



Introducing HALO[®] 2 Fused-Core[®] UHPLC Columns From Advanced Materials Technology

Rugged • High Efficiency • Low Back Pressure

HALO 2 Fused-Core particles are designed to address the disadvantages inherent in existing sub-2 micron non-core UHPLC columns.

HALO 2 UHPLC columns have all of the advantages of sub-2 μm non-core particle columns and will deliver 300,000 plates per meter efficiency (higher than existing non-core sub-2 μm columns).

Manufactured with 1.0 μm frits on the column inlet, HALO 2 columns are less susceptible to column plugging. These columns can be used up to 1,000 bar (14,500 psi), but will actually produce ~20% lower back pressure than most commercially available sub-2 μm UHPLC columns under the same conditions.

1 Advantages of HALO 2 Fused-Core Columns vs. Sub-2 μm Non-core UHPLC Columns

- Fused-Core UHPLC columns with ~300K plates per meter
 - Higher efficiency than existing non-core sub-2 μm columns
- Longer column lifetime – more injections, less downtime
 - Due to Fused-Core 2 micron particle architecture, 1 micron frits can be used on the column inlet
 - 1 micron frits are less likely to be plugged by UHPLC samples or mobile phase contaminants than typical 0.2 – 0.5 μm frits on sub-2 μm non-core columns
- All of the advantages of sub-2 μm non-core particles at lower operating pressures
 - High speed and efficiency with short columns
 - Improved productivity from faster analyses
 - Less solvent usage from shorter analysis times
 - High resolution and peak capacity in longer columns
 - Sharper, taller peaks = better sensitivity and lower LOD and LOQ
 - Lower back pressure than most commercially available non-core sub-2 μm columns

HALO Fused-Core Columns Have Revolutionized HPLC and now UHPLC Separations



2006

HALO 2.7 micron Fused-Core columns introduced for HPLC and UHPLC separations – deliver similar efficiency to sub-2 μm non-core columns



2012

HALO 5 micron Fused-Core columns introduced to replace underperforming non-core HPLC columns to advance lower pressure HPLC applications



2013

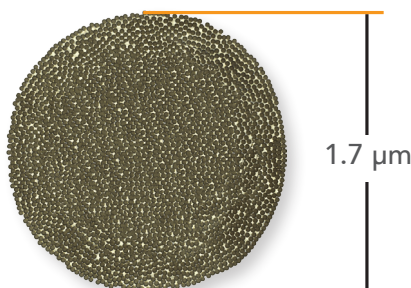
HALO BioClass introduced to bring higher efficiency to proteomics and bioanalytical separations



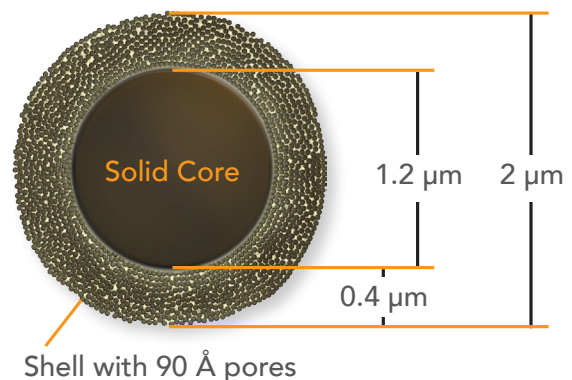
2014

HALO 2 micron columns designed to deliver 300,000 N/m – higher efficiency than non-core sub-2 micron columns

sub-2 μm
Non-core UHPLC Columns



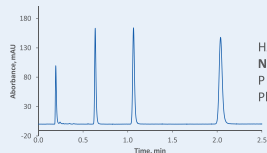
HALO 2
Fused-Core UHPLC Columns



2 Higher Plates With Lower Pressure

Columns: 2.1 x 50 mm

Mobile Phase: A: water, B: ACN; 15/85 A/B

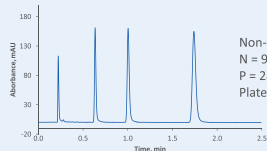


HALO 2 μm C18
N = 15500
P = 190 bar
Plates/Bar = 82

Flow rate: 0.5 mL/min
Temp: 25 °C
Detection: 254 nm

Sample:

