

## Application Note 181

# Ascentis® Express: A Fused-Core™ Particle HPLC Column for High Speed and High Efficiency Separations with Low Back Pressures

*Ascentis Express columns provide a breakthrough in HPLC column performance. Based on Fused-Core particle technology, Ascentis Express provides the benefits of high speed and high efficiencies of sub-2 μm particles but at much lower backpressure. Due to the high efficiencies at low backpressures, Ascentis Express can benefit both conventional HPLC users as well as UPLC™ or other ultra pressure system users.*

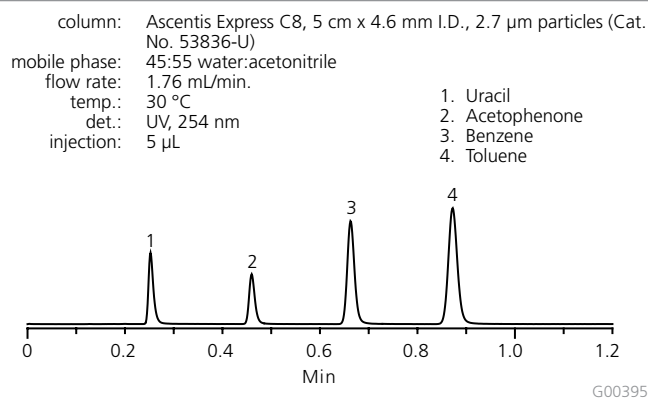
Increasing speed and resolution of HPLC analyses are drivers for innovation in both HPLC column and hardware design. To date, reducing particle size has been the strategy of many column manufacturers. Smaller particles result in flatter van Deemter curves allowing for higher flow rates while still maintaining near maximum efficiencies. The cost for the improved efficiencies is higher column backpressures. To obtain the benefit of the sub-2 μm particles, instrumentation beyond conventional HPLC is required.

The Fused-Core particle consists of a 1.7 μm solid core and a 0.5 μm porous shell. A major benefit of the Fused-Core particle is the small diffusion path (0.5 μm) compared to conventional fully porous particles. The shorter diffusion path reduces axial dispersion of solutes and minimizes peak broadening. In fact, Ascentis Express columns are able to achieve efficiencies of 240,000 N/m, which is similar to that obtained with sub-2 μm particle columns, even though the backpressures are only 50% of that achieved under similar conditions with sub-2 μm particles. This means that Ascentis Express can turn almost any HPLC system into an extreme performance workhorse for your lab.

### Experimental Conditions

Shown in Figure 1 is the HPLC chromatogram of a mix of polar and non-polar analytes.

**Figure 1. HPLC Chromatogram of a Mix of Polar and Non-Polar Analytes on Ascentis Express**



The chromatogram illustrates the high speed capabilities as well as high efficiencies of the Ascentis Express at low back pressures. Table 1 provides a summary of the performance parameters of Figure 1.

**Table 1. Summary of Efficiency, Backpressure, and Speed for Figure 1**

Column	Efficiency (N) Toluene	Backpressure (psi)	Runtime
Ascentis Express C8, 5 cm x 4.6 mm	11,000	2,300	< 1 minute

### Results and Discussion

Conventional HPLC users, as well as conventional UPLC users, can realize the benefits of Ascentis Express. Table 2 outlines strategies for maximizing speed or efficiency of any HPLC or UPLC system by simply utilizing Ascentis Express HPLC Columns.

**Table 2. Strategies for Improving LC Performance by Using Ascentis Express**

Desired Improvement	Current Particle	Change in Column Dimension with Ascentis Express	Change in Flow Rate with Ascentis Express	Change in Backpressure	Resulting Improvement
Speed	Sub-2 µm	Same as current	Double	None	Double the speed with equivalent plates
Efficiency	Sub-2 µm	Double the length	Same as current	None	Double the plates
Efficiency	3 µm	Same as current	Same as current	None	Double the plates

## Ordering Information

### Ascentis Express

Column Dimensions	C18	C8
3 cm x 2.1 mm I.D.	<b>53802-U</b>	<b>53839-U</b>
5 cm x 2.1 mm I.D.	<b>53822-U</b>	<b>53831-U</b>
7.5 cm x 2.1 mm I.D.	<b>53804-U</b>	<b>53843-U</b>
10 cm x 2.1 mm I.D.	<b>53823-U</b>	<b>53832-U</b>
15 cm x 2.1 mm I.D.	<b>53825-U</b>	<b>53834-U</b>
3 cm x 3.0 mm I.D.	<b>53805-U</b>	<b>53844-U</b>
5 cm x 3.0 mm I.D.	<b>53811-U</b>	<b>53848-U</b>
7.5 cm x 3.0 mm I.D.	<b>53812-U</b>	<b>53849-U</b>
10 cm x 3.0 mm I.D.	<b>53814-U</b>	<b>53852-U</b>
15 cm x 3.0 mm I.D.	<b>53816-U</b>	<b>53853-U</b>
3 cm x 4.6 mm I.D.	<b>53818-U</b>	<b>53857-U</b>
5 cm x 4.6 mm I.D.	<b>53826-U</b>	<b>53836-U</b>
7.5 cm x 4.6 mm I.D.	<b>53819-U</b>	<b>53858-U</b>
10 cm x 4.6 mm I.D.	<b>53827-U</b>	<b>53837-U</b>
15 cm x 4.6 mm I.D.	<b>53829-U</b>	<b>53838-U</b>

## Conclusions

Ascentis Express with Fused-Core particles is an excellent choice for improving any HPLC system. The combination of low backpressures and high efficiencies allows for greater column length and flow rate flexibility than offered by sub-2 µm columns under any given pressure limitation.

### Trademarks

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 UPLC — Waters Corp.

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