

ZORBAX and Poroshell Families

# CHOICES TO GIVE YOU CONTROL AND CONFIDENCE, INCLUDING UNSURPASSED FAST LC CAPABILITIES

The Measure of Confidence



**Agilent Technologies**

DAY TO DAY, COLUMN TO COLUMN...

## YOU CAN TRUST THE ZORBAX NAME FOR SUPERIOR REPRODUCIBILITY AND LONG-TERM STABILITY

From research... to leading-edge method development... to routine quality assurance... Agilent ZORBAX LC columns are optimized for high resolution and high throughput analysis, and feature the sensitivity, accuracy, and reliability that demanding applications require.

Chromatographers around the world recognize the ZORBAX name as synonymous with high quality and reliability.

What's more, ZORBAX columns have been manufactured by Agilent for more than 40 years. We meticulously oversee every step of the manufacturing process – including rigorous physical and chromatographic testing – to ensure the highest reproducibility for your method.

### ZORBAX: leading the way in LC breakthroughs

**2001**

Poroshell 300 – a ZORBAX family column for biomolecules – took its place as the first superficially porous column.

**2003**

Agilent introduces our ZORBAX Rapid Resolution High Throughput (RRHT) column family – the industry's first sub-2  $\mu\text{m}$  columns.

**2006**

ZORBAX Eclipse Plus columns harness a unique bonding and endcapping process to deliver symmetrical peak shapes for basic compounds.

**2009**

ZORBAX Rapid Resolution High Definition (RRHD) columns become the only columns stable to 1200 bar, thanks to an innovative loading process. RRHD columns help chromatographers maximize the UHPLC performance of the 1290 Infinity LC.

**2010**

Agilent's unique single-step coacervation process for Poroshell 120 columns yields a more consistent final superficially porous particle – and more reliable results. This column innovation also enables analysts to produce UHPLC efficiency on conventional HPLC instruments.

**2012**

Agilent engineers new Fast Guards for UHPLC to deliver rugged protection for both sub-2  $\mu\text{m}$  and Poroshell 120 columns while delivering the same high resolution and speed you expect from Fast LC.

## “Why should I start my LC column search with Agilent’s ZORBAX family?”

Designed especially for high-productivity analysis (Fast LC), Agilent ZORBAX and Poroshell columns are the best first choice for an analysis, because they give you:

- **The productivity you need to stay ahead of your competition:** technological advances like sub-2 µm particles and superficially porous Poroshell 120 columns deliver increased speed and resolution.
- **Flexibility and method scalability** from lab to lab and around the world – for small molecule and biomolecule analyses.
- **Unbeatable chromatographic performance:** ZORBAX silica – the base silica used for all ZORBAX and Poroshell 120 columns – is ultra-pure, very strong, and highly uniform for ultimate reliability.
- **The broadest range of phases and column configurations** to suit your specific application needs.

*“We choose ZORBAX because we need a robust and reproducible column in our laboratory routine.”*

**D.W.,  
Pharmaceutical QA Lab**

*“ZORBAX columns are extremely stable and provide reproducible results over very long periods.”*

**R.M.,  
Pharmaceutical Lab**

*“Switching to ZORBAX has extended my column lifetime by 40%.”*

**S.R.,  
Independent Testing Laboratory**

## Find the Right Column for Your Separation

### Try the LC Column Navigator

With just a few mouse clicks, you can:

- Explore columns based on method parameters, compound, and USP method
- Find sample prep guidance and method optimization tips
- Get selection assistance from Agilent chromatography experts
- Obtain technical support contact information

Best of all, you can access the LC Column Navigator anywhere – in your lab or in the field – from your smart phone or tablet.

Get started now at [agilent.com/chem/navigator](http://agilent.com/chem/navigator)



To learn more about the latest advances in Fast LC, visit [agilent.com/chem/lccolumns](http://agilent.com/chem/lccolumns)

# Begin your method development with ZORBAX Eclipse Plus C18 columns for confident separations of acids, bases, and neutrals

Eclipse Plus C18 is the ZORBAX family's flagship bonded phase, delivering superior, reproducible separations of tough basic compounds, as well as acids and neutrals.

These go-to columns achieve their outstanding performance through eXtra-Dense Bonding, combined with a double-encapping process. Moreover, Eclipse Plus columns are manufactured with enhanced high-performance silica, advanced endcapping reagents, and a unique bonding process that is optimized for the improved silica. Together, these features let you:

- Achieve excellent peak shape for all compounds, to reduce the confusion of co-elution or hidden peaks.
- Significantly reduce tailing – to confidently resolve and quantitate difficult analytes.
- Perform ultra-fast, fast or conventional LC under a range of temperatures, pressures, and pH conditions.

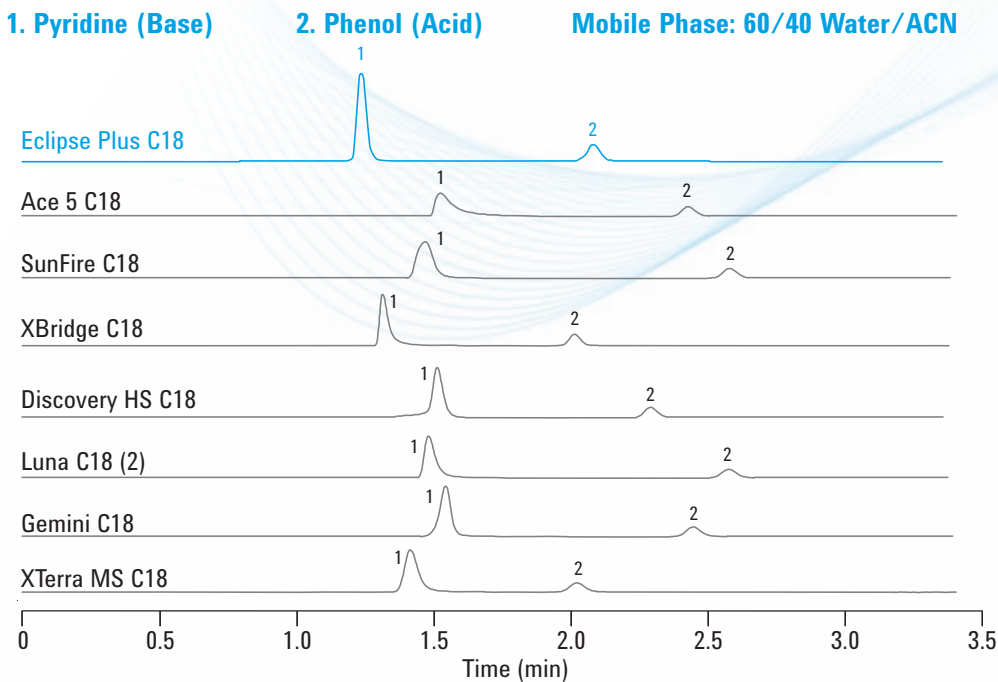
- Poroshell 120 EC-C18 is very similar in selectivity to Eclipse Plus C18, and an excellent first choice for method development for those seeking the benefits of superficially porous particle technology.

