

HPLC, LC/MS Columns

# InertSustain<sup>®</sup> 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 :	1.9 µm, 3 µm, 5 µm
Surface Area :	350 m <sup>2</sup> /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, L96
pH Range :	1~10

GL Sciences Inc.

# InertSustain® AQ-C18

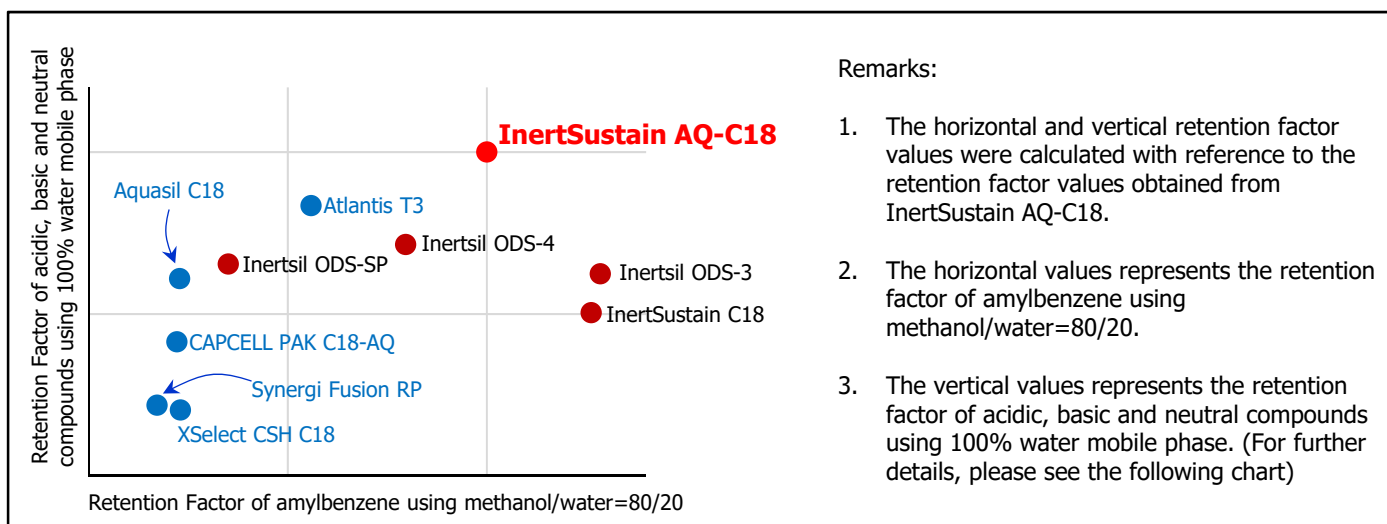
## Benefits

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

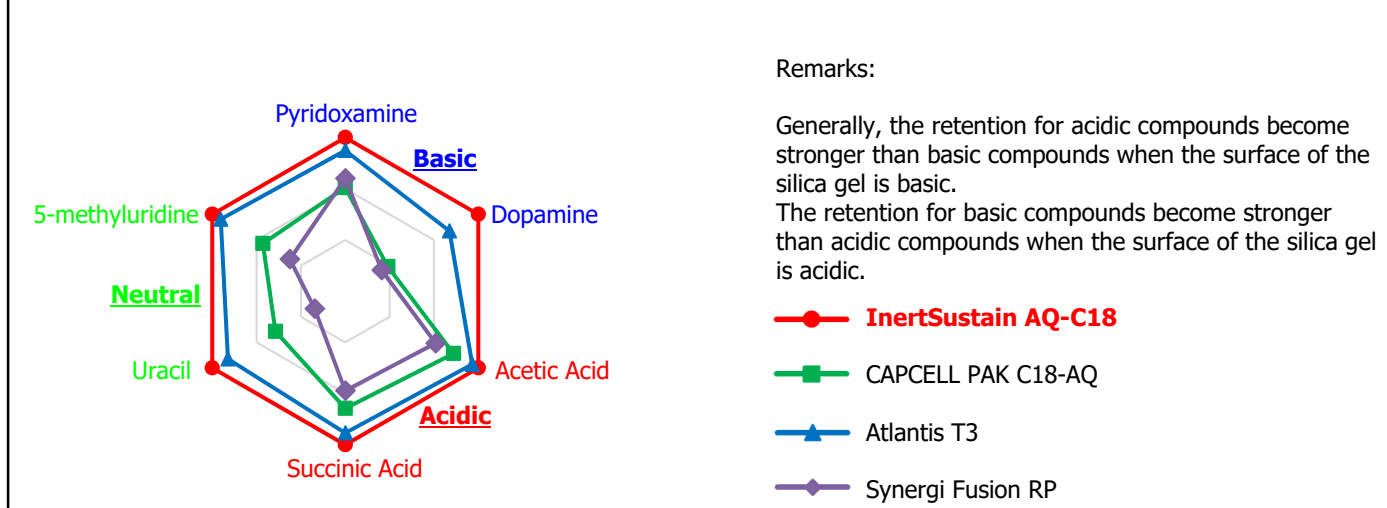
InertSustain AQ-C18 columns are designed to achieve strong retention for highly polar compounds, which is the most challenging goals in developing reversed phase methods. The optimization of bonding of the C18 groups at equal distance to the silica gel enable InertSustain AQ-C18 to offer significant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



