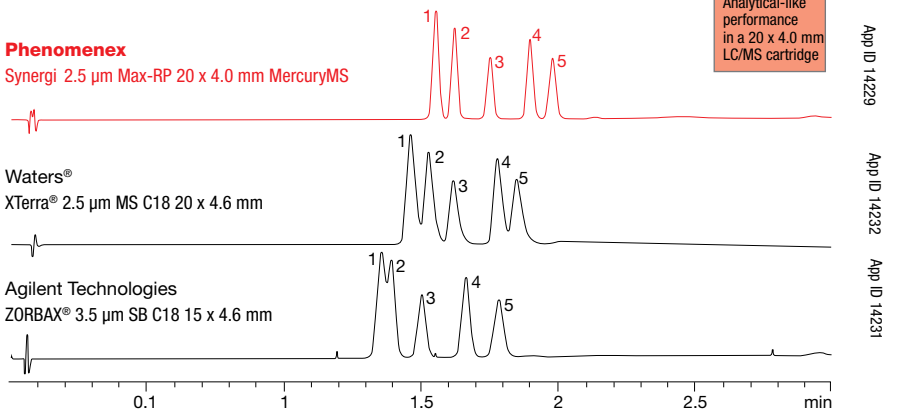
MercuryMS cartridges are engineered to provide superior performance to meet the demands of today's high-throughput environment. Synergi 2.5 µm silica provides efficiencies required when shortening run times. Utilizing the unique phase characteristics of Synergi Fusion-RP, Max-RP, Hydro-RP, and Polar-RP provides ultimate compound selectivity with up to 60 % reduction in analysis time. Synergi 2.5 µm materials are slurry packed into the MercuryMS cartridges, providing resolution & peak shapes equivalent to what was once only found in analytical columns.

### MercuryMS CARTRIDGE SYSTEM

Packed with 2.5 µm Synergi Max-RP, Synergi Hydro-RP, Synergi Fusion-RP, and Synergi Polar-RP




### PERFORMANCE COMPARISON OF LC/MS CARTRIDGES




Conditions for all columns:

Cartridges: Synergi 2.5 µm Max-RP
Waters XTerra 2.5 µm C18 MS
Agilent Technologies 3.5 µm ZORBAX SB-C18
Dimensions: 20 x 4.0 mm MercuryMS™ Cartridge (Synergi Max-RP)
20 x 4.6 mm (XTerra)
15 x 4.6 mm (ZORBAX)
Mobile Phase: A: Water with 0.1 % Formic acid
B: Acetonitrile with 0.1 % Formic acid
Gradient: A/B (85:15) to A/B (15:85) in 5 minutes

Flow Rate: 3 mL/min
Detection: UV @ 210 nm (XTerra & ZORBAX)
UV @ 254 nm (MercuryMS)
Temperature: 22 °C
Sample: 1. Desmethyldiazepam
2. Oxazepam
3. Lorazepam
4. Temazepam
5. Diazepam (Valium)


