HPLC, LC/MS Columns

InertSustain® AQ-C18

Maximizing retention for highly polar compounds in reversed phase methods with highly aqueous mobile phases

Physical Properties

Silica :	**ES (Evolved Surface) Silica Gel**
Particle Size :	**3 µm, 5 µm**
Surface Area :	**350 m^2/g**
Pore Size :	**100 Å (10 nm)**
Pore Volume :	**0.85 mL/g**
Bonded Phase :	**Octadecyl Groups**
End-capping :	**Complete**
Carbon Loading :	**13.0 %**
USP Code :	**L1**
pH Range :	**1~10**

GL Sciences Inc.

InertSustain® AQ-C18

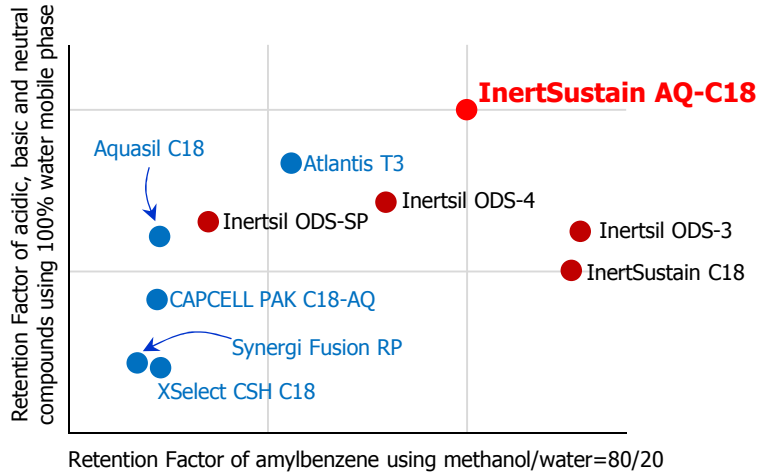
Benefits

1. **Exceptional retention for highly polar compounds (hydrophilic)**
2. **Highly inert packing material results in less tailing of peaks for virtually any type of analytes**
3. **Extreme resistance to low and high pH mobile phases**
4. **Endlessly reproducible from column-to-column and batch-to-batch**

InertSustain AQ-C18 columns are designed to achieve strong retention for highly polar compounds, which is the most challenging goals in developing reversed phase methods. The optimization of bonding of the C18 groups at equal distance to the silica gel enable InertSustain AQ-C18 to offer significant retention for highly polar compounds even under water rich mobile phases.

As illustrated in the following plot, InertSustain AQ-C18 provided exceptional retention for highly polar compounds even under water rich mobile phases without dewetting or phase collapse.

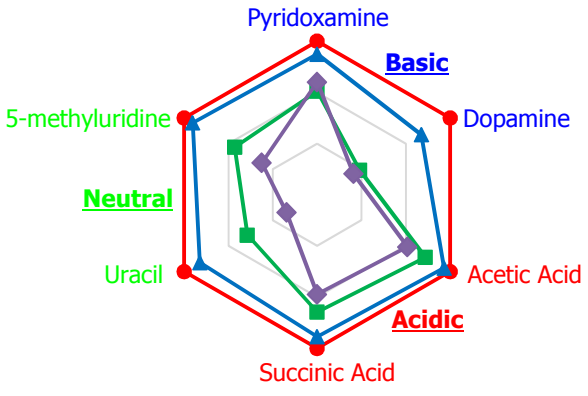
Retention Properties of InertSustain AQ-C18



Remarks:

1. The horizontal and vertical retention factor values were calculated with reference to the retention factor values obtained from InertSustain AQ-C18.
2. The horizontal values represents the retention factor of amylbenzene using methanol/water=80/20.
3. The vertical values represents the retention factor of acidic, basic and neutral compounds using 100% water mobile phase. (For further details, please see the following chart)

InertSustain AQ-C18 provided strong retention for all basic, neutral and acidic compounds under 100% water mobile phase



Remarks:

Generally, the retention for acidic compounds become stronger than basic compounds when the surface of the silica gel is basic.
The retention for basic compounds become stronger than acidic compounds when the surface of the silica gel is acidic.