- Choose from a variety of column dimensions, based on your application needs:

- Fast LC 1.8  $\mu\text{m}$  Rapid Resolution High Definition (RRHD) columns (stable to 1200 bar)
- Rapid Resolution High Throughput columns (stable to 600 bar)
- Rapid Resolution 3.5  $\mu\text{m}$  and 5  $\mu\text{m}$  configurations

What's more, you can run, transfer, or replace existing HPLC methods from site to site without worrying about change or variability in your results. So the methods you create today won't have to be re-validated tomorrow.

## Outstanding Peak Shape for Bases



BEYOND C18:

## A VARIETY OF BONDED PHASES WITH ALTERNATE SELECTIVITIES PUTS *YOU* IN CONTROL

While ZORBAX Eclipse Plus C18 is a reliable column for method development, your sample is unique and you may need alternate selectivities to perfect your separation. In addition, some separations may be optimized with bonded phases other than C18.

That's why the ZORBAX column family has more than 18 phases to provide the alternate selectivities that certain applications require.

Here are a few examples...

If you need...	Choose this bonded phase...
A "next step" alternative to C18	ZORBAX Eclipse Plus Phenyl-Hexyl
Suitability for highly aqueous compounds	ZORBAX SB-Aq and Bonus-RP
Stability at lower pH values (1-2)	ZORBAX StableBond
Alternate selectivity for USP L60	ZORBAX Bonus-RP
Compatibility with LC/MS applications	ZORBAX Solvent Saver (3.0 mm id) ZORBAX NarrowBore (2.1 mm id) ZORBAX MicroBore (1 mm id)
Stability up to 1200 bar with more selectivity options for UHPLC	ZORBAX Rapid Resolution High Definition (RRHD)
Hydrophilic interaction chromatography (HILIC) for retention of polar analytes	ZORBAX HILIC Plus

ZORBAX columns are available in a range of dimensions from nano to Prep with choices for reversed-phase separations of proteins such as 300Å ZORBAX and Poroshell 300.



Agilent offers a complete line of sample preparation products to support LC and LC/MS applications.

The Agilent Bond Elut and Captiva Sample Prep families of products offer the largest choice of formats and widest range of solutions available in the market today.

Learn more at [agilent.com/chem/sampleprep](http://agilent.com/chem/sampleprep)

To learn more about the latest advances in Fast LC, visit [agilent.com/chem/lccolumns](http://agilent.com/chem/lccolumns)

WELCOME TO THE LATEST ADVANCE IN FAST LC

## AGILENT POROSHELL 120 COLUMNS CAN MAKE YOUR LAB'S LC & LC/MS SYSTEMS WORK EVEN HARDER

Poroshell 120 columns provide exceptional efficiency for standard HPLC, and significantly boost the performance you'll get from UHPLC instruments. They are designed to deliver:

- **Comparable speed and resolution to sub-2  $\mu\text{m}$  columns** with up to 50% less backpressure – so you can use Poroshell 120 columns on older HPLC instruments, and push your UHPLC instrument to a more productive flow rate.
- **Extraordinary lot-to-lot reproducibility:** Poroshell 120 columns are manufactured using a patented single-step porous shell process that dramatically reduces minute differences between columns and lots.
- **Superior peak shape** – especially at pH 6-7 – for faster, more accurate results.
- **High-quality separations and longer column life:** Poroshell 120 columns use a standard 2  $\mu\text{m}$  frit, which makes them an excellent choice for bioanalysis, and with “dirty” samples in food and environmental analysis. With Poroshell 120 Fast Guards for UHPLC, you can extend your column life even longer. You can also use the columns in series for exceptionally high efficiency.

- **Easy method transfer and scalability:** Poroshell 120 columns are manufactured in the same facility – with the same strong base silica – as the full ZORBAX family of columns, and are available in TWELVE phases that are all very similar to ZORBAX phases.

In addition, chromatographers have reported that Poroshell 120 columns demonstrate outstanding method ruggedness.

### A new particle technology designed for peak performance

Like all ZORBAX columns, Poroshell 120 columns are manufactured by Agilent. For Poroshell, we start with a solid core and coat it with a superficially porous outer layer (or “porous shell”) that provides significant speed and resolution advantages.

To ensure that Poroshell 120 columns would be the best columns for small-molecule separations, we reinvented our porous particle manufacturing process. Instead of traditional multi-layering, used by other manufacturers, Poroshell 120 columns are manufactured **using a proprietary single-step coacervation process** that produces a more consistent final particle – and more reliable chromatographic results.

*“The selectivity of [superficially porous] Poroshell 120 columns is identical to traditional particles. Identical column dimensions make them easy to use in established methods. We find that column-to-column reproducibility is very good.”*

**K.O., Pharmaceutical Manufacturer**

*“Poroshell is my go-to column”*

*“For complicated samples – which I face most – Poroshell 120 columns save me a lot of time”*

*“Reliably excellent performance... the new ‘standard’ in our lab”*

**Quotes from our Poroshell 120 columns customers**



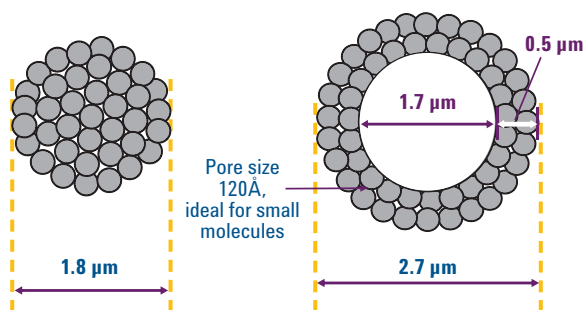
Poroshell 120 Fast Guards for UHPLC help extend your analytical column life without reducing Fast LC performance.

## Superficially porous microparticulate column packing

Poroshell 120 particles have a 1.7  $\mu\text{m}$  solid silica core with a 0.5  $\mu\text{m}$  porous outer layer to make a 2.7  $\mu\text{m}$  particle. This carefully selected configuration gives you all the performance advantages of sub-2  $\mu\text{m}$  particles with backpressure that is comparable to a sub-3  $\mu\text{m}$  particle.