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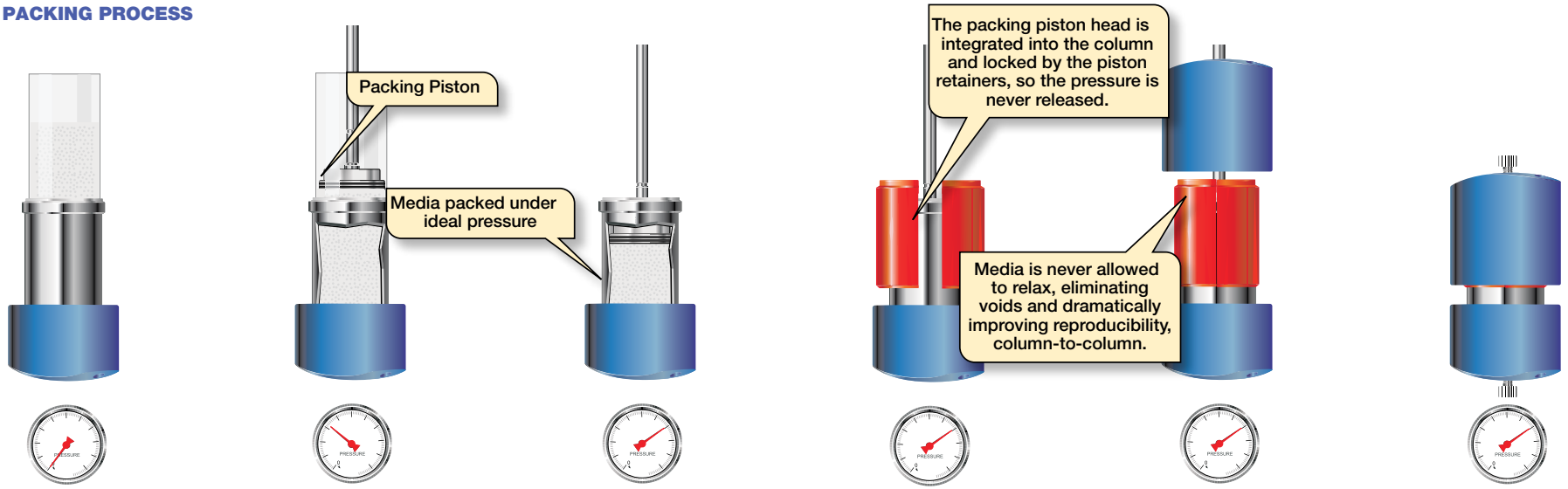
# AXIA PACKED PREPARATIVE TECHNOLOGY WITH SYNERGI MEDIA

An advanced column packing and hardware design, Axia incorporates patented Hydraulic Piston Compression technology to eliminate bed collapse as a source of failure in short preparative columns. Ideal bed density is custom calculated and automated for each support, chemistry, and column size. Computer control of the entire process assures both proper bed density and uniformity. Using a single, controlled hydraulic compression, the piston assembly is locked in place without allowing the media to decompress or "relax," thus maintaining media and column bed integrity. Recompression of the bed is not required, as it is for other packing methodologies.

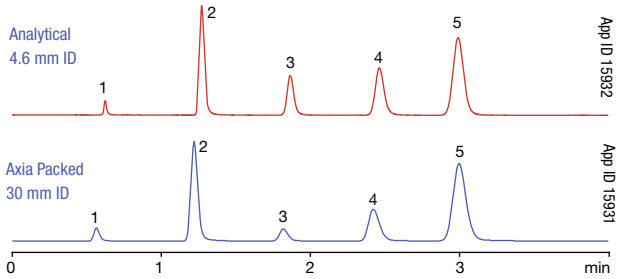
The result is an improved, repeatable packing process, giving preparative chromatographers:

- Extended column lifetime
- Column-to-column reproducibility
- Higher efficiency
- Improved peak shape
- Increased loadability
- Stability under high flow rates

## AXIA PACKING PROCESS




## HIGH EFFICIENCY IN A PREPARATIVE COLUMN




**Columns:** Synergi 4 µm Hydro-RP
**Dimensions:** 75 x 4.6 mm
75 x 30 mm Axia Packed
**Part No.:** 00C-4375-E0
00C-4375-U0-AX
**HPLC System:** Agilent 1100 (4.6 mm ID)
Gilson Preparative System (30 mm ID)
**Mobile Phase:** Water/Acetonitrile (35:65)
**Flow Rate:** 1.0 mL/min (4.6 mm ID)
43 mL/min (30 mm ID)

