GL Sciences | INERTSIL

> GL Sciences introduces NEW PRODUCTS for HPLC and Proteomics

HPLC, FAST LC/MS & PROTEOMICS PRODUCTS

Introducition of a new product from Inertsil Series

Inertsil® ODS-4 NEW

Inertsil ODS-4 is a C18 column developed focusing on superb inertness to basic, acidic, neutral and chelating compounds, which can virtually provide perfect peak shapes for any type of compounds.

Physical Properties

Silica	**: High Purity Spherical Silica Gel**
Purity	**: 99.999%**
Particle Size	**: 5um**
Surface Area	**: 450 m2/g**
Pore Volume	**: 100A**
Pore Size	**: 1.05 mL/g**
Bonded Phase	**: Octadecyl groups**
End-capping	**: Yes**
Carbon Loading	**: 11%**
USP Code	**: L1**

Concept of Inertsil ODS-4

Absolute Inertness for Most Critical Analyses

Demands from the market for;

- **analyzing wide variety of compounds because,**
  - **→ increase in candidate drug compounds & addition of legally controlled compounds in Environment & Food industry.**
  - **→ compounds that were analyzed by GC are now being analyzed by LC as well.**

- **high sensitivity because**
  - **→ the adsorption of trace amount of compounds causes a problem.**

- **change in mobile phase additives due to expanded use of LC/MS which requires**
  - **→ symmetrical peak shapes without adding any strong acids (ex. phosphoric acids or highly-concentrated buffers)**

Pursuit of the Inertness

To meet all the requirements, make the packing

- Inhibit adsorption of **basic compounds**
  by deactivating the silanol groups.
- Inhibit adsorption of **acidic compounds**
  by introducing a neutral functional groups.
- Inhibit adsorption of **chelating compounds**
  by adopting a highly pure silica gels.

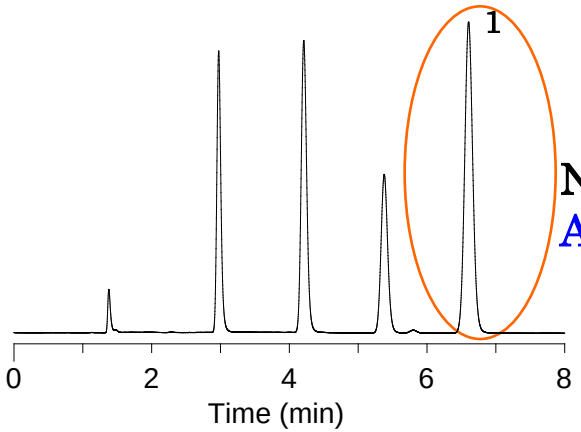
The Highest Inertness has been achieved on silica base HPLC columns for "any type of compounds".

by Inertsil ODS-4

Comparison of theorical plate of naphthalene between Inertsil ODS-4 and commercially ODS columns

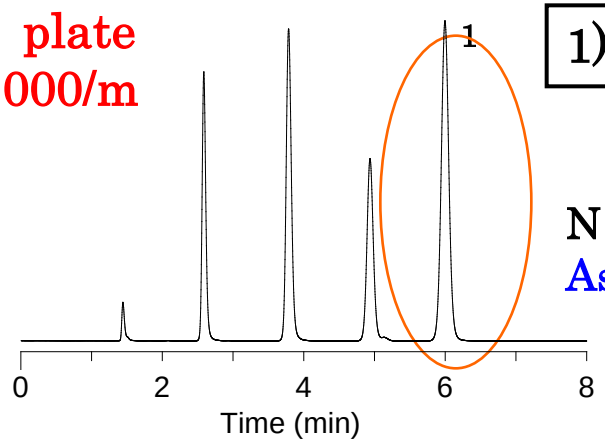
High theorical plate
N=15000 100,000/m

1) Naphthalene



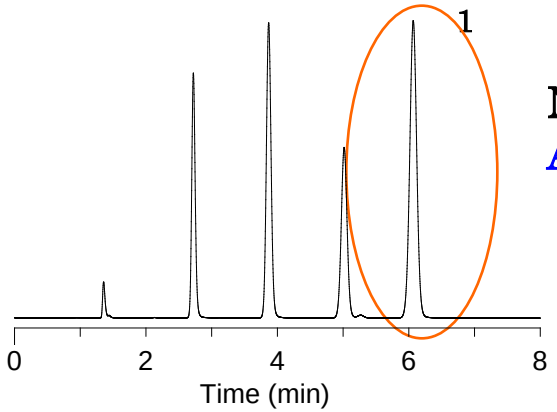
N = 15,014
Assy. = 1.06

Inertsil ODS-4



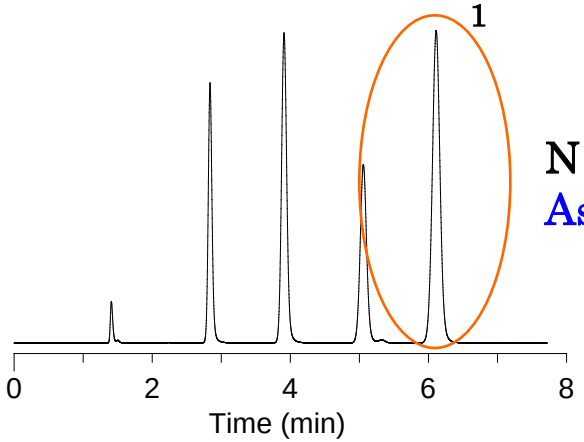
N = 14,229
Assy. = 1.05

L-Column2 ODS



N = 14,629
Assy. = 1.01

Capcell Pak C18 MGⅢ



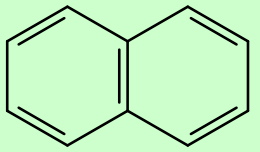
N = 13,667
Assy. = 1.03

Atlantis T3 (Waters)

Conditions
Column: 4.6 mm I.D x 150 mm length ,5μm
Mobile phase: Acetonitrile : H2O = 65 : 35
Flow rate: 1 ml / min
Column temperature: 35℃
Detection: UV 254 nm
Sample: 1μL (naphthalene 1mg/mL)

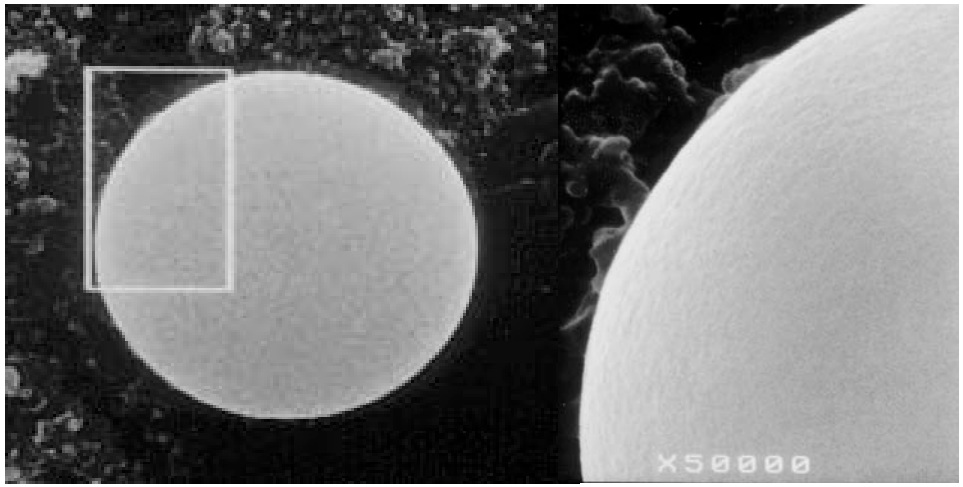
Naphthalene

(Neutral compound)

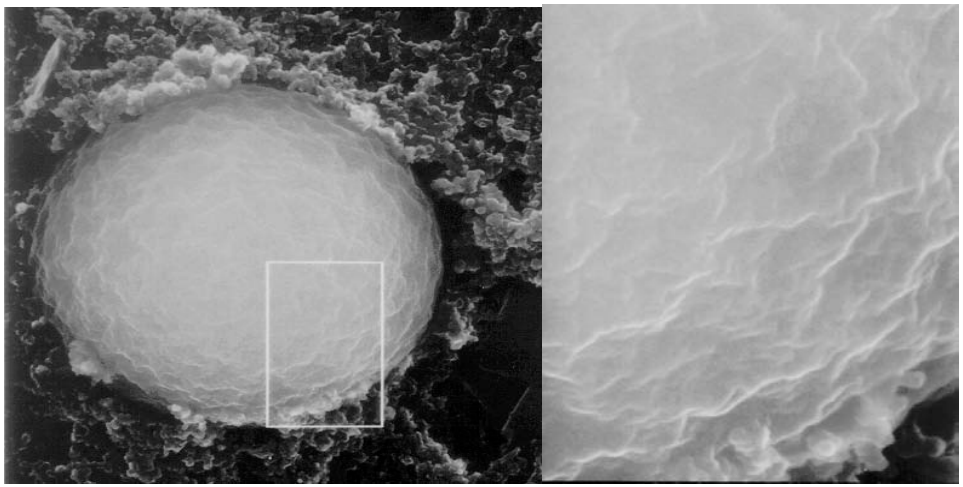


Highly Pure Base Silica-gel

- Completely spherical
- Smooth surface
- Synthesized from pure ingredients
- Focused only for chromatography
- Whole manufacturing process within GLS



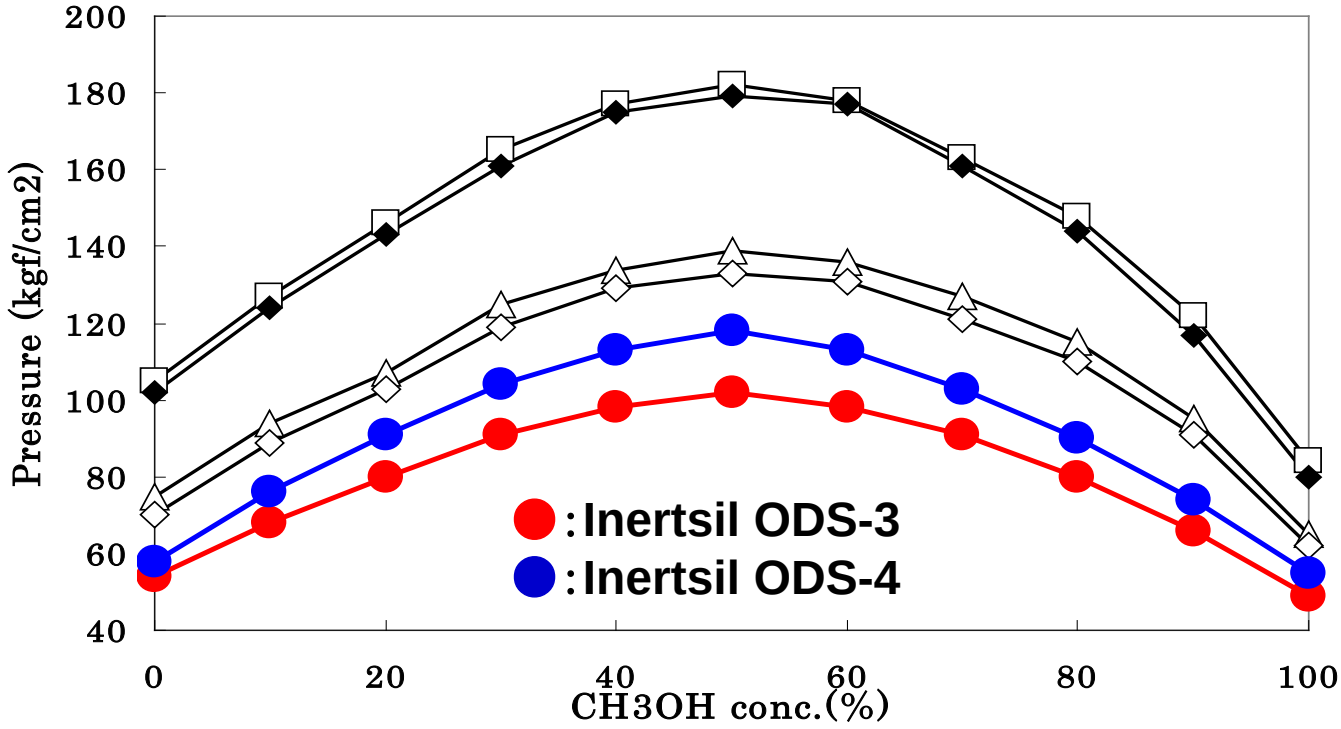
Inertsil Silica-gel



One competitor's Silica-gel

Back pressure of commercially available columns

Low Column Back Pressure



Analytical Conditions

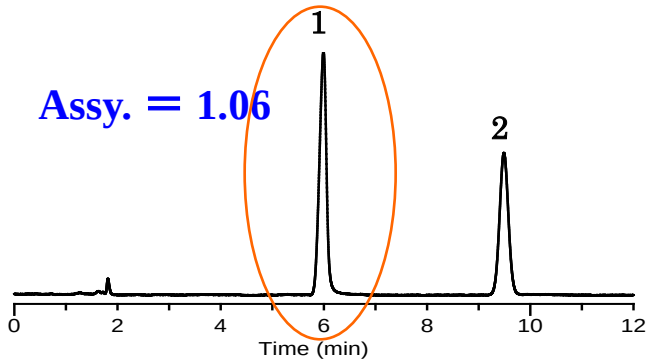
Column Size: 250x4.6mmID

Flow Rate: 1.0 mL/min

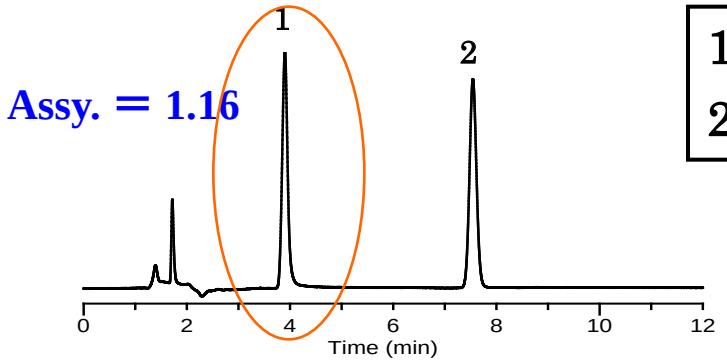
Col.Temp. : 40C

Comparison of inertness to pyridine between Inertsil ODS-4 and commercially ODS columns