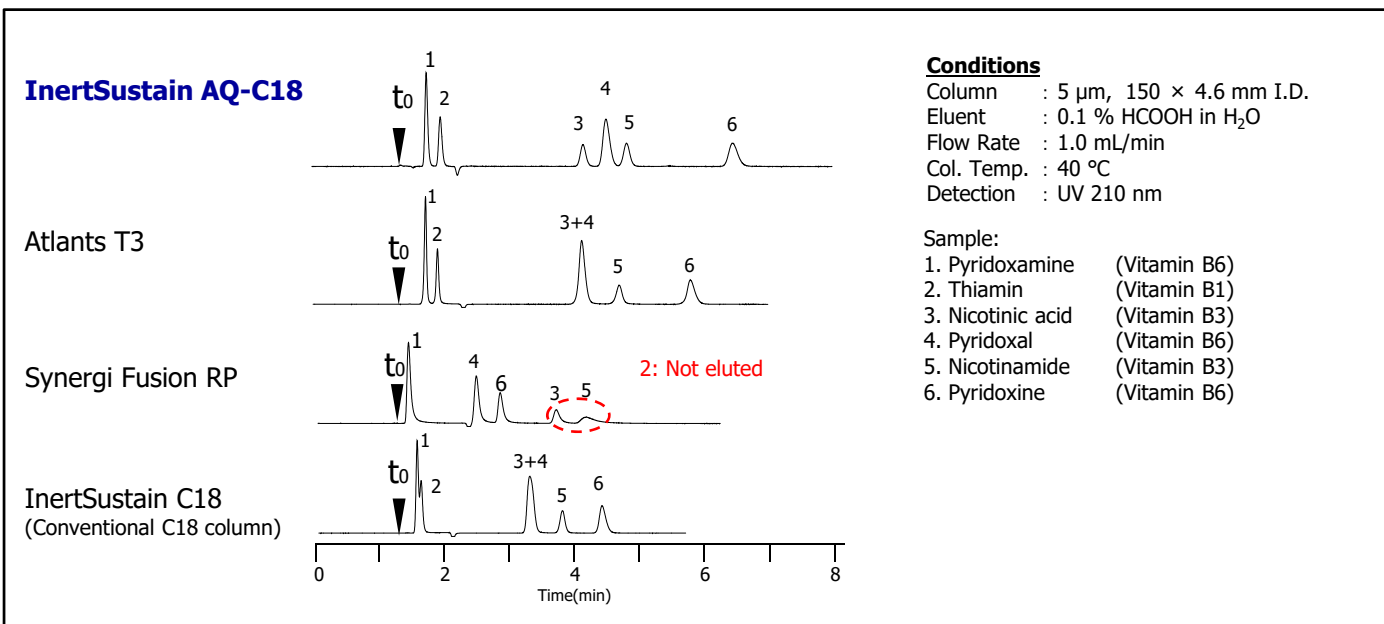
## InertSustain AQ-C18 provided strong retention for all basic, neutral and acidic compounds under 100% water mobile phase