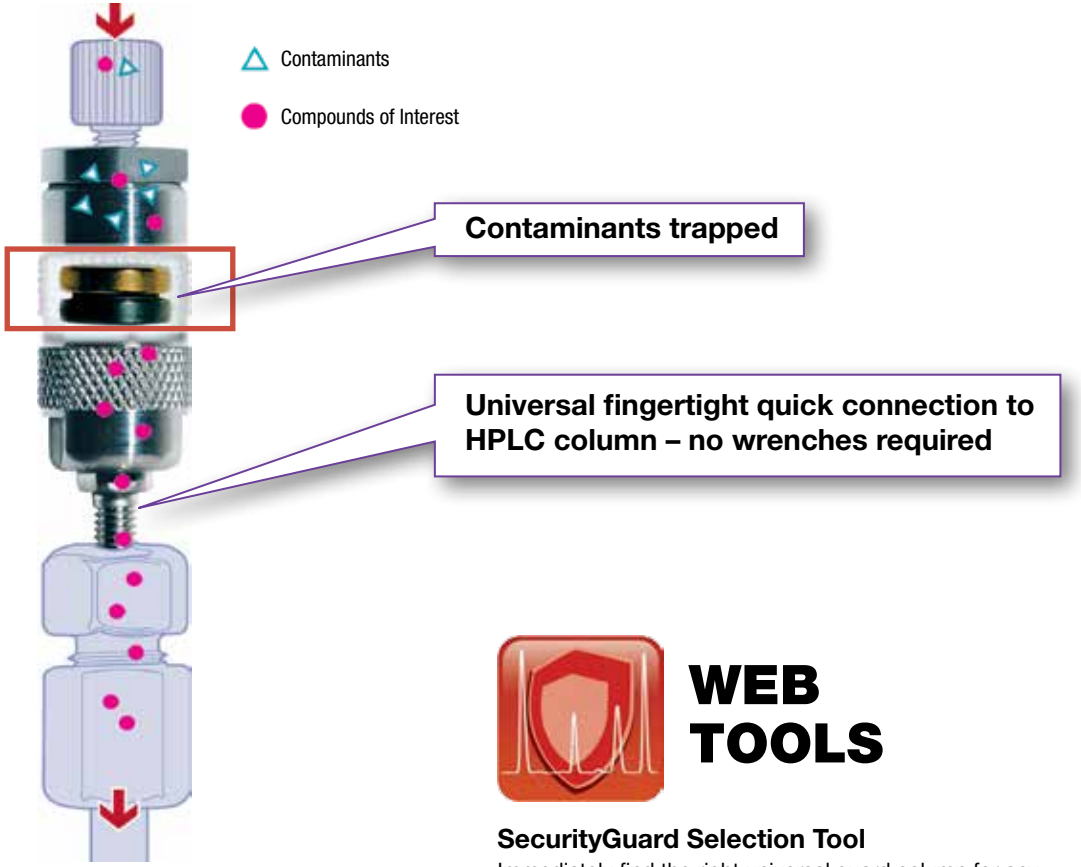
**Detection:** UV @ 254 nm
**Temperature:** Ambient
**Sample:** 1. Uracil
2. Acetophenone
3. Benzene
4. Toluene
5. Naphthalene

Visit **www.phenomenex.com/axia** to see our entire Prep column portfolio

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## PROTECT YOUR SYNERGI COLUMN

SecurityGuard is a universal HPLC guard cartridge system designed to protect all your valuable analytical and preparative HPLC columns from the damaging effects of chemical contaminants, without altering your chromatographic results.




## WEB TOOLS

**SecurityGuard Selection Tool**

Immediately find the right universal guard column for any HPLC/UHPLC analytical or preparative column at:

**www.phenomenex.com/GuardIt**

## VIRTUALLY NO CHANGE TO CHROMATOGRAPHY

SecurityGuard will protect your valuable HPLC columns, without altering your chromatographic results.




**Conditions for both columns:**

**Column:** Synergi 4 µm Max-RP
**Dimensions:** 250 x 4.6 mm
**Part No.:** 00G-4337-E0
**Mobile Phase:** Acetonitrile / Water (65:35)
**Flow Rate:** 1.0 mL/min
**Temperature:** 25 °C
**Detection:** UV @ 254 nm
**Injection Volume:** 1.0 µL

**Sample:** 1. Uracil
2. Acetophenone
3. Toluene
4. Naphthalene



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# ORDERING INFORMATION

## FAST LC SOLUTIONS



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

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

## CAPILLARY COLUMNS

| 4 µm Synergi Capillary 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 | 00F-4375-AF | 00G-4375-AF | 03M-4375-AC |
| Fusion-RP | 00B-4424-AC | 00F-4424-AC | 00F-4424-AF | — | 03M-4424-AC |

guarantee

If Synergi analytical columns do not provide at least an equivalent separation as compared to a competing column of similar particle size, similar phase and dimensions, return the column with your comparative data within 45 days for a FULL REFUND.