1) Pyridine
2) Phenol

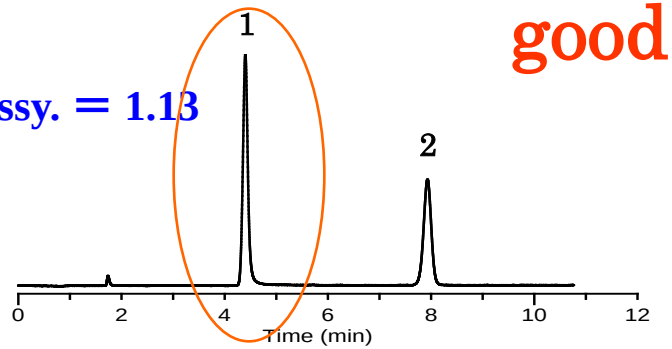


Inertsil ODS-4

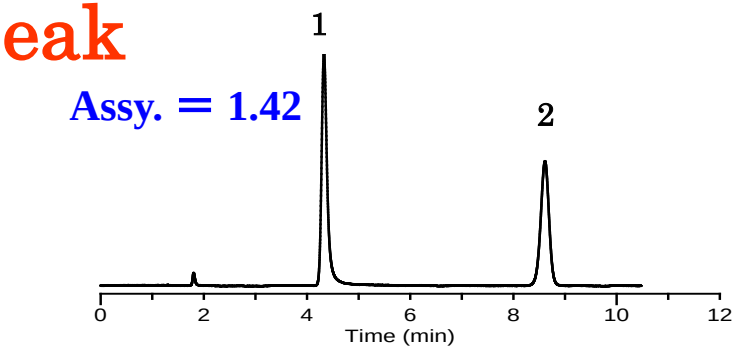


L-Column2 ODS

good peak



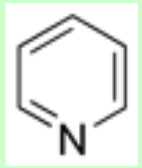
Capcell Pak C18 MGⅢ



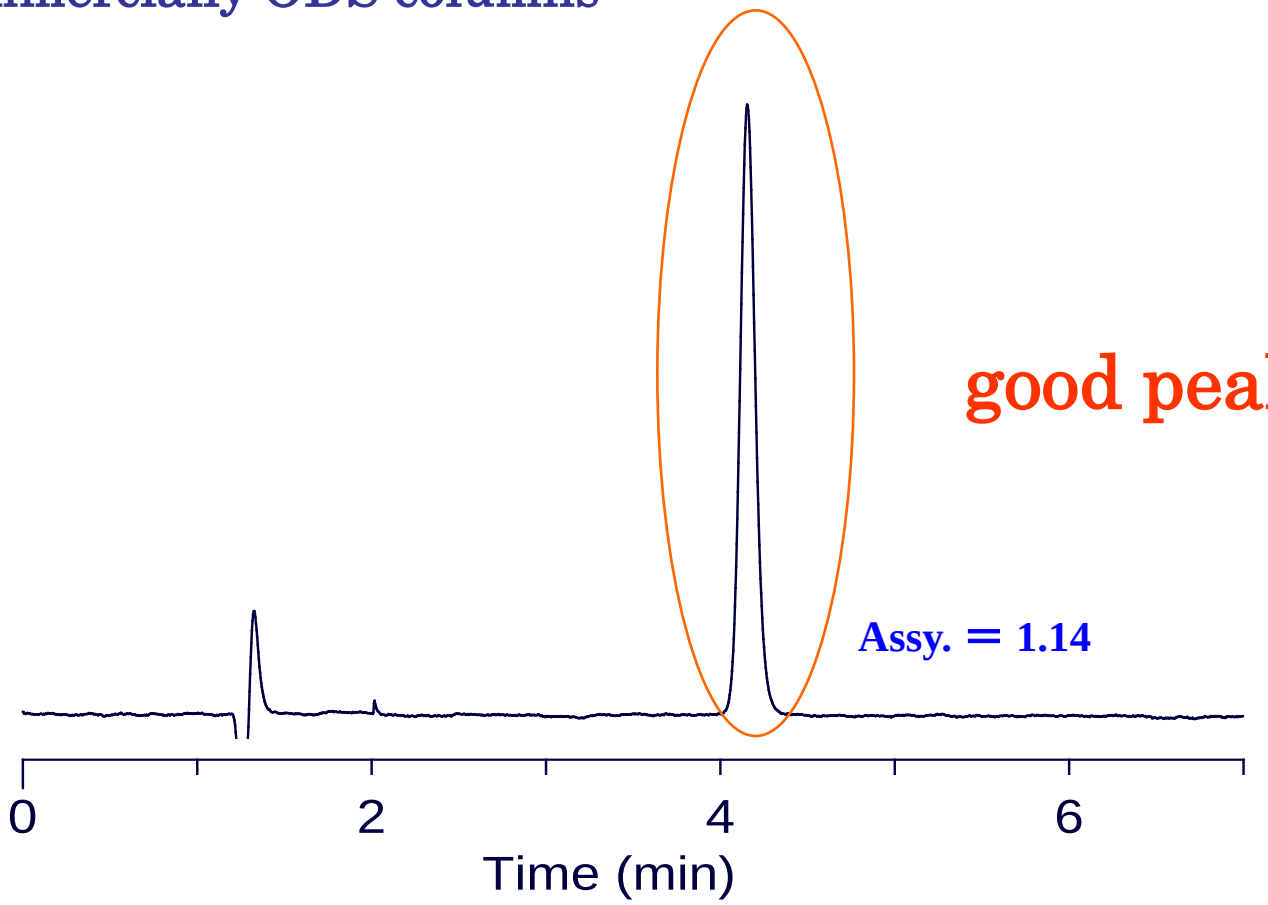
Atlantis T3 (Waters)

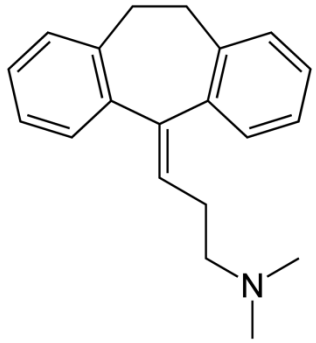
Conditions
Column: 4.6 mm I.D x 150 mm length ,5μm
Mobile phase: Methanol : H2O = 30 : 70
Flow rate: 1 ml / min
Column temperature: 40℃
Detection: UV 254 nm
Sample: 0.5μL (pyridine 0.09mg/mL, phenol 0.41mg/mL)

Pyridine
(Basic compound)



Comparison of inertness to amitriptyline between Inertsil ODS-4 and commercially ODS columns





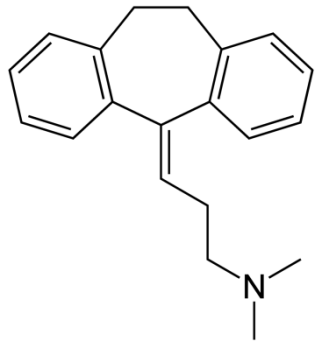
Inertsil ODS-4

Conditions
Column: 4.6 mm I.D x 150 mm length ,5μm
Mobile phase: Acetonitrile : 10mM Ammonium acetate =60 : 40
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 230 nm
Sample: 1μL (Amitriptyline hydrochloride 10mg/L)

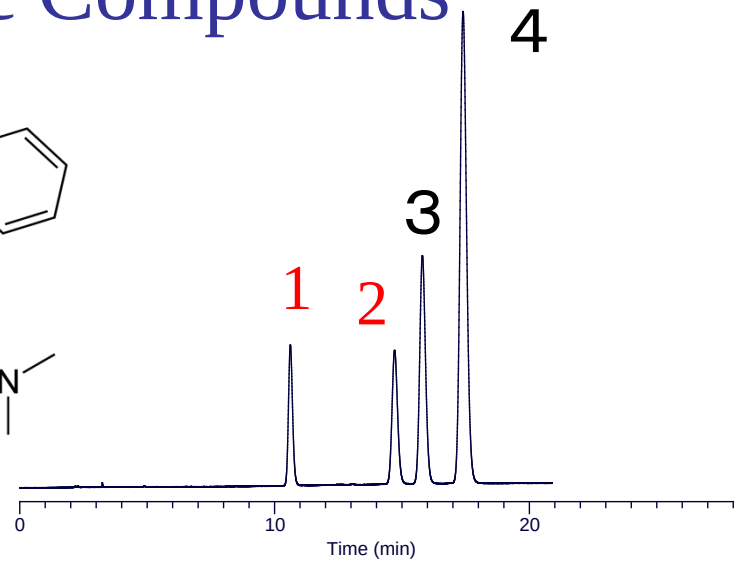
Interaction with Strong Basic Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
Acetonirile
/ 25mM Phosphate buffer
pH7.0 (60/40)
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 220nm
Injection Vol. : 1µl

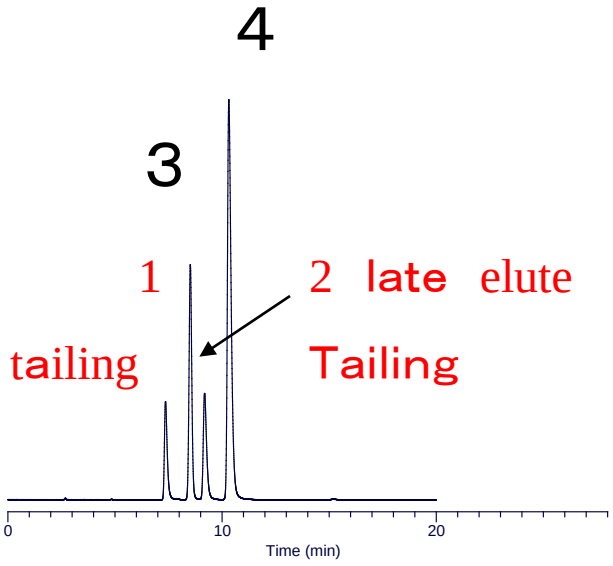
Amitriptyline
(Basic compound)



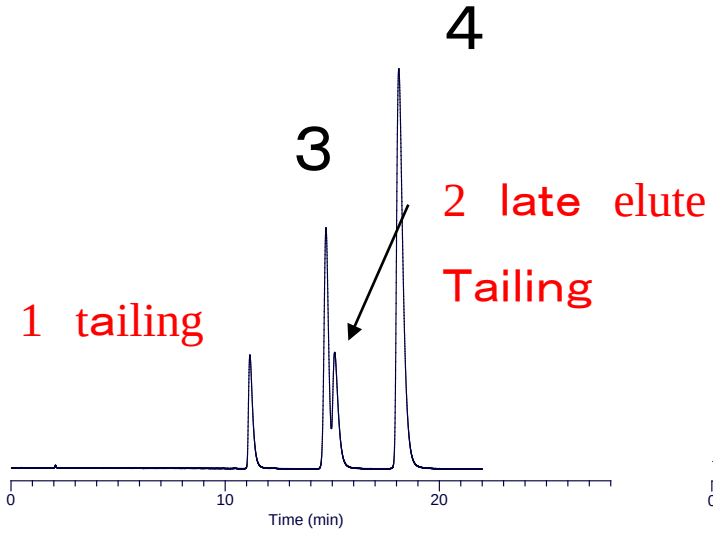
1) Mianserine
2) Amitriptyline (Basic compound)
3) imypramin
4) Chlomipramine