1.8  $\mu\text{m}$  totally porous

Agilent Poroshell 120 2.7  $\mu\text{m}$



## USP method for Naproxen tablets – 4.5X faster analysis on Agilent Poroshell 120 at HPLC pressures

This Naproxen separation demonstrates how easy it can be to convert a method to Poroshell 120 columns *without changing the flow rate or mobile phase*.

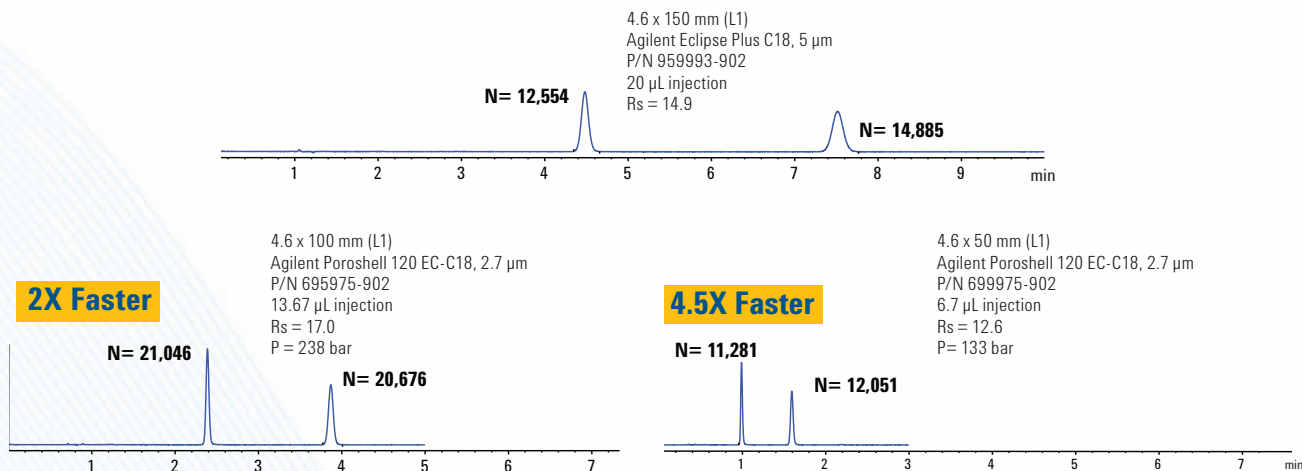
The **top** chromatogram shows a USP analysis on an Eclipse Plus C18 column, which delivers sharp peaks, three times the needed efficiency, and a resolution of 15.

In the **bottom left** chromatogram, the Poroshell 120 EC-C18 column (100 mm length) provides greater efficiency and resolution at *twice*

the speed of the original method. And because the pressure is only 238 bar, this isocratic method is an excellent HPLC option.

The Poroshell 120 EC-C18 column (50 mm length) on the **bottom right** chromatogram still meets the requirements for efficiency and resolution, but is 4.5 times faster than the 5  $\mu\text{m}$  column. Furthermore, the pressure is only 133 bar, which is very HPLC compatible.

### Method Requirement $N > 4000$ , $R_s$ better than 11.5



Agilent Poroshell 120 is an excellent choice for faster methods at HPLC pressures.

#### Common Conditions

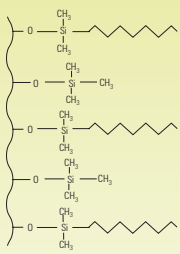
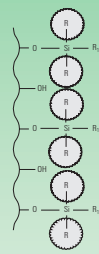
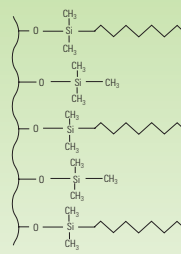
Mobile Phase: 50:49:1 MeCN:H<sub>2</sub>O  
 Acetic Acid  
 Flow Rate: 1.2 mL/min

Sample: 1. Naproxen  
 2. Butyrophene

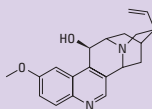
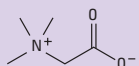
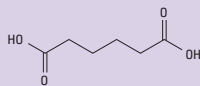
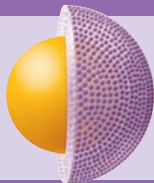
To learn more about the latest advances in Fast LC, visit [agilent.com/chem/lccolumns](http://agilent.com/chem/lccolumns)