InertSustain AQ-C18

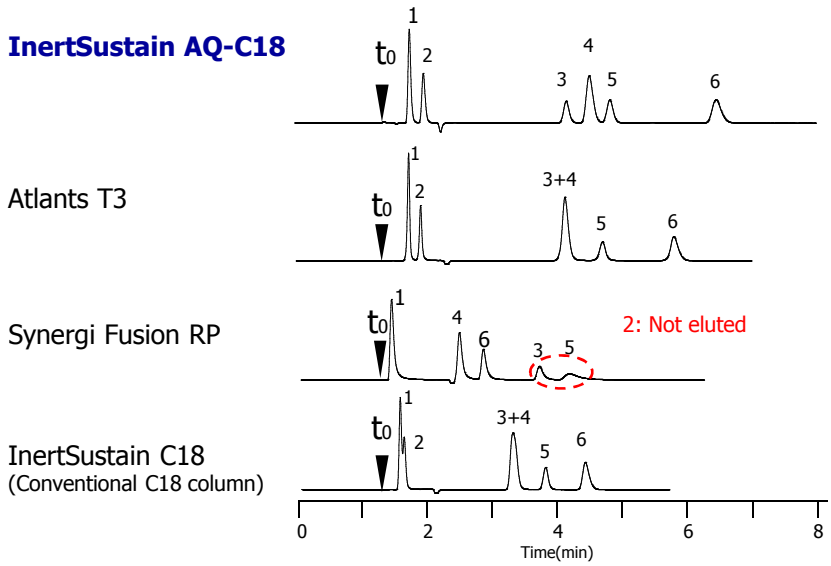
CAPCELL PAK C18-AQ

Atlantis T3

Synergi Fusion RP

Highly Polar Compound Retention with 100% Aqueous Mobile Phases

It is indeed difficult to retain highly polar samples by reversed phase mode as the polar samples tend to elute near the t_0 (void volume) with water rich mobile phases. On the other hand, polar embedded C18 columns or C18 columns with hydrophilic endcapping are available in the market for retaining highly polar compounds. However, they often show tailing or poor peak shapes due to the secondary interaction from their embedded functional groups.
InertSustain AQ-C18 not only provide strong retention for highly polar compounds, but also delivery symmetric peak shapes for virtually any type of analytes.



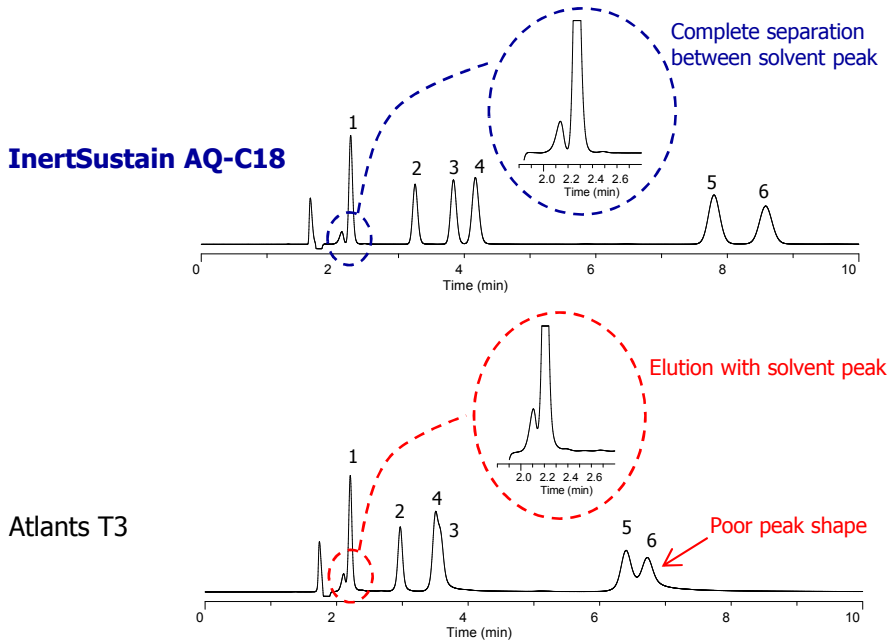
Conditions

Column	: 5 µm, 150 × 4.6 mm I.D.
Eluent	: 0.1 % HCOOH in H_2O
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 ℃
Detection	: UV 210 nm

Sample:
1. Pyridoxamine (Vitamin B6)
2. Thiamin (Vitamin B1)
3. Nicotinic acid (Vitamin B3)
4. Pyridoxal (Vitamin B6)
5. Nicotinamide (Vitamin B3)
6. Pyridoxine (Vitamin B6)

Retentivity Under 20% Organic Solvent

As shown below, InertSustain AQ-C18 delivered stronger retention of catechin sample even under 20% organic solvent mobile phase with exceptional peak shapes, while competitive column brand failed. Furthermore, InertSustain AQ-C18 can prevent the co-elution between the targeted polar analytes and solvent peaks or sample matrices due to its enhanced retentivity.