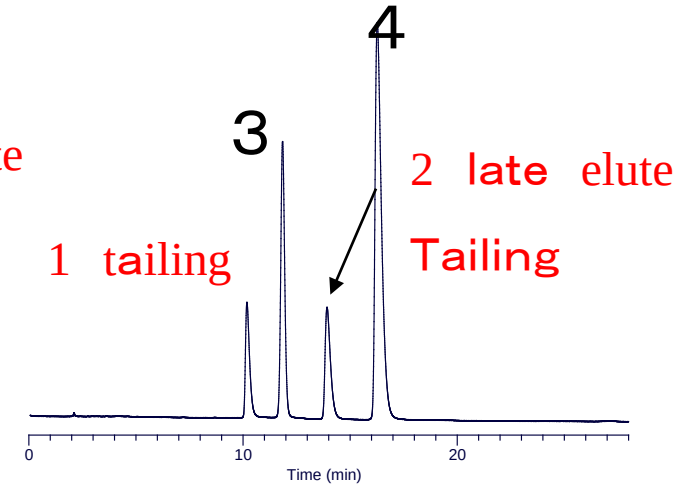
Inertsil ODS−4



Hypersil GOLD



Sunfire

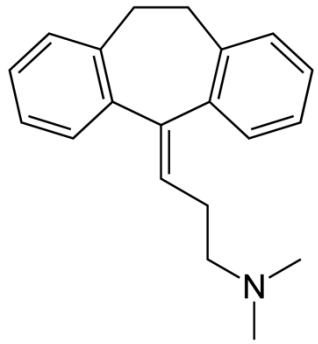


Zorbax Eclipse Plus C18

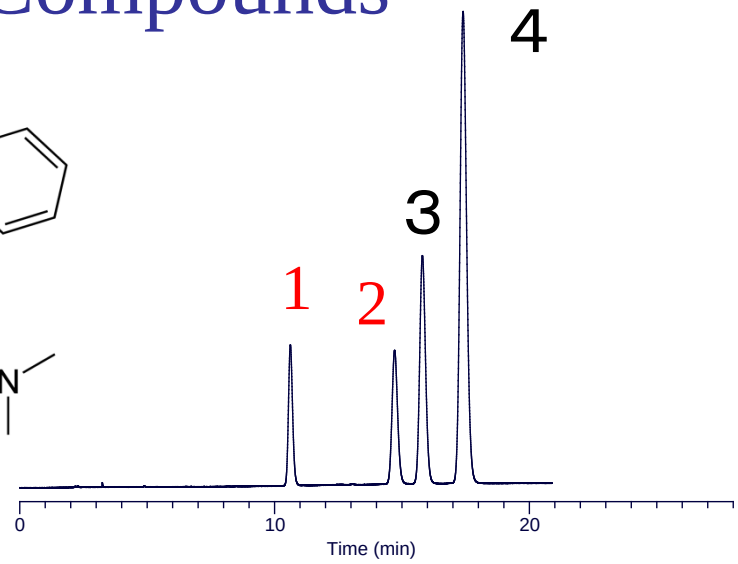
Interaction with Strong Basic Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
Acetonirile
/ 25mM Phosphate buffer
pH7.0 (60/40)
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 220nm
Injection Vol. : 1μl

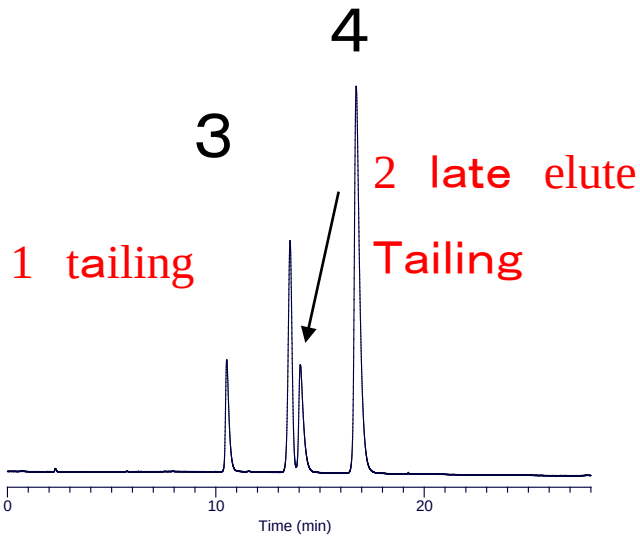
Amitriptyline
(Basic compound)



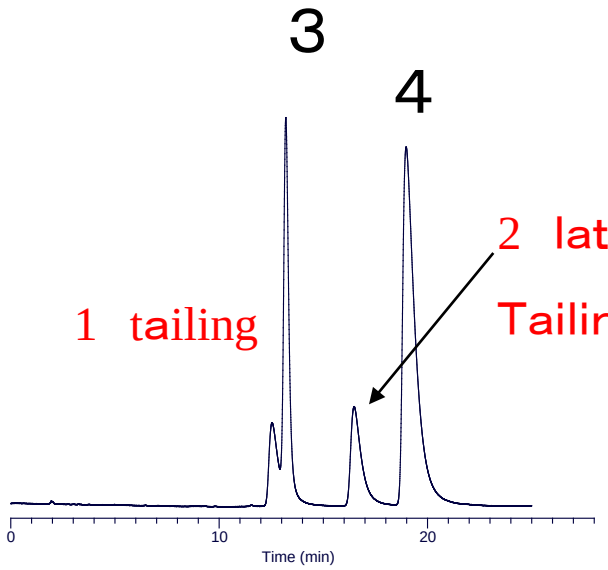
1) Mianserine
2) Amitriptyline (Basic compound)
3) imypramin
4) Chlomipramine



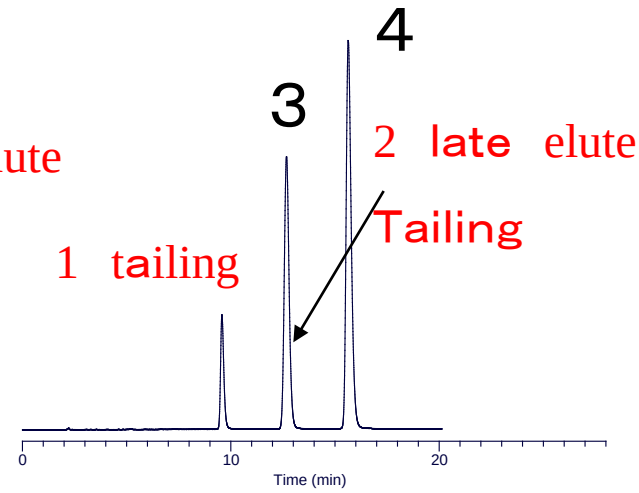
Inertsil ODS−4



Atlantis T3



Symmetry C18

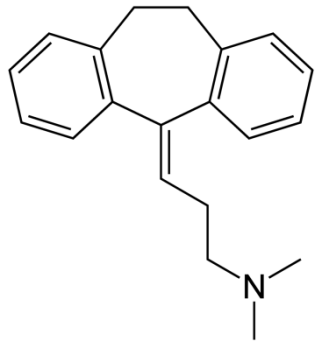


Luna 5u C18(2)

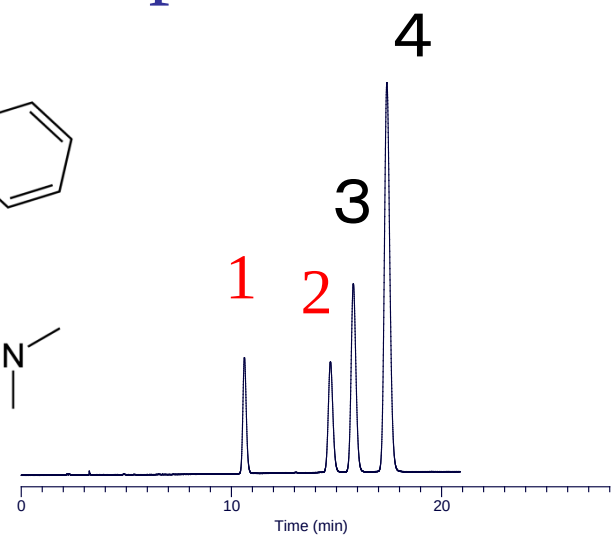
Interaction with Strong Basic Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
Acetonirile
/ 25mM Phosphate buffer
pH7.0 (60/40)
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 220nm
Injection Vol. : 1μl

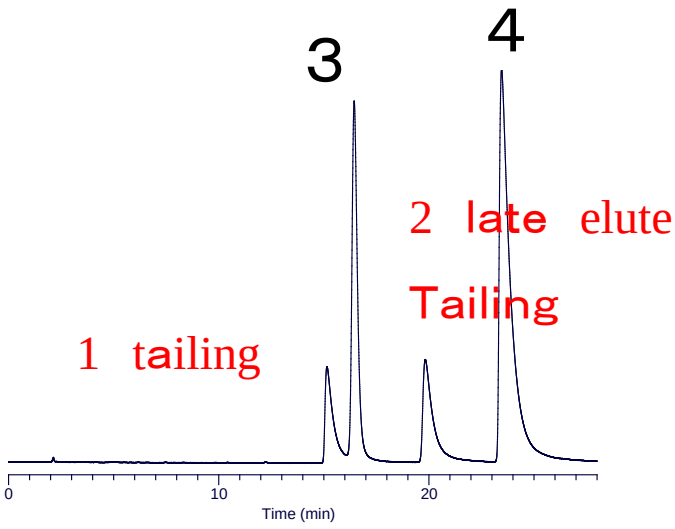
Amitriptyline
(Basic compound)



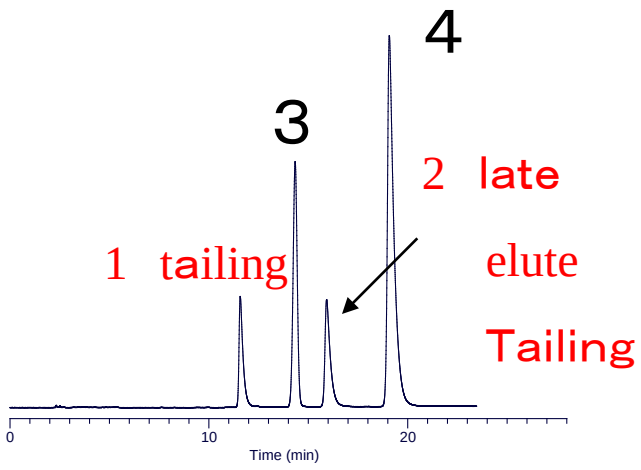
1) Mianserine
2) Amitriptyline (Basic compound)
3) imypramin
4) Chlomipramine



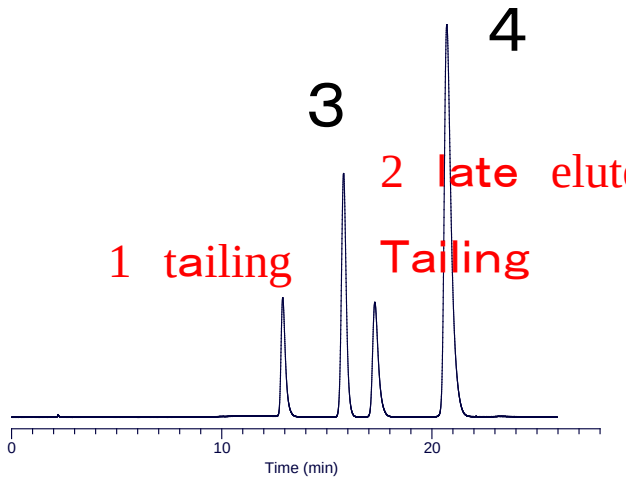
Inertsil ODS−4



Capcell Pak MGⅢ



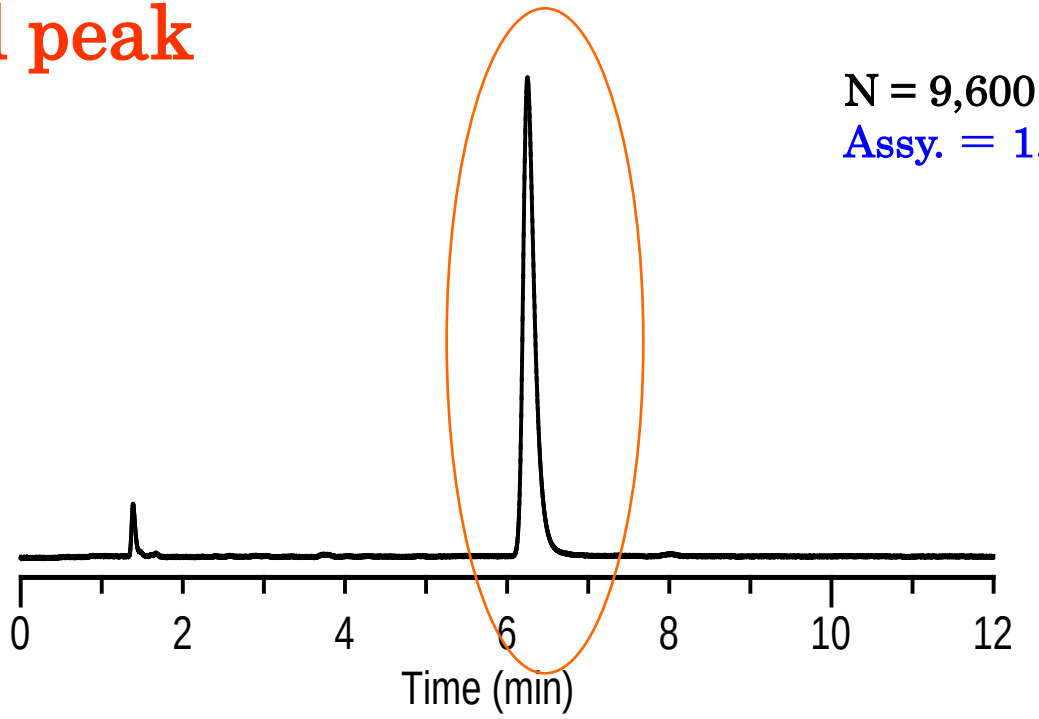
YMC-Pack Pro C18



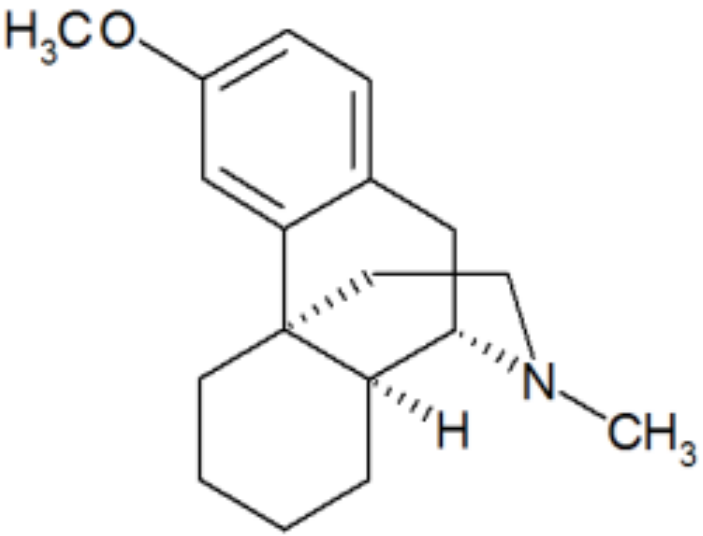
TSK-GEL ODS-100V

Comparison of inertness to dextromethorphan between Inertsil ODS-4 and commercially ODS columns

good peak



N = 9,600
Assy. = 1.5(



Dextromethorphan
(Basic compound)