## Highly Polar Compound Retention with 100% Aqueous Mobile Phases

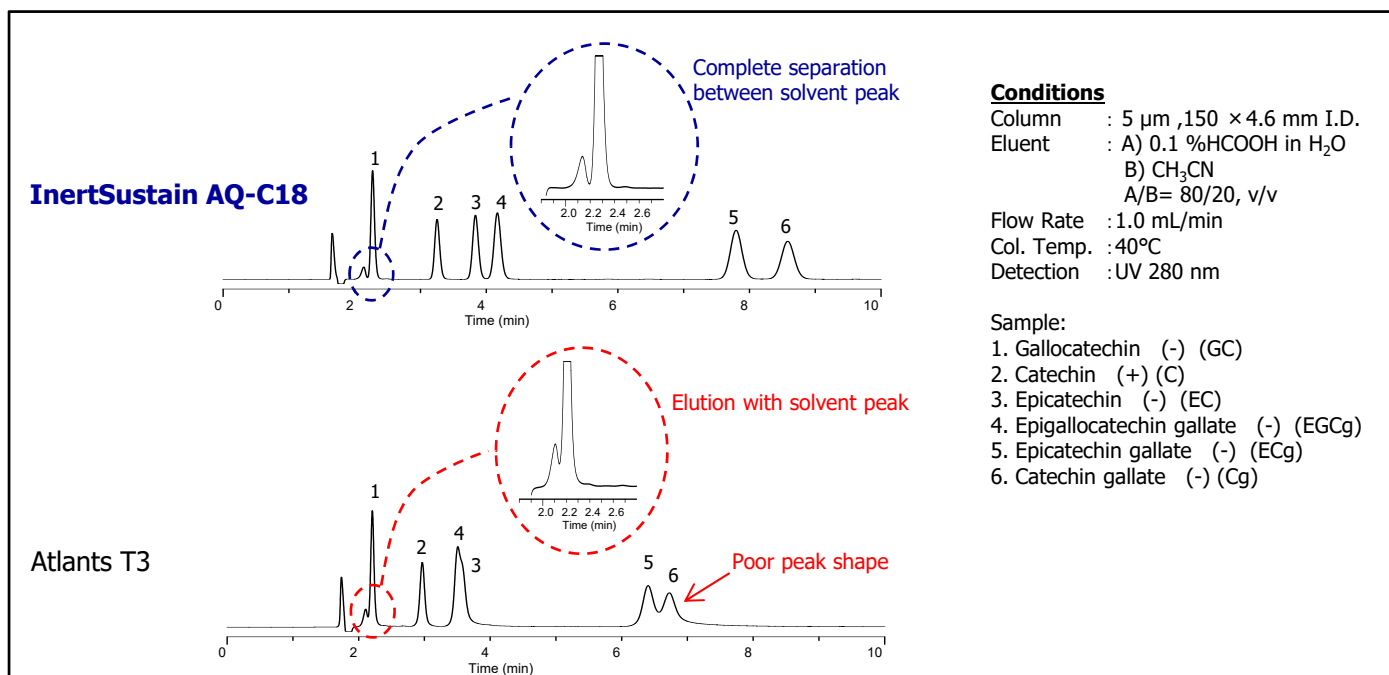
It is indeed difficult to retain highly polar samples by reversed phase mode as the polar samples tend to elute near the  $t_0$  (void volume) with water rich mobile phases. On the other hand, polar embedded C18 columns or C18 columns with hydrophilic endcapping are available in the market for retaining 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.



## 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.



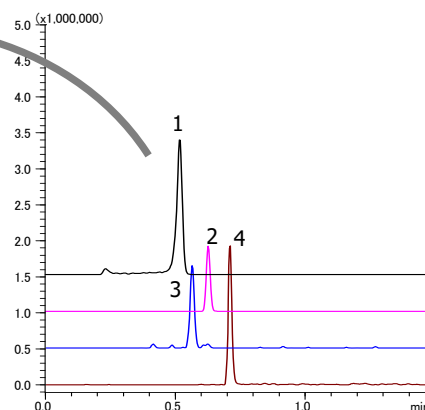
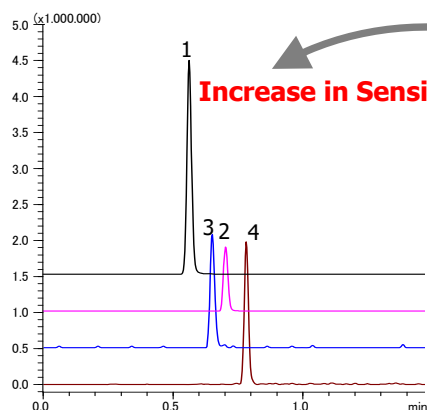
# InertSustain<sup>®</sup> AQ-C18