Conditions

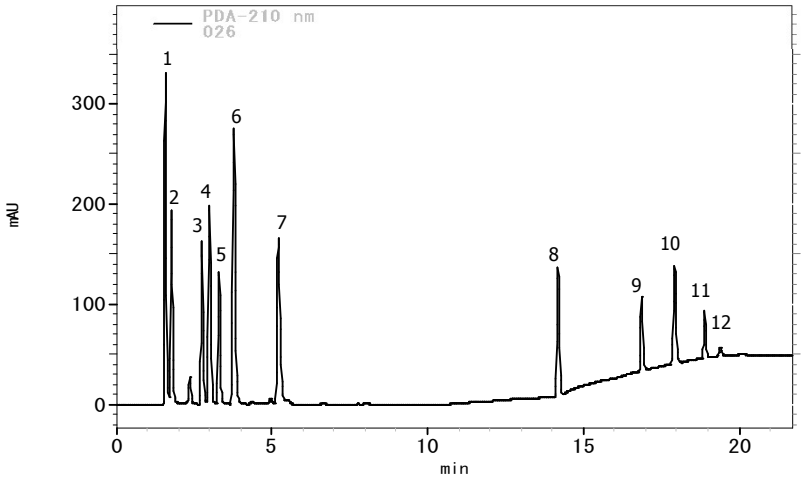
Column	: 5 µm ,150 ×4.6 mm I.D.
Eluent	: A) 0.1 %HCOOH in H_2O
	B) CH_3CN
	A/B= 80/20, v/v
Flow Rate	:1.0 mL/min
Col. Temp.	:40℃
Detection	:UV 280 nm

Sample:
1. Gallocatechin (-) (GC)
2. Catechin (+) (C)
3. Epicatechin (-) (EC)
4. Epigallocatechin gallate (-) (EGCg)
5. Epicatechin gallate (-) (ECg)
6. Catechin gallate (-) (Cg)

InertSustain® AQ-C18

Applications

Analysis of Water-Soluble Vitamins



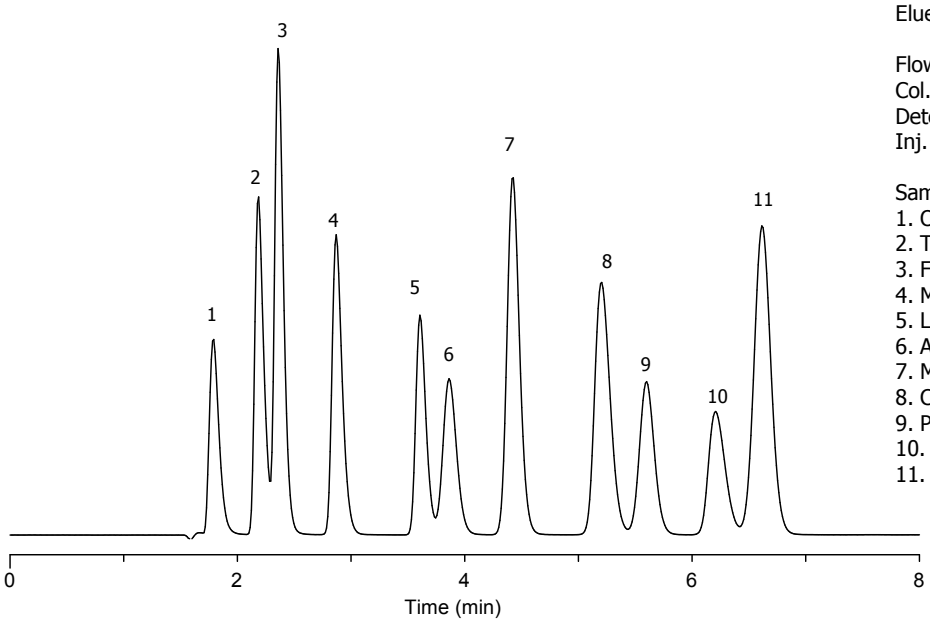
Conditions

Column	: 3 µm, 150 × 4.6 mm I.D.
Eluent	: A: 0.1% H_3PO_4 in H_2O B: CH_3CN A/B = 99/1 (5 min)- 99/1 – (20min) – 80/20 (5min), 99/1
Flow Rate	: 1.0 mL / min
Col. Temp.	: 40℃
Detection	: UV 220 nm
Inj. Vol.	: 5µL

Sample:

1. Pyridoxamine	2. Thiamin	3. Nicotinic Acid	4. Ascorbic acid
5. Nicotinamide	6. Pyridoxal	7. Pyridoxine	8. Pantonenic acid
9. Folic Acid	10. Cyanocobalamin	11. Riboflavin	12. Biotin