Inertsil ODS-4

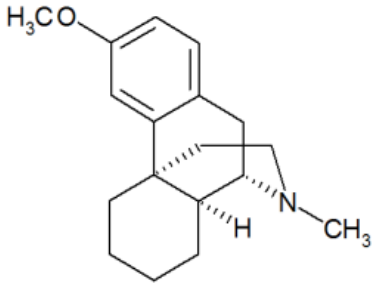
Conditions
Column: 4.6 mm I.D x 150 mm length ,5μm
Mobile phase:
Acetonitrile : 25mM Phosphate buffer(pH7.0) =40 : 60
Flow rate: 1 ml / min
Column temperature: 40℃
Detection: UV 220 nm
Sample: 1.0μL (Dextromethorphan hydrobromide 0.1mg/mL)

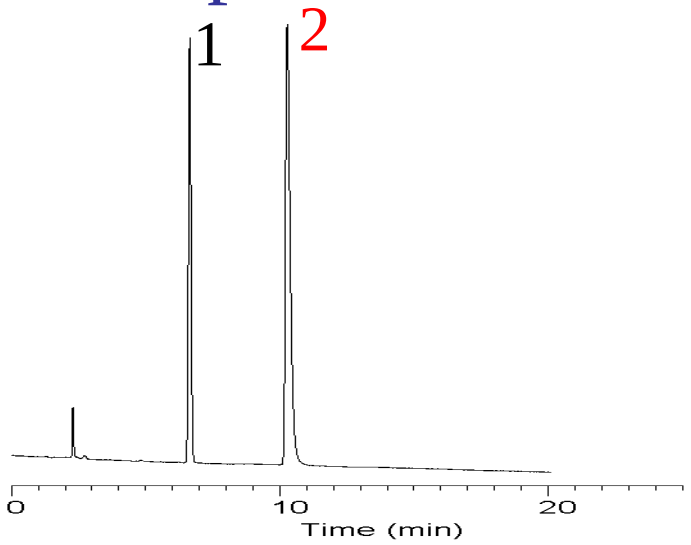
Interaction with Strong Basic Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
Acetonirile
/ 25mM Phosphate buffer
pH7.0 (40/60)
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 210nm
Sample: 1μL

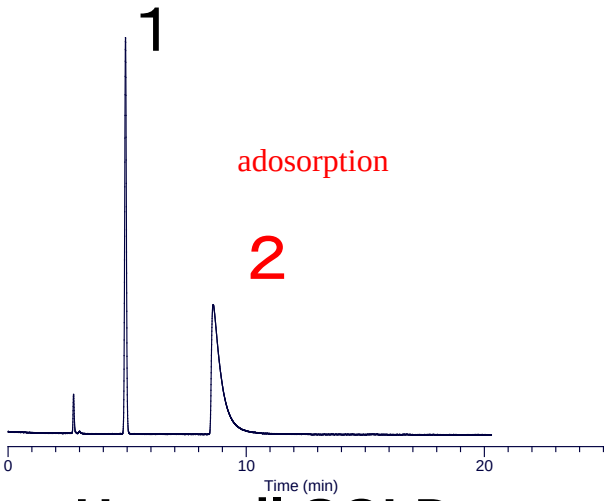
1)	phenol
2)	Dextromethorphan

Dextromethorphan (Basic compound)

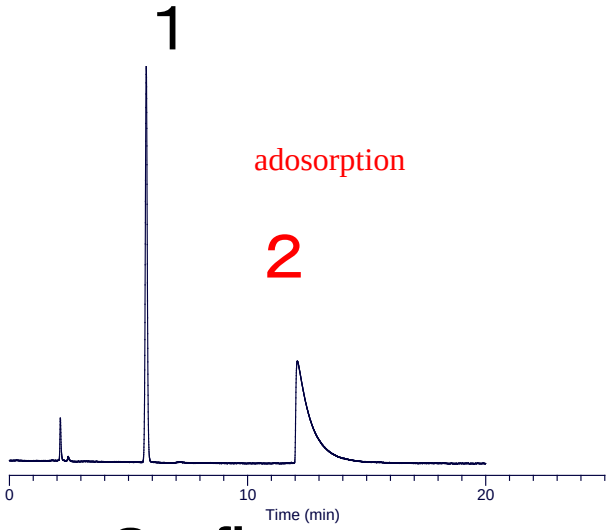




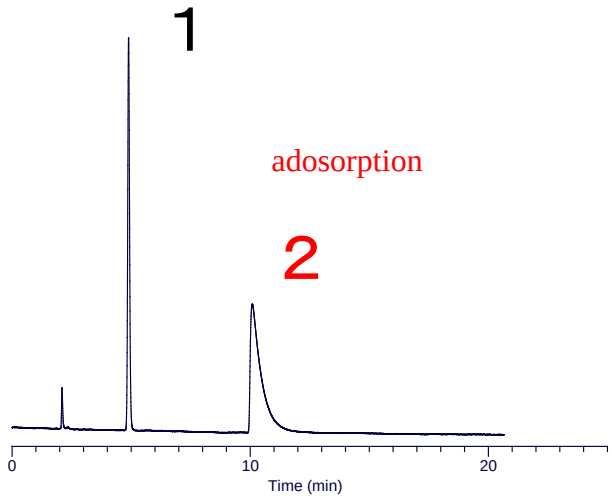
Inertsil ODS−4



Hypersil GOLD



Sunfire



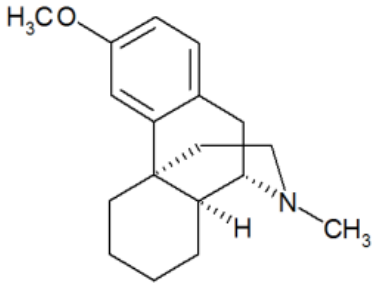
Zorbax Eclipse Plus C18

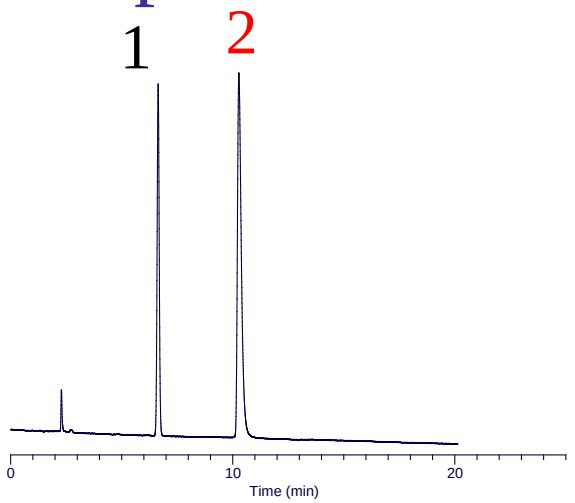
Interaction with Strong Basic Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
Acetonirile
/ 25mM Phosphate buffer
pH7.0 (40/60)
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 210nm
Sample: 1μL

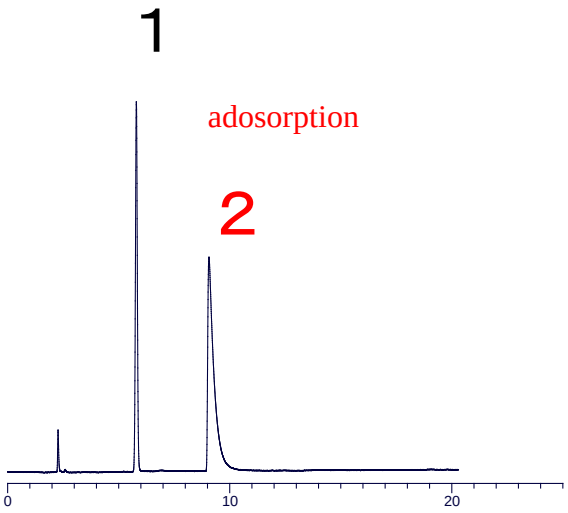
1)	phenol
2)	Dextromethorphan

Dextromethorphan (Basic compound)

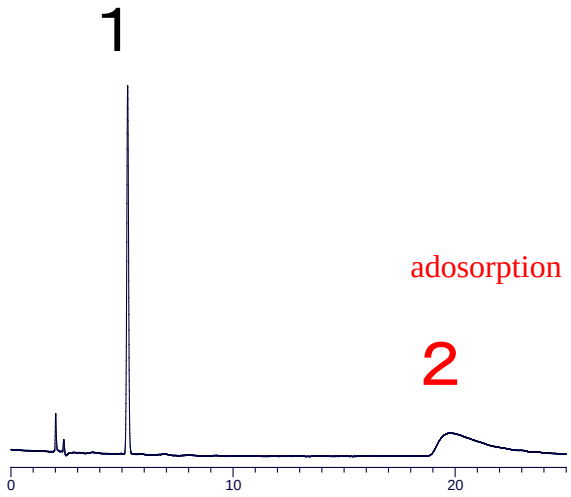




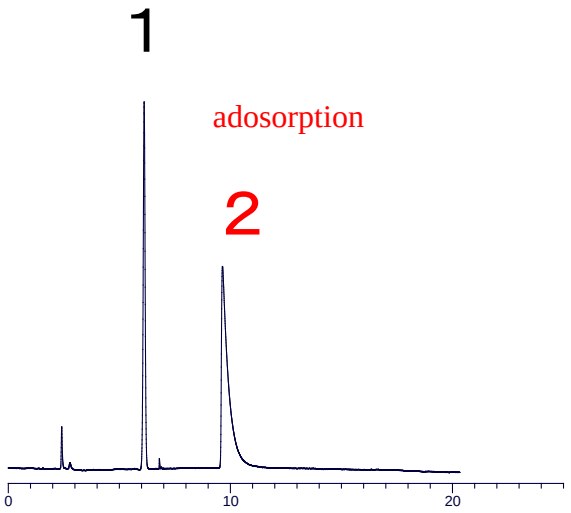
Inertsil ODS−4



Atlantis T3



Symmetry C18



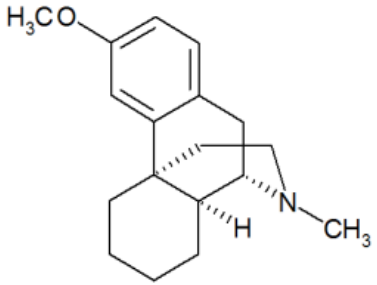
Luna 5u C18(2)

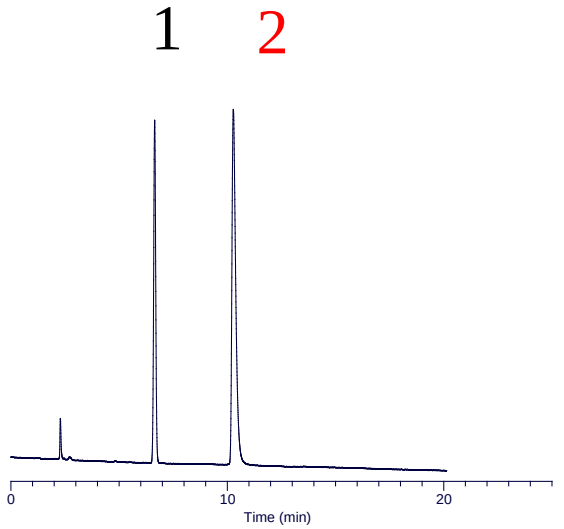
Interaction with Strong Basic Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
Acetonirile
/ 25mM Phosphate buffer
pH7.0 (40/60)
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 210nm
Sample: 1μL