## MERCURY MS™ CARTRIDGE HOLDERS



Direct-Connect Holder



Standard Holder

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

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

## MERCURY MS SCREENING KITS

These convenient screening kits allow quick, easy and economical evaluation of multiple phases. Each kit contains one cartridge of each available phase and a standard holder. Available in either 3 µm or 5 µm Luna® with 2.5 µm Synergi.



| Screening Kits | |
|---|---|
| | 20 x 2.0 mm Kit |
| Kit A includes 1 ea of:<br>Luna 3 µm C18(2) Cartridge<br>Luna 3 µm C8(2) Cartridge<br>Synergi 2.5 µm Max-RP Cartridge<br>Synergi 2.5 µm Hydro-RP Cartridge<br>20 mm Standard Cartridge Holder | KH0-7333 |
| Kit B includes 1 ea of:<br>Luna 5 µm C18(2) Cartridge<br>Luna 5 µm C8(2) Cartridge<br>Synergi 2.5 µm Max-RP Cartridge<br>Synergi 2.5 µm Hydro-RP Cartridge<br>20 mm Standard Cartridge Holder | KH0-7335 |



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synergi™

# ORDERING INFORMATION

## HPLC COLUMNS

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

for ID: 2.0-3.0 mm

| 4 µm MidBore™ Bore Columns (mm) | | | | SecurityGuard™ Cartridges (mm) |
|---|---|---|---|---|
| Phases | 30 x 3.0 | 50 x 3.0 | 250 x 3.0 | 4 x 2.0* |
| | | | | /10 pk |
| Max-RP | — | 00B-4337-Y0 | 00G-4337-Y0 | AJ0-6073 |
| Hydro-RP | 00A-4375-Y0 | 00B-4375-Y0 | 00G-4375-Y0 | AJ0-7510 |
| Polar-RP | 00A-4336-Y0 | 00B-4336-Y0 | 00G-4336-Y0 | AJ0-6075 |
| Fusion-RP | — | 00B-4424-Y0 | 00G-4424-Y0 | AJ0-7556 |

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

for ID: 3.2-8.0 mm

## PREPARATIVE COLUMNS

| 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 | 00B-4337-P0-AX | 00D-4337-P0-AX | 00F-4337-P0-AX | 00G-4337-P0-AX | AJ0-7842 |
| Hydro-RP | 00B-4375-P0-AX | 00D-4375-P0-AX | 00F-4375-P0-AX | 00G-4375-P0-AX | AJ0-7843 |
| Polar-RP | 00B-4336-P0-AX | 00D-4336-P0-AX | 00F-4336-P0-AX | 00G-4336-P0-AX | AJ0-7845 |
| Fusion-RP | 00B-4424-P0-AX | 00D-4424-P0-AX | 00F-4424-P0-AX | 00G-4424-P0-AX | AJ0-7844 |
| **10 µm** | | | | | /ea |
| Max-RP | — | 00D-4350-P0-AX | Inquire | 00G-4350-P0-AX | AJ0-7842 |
| Hydro-RP | — | — | Inquire | 00G-4376-P0-AX | AJ0-7843 |
| Polar-RP | — | — | Inquire | 00G-4351-P0-AX | AJ0-7845 |
| Fusion-RP | — | — | Inquire | 00G-4425-P0-AX | AJ0-7844 |

for ID: 18-29 mm

| Axia™ Packed Preparative Columns (mm) continued | | | | | SecurityGuard™ Cartridges (mm) |
|---|---|---|---|---|---|
| Phases | 50 x 30 | 75 x 30 | 100 x 30 | 250 x 30 | 15 x 30.0♦ |
| **4 µm** | | | | Inquire | /ea |
| Max-RP | — | — | 00D-4337-U0-AX | 00G-4337-U0-AX | AJ0-8304 |
| Hydro-RP | 00B-4375-U0-AX | 00C-4375-U0-AX | 00D-4375-U0-AX | 00G-4375-U0-AX | AJ0-8305 |
| Polar-RP | 00B-4336-U0-AX | 00C-4336-U0-AX | 00D-4336-U0-AX | 00G-4336-U0-AX | AJ0-8307 |
| Fusion-RP | — | — | 00D-4424-U0-AX | — | AJ0-8306 |
| **10 µm** | | | | | /ea |
| Max-RP | 00B-4350-U0-AX | — | — | 00G-4350-U0-AX | AJ0-8304 |
| Hydro-RP | — | — | — | 00G-4376-U0-AX | AJ0-8305 |

for ID: 30-49 mm

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

for ID: 9-16 mm

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



### 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!





## 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 |
| Max-RP | 00G-4350-E0 | 00G-4350-N0 | AJ0-6074 | AJ0-7275 |
| Hydro-RP | 00G-4376-E0 | 00G-4376-N0 | AJ0-7511 | AJ0-7512 |
| Polar-RP | 00G-4351-E0 | 00G-4351-N0 | AJ0-6076 | AJ0-7276 |
| Fusion-RP | 00G-4425-E0 | 00G-4425-N0 | AJ0-7557 | AJ0-7558 |
| | | | for ID: 3.2-8.0 mm | 9-16 mm |

