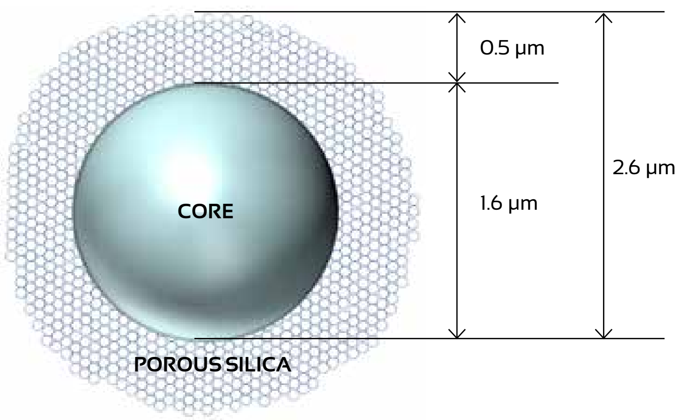
WHAT IS SUNSHELL?
THE NEXT GENERATION HARDCORE SHELL PARTICLE

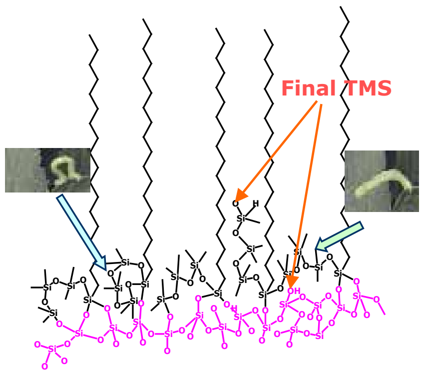
Secure your analysis with SunShell hardcore column technology

Unique bonding technology combined with core shell particles gives you faster performance and more reliable results. The SunShell technique assures top efficiency with all kinds of LC and UHPLC systems.

FEATURES OF SUNSHELL 2.6 µm AND 5 µm

. 1.6 µm and 3.4 µm of core and 0.5 µm and 0.6 µm of superficially porous silica layer.
. Same efficiency and high throughput as a Sub-2 µm and 3 µm particle.
. Same pressure as a 3 µm and 5 µm particles.
. Same chemistry as Sunniest technology (reference figure below).
. Good peak shape for all compounds such as basic, acidic and chelating compounds.
. High stability (pH range for SunShell C18, 1.5 to 10).
. Low bleeding.

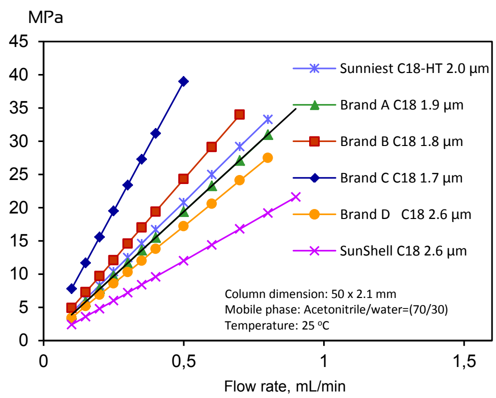




Schematic diagram of bonding of SunShell C18

SunShell C18 shows same efficiency as a Sub 2 µm C18. In comparison between fully porous 2.6 µm and core shell 2.6 µm (SunShell), SunShell shows lower values for A term, B term and C term of Van Deemter equation. The core shell structure leads to higher performance compared with the fully porous structure.

Furthermore back pressure of SunShell C18 is less than a half compared to Sub-2 µm C18s.



Comparison of back pressure for high throughput columns

HOW DOES SUNSHELL WORK?

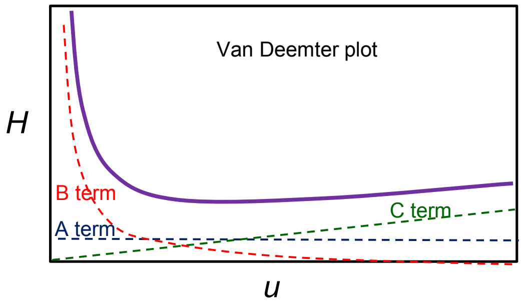
NARROW PARTICLE DISTRIBUTION

VAN DEEMTER **EQUATION**

Van Deemter Equation

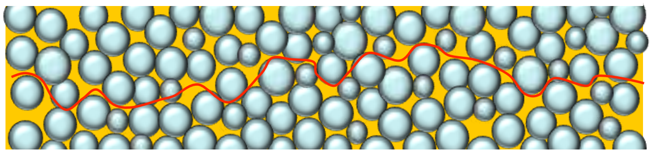
$$H = Ad_p + B\frac{D_m}{u} + C\frac{d_p^2}{D_m}u$$