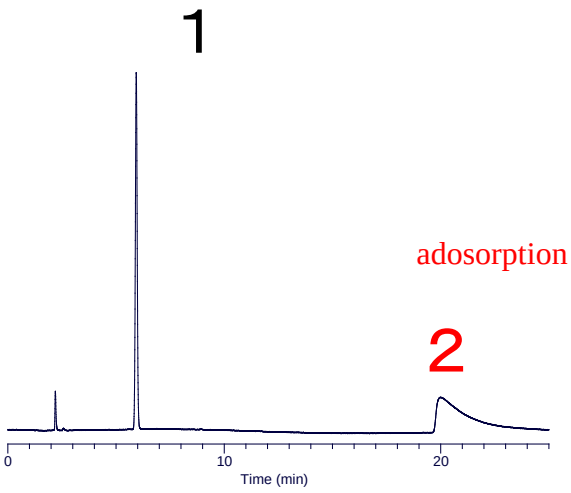
1)	phenol
2)	Dextromethorphan

Dextromethorphan (Basic compound)

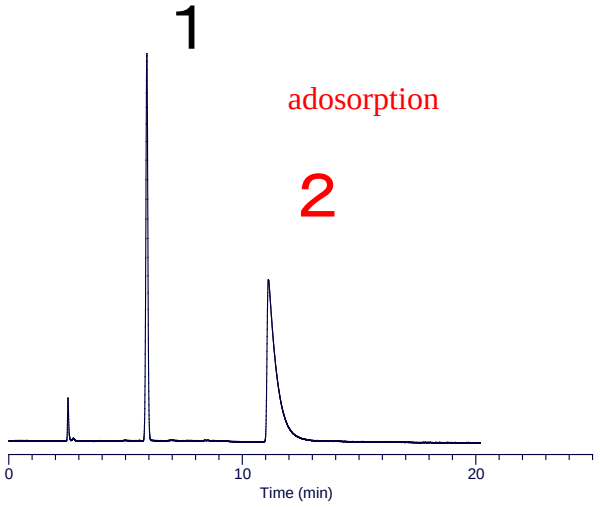




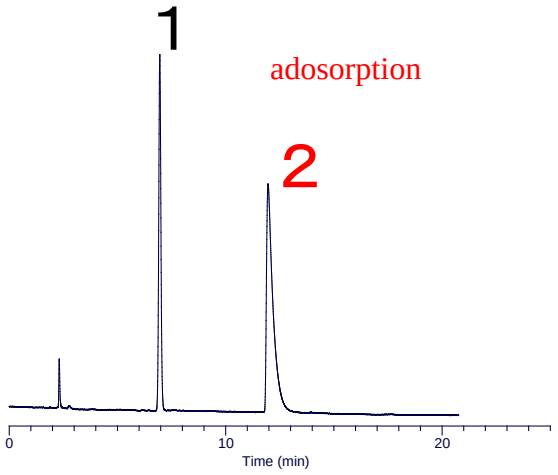
Inertsil ODS－4



Capcell Pak MGⅢ



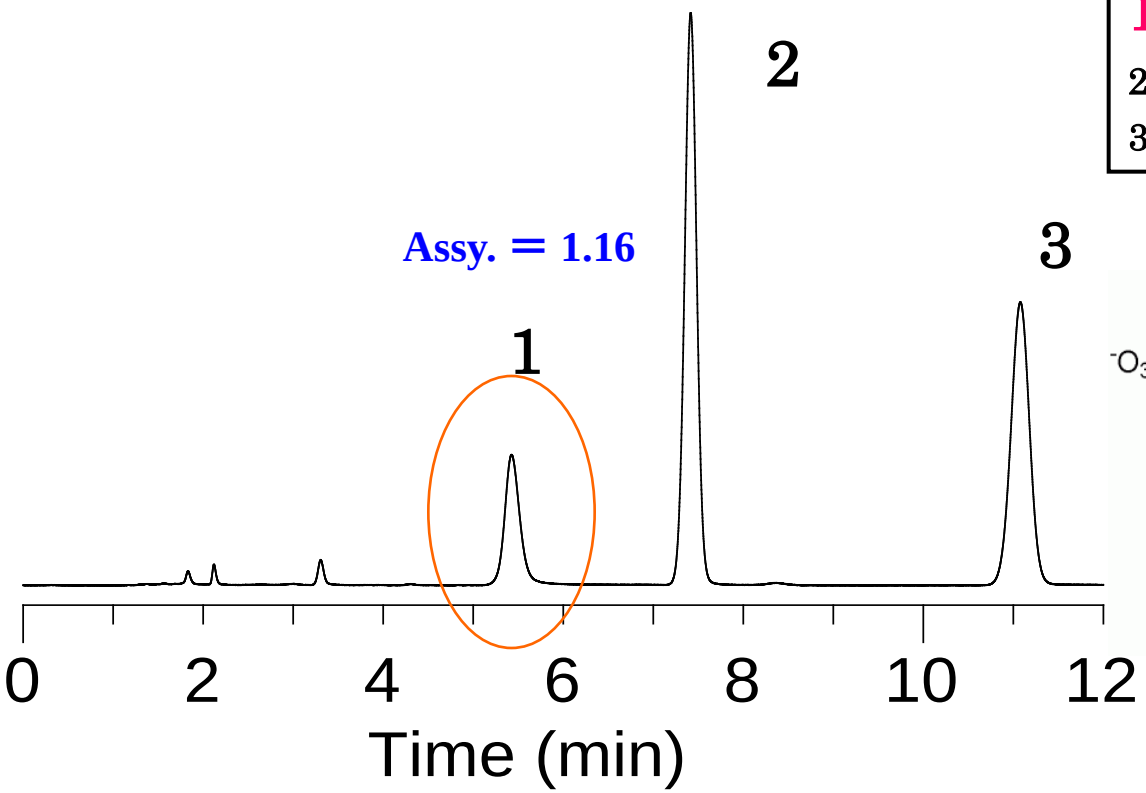
YMC-Pack Pro C18

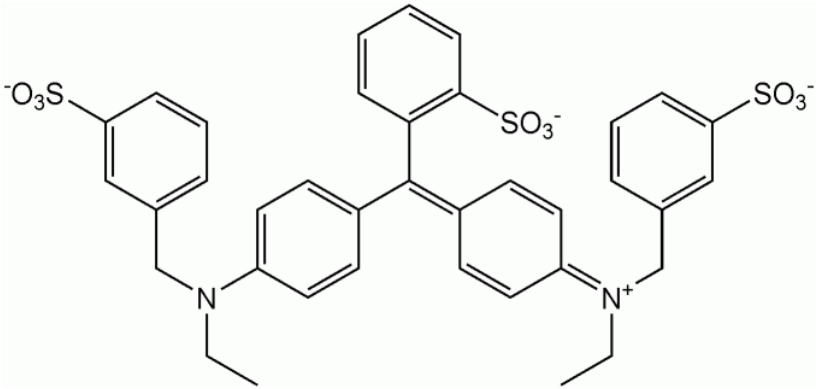


TSK-GEL ODS-100V

Comparison of inertness to strong acidic compounds between Inertsil ODS-4 and commercially ODS columns

1) Brilliant Blue FCF
2) Phenol
3) Salicylic acid





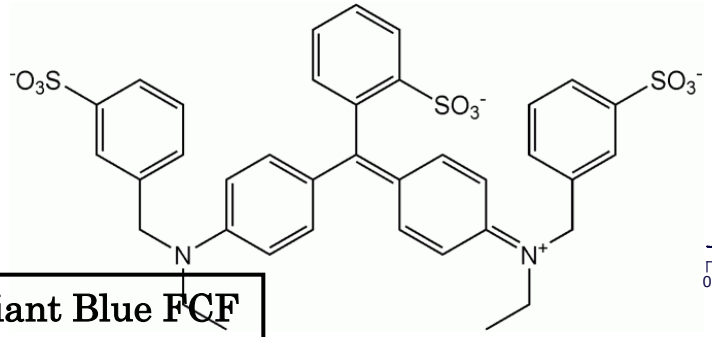
Inertsil ODS-4

Conditions
Column: 4.6 mm I.D x 150 mm length ,5µm
Mobile phase: Acetonitrile : 0.1%(v/v) Phosphoric acid = 25 : 75
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 254 nm
Sample: 3µL (Brilliant Blue FCF 0.05mg/mL, Phenol 0.3mg/mL, Salicylic acid 0.2mg/mL)

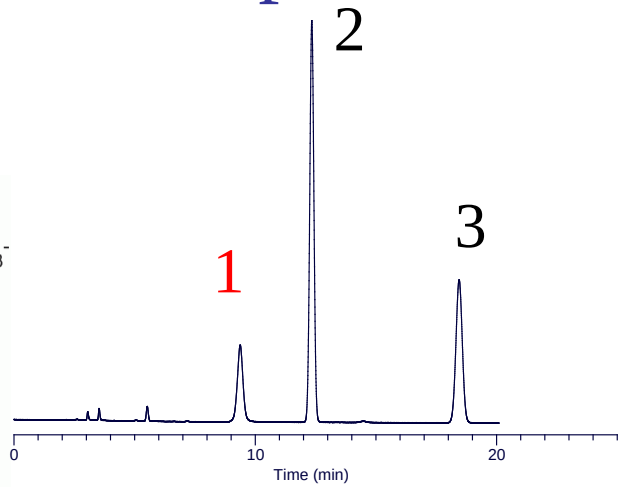
Interaction with Strong Acidic Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
0.1%(v/v) Phosphoric acid
in 25% Acetonitrile
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 254 nm
Sample: 3μL

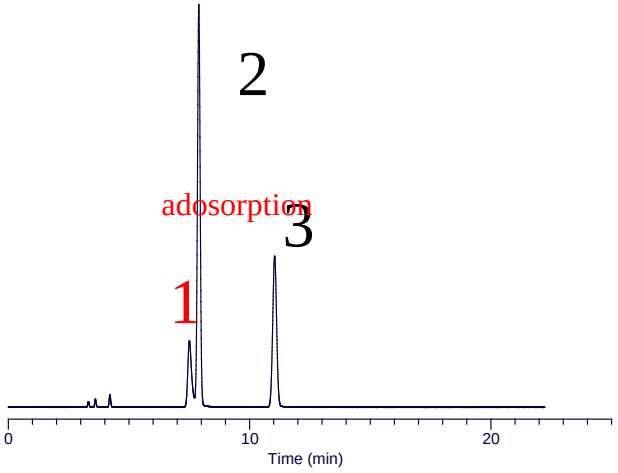
Brilliant Blue FCF



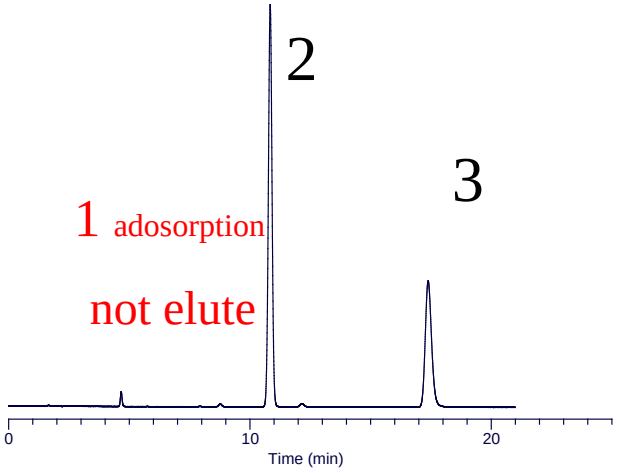
1) Brilliant Blue FCF
2) Phenol
3) Salicylic acid



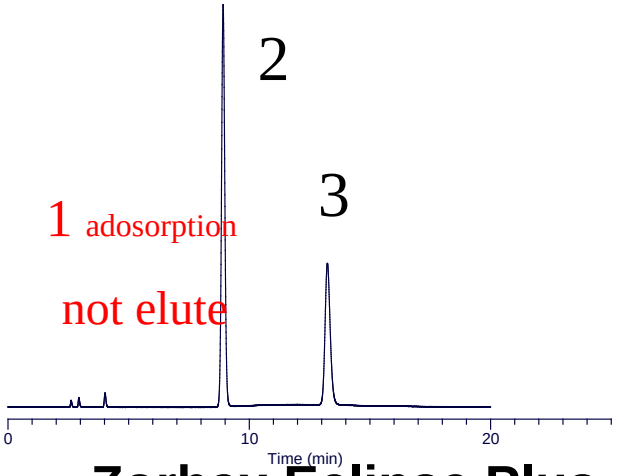
Inertsil ODS−4



Hypersil GOLD



Sunfire



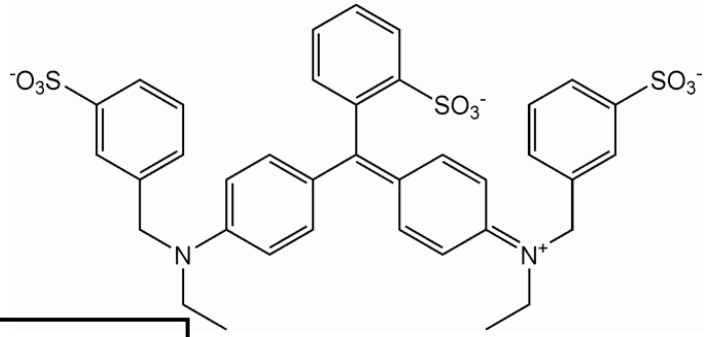
Zorbax Eclipse Plus C18

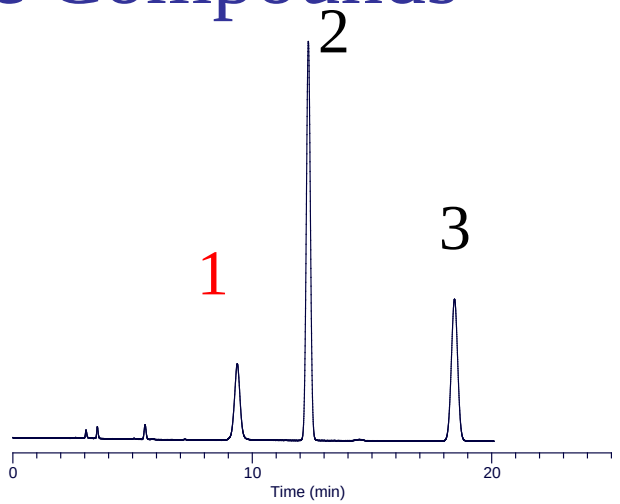
Interaction with Strong Acidic Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
0.1%(v/v) Phosphoric acid
in 25% Acetonitrile
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 254 nm
Sample: 3μL