## Applications

### High-Throughput Analysis of Drugs

#### InertSustain AQ-C18 (1.9 $\mu\text{m}$ )

#### Acquity BEH C18 (1.7 $\mu\text{m}$ )



#### Conditions

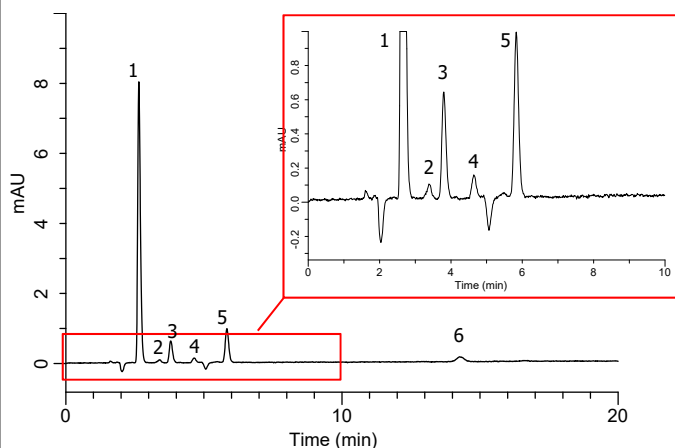
Column Size : 50 × 2.1 mm I.D.  
 Eluent : A) 0.05 % HCOOH in H<sub>2</sub>O  
           : B) CH<sub>3</sub>CN  
           : A/B= 70/30 - (0.5 min) - 10/90 - (0.5 min hold)  
 Flow Rate : 0.6 mL/min  
 Detection : LC/MS/MS(ESI,SRM)  
 Injection Vol. : 5  $\mu\text{L}$

#### Sample:

1. Propranolol(+)  
 2. Carbamazepine(+)  
 3. Salicylic acid(-)  
 4. Ketoprofen(-)  
 (each 100  $\mu\text{g/L}$  in 50 % ACN)

(+): Positive mode  
 (-): Negative mode

### Analysis of Nucleotide in Fish Meat



#### Conditions

Column : InertSustain AQ-C18  
           (5  $\mu\text{m}$ , 150 × 4.6 mm I.D.)  
 Eluent : 50 mM K<sub>2</sub>HPO<sub>4</sub> in H<sub>2</sub>O (pH 7.0, H<sub>3</sub>PO<sub>4</sub>)\*  
 Flow Rate : 1.0 mL/min  
 Col.Temp. : 40 °C  
 Detection : UV 260 nm  
 Injection Vol. : 1  $\mu\text{L}$

#### Sample:

1.IMP  
 2.ATP  
 3.ADP  
 4.AMP  
 5.Hyp  
 6.Ino  
 (each 5 mg/L)

\* Equilibrate the column with CH<sub>3</sub>CN/H<sub>2</sub>O=1/1,v/v after the analysis.  
 When storing the column for a long period of time, store it with  
 100 % CH<sub>3</sub>CN 100 %.

## Applications

### Analysis of Water-Soluble Vitamins

1.9  $\mu\text{m}$ , 50  $\times$  2.1 mm I.D.  
0.4 mL/min

5  $\mu\text{m}$ , 150  $\times$  4.6 mm I.D.  
1.0 mL/min

#### Conditions

Column : InertSustain AQ-C18  
Eluent : A) 0.1%  $\text{H}_3\text{PO}_4$  B)  $\text{CH}_3\text{CN}^*$   
Col. Temp. : 40°C  
Detection : UV 210 nm