# AGILENT LC COLUMNS OVERVIEW:

## A FAMILY OF PHASE CHOICES TO PERFECT EVERY SEPARATION

Start with Poroshell 120 for Fast LC performance on any HPLC – phases align with ZORBAX family			
Up to 50% less pressure than sub-2 µm; a total lab productivity enhancer			
1.7 µm solid core; 0.5 µm porous outer layer for a 2.7 µm particle, id: 4.6 mm, 3.0 mm, 2.1 mm, Lengths: 30-150 mm. Compatible with HPLC and UHPLC instruments. Suitable for analysis of acids, bases, and neutrals. Also great for peptide mapping. Poroshell 120 is for any lab looking for increased analytical speed and resolution with less backpressure.			
Poroshell 120 Family	<p><b>First place to start for Method Development</b></p> <p><b>Poroshell 120 EC-C18</b> (very similar to Eclipse Plus C18)</p> <p><b>Poroshell 120 EC-C8</b> (very similar to Eclipse Plus EC-C8)</p> <p><b>Poroshell 120 Phenyl-Hexyl</b> (very similar to Eclipse Plus Phenyl-Hexyl)</p>	<p><b>Poroshell 120 SB-C18</b> (very similar to ZORBAX StableBond SB-C18)</p> <p><b>Poroshell 120 SB-C8</b> (very similar to ZORBAX StableBond SB-C8)</p>	<p><b>Poroshell 120 EC-CN</b> (very similar to ZORBAX Eclipse XDB-CN)</p>
	<p><b>ZORBAX Eclipse Plus**</b></p> <p>RRHD: 1.8 µm, stable to 1200 bar RRHT: 1.8 µm, 600 bar Lengths: 30-250 mm id: 4.6 mm, 3.0 mm, 2.1 mm, 1.0 mm; Prep</p> <p><b>Great for Method Development</b></p> <p><b>C18 (USP L1)</b></p> <p><b>C8 (USP L7)</b></p> <p><b>Phenyl-Hexyl (USP L11)</b></p> <p><b>PAH (USP L1)</b></p>  <p><i>High performance and excellent peak shape with acids, bases and neutrals.</i></p> <p><b>Sample Applications</b> <b>Environmental:</b> EPA Method 1694, Illicit and prescribed drugs in wastewater <b>Food Safety:</b> Quinolone antibiotics <b>Pharmaceutical:</b> Chloramphenicol, Simvastatin, Chrysophenol (TCM), amphetamine, ranitidine</p> <p>■ Indicates specs for Poroshell 120</p> <p><b>Chemistry specs:</b> <b>Double-encapped</b> (except PAH, which is not endcapped); <b>Temp limit:</b> 60 °C; <b>Pore size:</b> 95Å, 120Å; <b>Surface area:</b> 160 m<sup>2</sup>/g, 130 m<sup>2</sup>/g; <b>Particle sizes:</b> 1.8, 3.5, 5, 2.7 µm; <b>pH:</b> 2.0-9.0 for C18 and C8; 2.0-8.0 for PAH and Phenyl-Hexyl; <b>Carbon load:</b> 9% for C18 (10% for Poroshell 120 EC-C18); 7% for C8 (8% for Poroshell 120 EC-C8); 9% for Phenyl-Hexyl; 14% for PAH</p>	<p><b>ZORBAX StableBond</b></p> <p>RRHD: 1.8 µm, stable to 1200 bar RRHT: 1.8 µm, 600 bar Lengths: 20-250 mm id: 4.6 mm, 3.0 mm, 2.1 mm, 1.0 mm; Prep, Capillary (C18)</p> <p><b>SB-C18 (USP L1)</b></p> <p><b>SB-C8 (USP L7)</b></p> <p><b>SB-C3 (USP L56)</b></p> <p><b>SB-Phenyl (USP L11)</b></p> <p><b>SB-CN (USP L10)</b></p> <p><b>SB-Aq</b></p>  <p><i>High performance with acids, bases, and neutrals with superior lifetime at low pH.</i></p> <p><b>Sample Applications</b> <b>Chemical/Industrial:</b> Triton <b>Environmental:</b> Organic acids, pesticides in drinking water <b>Food Safety:</b> Anthocyanine, parabens, melamine <b>Pharmaceutical:</b> Analgesics, anesthetics, traditional Chinese medicine</p> <p>■ Indicates specs for Poroshell 120</p> <p><b>Chemistry specs:</b> <b>Non-encapped; Temp limit:</b> 80 °C, 90 °C, 90 °C for SB-C18; <b>Pore size:</b> 80Å, 120Å; <b>Surface area:</b> 180 m<sup>2</sup>/g, 130 m<sup>2</sup>/g; <b>Particle sizes:</b> 1.8, 3.5, 5, 7, 2.7 µm; <b>pH:</b> 1.0-8.0, 0.8-8.0 for SB-C18; <b>Carbon load:</b> 10% for C18, 8%, 5.5% for C8, 4% for C3, 5.5% for Phenyl, 4% for CN, proprietary for Aq</p>	<p><b>ZORBAX Eclipse XDB</b></p> <p>RRHD: 1.8 µm, stable to 1200 bar RRHT: 1.8 µm, 600 bar Lengths: 15-250 mm id: 4.6 mm, 3.0 mm, 2.1 mm, 1.0 mm; Capillary and Prep</p> <p><b>C18 (USP L1)</b></p> <p><b>C8 (USP L7)</b></p> <p><b>Phenyl (USP L11)</b></p> <p><b>CN (USP L10)</b></p>  <p><i>Good peak shape for basic, acidic, and neutral compounds with high performance over a wide pH range (pH 2-9). eXtra Dense Bonding and double endcapping help give this column a long lifetime.</i></p> <p><b>Sample Applications</b> <b>Environmental:</b> Herbicides/pesticides, steroids in water <b>Food Safety:</b> Food colors, aromatic flavorings, mycotoxins, epoxyphenolic-based can coatings <b>Pharmaceutical:</b> Goldenseal and related alkaloids, antidepressants, triamcinolone</p> <p>■ Indicates specs for Poroshell 120</p> <p><b>Chemistry specs:</b> <b>Double-encapped; Temp limit:</b> 60 °C; <b>Pore size:</b> 80Å, 120Å; <b>Surface area:</b> 180 m<sup>2</sup>/g, 130 m<sup>2</sup>/g; <b>Particle sizes:</b> 1.8, 3.5, 5, 7, 2.7 µm; <b>pH:</b> 2.0-9.0, 2.0-8.0 for CN and EC-CN; <b>Carbon load:</b> 10% for C18, 7.6% for C8, 7.2% for Phenyl, 4.3% for CN, 3.5%</p>
ZORBAX Family	<p><b>Best all around – exceptional peak shape, efficiency, resolution, and lifetime</b></p>	<p><b>Best for low pH mobile phases – great for method development</b></p>	<p><b>High performance over a wide pH range</b></p>





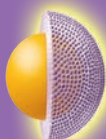
### Poroshell 120 HPH-C18 and HPH-C8

Unique-chemically modified for high pH stability

**Double-endcapped; Pore size:** 100Å;

**Surface area:** 95 m<sup>2</sup>/g;

**Temp limit:** 60 °C; **pH:** 3.0-11.0



### Poroshell 120 Bonus-RP and Poroshell 120 PFP

See Bonus-RP specs below.

**Poroshell 120 PFP:**

**Encapped; Pore size:** 120Å; **Surface area:** 130m<sup>2</sup>/g;

**Temp limit:** 60 °C; **pH:** 2.0-8.0; **Carbon load:** 5.1%

### Poroshell 120 SB-Aq

(very similar to ZORBAX SB-Aq)

**Poroshell 120 HILIC**

(very similar to ZORBAX HILIC Plus)

## POLAR Compounds

### ZORBAX Extend-C18

**RRHD:** 1.8 µm, stable to 1200 bar

**RRHT:** 1.8 µm, 600 bar

**Lengths:** 20-250 mm

**id:** 4.6 mm, 3.0 mm, 2.1 mm, 1.0 mm

**C18 (USP L1)**



*High efficiency and long life at high pH – up to pH 11.5. Improve retention, resolution and peak shape of basic compounds. High sensitivity for LC/MS separations of peptides. Unique bidendate bonding and double endcapping provides high pH stability.*

#### Sample Applications

**Environmental:** EPA 8330 (explosives)

**Food Safety:** Aflatoxins, mycotoxins

**Pharmaceutical:** Antihistamines, xanthines

#### Chemistry specs:

**Double-endcapped; Temp limit:** 60 °C; **Pore Size:**

80Å; **Surface area:** 180 m<sup>2</sup>/g; **Particle sizes:** 1.8,

3.5, 5 µm; **pH:** 2.0-11.5; **Carbon load:** 12.5%

### ZORBAX Bonus-RP

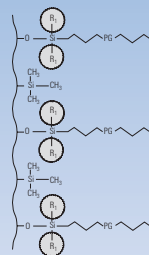
**RRHD:** 1.8 µm, stable to 1200 bar

**RRHT:** 1.8 µm, 600 bar

**Lengths:** 30-250 mm

**id:** 4.6 mm, 3.0 mm, 2.1 mm, 1.0 mm; Prep

**Bonus-RP (USP-L60)**



*Polar-embedded to improve peak shapes; for basic compounds at low and mid pH.*

#### Sample Applications

**Environmental:** Triazine pesticides

**Food Safety:** Hydroxymethylfurfural

**Pharmaceutical:** Antifungal medications, anorectics, ulcer medications

■ Indicates specs for Poroshell 120

#### Chemistry specs:

**Triple-endcapped; Temp limit:** 60 °C;

**Pore size:** 80Å, 120Å; **Surface area:** 180 m<sup>2</sup>/g,

130 m<sup>2</sup>/g; **Particle sizes:** 1.8, 3.5, 5, 2.7 µm;

