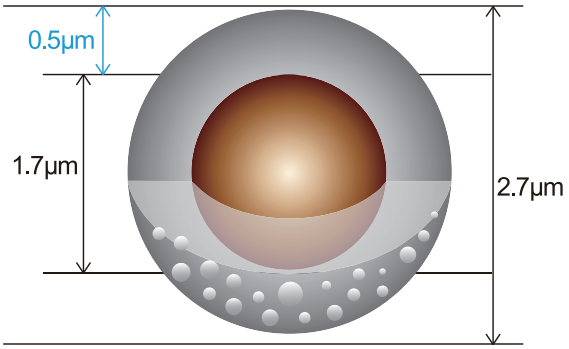
Boltimate

Core-Shell HPLC Columns

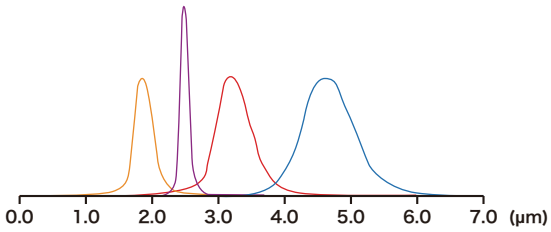
Welch Boltimate™ core-shell HPLC column particle has a size of 2.7 μm, and consists of 1.7 μm solid core and 0.5 μm porous layer(porous shell). This type of column can provide sub-2 μm efficiencies (~200000 p/m) and high resolution at much lower back pressure. Boltimate core-shell column can be used on both HPLC and UHPLC systems, with straight-forward method optimization process.

Features

- Sub-2 μm efficiencies (~200000 p/m) and ultra-high resolution at much lower back pressure
- Ultra-fast separation
- Compatible with both HPLC and UHPLC system
- Narrow particle distribution
- A standard 2 μm inlet frit prevents plugging by dirty samples, suitable for complex sample analysis
- A variety of bonding phases provide choices of different selectivities, while always maintaining excellent peak shape and lot-to-lot reproducibility
- Maximum pressure: 600bar

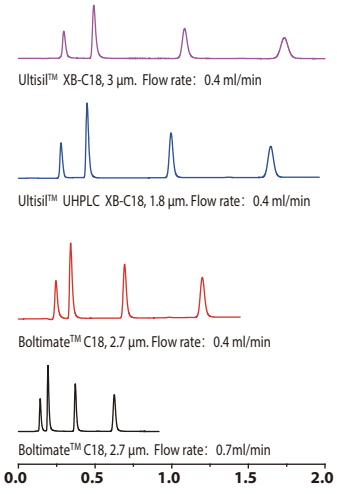


With solid core and thin porous surface layer, core-shell particles decrease the diffusion distance of sample moleculars, enabling faster mobile phase flow rate leading to increased analytical speed. Compared with traditional porous HPLC columns, Boltimate core-shell column has narrower particle size distribution, resulting in higher column efficiency, higher resolution and lower back pressure.



	D10	D90	D90/D10
5μm porous silica	3.61	5.22	1.44
3μm porous silica	2.83	3.98	1.41
1.8μm porous silica	1.51	2.11	1.40
2.7μm Boltimate core shell silica	2.51	2.81	1.12

1.8μm porous silica 2.7μm core-shell silica 3μm porous silica 5μm porous silica



Column: 2.1×50mm
Mobile phase : ACN : H_2O =60 : 40
Temperature: 24℃
HPLC instrument: Agilent 1290
Flow cell: 1μ L
Injection Value: 1μ L
Samples:
1. Uracil
2. Phenol
3. 4-Chloro Nitrobenzene
4. Naphthalene

Theoretical plate number and column pressure (based on Naphthalene)

Column	Theoretical plates	Pressure(bar)	Time
Ultisil™ XB-C18, 3μm, 2.1×50 mm	5600	85	2.0min
Ultisil™ UHPLC XB-C18, 1.8μm, 2.1×50 mm	10500	260	1.8min
Boltimate™ C18, 2.7μm, 2.1×50 mm	10100	108	1.5min
Boltimate™ C18, 2.7μm, 2.1×50 mm	9500	190	0.8min

Boltimate C18 column efficiency is almost the same as that of 1.8μm porous C18 column, and two times that of 3μm porous C18 column.
Even with 2X faster flow rate, the pressure of Boltimate is still lower than that of 1.8 μm porous C18 column of the same dimensions under the same analysis conditions, without sacrificing efficiency.