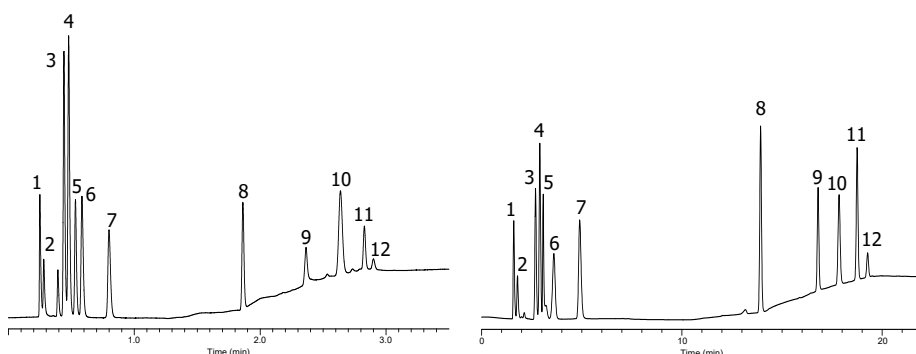
#### \* Gradient Time Program

<1.9  $\mu\text{m}$ >

Time (min)	A%	B%
0	99	1
2	80	20
3.3	99	1

<5  $\mu\text{m}$ >

Time (min)	A%	B%
0	99	1
5	99	1
20	80	20
27	1	99
68	99	1



#### Sample:

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

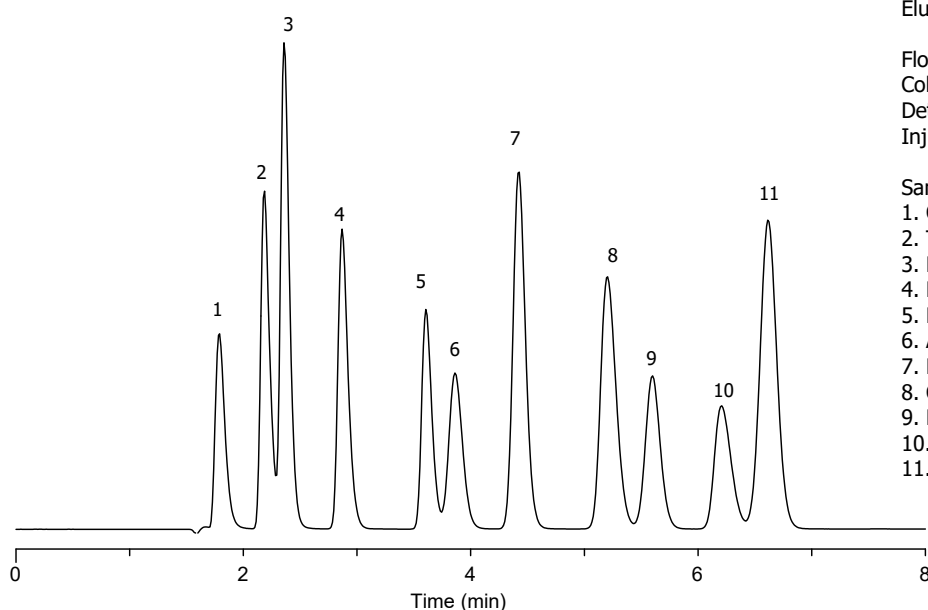
### Analysis of Organic Acids

#### Conditions

Column : 5  $\mu\text{m}$ , 150  $\times$  4.6 mm I.D.  
Eluent : 50 mM  $\text{NaH}_2\text{PO}_4$  in  $\text{H}_2\text{O}$   
(pH 2.1,  $\text{H}_3\text{PO}_4$ )  
Flow Rate : 1.0 mL / min  
Col. Temp. : 40°C  
Detection : UV 210 nm  
Inj. Vol. : 10  $\mu\text{L}$

#### 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

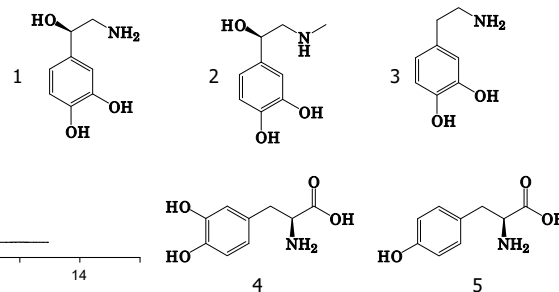
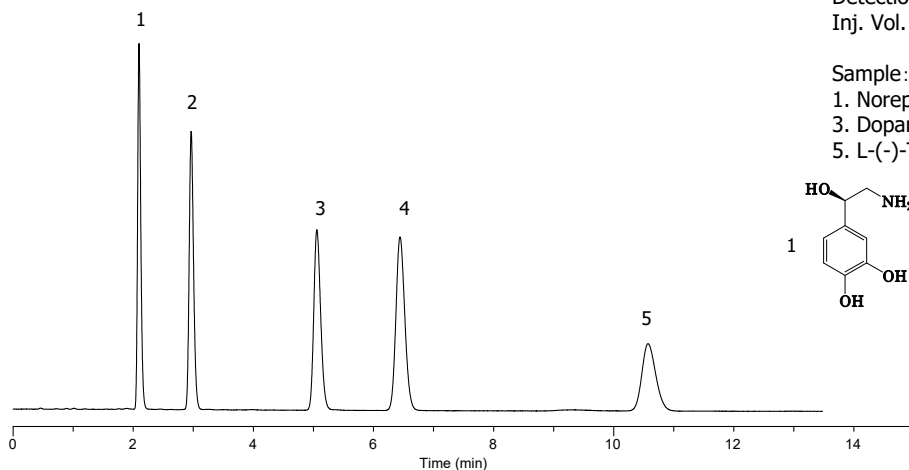
### Analysis of Catecholamines