**pH:** 2.0-9.0; **Carbon load:** 9.5%

### SB-AQ

**RRHD:** 1.8 µm, stable to 1200 bar

**RRHT:** 1.8 µm, 600 bar

**Lengths:** 20-250 mm

**id:** 4.6 mm, 3.0 mm, 2.1 mm; Prep

#### ZORBAX SB-Aq

*Proprietary phase ideal for polar compounds and high aqueous conditions.*

#### Sample Applications

**Environmental:** Pesticides in drinking water

**Food Safety:** Pesticides in food

**Pharmaceutical:** Water-soluble vitamins

See ZORBAX StableBond for specification and structure.

**Exceptional lifetime at low pH – no endcapping**

### HILIC

**RRHD:** 1.8 µm, stable to 1200 bar

**Lengths:** 50, 100, 150 mm

**id:** 4.6 mm (3.5 µm only), 3.0 mm, 2.1 mm

*HILIC Plus is a HILIC column based on Eclipse Plus silica for excellent peak shapes*

**Poroshell 120 HILIC:** 2.7 µm, stable to 600 bar

■ Indicates specs for Poroshell 120

#### Chemistry specs:

**Non-bonded silica; Pore size:** 95Å, 120Å;

**Surface Area:** 160 m<sup>2</sup>/g, 130 m<sup>2</sup>/g;

**Particle Sizes:** 1.8, 2.7, 3.5 µm **pH:** 0-8.0

**A good option for separations at high pH**

**Alternative selectivity to alkyl, phenyl, cyano phases**

**High sensitivity for LC/MS applications and recommended for EPA 1694**

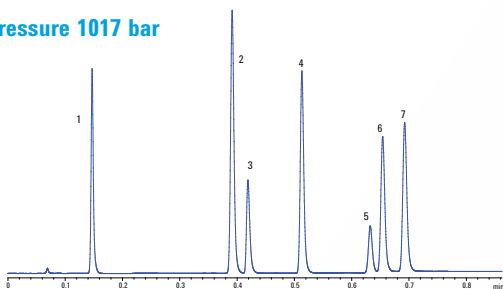
# Harness the full potential of UHPLC with our expanded selection of ZORBAX Rapid Resolution High Definition (RRHD) columns

Agilent RRHD columns are manufactured with a proprietary loading process that allows them to withstand UHPLC pressures. In fact, they are the *only* columns stable to 1200 bar. Choose from more than 12 phases, plus HILIC and multiple 300Å options for analysis of intact proteins and digests.

The RRHD family also includes our method-tested ZORBAX phases – including **Eclipse Plus**, **StableBond**, and specialty phases such as **Bonus-RP** – so you can reliably scale between conventional and UHPLC methods.

## Separation of Seven Biocides in 0.7 min on a ZORBAX RRHD Eclipse Plus C18 2.1 x 50 mm, 1.8 µm Column

Pressure 1017 bar



1. Kathon 1A
2. Kathon 1B
3. Carbenbazim
4. 1,2-Benzisothiazol-3(2H)-one
5. 2-Phenoxyethanol
6. Benzoic Acid
7. Methyl Paraben

**A: H<sub>2</sub>O (0.05 v% TFA)**

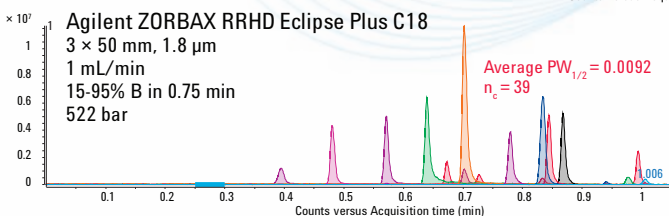
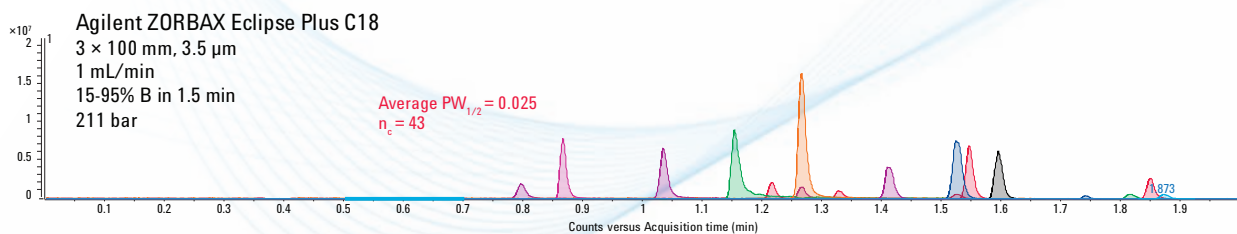
Time 0.0 95/5 A/B  
 Time 1.0 55/45 A/B  
 Time 1.1 0/100 A/B  
 Flow Rate: 1.7 mL/min;  
 1 µL injection; 50 ppm  
 std.; 30 °C

**B: ACN (0.04 v% TFA)**

DAD: 275 nm (0 min)  
 225 nm (0.46 min)  
 255 nm (0.67 min)

## New levels of sensitivity and resolution

By transferring your method to an Agilent RRHD column, you can enhance resolution for difficult analyses – allowing you to save time by using shorter columns without compromising performance.



A comparison of Agilent ZORBAX Eclipse Plus C18 columns with RRHD Eclipse Plus C18 columns. Scaling gradient methods according to column volume preserves selectivity during method transfer. The RRHD column saves analytical time without sacrificing performance.