Analysis of Organic Acids



Conditions

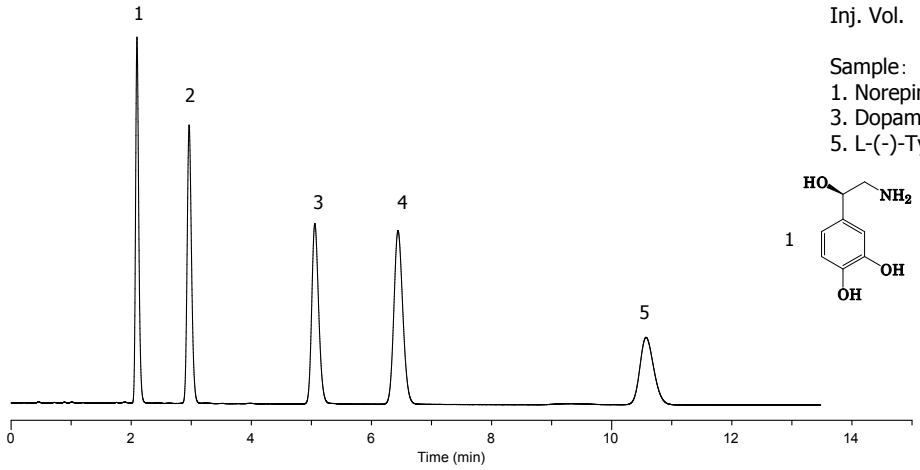
Column	: 5 µm, 150 × 4.6 mm I.D.
Eluent	: 50 mM NaH_2PO_4 in H_2O (pH 2.1, H_3PO_4)
Flow Rate	: 1.0 mL / min
Col. Temp.	: 40℃
Detection	: UV 210 nm
Inj. Vol.	: 10 µL

Sample:

1. Oxalic acid	50 mg/L
2. Tartaric acid	500 mg/L
3. Formic acid	1000 mg/L
4. Malic acid	1000 mg/L
5. Lactic acid	1000 mg/L
6. Acetic acid	1000 mg/L
7. Maleic acid	10 mg/L
8. Citric acid	1000 mg/L
9. Pyroglutamic acid	100 mg/L
10. Succinic acid	1000 mg/L
11. Fumaric acid	10 mg/L

Applications

Analysis of Catecolamines

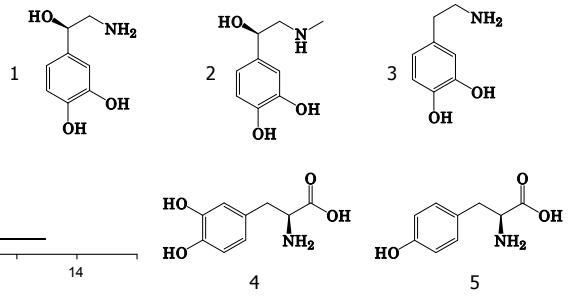


Conditions

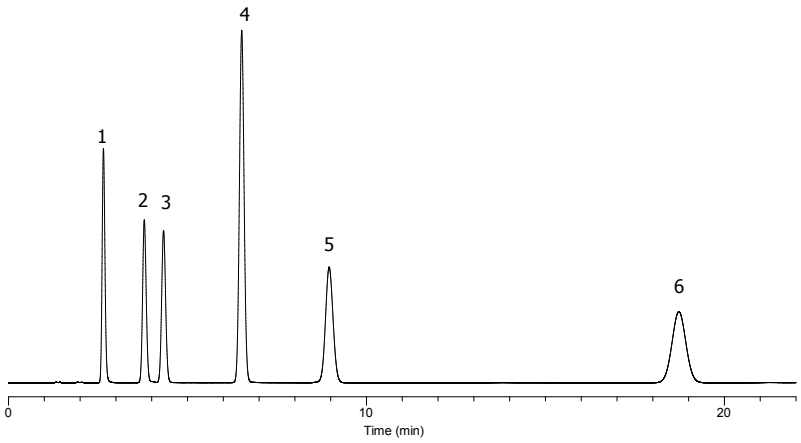
Column	: 5 µm, 150 × 4.6 mm I.D.
Eluent	: 0.1% H_3PO_4 in H_2O
Flow Rate	: 1.0 mL / min
Col. Temp.	: 40℃
Detection	: UV 210 nm
Inj. Vol.	: 1 µL

Sample:

1. Norepinephrine
2. L-Adrenaline
3. Dopamine
4. L-DOPA
5. L-(-)-Tyrosine



Analysis of Fish Freshness, K-Value



Conditions

Column	: 5 µm, 150 × 4.6 mm I.D.
Eluent	: 20 mM NaH_2PO_4 in H_2O
Flow Rate	: 1.0 mL / min
Col. Temp.	: 40℃
Detection	: UV 254 nm
Inj. Vol.	: 1 µL