A term : Eddy diffusion (dp is particle diameter)
B term : Longitudinal diffusion
(Dm is diffusion coefficient)
C term : Mass transfer

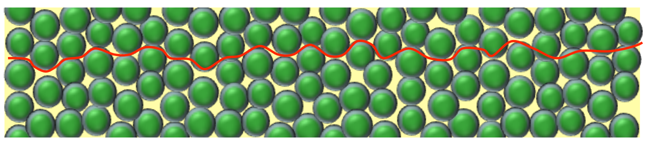


A TERM

The size distribution of a core shell (SunShell) particle is much narrower than that of a conventional totally porous particle, so that the space in between the particles in the column is reduced and efficiency increases by reducing Eddy Diffusion (multi-path diffusion) as the A term in Van Deemter Equation.



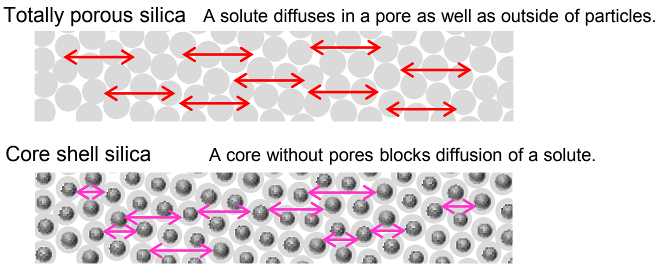
Wide particle distribution
(Conventional silica gel D_{90}/D_{10}=1.50)



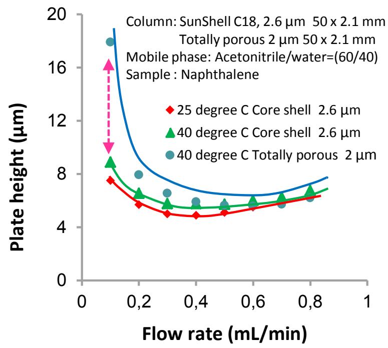
Narrow particle distribution
(Core Shell silicaD_{90}/D_{10}=1.15)

B TERM

Diffusion of a solute is blocked by the existence of a core, so that a solute diffuses less in a core shell silica column than in a totally porous silica column. Consequently B term in Van Deemter Equation reduces in the core shell silica column.

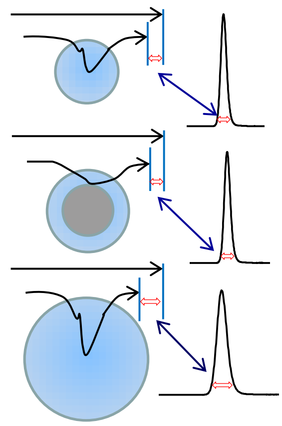


Difference in longitudinal diffusion



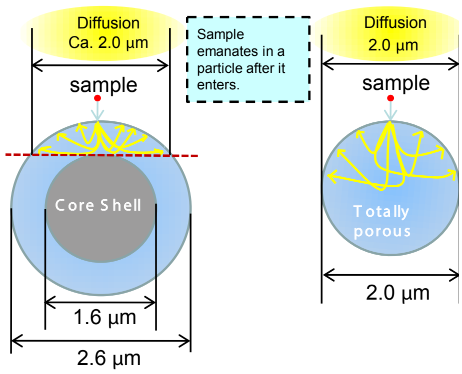
Plot of Plate height vs Flow rate

C TERM


Comparison of diffusion path

As shown in the left figure, a core shell particle has a core so that the diffusion path of samples shortens and mass transfer becomes fast. This means that the C term in Van Deemter Equation reduces. In other words, HETP (theoretical plate) is kept even if flow rate increases. A 2.6 µm core shell particle shows the same column efficiency as a totally porous Sub-2 µm particle.

The right figure shows the diffusion width of a sample in a 2.6 µm core shell particle and a 2 µm totally porous particle. Both diffusion widths are almost the same. The 2.6 µm core shell particle is superficially porous, so that the diffusion width becomes narrower than particle size. Same diffusion means same efficiency.



Diffusion of a sample in core shell and totally porous silica