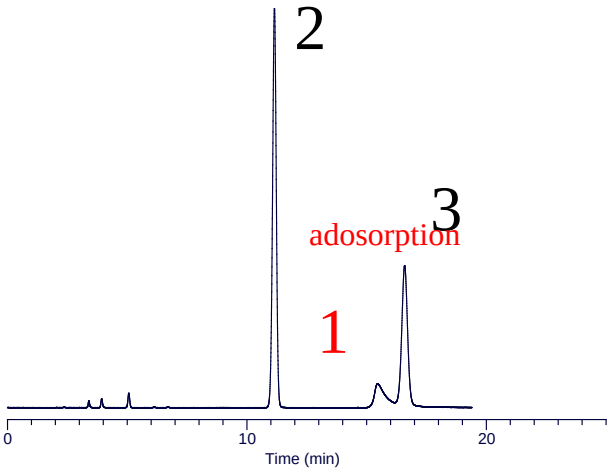
1)	Brilliant Blue FCF
2)	Phenol
3)	Salicylic acid

Brilliant Blue FCF

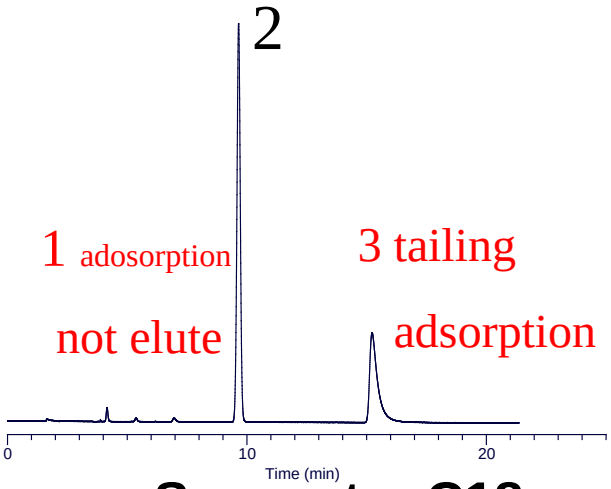




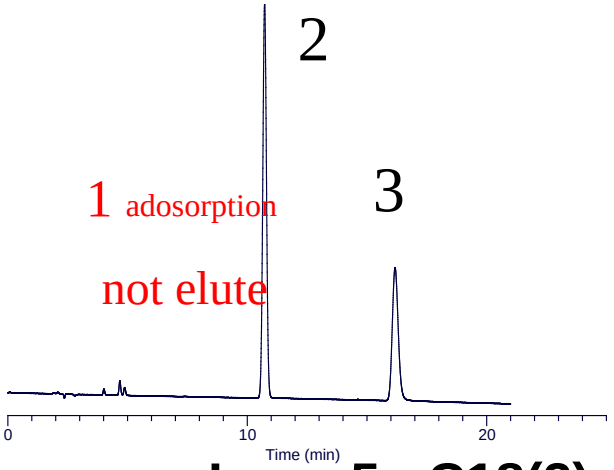
Inertsil ODS−4



Atlantis T3



Symmetry C18



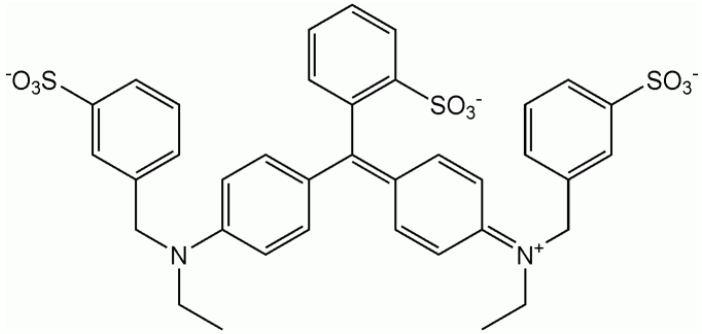
Luna 5u C18(2)

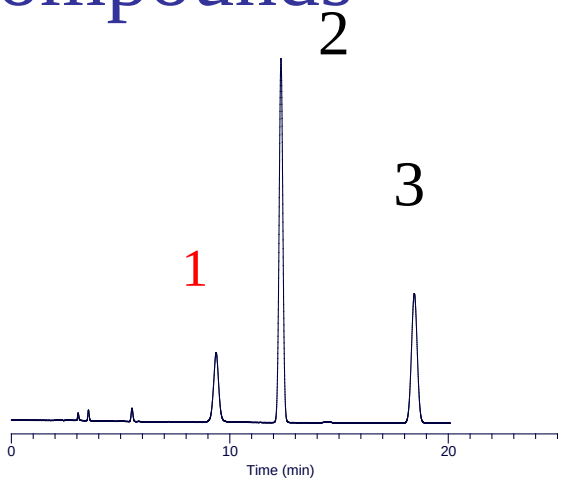
Interaction with Strong Acidic Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
0.1%(v/v) Phosphoric acid
in 25% Acetonitrile
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 254 nm
Sample: 3μL

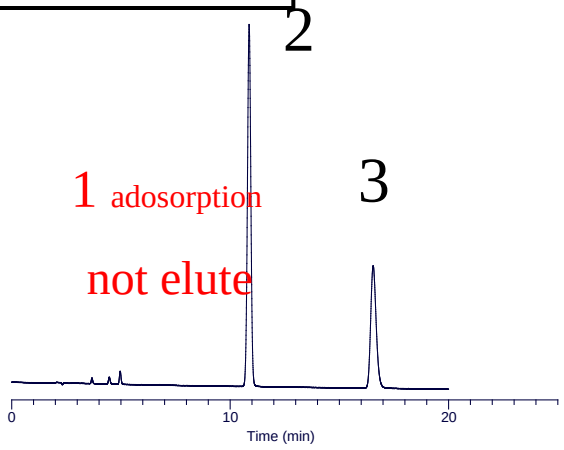
1) Brilliant Blue FCF
2) Phenol
3) Salicylic acid

Brilliant Blue FCF

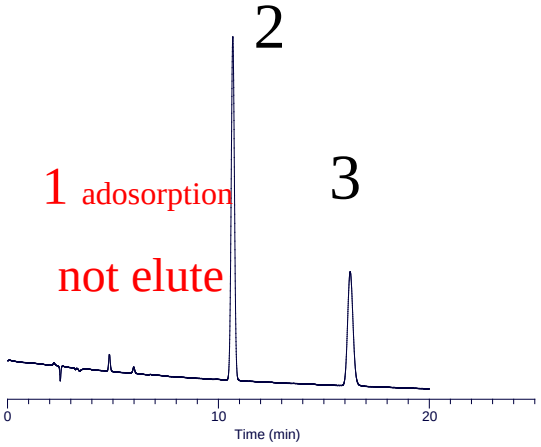




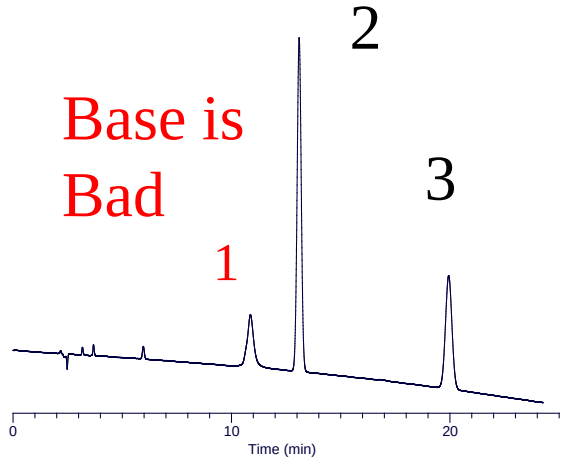
Inertsil ODS－4



Capcell Pak MGⅢ



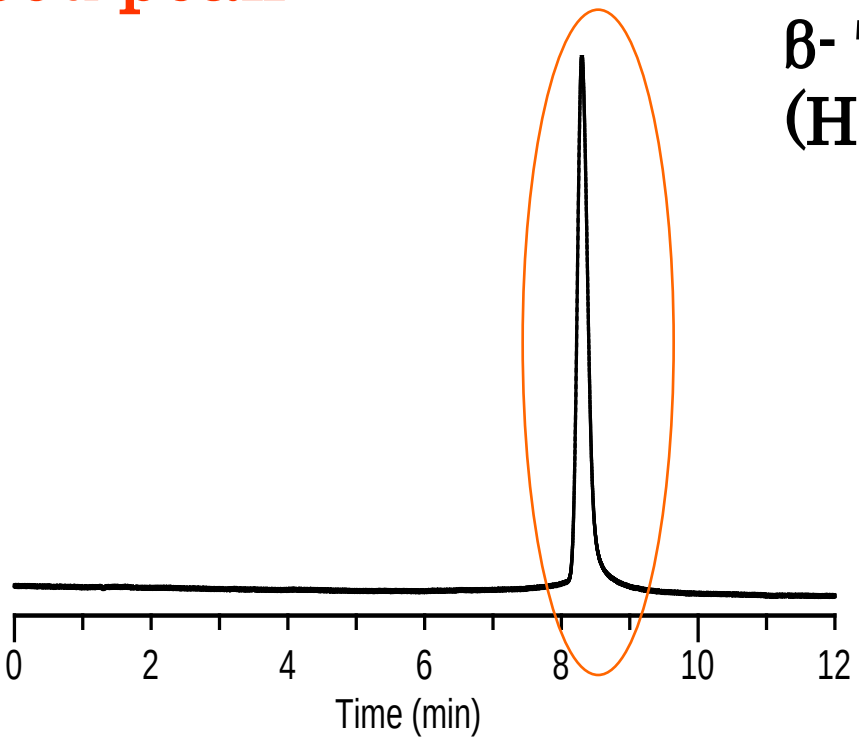
YMC-Pack Pro C18



TSK-GEL ODS-100V

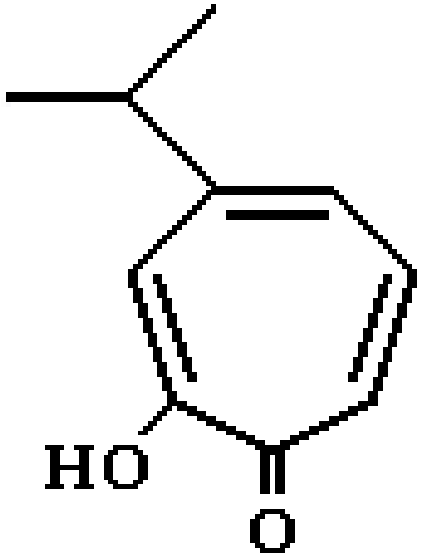
Comparison of inertness to chelating test sample between Inertsil ODS-4 and commercially ODS columns

good peak



Inertsil ODS-4

ß- Thujaplicin
(Hinokitiol)



Conditions
Column dimensions:
4.6 mm I.D x 150 mm length
Mobile phase:
Acetonitrile : 0.1%(v/v) Phosphoric acid = 25 : 75
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 254 nm
Sample: 1µL

(ß- Thujaplicin(Hinokitiol) 0.1mg/mL)

Highly Pure Base Silica-gel

Amount of Metals are inspected by Atomic Emission and ICP.