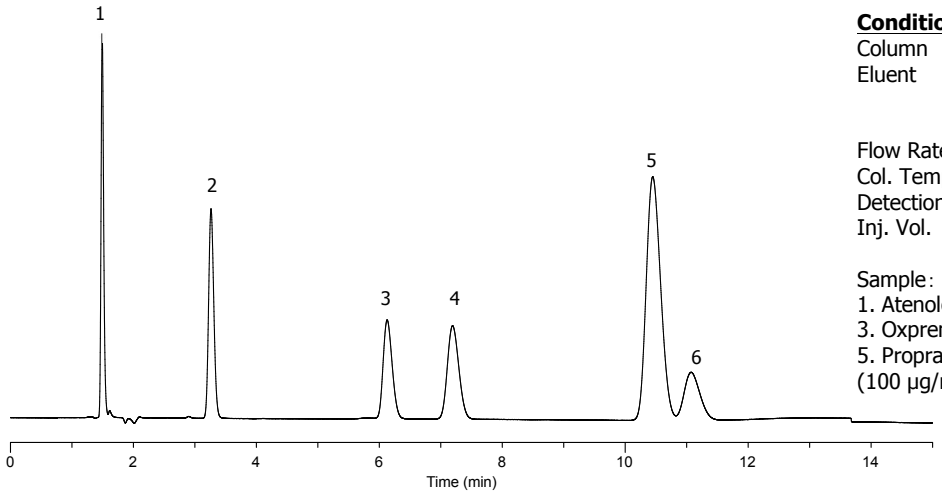
Sample : 100 ppm

1. ATP
2. ADP
3. IMP
4. Hypoxanthine
5. AMP
6. Inosine

InertSustain® AQ-C18

Applications

Analysis of β-blocker



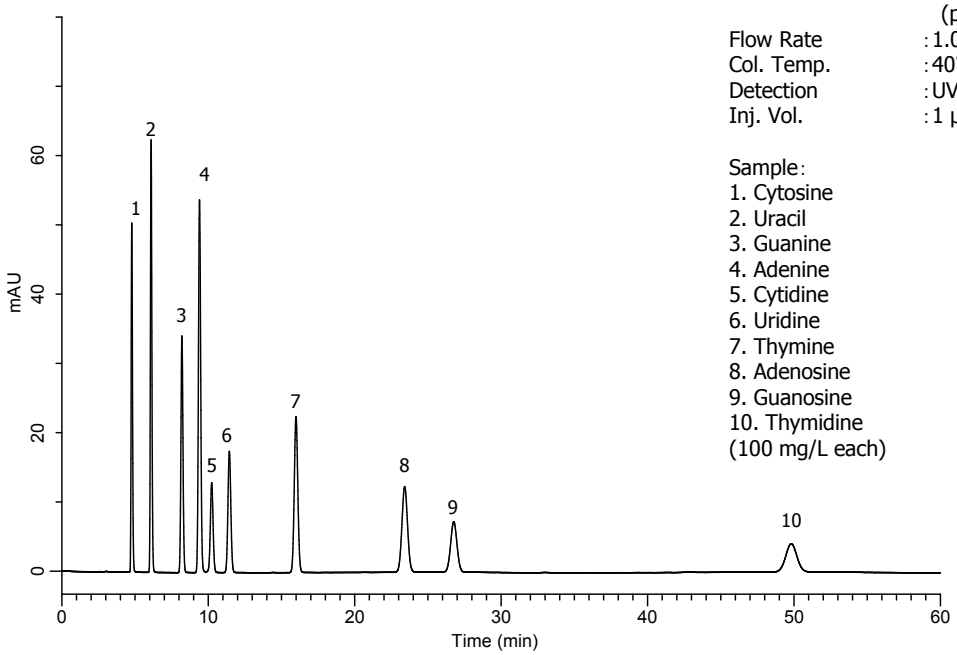
Conditions

Column	: 5 µm, 150 × 4.6 mm I.D.
Eluent	: A: CH_3CN B: 0.1% H_3PO_4 in H_2O A/B=25/75, v/v
Flow Rate	: 1.0 mL / min
Col. Temp.	: 40℃
Detection	: UV 220 nm
Inj. Vol.	: 1 µL

Sample:

1. Atenolol	2. Acebutolol
3. Oxprenolol	4. Labetalol
5. Propranolol	6. Alprenolol
(100 µg/mL each)	

Analysis of Nucleoside and Nucleic Acid Base



Conditions

Column	: 5 µm, 250 × 4.6 mm I.D.
Eluent	: 0.1 M KH_2PO_4 in H_2O + 0.2 M $NaClO_4$ in H_2O (pH2.0, H_3PO_4)
Flow Rate	: 1.0 mL / min
Col. Temp.	: 40℃
Detection	: UV 260 nm
Inj. Vol.	: 1 µL

Sample:
1. Cytosine
2. Uracil
3. Guanine
4. Adenine
5. Cytidine
6. Uridine
7. Thymine
8. Adenosine
9. Guanosine
10. Thymidine
(100 mg/L each)

Applications

Analysis of Nucleotides via LC/MS/MS

Samples such as nucleotides have several phosphate groups which is sensitive to stainless steel hardware. As shown below, the combination of highly inert packing material of InertSustain AQ-C18 and usage of a new *Steel-Coated-PEEK hardware (metal-free) deliver excellent peak shapes with higher sensitivity for phosphate compounds WITHOUT the formation of phosphate-iron complexes found with stainless steel column hardwares.