#### Conditions

Column : 5  $\mu$ m, 150  $\times$  4.6 mm I.D.  
 Eluent : 0.1% H<sub>3</sub>PO<sub>4</sub> in H<sub>2</sub>O  
 Flow Rate : 1.0 mL / min  
 Col. Temp. : 40°C  
 Detection : UV 210 nm  
 Inj. Vol. : 1  $\mu$ L

#### Sample:

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



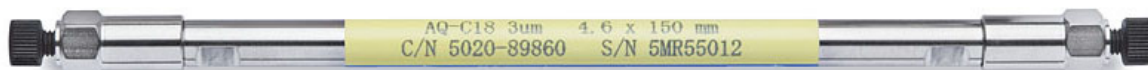
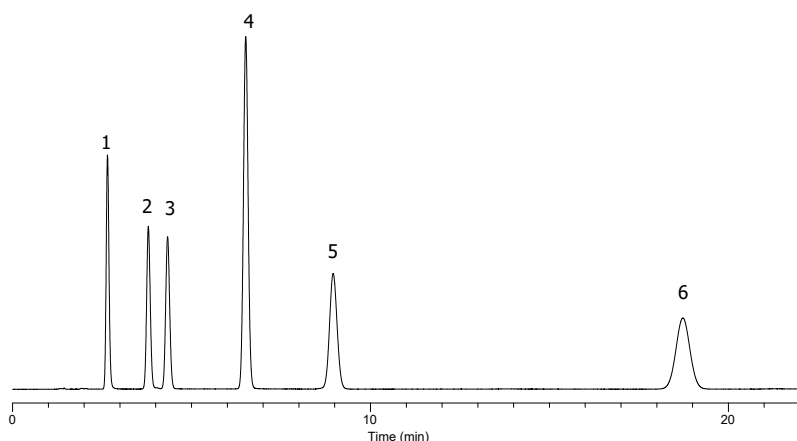
### Analysis of Fish Freshness, K-Value

#### Conditions

Column : 5  $\mu$ m, 150  $\times$  4.6 mm I.D.  
 Eluent : 20 mM NaH<sub>2</sub>PO<sub>4</sub> in H<sub>2</sub>O  
 Flow Rate : 1.0 mL / min  
 Col. Temp. : 40°C  
 Detection : UV 254 nm  
 Inj. Vol. : 1  $\mu$ L

