

Introducing Ascentis® Express....

Now, High Speed and High Efficiency HPLC Separations are Possible on Any LC System

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Designed for high speed and high resolution, Ascentis Express has all the efficiency benefits of sub-2 μm particles, but without the high column backpressure that restricts the use of sub-2 μm particles to ultra high pressure instruments.

Supelco customers and Reporter readers who have followed the chronology of new HPLC product introductions by Supelco over the past decade will likely notice our

Ascentis Express provides extreme performance on any HPLC, LC-MS or UPLC™ or other ultra-high pressure LC system:

- Hyper-Fast
- High Definition "HD"-Resolution
- Super Sensitive
- Super Rugged

emphasis on using the power of bonded phase and particle chemistry to improve resolution. Through our unique bonded phases, surface treatments and particle chemistries, we sought to improve resolution by increasing retention and relative retention of analytes.

Although we will continue to introduce new and unique chemistries, in parallel we have also been active in improving the kinetics of the separation process by modifying the physical structure of the underlying support platform. In this article, we will describe a new HPLC column, Ascentis Express, which is based on unique Fused-Core™ technology invented by HPLC pioneer Jack Kirkland.

Exceeding the Performance of Other "Fast" HPLC Particles

Designed to deliver speed and resolution on all LC systems, Ascentis Express meets and exceeds the benefits of competitive particles, including 3 μm and sub-2 μm particles. Under the same conditions, Ascentis Express columns deliver the same efficiencies at half the backpressure of sub-2 μm particles and nearly twice the efficiency of 3 μm particles.

Compared to sub-2 μm particles:

Advantage: Ascentis Express columns can be run successfully on conventional, mid-pressure and ultra high pressure HPLC and LC-MS instruments.

Advantage: Double the column length. Longer Ascentis Express columns can be used, giving additional resolving power.

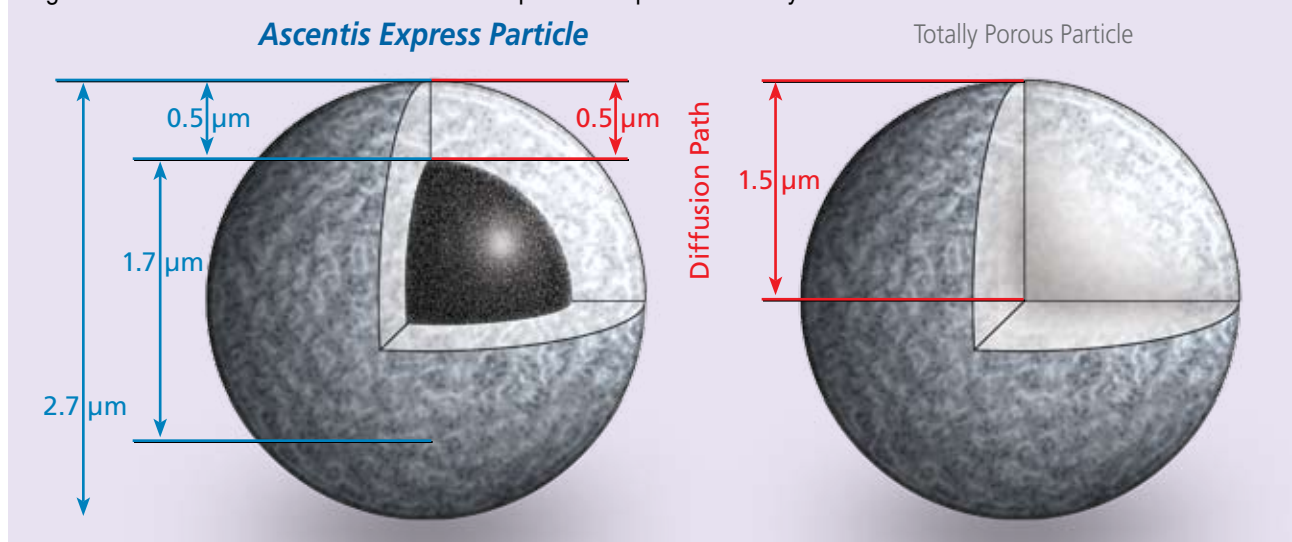
Advantage: Double the flow rate. Run Ascentis Express columns at higher flow rates for faster analyses.