*Ordering information on Steel-Coated-PEEK hardware is available at page 10.

Conditions

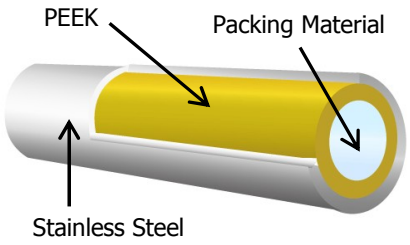
System : Nexera LCMS-8030 plus system
Column size : 3 µm HP, 150 x 2.1 mm I.D
Eluent : A) 5 mM Ammonium formate in H_2O
B) CH_3CN

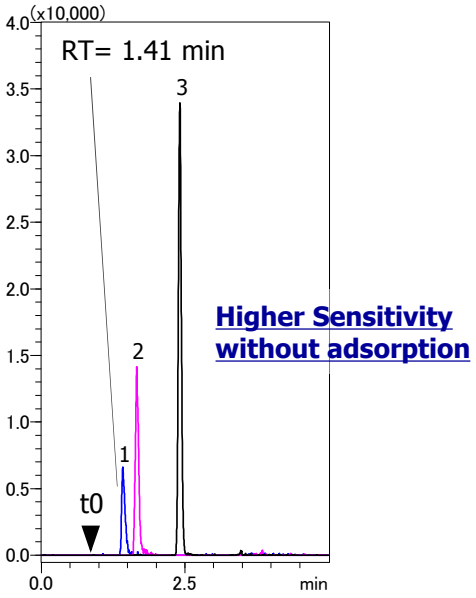
Time (min)	B%
0	2
0.5	2
3.0	25
3.01	2
7.00	2

Flow Rate : 0.3 mL/min
Col. Temp. : 40 ℃
Detection : LC/MS/MS (ESI) , Positive
Injection Vol. : 2 µL

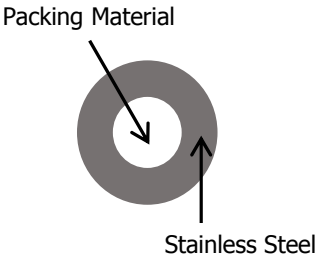
Sample : 1.ATP 500 µg/L
2.ADP 500 µg/L
3.AMP 500 µg/L

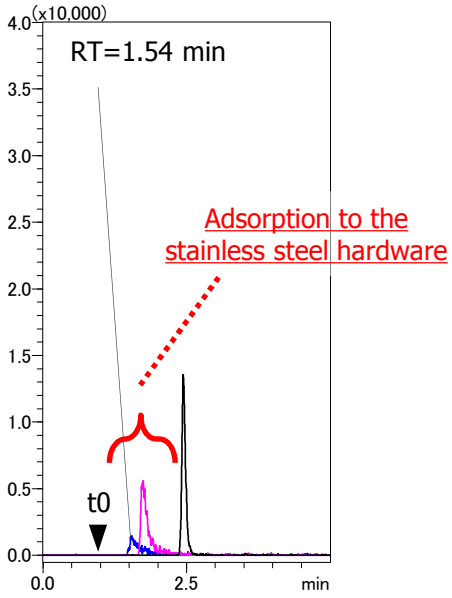
Steel-Coated-PEEK hardware Packed with InertSustain AQ-C18





Stainless Steel Hardware Packed with InertSustain AQ-C18





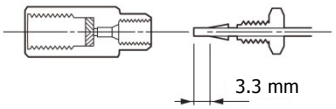
InertSustain® AQ-C18

Ordering Information

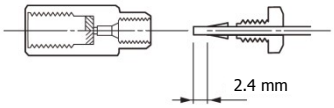
Analytical Columns

	Length/ I.D. (mm)	2.1	3.0	4.6
HP Series Particle Size：3 µm Max. Operating Pressure： 50 MPa (500 Bar)	30	5020-89920	5020-89926	5020-89932
	50	5020-89921	5020-89927	5020-89933
	75	5020-89922	5020-89928	5020-89934
	100	5020-89923	5020-89929	5020-89935
	150	5020-89924	5020-89930	5020-89936
	250	5020-89925	5020-89931	5020-89937

End-fitting Format



1/16” Waters End-fittings



UP Type End-fittings

※ End-fittings are 1/16” Waters-compatible.
※ UHPLC compatible end-fittings are also available upon request for UHPLC systems (Ex: UPLC®) to avoid dead volume.
※ Indicate “UP Type end-fittings” when ordering. (Please note that UP type is not available for a 4.6 mm I.D. column)

UPLC® is a registered trademark of Waters Corporation.