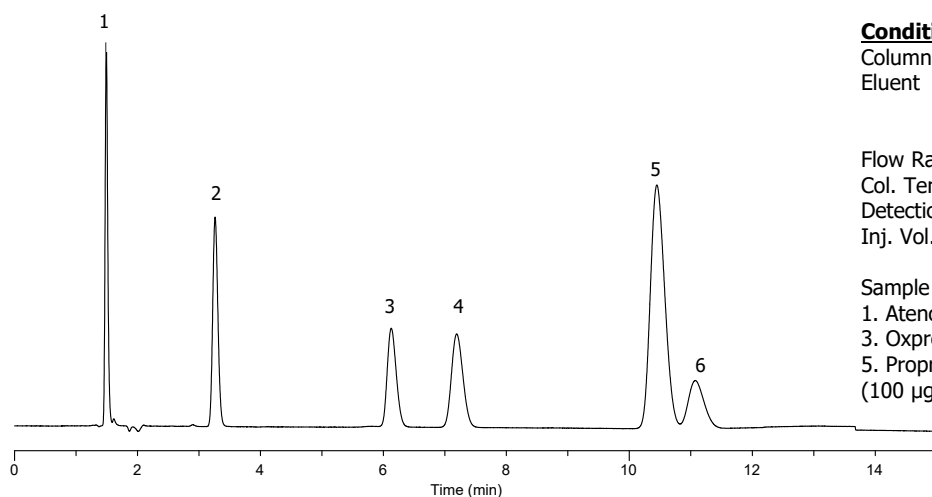
#### Sample

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



## Applications

### Analysis of $\beta$ -blocker



#### Conditions

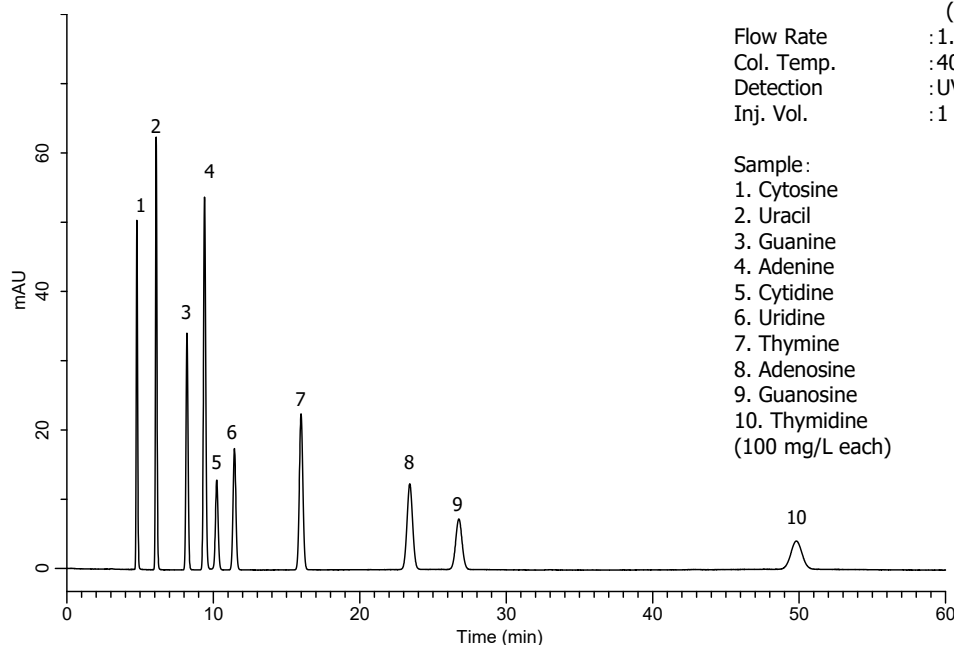
Column : 5  $\mu$ m, 150  $\times$  4.6 mm I.D.  
 Eluent : A: CH<sub>3</sub>CN  
 B: 0.1% H<sub>3</sub>PO<sub>4</sub> in H<sub>2</sub>O  
 A/B=25/75, v/v

Flow Rate : 1.0 mL / min  
 Col. Temp. : 40°C  
 Detection : UV 220 nm  
 Inj. Vol. : 1  $\mu$ L

#### Sample:

1. Atenolol  
 2. Acebutolol  
 3. Oxprenolol  
 4. Labetalol  
 5. Propranolol  
 6. Alprenolol  
 (100  $\mu$ g/mL each)

### Analysis of Nucleoside and Nucleic Acid Base



#### Conditions

Column : 5  $\mu$ m, 250  $\times$  4.6 mm I.D.  
 Eluent : 0.1 M KH<sub>2</sub>PO<sub>4</sub> in H<sub>2</sub>O + 0.2 M NaClO<sub>4</sub> in H<sub>2</sub>O  
 (pH2.0, H<sub>3</sub>PO<sub>4</sub>)

Flow Rate : 1.0 mL / min  
 Col. Temp. : 40°C  
 Detection : UV 260 nm  
 Inj. Vol. : 1  $\mu$ L

#### 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)



# InertSustain® AQ-C18

## 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 hardware.

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

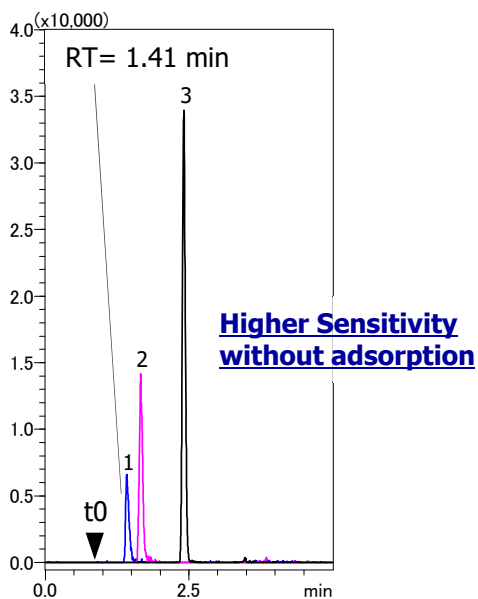
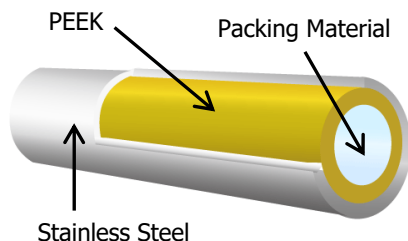
#### Conditions