Compared to 3 μm particles:

Advantage: Double the efficiency. Ascentis Express columns have nearly twice the column efficiency of 3 μm particles.

(continued on page 4)

Figure 1. Fused-Core Structure of Ascentis Express Compared to Totally Porous Particles



(continued from page 3)

The Particle Platform Innovations Behind Ascentis Express

Like most modern HPLC particles, Ascentis Express particles are high surface area spheres made from high purity silica gel. The total particle diameter is 2.7 μm . However, here the comparison ends. What sets apart Ascentis Express from conventional HPLC particles is the patent pending Fused-Core technology. Ascentis Express particles comprise a solid 1.7 μm diameter silica core that is encapsulated in a 0.5 μm thick layer of porous silica gel (Figure 1, page 3).

There are six distinct properties of Ascentis Express particles that account for their high performance and are worth emphasizing:

1. The solid core

Because of the solid core, analytes cannot diffuse as deeply into the particle, resulting in less band broadening, and hence higher efficiency and sensitivity, compared to totally porous particles of the same diameter.

2. The 0.5 μm porous shell surrounding the solid core

The porous shell gives the particles a surface area comparable to totally porous particles for excellent phase loading and sample capacity.

3. The total particle diameter (2.7 μm)

Compared to sub-2 μm porous particles, Ascentis Express yields half the column backpressure, allowing longer columns and faster flow rates (Figures 2 and 3).

Compared to 3 μm porous particles, Ascentis Express yields nearly twice the efficiency (Figure 4).

4. The narrow particle size distribution.

Compared to both sub-2 μm and 3 μm particles, Ascentis Express provides longer column lifetime because the narrow particle size distribution allows us to use larger pore size frits (2 μm vs. 0.5 μm) that are less susceptible to fouling.

5. The high particle density

By virtue of the solid core, Ascentis Express particles yield a more densely packed bed for added stability and long column lifetime.

6. The high purity, type-B silica

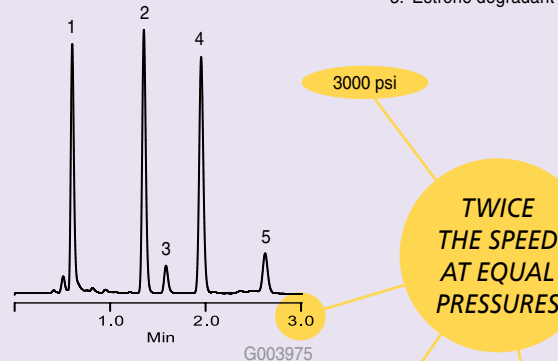
Excellent peak shape on Ascentis Express is ensured because of the absence of highly adsorptive active sites, including metal ions and certain types of free silanol groups.

Figure 2. Hyper-Fast Separations on Ascentis Express

column: Ascentis Express C18, 10 cm x 2.1 mm I.D., 2.7 μm particles (53823-U) and sub-2 μm particle column (same dimensions)
mobile phase: 49:51 or 55:45, water:acetonitrile
flow rate: 0.4 or 0.2 mL/min.
temp.: ambient
det.: UV at 200 nm
injection: 1 μL

