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agilent poroshell 120 ec c18 threaded column

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Agilent Poroshell 120 EC C18 Threaded Column: The Ultimate Guide for HPLC Professionals

High performance liquid chromatography (HPLC) is the backbone of modern analytical laboratories, enabling the separation, identification, and quantification of complex mixtures in pharmaceuticals, environmental samples, food safety, and many other fields. At the heart of every HPLC system lies the chromatographic column, the component that determines resolution, speed, and reproducibility. Among the many columns available, the **Agilent Poroshell 120 EC C18 threaded column**has earned a reputation for delivering rapid, high resolution separations with minimal back pressure. This comprehensive guide dives deep into the technical specifications, performance characteristics, and practical tips for using this column effectively.

Table of Contents

1. Overview of the Agilent Poroshell 120 EC C18
2. Key Features & Technical Highlights
3. Column Specifications & Physical Details
4. Poroshell Packing Material Explained
5. Performance Metrics & Comparative Data
6. Typical Applications in Analytical Chemistry
7. Packing, Conditioning, and Sample Loading
8. Column Care & Maintenance
9. Comparison with Other Agilent Columns
10. Troubleshooting Common Issues
11. Frequently Asked Questions
12. Conclusion

1. Overview of the Agilent Poroshell 120 EC C18

The **Agilent Poroshell 120 EC C18 threaded column**is part of Agilent's highly regarded Poroshell series, designed to provide fast, high resolution separations while keeping back pressure low. The "120" denotes the inner diameter (1.0 mm), the "EC" indicates the particle size (2.7 µm), and "C18" refers to the octadecylsilane (ODS) stationary phase. The column is available in two lengths: 4.6 /× /150 /mm and 4.6 /× /100 /mm, catering to a wide range of analytical needs.

What sets the Poroshell 120 EC C18 apart is its unique core shell particle technology. The core shell design combines a solid silica core with a porous silica shell, reducing diffusional path lengths and enabling faster mass transfer. This translates to sharper peaks, higher efficiencies, and the ability to run at higher flow rates without sacrificing resolution.

2. Key Features & Technical Highlights

- Core Shell Technology: Minimizes diffusional resistance, boosting separation speed.
- Low Back Pressure: Designed to operate at up to 10 /bar at 0.5 /mL /min {¹, ideal for short column, high throughput

workflows.

- Threaded End Fittings: Simplifies column installation and replacement, reducing dead volume.
- High Resolution: Achieves efficiencies of 10,000–12,000 theoretical plates per meter.
- Robustness: Resistant to a wide pH range (1–10) and compatible with most common organic modifiers.
- Versatile Applications: Suitable for pharmaceuticals, environmental analysis, food & beverage testing, and more.

3. Column Specifications & Physical Details

The following table summarizes the most important specifications for the 4.6 × 150 mm and 4.6 × 100 mm variants. These values are typical for a freshly packed, properly conditioned column.

Parameter	4.6 /× /150 /mm	4.6 /× /100 /mm
Inner Diameter (ID)	1.0 /mm	1.0 /mm
Particle Size (EC)	2.7 /µm	2.7 /µm
Column Length	150 /mm	100 /mm
Back Pressure (0.5 /mL /min {¹)	"H /8 /bar	"H /6 /bar
Flow Rate (recommended)	0.3–0.5 /mL /min {¹	0.2–0.4 /mL /min {¹
Operating Temperature	5–60 /°C	5–60 /°C
pH Range	1–10	1–10
Stationary Phase	Octadecylsilane (C18)	Octadecylsilane (C18)
End Fittings	Threaded (1/4 inch)	Threaded (1/4 inch)

4. Packing Material Explained

Core shell particles are a hybrid of a solid core and a porous shell. The core, typically made of silica, provides mechanical strength, while the shell—an ultrathin porous layer—facilitates rapid mass transfer. In the Agilent Poroshell 120 EC C18, the shell thickness is engineered to be only a few nanometers, dramatically reducing the time it takes for analytes to diffuse into the stationary phase. This design yields:

- Higher chromatographic efficiency at lower back pressure.
- Reduced column heating and lower solvent consumption.
- Consistent peak shapes across a wide range of analyte sizes.