System	: Nexera LCMS-8030 plus system	Flow Rate	: 0.3 mL/min
Column size	: 3 µm HP, 150 x 2.1 mm I.D	Col. Temp.	: 40 °C
Eluent	: A) 5 mM Ammonium formate in H <sub>2</sub> O B) CH <sub>3</sub> CN	Detection	: LC/MS/MS (ESI) , Positive
		Injection Vol.	: 2 µL

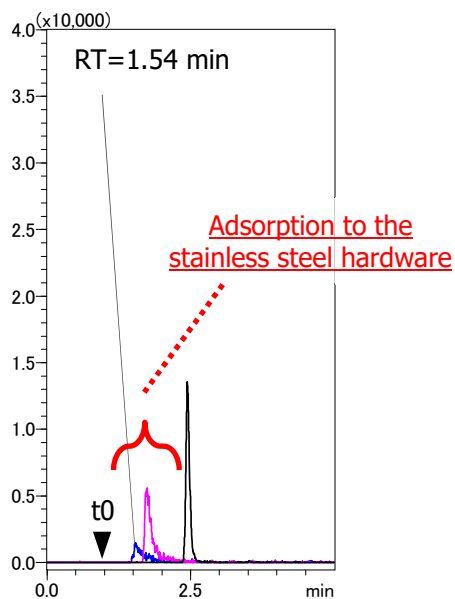
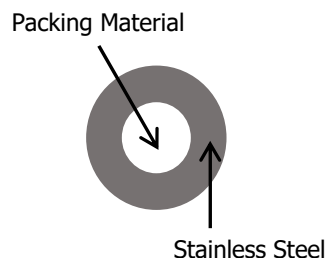
Time (min)	B%
0	2
0.5	2
3.0	25
3.01	2
7.00	2

Sample	: 1.ATP 500 µg/L 2.ADP 500 µg/L 3.AMP 500 µg/L
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#### Steel-Coated-PEEK hardware Packed with InertSustain AQ-C18



#### Stainless Steel Hardware Packed with InertSustain AQ-C18





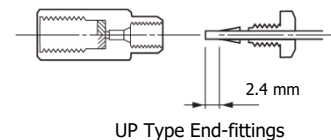
## Ordering Information

### Analytical Columns

Particle Size: 1.9 µm Max. Operating Pressure: 80 MPa (800 Bar)	Length/ I.D. (mm)	2.1	3.0
	50	5020-89938	5020-89941
	100	5020-89939	5020-89942
	150	5020-89940	5020-89943

※ End-fittings are UP Type end-fittings.

### End-fitting Format



HP Series Particle Size: 3 µm Max. Operating Pressure: 50 MPa (500 Bar)	Length/ I.D. (mm)	2.1	3.0	4.6
	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

Particle Size: 3 µm Max. Operating Pressure: 20 MPa (200 Bar)	Length/I.D. (mm)	1.0	1.5		
	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



# InertSustain® AQ-C18

## 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	Replacement Cartridge (2 pcs)	Cartridge (2 pcs) + Holder (1 pcs) Set	
			Particle Size 1.9 µm	Particle Size 1.9 µm	Particle Size 3 µm	Particle Size 3 µm	
1.0	10	1.5	5020-89944	5020-89947	5020-89824	5020-89827	
1.5, 2.1		2.1	5020-89845	5020-89948	5020-89825	5020-89828	
2.1, 3.0		3.0	5020-89946	5020-89949	5020-89826	5020-89829	
Holder for Guard Column for UHPLC						5020-08630	

### 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	20	4.0	5020-89906	5020-89804	5020-89907	5020-89805
2.1,3.0		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
				For 20 mm Length	5020-08550	

### Metal-Free PEEK Columns

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



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