RRHD Column

# Guard your Fast LC Column – without giving up Fast LC Performance

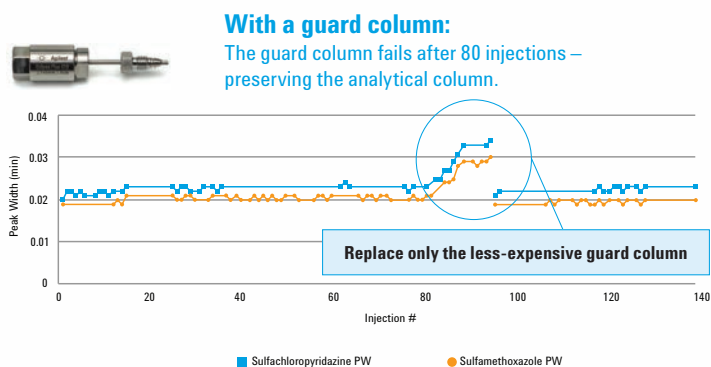
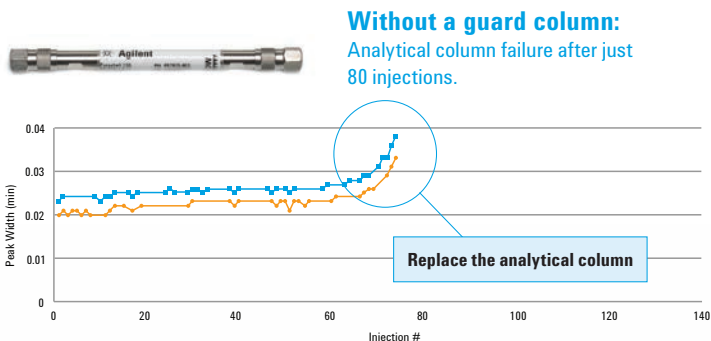
## Why use a guard column?

Simply put, guard columns can save your lab money by extending the life of your analytical column.

Installing a less expensive guard column – especially when analyzing dirty samples – prevents damage caused by particulate matter and strongly adsorbed material. As a guide, you should replace your guard column when the plate number, pressure, or resolution changes by more than 10%; however, you will need to make an exact determination based on your application.

The example here is an **accelerated lifetime test** with 300:1 water/similac with 0.1 mg sulfachloropyridazine and sulfamethoxazole.

Mobile phase:	A: 0.1% Formic acid in water B: Acetonitrile
Flow rate:	0.65 mL/min
Gradient:	Hold 10% B for 2 min, ramp to 45% B in 2 min
Injection volume:	10 $\mu$ L
Temperature:	23 $^{\circ}$ C
Detection:	Sig = 254, 4 nm; Ref = Off
Instrument:	Agilent 1200 Series RRLC
Sample preparation:	100 mL Water + 0.333 mL similac + 1 mL 0.1 mg/mL sulfachloropyridazine and sulfamethoxazole



Watch our video demonstration to learn how easy it is to install Agilent Fast Guard columns: [agilent.com/chem/poroshell120](http://agilent.com/chem/poroshell120)



## Flexible, cost-effective options for scaling and prep

Whether you are scaling up a routine analytical method... or maintaining precise separations throughout every phase of production, Agilent can help you rise to the challenge.

Visit [agilent.com/chem/prepscale](http://agilent.com/chem/prepscale) to learn more.



To learn more about the latest advances in Fast LC, visit [agilent.com/chem/lccolumns](http://agilent.com/chem/lccolumns)

## Perfect your separations with ZORBAX HPLC Method Development Kits

Agilent method validation kits put a variety of column chemistries and selectivities at your fingertips, so you can quickly adjust analyte retention and selectivity.

- **Our ZORBAX RRHD Eclipse Plus Kit** helps you achieve outstanding performance and peak shape for pH 2-9. The kit contains 3 Eclipse Plus phases – C18, C8, and Phenyl-Hexyl – for method development flexibility.
- **Our ZORBAX RRHD pH Method Kit** gives you more options when performing separations at varying pH levels. The kit includes three column phases: SB-C18 (for low pH), Eclipse Plus C18 (for pH 2-9), and Extend-C18 (for high pH).
- **ZORBAX RRHD and Poroshell 120 Aqueous Method Development Kits** are ideal for polar compounds and 100% aqueous conditions. The kit contains SB-Aq, Bonus-RP, and Phenyl-Hexyl bonded phases, which allow you to achieve greater analyte retention *without* the phase collapse that can occur with C18 chemistries.
- **Our Poroshell 120 L1, L7, and L10 USP Kit** makes it easier to improve speed and sample throughput – *without sacrificing resolution* – by transferring your 5 µm USP methods to Poroshell 120 columns. The kit offers three popular Poroshell 120 USP-designated chemistries: EC-C18 (L1), EC-C8 (L7), and EC-CN (L10).
- **Poroshell 120 Selectivity Kits** provide a variety of column chemistries and selectivities to help you perfect your separation. This Poroshell 120 kit includes three column phases: EC-C18, Phenyl-Hexyl, and Bonus-RP, which allow you to quickly adjust your analyte retention and selectivity by changing out the column.

### ZORBAX Method Development Kit Ordering Information

Kits (SAP Description)	Description	Dimension	Part No.
ZORBAX RRHD pH Method Development Kit	One of each: SB-C18, Eclipse Plus C18, and Extend-C18	2.1 x 50 mm	5190-6152
ZORBAX RRHD Eclipse Plus Method Development Kit	One of each: Eclipse Plus C18, Eclipse Plus C8, Eclipse Plus Phenyl-Hexyl	2.1 x 50 mm	5190-6153
ZORBAX RRHD Aqueous Method Development Kit	One of each: SB-Aq, Bonus-RP, Eclipse Plus Phenyl-Hexyl	2.1 x 50 mm	5190-6154
Poroshell 120 Selectivity Method Development Kit	One of each: EC-C18, Phenyl-Hexyl, Bonus-RP	2.1 x 50 mm	5190-6155
Poroshell 120 Selectivity Method Development Kit	One of each: EC-C18, Phenyl-Hexyl, Bonus-RP	4.6 x 50 mm	5190-6156
Poroshell 120 Aqueous Method Development Kit	One of each: SB-Aq, Phenyl-Hexyl, Bonus-RP	2.1 x 50 mm	5190-6157
Poroshell 120 Aqueous Method Development Kit	One of each: SB-Aq, Phenyl-Hexyl, Bonus-RP	4.6 x 50 mm	5190-6158
Poroshell 120 L1, L7, and L10 USP Method Development Kit	One of each: EC-C18, EC-C8, EC-CN	4.6 x 100 mm	5190-6159
Poroshell 120 L1, L7, and L10 USP Method Development Kit	One of each: EC-C18, EC-C8, EC-CN	3.0 x 100 mm	5190-6160

### Easy, Reliable pH Testing

Agilent offers a full line of pH meters and electrodes. Designed for chromatographers, these pH meters offer intuitive user design and exceptional ruggedness for your lab. **Agilent CrossLab electrodes are available for non-Agilent pH meters.**

Learn more at [agilent.com/chem/AgilentpH](http://agilent.com/chem/AgilentpH)



## Agilent 1200 Infinity Series

### Infinitely more confident execution of Fast LC applications

When you apply LC technologies to today's challenging analyses, accurate quantitation and precise retention times are critical.