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

Larger quantities of bulk media available upon request.

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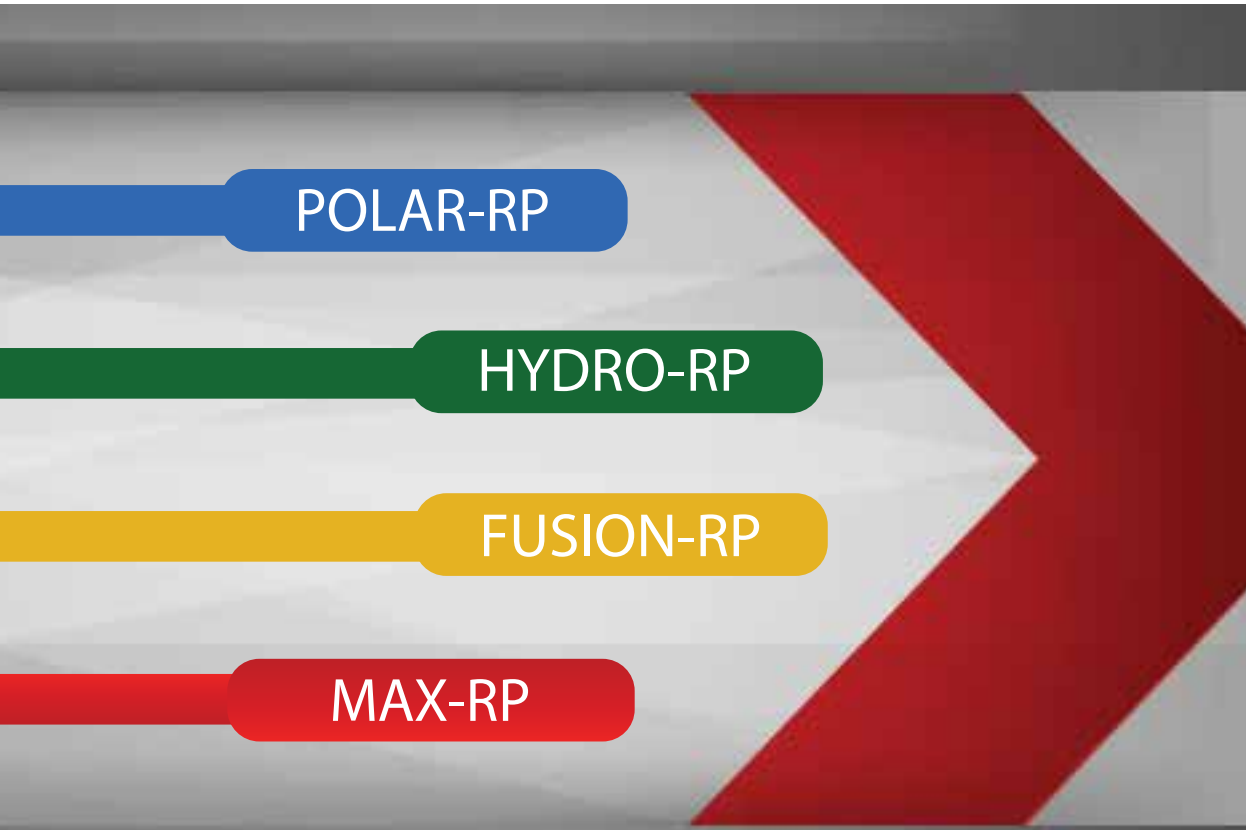
Axia column and packing technology is patented by Phenomenex, U.S. Patent No. 7,674,383

SecurityGuard is patented by Phenomenex, U.S. Patent No. 6,162,362
*Caution: This patent applies only 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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