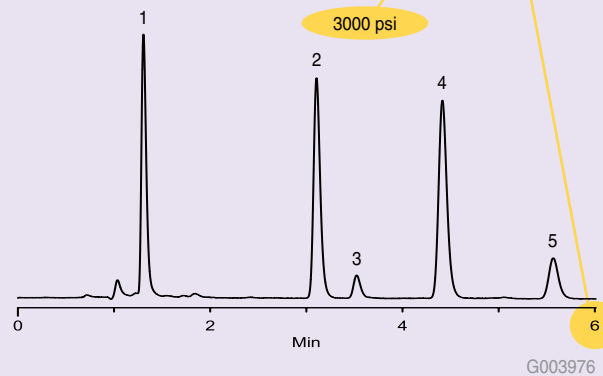
Ascentis Express C18

0.4 mL/min flow rate



Sub-2 μm competitor 2

0.2 mL/min flow rate



Ascentis Express: High Speed, High Efficiency Separations Adaptable Equally to R&D and Routine Analysis Settings

The recent introduction of UPLC™ and other ultra high pressure LC systems addressed the need for high throughput separations. However, speed is not the only important criteria: the need for more sensitivity, more resolution and improved ruggedness of the technique has led to a continual stream of new LC and LC-MS instruments. Coupled with the large installed base of conventional HPLC instruments, the result is that most laboratories have a mixture of instruments, old and new. Whereas columns packed with sub-2 μm particles require ultra high pressure instruments, Ascentis Express columns can be run on any LC system. Methods developed on Ascentis Express can be readily and reliably validated and transferred from R&D to routine analysis labs, whether across the building or across the world.

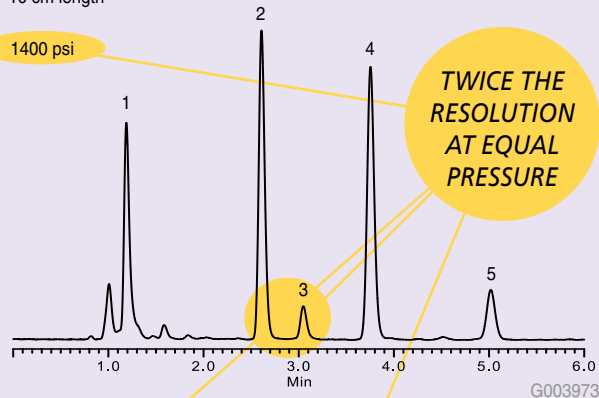
Figure 3. HD-Resolution on Ascentis Express Compared to Sub-2 μm Columns

column: Ascentis Express C18, 10 cm x 2.1 mm I.D., 2.7 μm particles (53823-U) and sub-2 μm particle column, 5 cm x 2.1 mm I.D.
mobile phase: 55:45 or 54:46, water:acetonitrile
flow rate: 0.2 mL/min.
temp.: ambient
det.: UV at 200 nm
injection: 1 μL