	Length/I.D. (mm)	1.0	1.5		
Particle Size：3 µm Max. Operating Pressure： 20 MPa (200 Bar)	30	5020-89871	5020-89877		
	50	5020-89872	5020-89878		
	75	5020-89873	5020-89879		
	100	5020-89874	5020-89880		
	150	5020-89875	5020-89881		
	250	5020-89876	5020-89882		
	Length/I.D. (mm)	2.1	3.0	4.0	4.6
	30	5020-89831	5020-89839	5020-89847	5020-89855
	50	5020-89832	5020-89840	5020-89848	5020-89856
	75	5020-89833	5020-89841	5020-89849	5020-89857
	100	5020-89834	5020-89842	5020-89850	5020-89858
	125	5020-89835	5020-89843	5020-89851	5020-89859
	150	5020-89836	5020-89844	5020-89852	5020-89860
	250	5020-89837	5020-89845	5020-89853	5020-89861
Particle Size：5 µm Max. Operating Pressure： 20 MPa (200 Bar)	Length/I.D. (mm)	1.0	1.5		
	30	5020-89741	5020-89747		
	50	5020-89742	5020-89748		
	75	5020-89743	5020-89749		
	100	5020-89744	5020-89750		
	150	5020-89745	5020-89751		
	250	5020-89746	5020-89752		
	Length/I.D. (mm)	2.1	3.0	4.0	4.6
	30	5020-89701	5020-89709	5020-89717	5020-89725
	50	5020-89702	5020-89710	5020-89718	5020-89726
	75	5020-89703	5020-89711	5020-89719	5020-89727
	100	5020-89704	5020-89712	5020-89720	5020-89728
	125	5020-89705	5020-89713	5020-89721	5020-89729
	150	5020-89706	5020-89714	5020-89722	5020-89730
	250	5020-89707	5020-89715	5020-89723	5020-89731

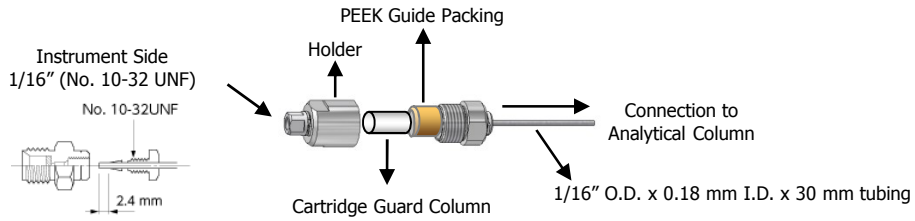
※ End-fittings are 1/16” Waters-compatible.
※ Other column sizes available upon request.

Ordering Information

Guard Column for UHPLC (Max. Operating Pressure 80 MPa, 800 Bar)

I.D. of the Analytical Column Applicable (mm)	Length (mm)	I.D. (mm)	Replacement Cartridge (2 pcs)	Cartridge (2 pcs) + Holder (1 pcs) Set
			Particle Size 3 µm	Particle Size 3 µm
1.0	10	1.5	5020-89824	5020-89827
1.5, 2.1		2.1	5020-89825	5020-89828
2.1, 3.0		3.0	5020-89826	5020-89829
Holder for Guard Column for UHPLC				5020-08630

※ For connection details, please refer to the diagram below.



Cartridge Guard Columns

I.D. of the Analytical Column Applicable (mm)	Length (mm)	I.D. (mm)	Replacement Cartridge E (2 pcs)		Cartridge E (2 pcs) + Holder (1 pcs) Set	
			Particle Size		Particle Size	
			3 µm	5 µm	3 µm	5 µm
1.0	10	1.0	5020-89910	5020-89808	5020-89911	5020-89809
1.5,2.1		1.5	5020-89912	5020-89810	5020-89913	5020-89811
2.1,3.0		3.0	5020-89908	5020-89806	5020-89909	5020-89807
4.0,4.6		4.0	5020-89906	5020-89804	5020-89907	5020-89805
2.1,3.0	20	3.0	5020-89916	5020-89814	5020-89917	5020-89815
4.0,4.6		4.0	5020-89914	5020-89812	5020-89915	5020-89813
Holder for Cartridge Guard Column E				For 10 mm Length		5020-08500
				For 20 mm Length		5020-08550

※ End-fittings are 1/16" Waters-compatible.
※ Maximum operating pressure is 20 MPa, 200 Bar.