**The Agilent 1200 Infinity Series** is designed to generate reliable data – regardless of variables such as pressure, flow, column dimension, and particle size. Whether you need a “workhorse” LC system for routine analysis or a sophisticated, high-resolution LC/MS system, the Agilent 1200 Infinity Series has what you're looking for.

Together with Agilent ZORBAX LC columns, our 1200 Infinity Series deliver ultimate resolution and sensitivity, while helping you boost your separation power per time. They also ensure easy method transferability between systems – without redevelopment or revalidation.



### Agilent 1290 Infinity LC *Infinitely more powerful*

Now you are no longer limited in your choice of column dimension, particle type, mobile and stationary phase, flow rate, or pressure. The **Agilent 1290 Infinity LC** gives you the foundation for method transfer to or from any Agilent or non-Agilent UHPLC or HPLC system. You also get the confidence that comes with high-performance features like binary pump, active damping, and Infinity Diode Array Detector.



### Agilent 1260 Infinity LC *Infinitely more confident*

Finally – an LC system that meets your demands for chromatographic performance while matching the constraints of your budget.

The **Agilent 1260 Infinity LC** sets a new standard for analytical HPLC with a 600 bar, high-speed 80 Hz detector, and up to 10x greater sensitivity. It is also 100% compatible with HPLC and RRLC.

To learn more about the Agilent 1200 Infinity Series, visit [agilent.com/chem/infinity](http://agilent.com/chem/infinity)

### You're just a few clicks away from a wealth of LC resources

Download the Infinity Series LC supplies catalog, Capillary Selection Guide and Sample Prep Selection Guides at: [agilent.com/chem/getguides](http://agilent.com/chem/getguides)

Get help selecting the right column; email us at: [lc-column-support@agilent.com](mailto:lc-column-support@agilent.com)

Access the RRHD product details and application notes: [agilent.com/chem/rrhd](http://agilent.com/chem/rrhd)

Learn more about the Poroshell 120 column family, including quick access to application notes: [agilent.com/chem/poroshell120](http://agilent.com/chem/poroshell120)



#### Download Agilent's LC Handbook

With tips and tools for working with HPLC – for your mobile device:

[agilent.com/chem/lchandbookmobile](http://agilent.com/chem/lchandbookmobile)

To learn more about the latest advances in Fast LC, visit [agilent.com/chem/lccolumns](http://agilent.com/chem/lccolumns)

## Agilent ZORBAX Rapid Resolution High Definition (RRHD) columns

Achieve true high-definition separations without sacrificing stability

Size (mm)	Particle Size (µm)	Eclipse Plus C18 (USP L1)	Eclipse Plus C8 (USP L7)	Eclipse XDB-C18 (USP L1)	Extend-C18 (USP L1)	Eclipse PAH (USP L1)	Eclipse Plus Phenyl-Hexyl (USP L11)	Bonus RP (USP L60)
<b>Columns</b>								
3.0 x 150	1.8	959759-302	959759-306	981759-302				
3.0 x 100	1.8	959758-302	959758-306	981758-302	758700-302	959758-318	959758-312	
3.0 x 50	1.8	959757-302	959757-306	981757-302	757700-302	959757-318	959757-312	
2.1 x 150	1.8	959759-902	959759-906	981759-902	759700-902	959759-918	959759-912	859768-901
2.1 x 100	1.8	959758-902	959758-906	981758-902	758700-902	959758-918	959758-912	858768-901
2.1 x 50	1.8	959757-902	959757-906	981757-902	757700-902	959757-918	959757-912	857768-901
<b>Guard Columns</b>								
3.0 x 5	1.8	823750-901		823750-903				
2.1 x 5	1.8	821725-901		821725-903				

Size (mm)	Particle Size (µm)	StableBond SB-C18 (USP L1)	StableBond SB-C8 (USP L7)	StableBond SB-Phenyl (USP L11)	StableBond SB-CN (USP L10)	StableBond SB-Aq	HILIC Plus
<b>Columns</b>							
3.0 x 150	1.8	859700-302	859700-306				
3.0 x 100	1.8	858700-302	858700-306	858700-312	858700-305	858700-314	959758-301
3.0 x 50	1.8	857700-302	857700-306	857700-312	857700-305	857700-314	959757-301
2.1 x 150	1.8	859700-902	859700-906	859700-912	859700-905	859700-914	959759-901
2.1 x 100	1.8	858700-902	858700-906	858700-912	858700-905	858700-914	959758-901
2.1 x 50	1.8	857700-902	857700-906	857700-912	857700-905	857700-914	959757-901
<b>Guard Columns</b>							
3.0 x 5	1.8	823750-902	823750-904				
2.1 x 5	1.8	821725-902	821725-904				

Wide pore options for biomolecules are also available. Learn more at [agilent.com/chem/advancebio](http://agilent.com/chem/advancebio)

## Agilent Poroshell 120 columns (2.7 µm)

High efficiency at lower pressures with proven column-to-column consistency

Size (mm)	EC-C18	EC-C8	SB-C18	SB-C8	HPH-C18	HPH-C8
4.6 x 150	693975-902	693975-906	683975-902	683975-906	693975-702	693975-706
4.6 x 100	695975-902	695975-906	685975-902	685975-906	695975-702	695975-706
4.6 x 75	697975-902	697975-906	687975-902			
4.6 x 50	699975-902	699975-906	689975-902	689975-906	699975-702	699975-706
4.6 x 30	691975-902	691975-906	681975-902			
3.0 x 150	693975-302	693975-306	683975-302	683975-306	693975-502	693975-506
3.0 x 100	695975-302	695975-306	685975-302	685975-306	695975-502	695975-506
3.0 x 75	697975-302	697975-306	687975-302			
3.0 x 50	699975-302	699975-306	689975-302	689975-306	699975-502	699975-506
3.0 x 30	691975-302	691975-306	681975-302			
2.1 x 150	693775-902	693775-906	683775-902	683775-906	693775-702	693775-706
2.1 x 100	695775-902	695775-906	685775-902	685775-906	695775-702	695775-706
2.1 x 75	697775-902	697775-906	687775-902			
2.1 x 50	699775-902	699775-906	689775-902	689775-906	699775-702	699775-706
2.1 x 30	691775-902	691775-906	681775-902			

Size (mm)	Phenyl-Hexyl	SB-Aq	Bonus-RP	HILIC	EC-CN	PFP
4.6 x 150	693975-912	683975-914	693968-901	693975-901	693975-905	693975-408
4.6 x 100	695975-912	685975-914	695968-901	695975-901	695975-905	695975-408
4.6 x 50	699975-912	689975-914	699968-901	699975-901	699975-905	699975-408
3.0 x 150	693975-312	683975-314	693968-301	693975-301	693975-305	693975-308
3.0 x 100	695975-312	685975-314	695968-301	695975-301	695975-305	695975-308
3.0 x 50	699975-312	689975-314	699968-301	699975-301	699975-305	699975-308
2.1 x 150	693775-912	683775-914	693768-901	693775-901	693775-905	693775-408
2.1 x 100	695775-912	685775-914	695768-901	695775-901	695775-905	695775-408
2.1 x 50	699775-912	689775-914	699768-901	699775-901	699775-905	699775-408

Note: Poroshell 120 columns have a 600 bar/9000 psi pressure limit.