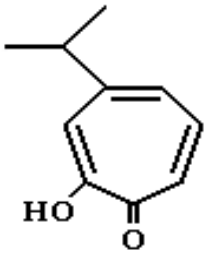
Manufacturer's Validation Certificate		
Atomic Emission ppm	Specification	Results
Fe	<10	5
Na	<10	4
Al	<10	1
Ti	<1	<0.5

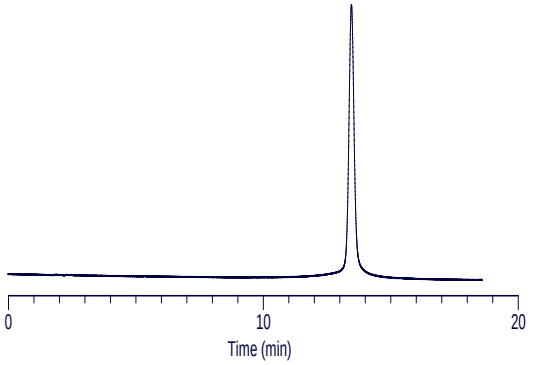
Interaction with chelating Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
Acetonitrile : 0.1%(v/v) Phosphoric acid = 40 :60
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 254 nm
Sample: 1μL

(β- Thujaplicin(Hinokitiol) 0.1mg/mL)

β- Thujaplicin (Hinokitiol)

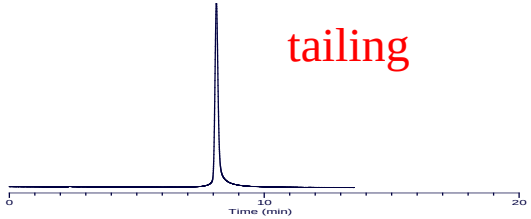




Inertsil ODS－4

1 adosorption

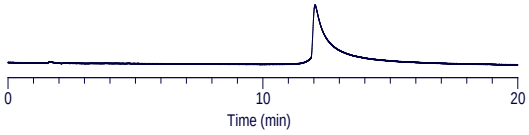
tailing



Hypersil GOLD

1 adosorption

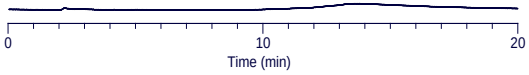
tailing



Sunfire

1 adosorption

not elute



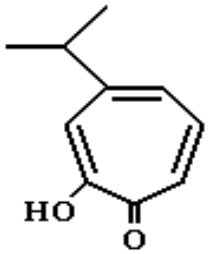
Zorbax Eclipse Plus C18

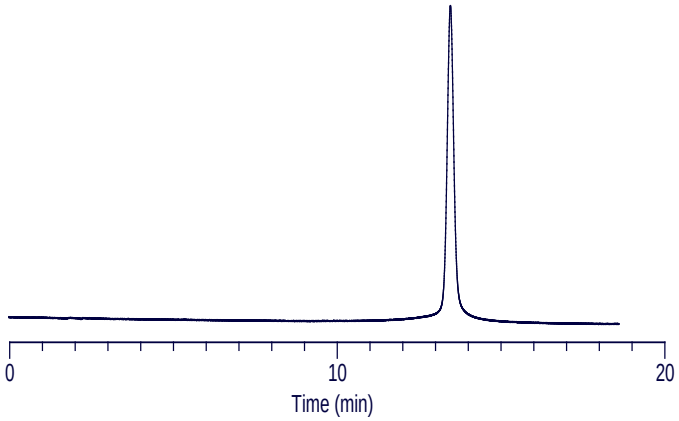
Interaction with chelating Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
Acetonitrile : 0.1%(v/v) Phosphoric acid = 40 :60
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 254 nm
Sample: 1μL

(β- Thujaplicin(Hinokitiol) 0.1mg/mL)

β- Thujaplicin (Hinokitiol)

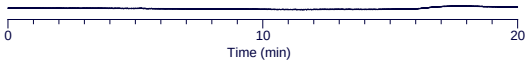




Inertsil ODS－4

1 adosorption

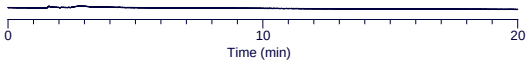
not elute



Atlantis T3

1 adosorption

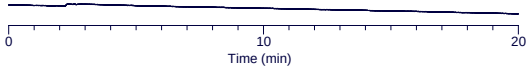
not elute



Symmetry C18

1 adosorption

not elute



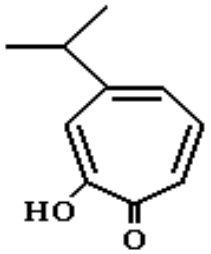
Luna 5u C18(2)

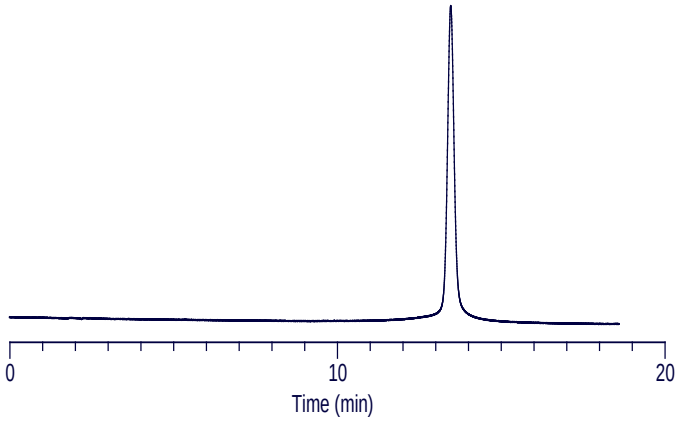
Interaction with chelating Compounds

Conditions
Column dimensions:
4.6 mm I.D x 250 mm length
Mobile phase:
Acetonitrile : 0.1%(v/v) Phosphoric acid = 40 :60
Flow rate: 1 ml / min
Col.Temp.: 40℃
Detection: UV 254 nm
Sample: 1μL

(β- Thujaplicin(Hinokitiol) 0.1mg/mL)

β- Thujaplicin
(Hinokitiol)

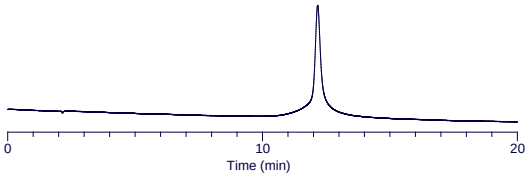




Inertsil ODS-4

1 adosorption

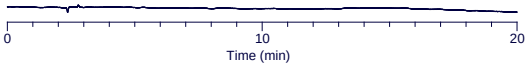
tailing



Capcell Pak MGⅢ

1 adosorption

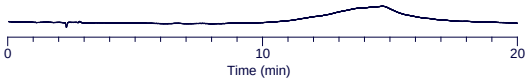
not elute



YMC-Pack Pro C18

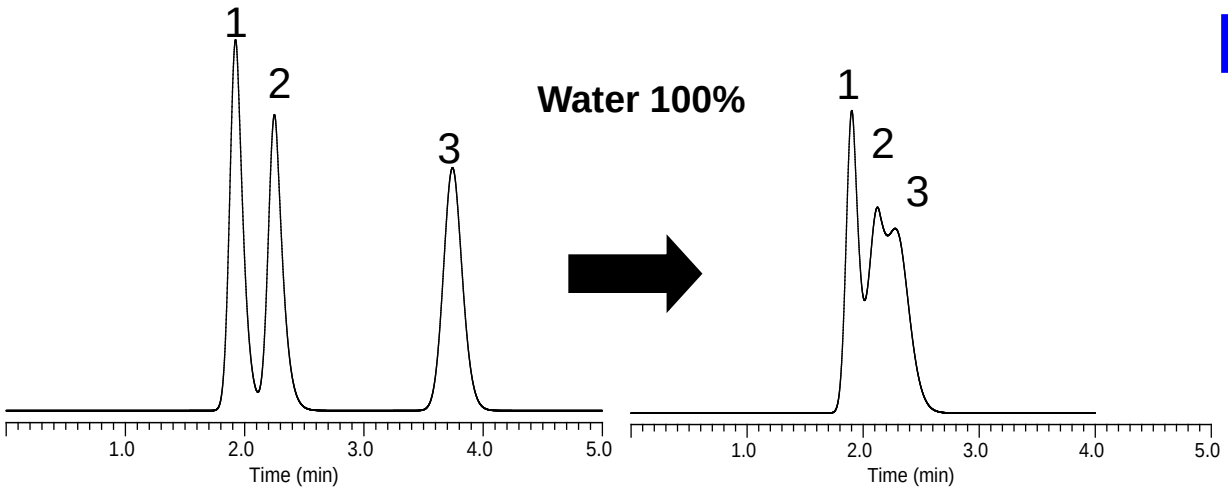
1 adosorption

not elute

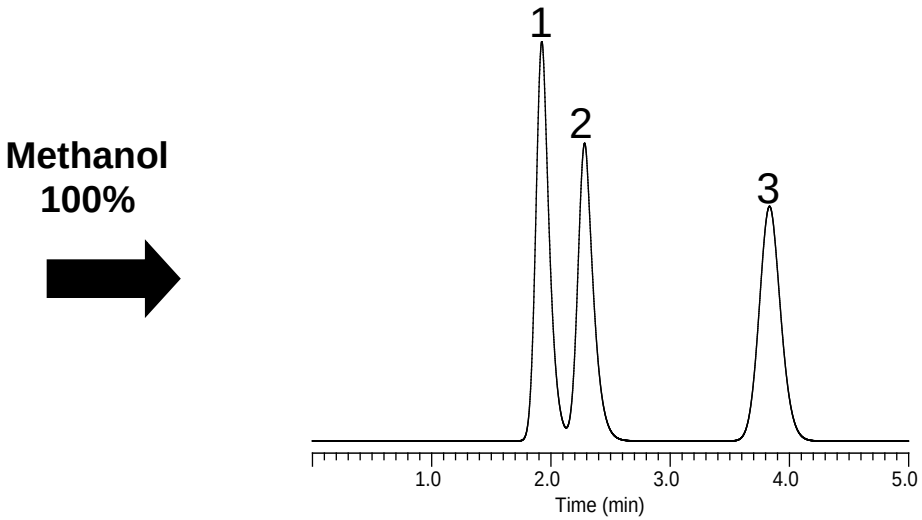


TSK-GEL ODS-100V

Reversed phase columns often show…



Typical Alkyl C18



De-wetting

Conditions

Column:4.6 mmI.D x 150mm

Mobile Phase:

10mM Phosphate Buffer (pH6.8)