1. Uracil
2. Pyrene
3. Decanophenone
4. Dodecanophenone



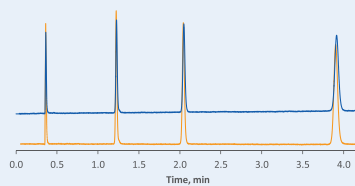
Non-Core 1.7 μm C18
N = 9600
P = 280 bar
Plates/Bar = 34

The higher efficiency of HALO 2 columns without the ultrahigh back pressure provides less wear on the HPLC system, which means less maintenance. Nearly 2.5 times higher plates/bar is attained using the HALO 2 column compared to the sub-2 μm non-core column.*

3 HALO 2 High Pressure Stability

Column: HALO 2 C18, 2.1 x 100 mm

Mobile Phase: A: water, B: ACN; 15/85 A/B



N = 31400 - after high pressure
N = 31500 - before high pressure

Flow rate: 0.5 mL/min
Temp: 25 °C
Detection: 254 nm
Sample: Same as in Figure 2 at left

The high performance of HALO 2 columns is maintained after injections at 970 bar. These results demonstrate the rugged stability of HALO 2 columns.

4 Rapid, High Resolution With HALO 2

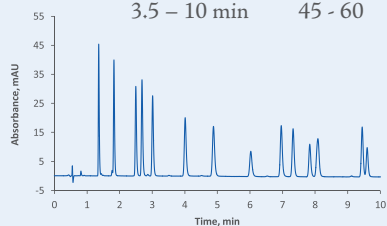
Column: HALO 2 C18, 2.1 x 100 mm

Instrument: 600 bar max HPLC system

Mobile Phase: A: water, B: 80/20 ACN/THF

Gradient:

Time	%B
0 - 3.5 min	45
3.5 - 10 min	45 - 60



Flow rate: 0.5 mL/min
Temp: 30 °C
Detection: 360 nm
Pressure: 545 bar
Sample: DNPH Derivatized Carbonyl Compounds

This example demonstrates the rapid, high resolution performance that can be obtained with a 2.1 x 100 mm HALO 2 column. These 14 compounds are separated in less than 10 minutes at only 545 bar. A comparable separation using a 2.1 x 100 mm sub-2 μm non-core particle column would require more than 600 bar and could not be accomplished without a UHPLC system.

HALO 2 COLUMNS Specifications

Packing Description	HALO 2 C18	HALO 2 PFP
Bonded Phase	Dimethyloctadecylsilane, endcapped	Pentafluorophenylpropylsilane, endcapped
Particle Size (μm)	2	2
Pore Size (\AA)	90	90
Surface Area (meters ² per gram)	120	120
pH Range	2 - 9	2 - 9
Maximum Pressure (bar)	1000	1000

HALO 2 COLUMNS Ordering Information

Halo 2 Columns

Dimensions (mm)	C18	PFP
2.1 x 20	91812-202	91812-209
2.1 x 30	91812-302	91812-309
2.1 x 50	91812-402	91812-409
2.1 x 75	91812-502	91812-509
2.1 x 100	91812-602	91812-609
2.1 x 150	91812-702	91812-709
3.0 x 20	91813-202	91813-209
3.0 x 30	91813-302	91813-309
3.0 x 50	91813-402	91813-409
3.0 x 75	91813-502	91813-509
3.0 x 100	91813-602	91813-609
3.0 x 150	91813-702	91813-709

Guard Columns, 3/Pack

Dimensions (mm)	C18	PFP
2.1 x 5	91812-102	91812-109
3.0 x 5	91813-102	91813-109



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