## Agilent Poroshell 120 Fast Guards for UHPLC

Size (mm)	EC-C18	EC-C8	SB-C18	Phenyl-Hexyl	PFP
4.6 x 5	820750-911	820750-913	820750-912	820750-914	
3.0 x 5	823750-911	823750-913	823750-912	823750-914	
2.1 x 5	821725-911	821725-913	821725-912	821725-914	821725-915



## Agilent ZORBAX Rapid Resolution High Throughput (RRHT) columns, Stable to 600 Bar

Size (mm)	Particle Size (µm)	Eclipse Plus C18 (USP L1)	Eclipse Plus C8 (USP L7)	Eclipse Plus Phenyl-Hexyl (USP L11)	Eclipse Plus PAH (USP L1)
<b>Columns</b>					
4.6 x 100	1.8	959964-902	959964-906	959964-912	959964-918
4.6 x 75	1.8	959951-902			
4.6 x 50	1.8	959941-902	959941-906	959941-912	959941-918
4.6 x 30	1.8	959931-902	959931-906	959931-912	959931-918
3.0 x 100	1.8	959964-302	959964-306	959964-312	
3.0 x 50	1.8	959941-302	959941-306	959941-312	
2.1 x 100	1.8	959764-902	959764-906	959764-912	959764-918
2.1 x 50	1.8	959741-902	959741-906	959741-912	959741-918
2.1 x 30	1.8	959731-902	959731-906	959731-912	
<b>Guard Column</b>					
4.6 x 5	1.8	820750-901			
3.0 x 5	1.8	823750-901			
2.1 x 5	1.8	821725-901			



## Agilent ZORBAX Eclipse Plus 3.5 µm and 5 µm columns

Special bonding that delivers exceptional peak shapes for a broad range of analytes

Size (mm)	Particle Size (µm)	Eclipse Plus C18 (USP L1)	Eclipse Plus C8 (USP L7)	Eclipse Plus Phenyl-Hexyl (USP L11)	Eclipse Plus PAH (USP L1)
4.6 x 250	5	959990-902	959990-906	959990-912	959990-918
4.6 x 150	5	959993-902	959993-906	959993-912	959993-918
4.6 x 100	5	959996-902	959996-906	959996-912	959996-918
4.6 x 50	5	959946-902	959946-906		
3.0 x 250	5				959990-318
3.0 x 150	5	959993-302	959993-306		
2.1 x 250	5				959790-918
2.1 x 150	5	959701-902	959701-906	959701-912	959701-918
2.1 x 50	5	959746-902	959746-906		
4.6 x 150	3.5	959963-902	959963-906	959963-912	959963-918
4.6 x 100	3.5	959961-902	959961-906	959961-912	959961-918
4.6 x 75	3.5	959933-902	959933-906	959933-902	
4.6 x 50	3.5	959943-902	959943-906	959943-912	959943-918
4.6 x 30	3.5	959936-902	959936-906	959936-912	
3.0 x 150	3.5	959963-302	959963-306	959963-312	
3.0 x 100	3.5	959961-302	959961-306	959961-312	
2.1 x 150	3.5	959763-902	959763-906	959763-912	
2.1 x 100	3.5	959793-902	959793-906	959793-912	959793-918
2.1 x 50	3.5	959743-902	959743-906	959743-912	
2.1 x 30	3.5	959733-902	959733-906	959733-912	

To place your order now and view a complete list of Agilent LC columns, visit [agilent.com/chem/lccolumns](http://agilent.com/chem/lccolumns)

## Agilent's ZORBAX LC column family

Results you can trust across broad separation conditions

- **Superior choice and flexibility** for small molecule and reversed-phase biomolecule analysis with more than 18 phases, including Eclipse Plus and HILIC
- **Easy method development** starting with ZORBAX Eclipse Plus C18 for excellent performance across analytes and conditions
- **Cutting-edge Fast LC** with advances such as superficially porous Poroshell 120 columns for faster analysis and high resolution on any HPLC or UHPLC
- **UHPLC method refinement** via ZORBAX RRHD 1.8  $\mu\text{m}$  columns (stable to 1200 bar)
- **Performance, reproducibility, and value** – *proven* through millions of injections
- **Exceptional peak shape performance** through proven and innovative silica and bonding technologies
- **The long-term confidence** of superior prep and scalability across the entire family, and the knowledge that the choices you need for analytical and preparative separations are available when you need them.

You also have access to Agilent's extensive applications library for faster method development – plus worldwide technical support, speedy problem resolution, and our global infrastructure and delivery network.

Find the right column for your separation at

[agilent.com/chem/navigator](http://agilent.com/chem/navigator)



### Agilent Chemistries:

Keeping you in command of your analyses

In addition to ZORBAX columns for small molecule and biomolecule reversed-phase analysis, we offer columns with alternate selectivities – plus a range of biocolumns for fast separation and characterization of biomolecules using techniques such as size exclusion, ion exchange, affinity, and HILIC.

Agilent's meticulous production oversight also ensures column and sample prep consistency and performance. With more than 40 years of experience in producing polymers and silica chemistries, our team is committed to continuously developing new advances that make you most productive.

**Learn more** about Agilent AdvanceBio

Reversed-Phase Columns by requesting

publication 5991-2348EN: *Keys for*

*Enabling Optimum Peptide Characterizations -*

*A Peptide Mapping "How to" Guide: [agilent.com/chem/getbioguides](http://agilent.com/chem/getbioguides)*



To learn more about Agilent ZORBAX columns, visit us online at [agilent.com/chem/lccolumns](http://agilent.com/chem/lccolumns)

In the U.S. and Canada, call toll free: **1-800-227-9770**, option 3, then option 3 again

In other countries, please call your local Agilent Representative or Agilent Authorized Distributor – see [agilent.com/chem/contactus](http://agilent.com/chem/contactus)

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