1. Estradiol
2. β -Estradiol
3. Impurity
4. Estrone
5. Estrone degradant

Ascentis Express C18

10 cm length



C18 Sub-2 μm
5 cm length

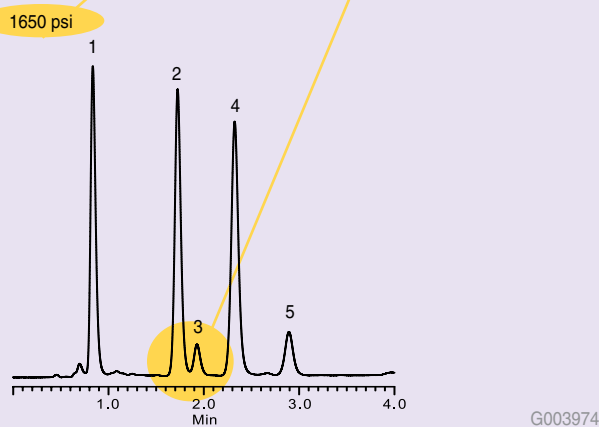


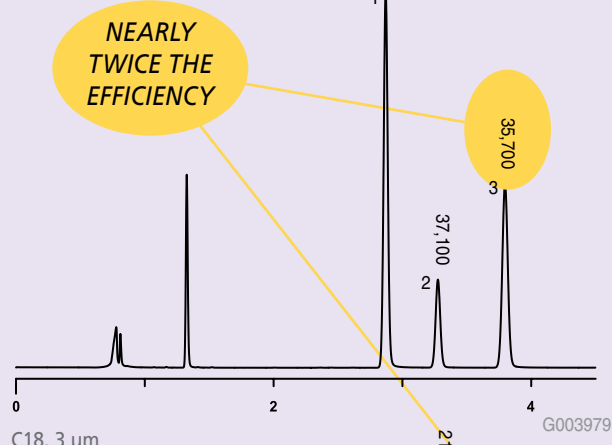
Figure 4. HD-Resolution on Ascentis Express Compared to 3 μm Particles

column: Ascentis Express C18, 15 cm x 4.6 mm I.D., 2.7 μm particles (53829-U) and C18, 15 cm x 4.6 mm I.D., 3 μm particles
mobile phase: 35:65 or 27.5:72.5, water:acetonitrile
flow rate: 1.5 mL/min.
temp.: ambient
det.: UV at 220 nm
injection: 2 μL

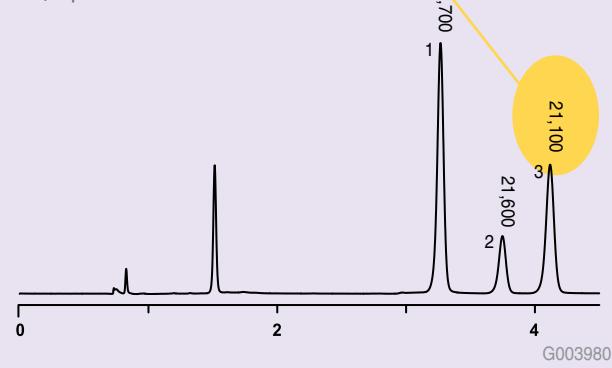
1. Naphthalene
2. p-Xylene
3. Biphenyl

Ascentis Express C18

C18, 3 μm



C18, 3 μm



We hope this article has sparked an interest in Ascentis Express and the benefits it can bring to your laboratory. Subsequent Reporter articles will develop the Ascentis Express message by focusing on specific features and application areas.

Ascentis Express Properties

- Ultra-pure, Type B silica
- 1.7 μm solid core particle with 0.5 μm porous silica shell (effective 2.7 μm)
- 150 m^2/gram surface area (comparable to $\sim 225 \text{m}^2/\text{g}$ porous particle)
- 90 \AA pore size
- Monomeric bonding chemistry and maximized endcapping
- pH Range: 2 – 9

Featured Products

| ID (mm) | Length (cm) | Ascentis Express C18 | Ascentis Express C8 |
|---------------------------------|-------------|----------------------|---------------------|
| Ascentis Express Columns | | | |
| 2.1 | 3 | 53802-U | 53839-U |
| 2.1 | 5 | 53822-U | 53831-U |
| 2.1 | 7.5 | 53804-U | 53843-U |
| 2.1 | 10 | 53823-U | 53832-U |
| 2.1 | 15 | 53825-U | 53834-U |
| 3 | 3 | 53805-U | 53844-U |
| 3 | 5 | 53811-U | 53848-U |
| 3 | 7.5 | 53812-U | 53849-U |
| 3 | 10 | 53814-U | 53852-U |
| 3 | 15 | 53816-U | 53853-U |
| 4.6 | 3 | 53818-U | 53857-U |
| 4.6 | 5 | 53826-U | 53836-U |
| 4.6 | 7.5 | 53819-U | 53858-U |
| 4.6 | 10 | 53827-U | 53837-U |
| 4.6 | 15 | 53829-U | 53838-U |

Related Information

For more information on Ascentis Express columns, request T407044 (JHD) or visit sigma-aldrich.com/express