Preparative Columns

	Length/ I.D. (mm)	6.0	7.6	10	14	20
Particle Size: 5 µm Max. Operating Pressure: 20 MPa (200 Bar)	50	5020-89757	5020-89761	5020-89765	5020-89769	5020-89773
	100	5020-89758	5020-89762	5020-89766	5020-89770	5020-89774
	150	5020-89759	5020-89763	5020-89767	5020-89771	5020-89775
	250	5020-89760	5020-89764	5020-89768	5020-89772	5020-89776

Preparative Guard Columns

	Length x I.D. (mm)	6.0	7.6	10	14	20
Particle Size: 5 µm Max. Operating Pressure: 20 MPa (200 Bar)	50	5020-89777	5020-89778	5020-89779	5020-89780	5020-89781

Ordering Information

Capillary Columns

EX-Nano Columns Particle Size:3 μm Max. Operating Pressure: 15 MPa (150 Bar)	Length/ I.D. (mm)	0.05	0.075	0.1	0.2
	50	5020-89894	5020-89897	5020-89900	5020-89903
	150	5020-89895	5020-89898	5020-89901	5020-89904
	250	5020-89896	5020-89899	5020-89902	5020-89905
EX Columns Particle Size:3 μm Max. Operating Pressure: 20 MPa (200 Bar)	Length/ I.D. (mm)	0.3	0.5	0.7	
	50	5020-89887	5020-89889	5020-89891	
	150	5020-89888	5020-89890	5020-89892	
	250	-	-	-	
EX-Nano Columns Particle Size:5 μm Max. Operating Pressure: 15 MPa (150 Bar)	Length/ I.D. (mm)	0.05	0.075	0.1	0.2
	50	5020-89792	5020-89795	5020-89798	5020-89801
	150	5020-89793	5020-89796	5020-89799	5020-89802
	250	5020-89794	5020-89797	5020-89800	5020-89803
EX Columns Particle Size:5 μm Max. Operating Pressure: 20 MPa (200 Bar)	Length/ I.D. (mm)	0.3	0.5	0.7	
	50	5020-89784	5020-89786	5020-89788	
	150	5020-89785	5020-89787	5020-89789	
	250	-	-	-	

※ End-fittings are 1/16" Valco (10-32 UNF).
※ 1/32" Valco (6-40 UNF) end-fittings can also be arranged upon request.
※ Indicate "1/32" end-fittings" when ordering.

Connection Kits for Capillary EX-Nano and EX Columns

	For Capillary EX-Nano Columns
·Column Coupler ·40 × 0.05 mm I.D. 1/16" O.D. Tubing (Both ends with male nuts including PEEK ferrules) ·Capillary Tubing Connector ·300 × 0.05 mm I.D. 0.375 mm O.D. Tubing ·300 × 0.03 mm I.D. 0.375 mm O.D. Tubing ·300 × 0.02 mm I.D. 0.375 mm O.D. Tubing (Male nut, PEEK ferrule, 1/16" O.D. PTFE with sleeve) ·PTFE Tubing 20 mm 2 pcs 1/16" O.D. (O.D. 0.375 mm Connection for Capillary Tubing)	5020-01881
	For Capillary EX Columns
·Column Coupler ·40 × 0.1 mm I.D. 1/16" O.D.Tubing (Both ends with male nuts including PEEK ferrules) ·Capillary Tubing Connector 5020-01880 ·500 × 0.075 mm I.D. 0.375 mm O.D. Tubing (Male nut, PEEK ferrule, 1/16" O.D. PTFE with sleeve) ·PTFE Tubing 20 mm 2 pcs 1/16" O.D. (O.D. 0.375 mm Connection for Capillary Tubing)	5020-01880

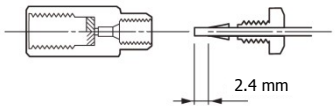
Ordering Information

Metal-Free PEEK Columns

	Length/ I.D. (mm)	2.1	4.6
PEEK Columns Particle Size：5 µm Max. Operating Pressure： 20 MPa (200 Bar)	30	Please inquire	-
	33	Please inquire	Please inquire
	50	Please inquire	Please inquire
	75	-	Please inquire
	100	Please inquire	Please inquire
	150	Please inquire	Please inquire
	200	-	Please inquire
	250	Please inquire	Please inquire
	300	Please inquire	Please inquire
	Length/ I.D. (mm)	2.1	4.6
Steel-Coated PEEK Columns Particle Size：3 µm Max. Operating Pressure： 50 MPa (500 Bar)	50	Please inquire	Please inquire
	100	Please inquire	Please inquire
	150	Please inquire	Please inquire
	250	Please inquire	Please inquire

※ End-fittings are UP type end-fittings.
※ For further product details, please contact your local GL Sciences' representative.

End-fitting Format



UP Type End-fittings

InertSearch Application Notes

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