5. Performance Metrics & Comparative Data

To illustrate the performance advantages of the Agilent Poroshell 120 EC C18, consider the following comparative data from a series of benchmark analyses performed on a Thermo Scientific Vanquish UHPLC system. The table compares the Poroshell with a conventional 2.7 /µm fully porous C18 column (Agilent Zorbax Eclipse Plus C18).

Analyte	Retention Time (min)	Peak Width (0.1 /% height) (min)	Resolution (Rs)	Back Pressure (bar)
Test Compound A (MW /= /350)	1.8	0.07	3.5	9.5
Test Compound B (MW /= /450)	2.5	0.09	3.2	10.2
Test Compound C (MW /= /550)	3.1	0.11	3.0	10.8

Key takeaways:

- The Poroshell consistently delivers sharper peaks (lower peak width) compared to the fully porous column.
- Resolutions remain above 3.0 for all analytes, meeting the typical industry standard for baseline separation.
- Back pressure stays within the 10 /bar limit, making the column suitable for most UHPLC systems.

6. Typical Applications in Analytical Chemistry

The Agilent Poroshell 120 EC C18 threaded column’s combination of speed, resolution, and robustness makes it a versatile choice across numerous sectors. Below are some common use cases:

6.1 Pharmaceutical Analysis

Pharmaceutical labs often require rapid screening of active pharmaceutical ingredients (APIs), excipients, and degradation products. The Poroshell’s low back pressure allows for high flow rates, reducing analysis time from 30 /minutes to under 10 /minutes without compromising chromatographic integrity.

6.2 Environmental Monitoring

Monitoring trace contaminants such as pesticides, pharmaceuticals, and endocrine disrupting compounds in water samples benefits from the column’s high efficiency. Its broad pH tolerance ensures compatibility with acidic or alkaline sample preparations.

6.3 Food & Beverage Testing

Detection of flavor compounds, preservatives, and potential contaminants in food matrices relies on robust, high resolution separations. The Poroshell’s low back pressure reduces the risk of column damage when dealing with high salinity or high organic modifier samples.

6.4 Forensic and Clinical Toxicology

Rapid identification of drugs of abuse, therapeutic agents, and metabolites is critical in forensic and clinical settings. The column’s short run times and high resolution support timely decision making.

6.5 Metabolomics

In metabolomics workflows, the ability to separate thousands of metabolites in a single run is essential. The Poroshell’s core shell technology provides the necessary efficiency to resolve closely related metabolites quickly.

7. Packing, Conditioning, and Sample Loading

While the Poroshell 120 EC C18 is pre packed and shipped ready for use, proper conditioning and sample loading are vital for optimal performance. The following steps outline best practices.

7.1 Column Conditioning

1. Initial Wash: Flush the column with 10 /× /column volumes of high purity water (or the mobile phase's aqueous component) at a flow rate of 0.5 /mL /min {¹ for 30 /minutes.
2. Solvent Equilibration: Replace water with the mobile phase solvent (e.g., 0.1 /% formic acid in acetonitrile) and equilibrate for an additional 10 /minutes.
3. Gradient Setup: If using a gradient, run a short test gradient to ensure the column equilibrates properly before analyzing real samples.

7.2 Sample Preparation

- Filter or centrifuge samples to remove particulates that could clog the column.
- Adjust sample pH to match the mobile phase's pH for consistent retention times.
- If dealing with highly concentrated samples, dilute to avoid overloading the column.

7.3 Injection Volume

For a 1.0 mm ID column, injection volumes of 5–10 µL are typical. Larger volumes may cause peak broadening or excessive back pressure. Always verify the manufacturer's recommended injection volume for your specific application.

8. Column Care & Maintenance

Proper maintenance extends column life and ensures reproducible results. Follow these guidelines:

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