Detection of Ginsenosides:

Chromatographic conditions:

Columns: three types of C18 columns from Welch / Temperature: room temperature / Detection : UV 203nm

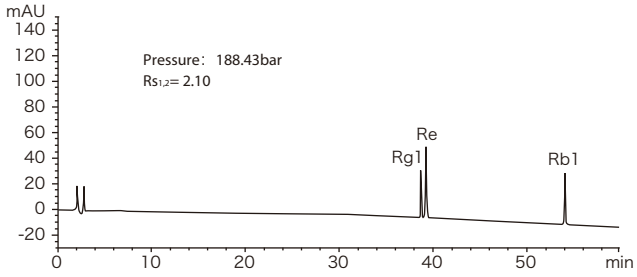
Mobile phase A: 0.1%H_3PO_4 in water / Mobile phase B: Acetonitrile

1.Welch Ultisil™ XB-C18 (4.6×250mm, 5μm)
Separation of Ginsenosides

Flow rate:1.3ml/min Injection volume:10μl

Gradient program:

Time(min)	Mobile phase A(%)	Mobile phase B(%)
0	81	19
30	81	19
35	76	24
60	60	40
60.1	0	100
70	0	100
70.1	81	19
78	81	19

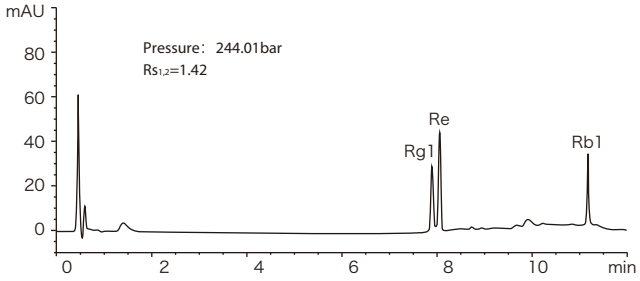


Welch Ultisil™ XB-C18, 4.6×250mm, 5μm, saparation of three Ginsenosides

2. Welch Ultisil™ UHPLC XB-C18 (2.1×50mm, 1.8μm)
Separatrion of Ginsenosides

Flow rate: 0.27ml/min Injection volume: 0.7μ l
Gradient program:

TIme(min)	Mobile phase (A%)	Mobile phase B(%)
0	81	19
6	81	19
7	76	24
12	60	40
12.1	0	100
14	0	100
15	81	19
18	81	19

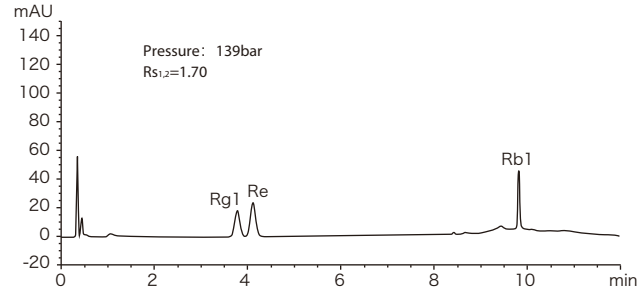


Welch Ultisil™ XB-C18, 2.1×50mm, 1.8μm, separation of three Ginsenosides

3. Welch Boltimate™ C18 (3.0×50mm, 2.7μm)
Separatrion of Ginsenosides

Flow rate: 0.55ml/min Injection volume:1.7μl
Gradient program:

Time(min)	Mobile phase A(%)	Mobile phase B(%)
0	81	19
6	81	19
7	76	24
12	60	40
12.01	0	100
14	0	100
15	81	19
18	81	19



Welch Boltimate™ C18, 3.0×50 mm, 2.7μm, separation of three Ginsenosides

From the results above, Boltimate core-shell column has a lower column pressure and faster analysis time , and high resolution.

Welch provides a variety of bonding phases

Bonding Phases	Feature Description	Particle Size μm	Solid Core Diamameter μm	Porous Shell Depth μm	Pore Size Å	Surface Area m^2/g	C%	End/ capped	pH Range	Maximum Pressure Bar	USP
C18	Excellent peak shape and resolution for acids, bases, and neutrals. Exceptional resolution and lifetime.	2.7	1.7	0.5	90	120	9	Double	2-8.5	600	L1
Phenyl-Hexyl	Alternative selectivity for phenyl groups.	2.7	1.7	0.5	90	120	7	Double	2-8.5		L11
EXT-C18	Extended pH range due to hybrid organic/inorganic layer on silica.	2.7	1.7	0.5	90	120	8	Double	1.5-12		L1
EXT-PFP	An alternative selectivity for halogenated compounds and polar analytes.	2.7	1.7	0.5	90	120	5	Double	1.5-10		L43
HILIC	With its unbonded silica, Boltimate HILIC retains and separates polar analytes.	2.7	1.7	0.5	90	120	-	-	2-8.5		L3
LP-C18	LP phase utilizes unique technique to prevent siloxane bond from hydrolysis at low pH.	2.7	1.7	0.5	90	120	7	No	1.0-8.5		L1