Flow Rate:	1 mL/ min
Column Temp.:	40C
Detection:	UV 265 nm

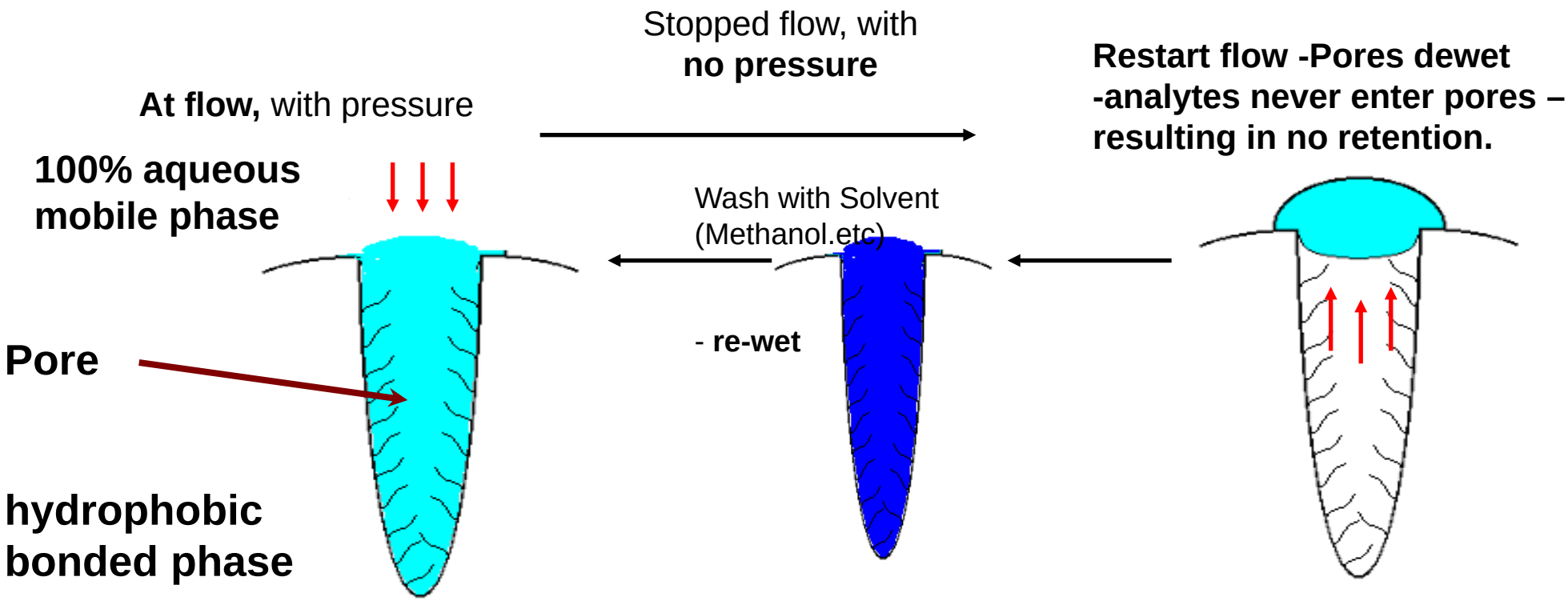
1.Cytosine

2. Uracil

3.Thymine

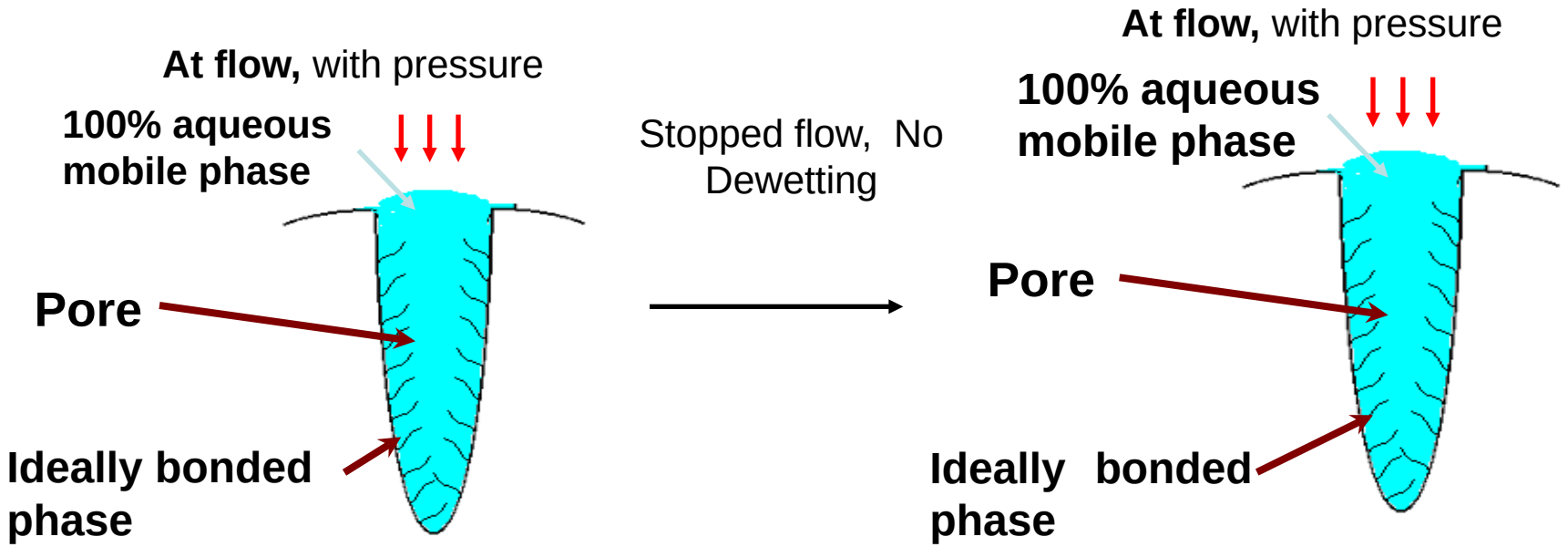
Explanation for Dewetting

Stop and Flow Test using a typical Alkyl C18 Column…



No Dewetting on 100% aqueous mobile phase

Restart flow – No dewetting
-analytes can enter pores
- resulting in retention.

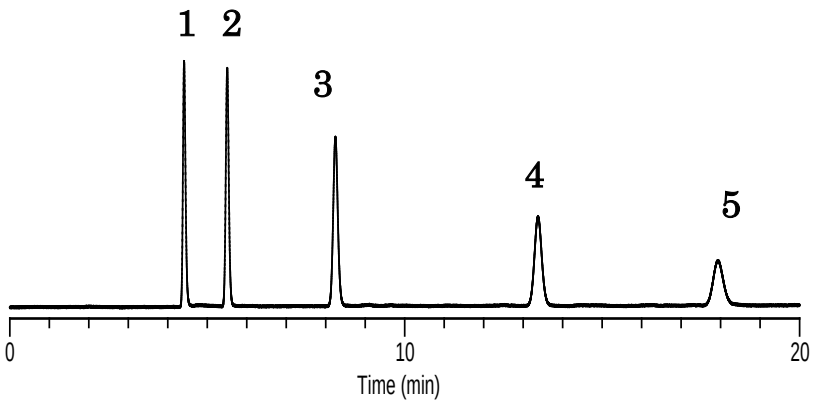


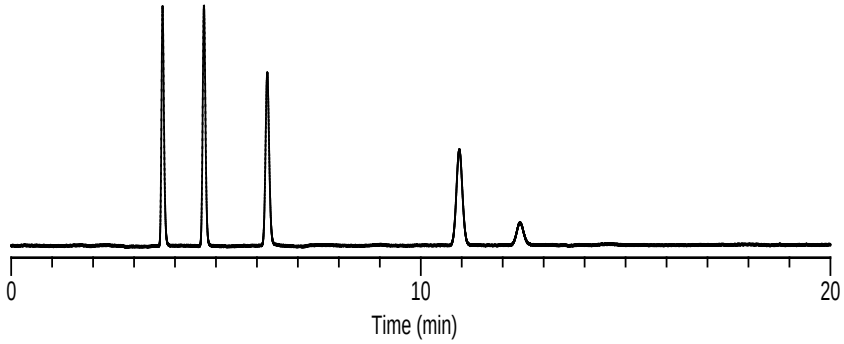
De-wetting TEST

Analytical Conditions

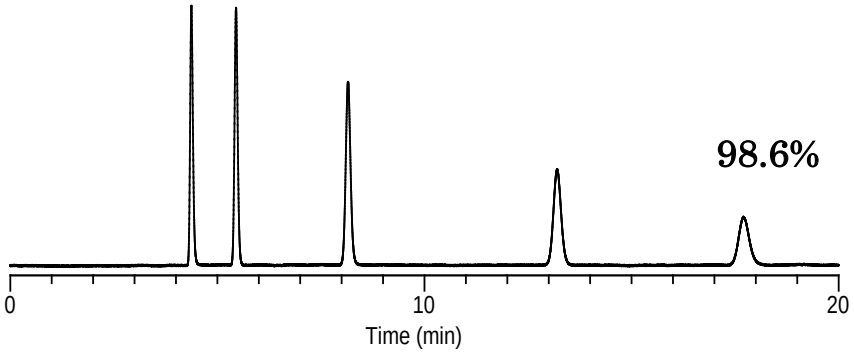
Column Size : 250 × 4.6 mmI.D. 5μm
Eluent : H_2O
Flow rate : 1mL/min
Detector : UV 254nm
Col.Temp. : 40 ℃

1. Cytosine
2. Uracil
3. Guanine
4. Thymine
5. Adenine

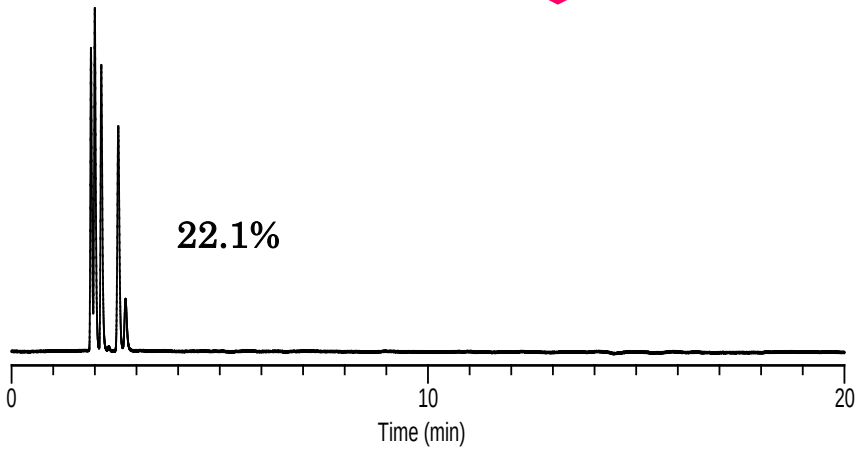




Stop the pump for 15min, then analyze again



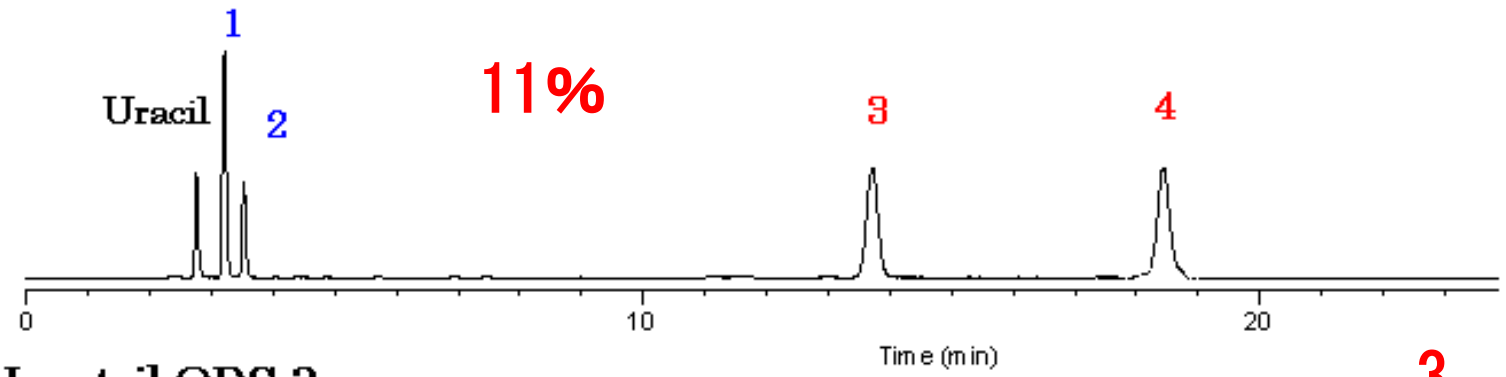
Inertsil ODS-4

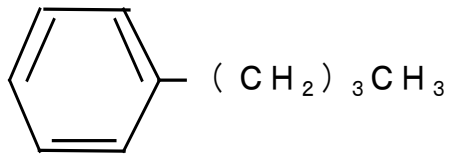


General ODS

Characterization of Inertsil ODS-4 ,ODS-3 and ODS-SP

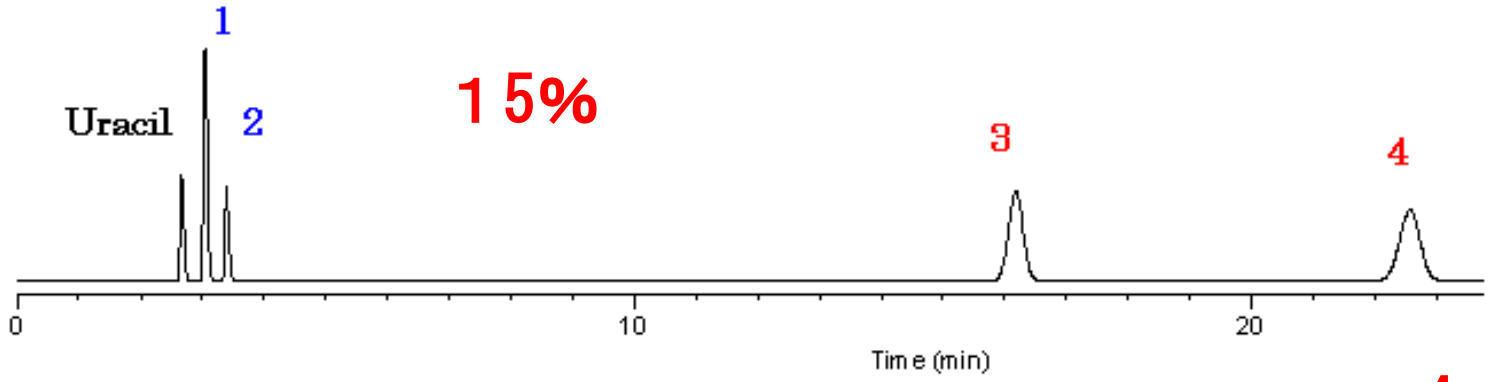
Inertsil ODS-4

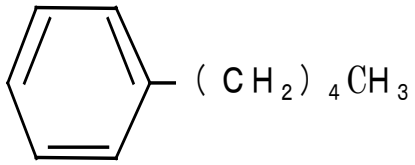




3. n-Butylbenzene

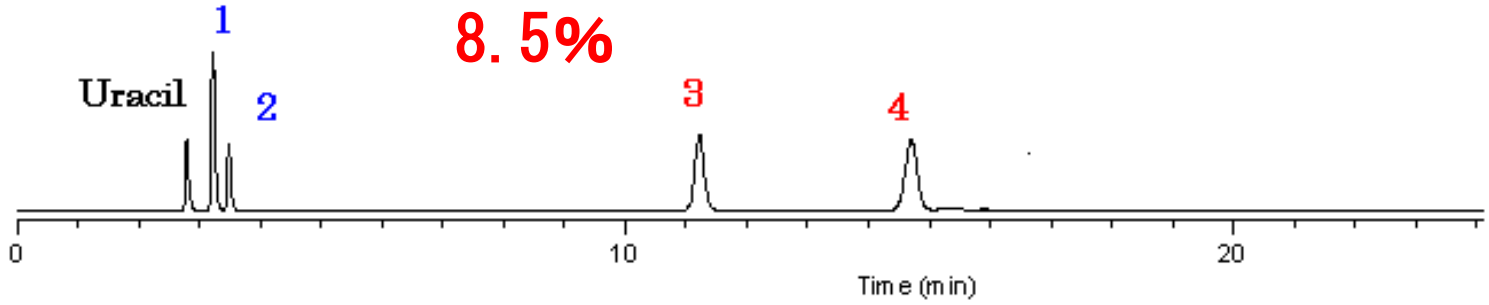
Inertsil ODS-3



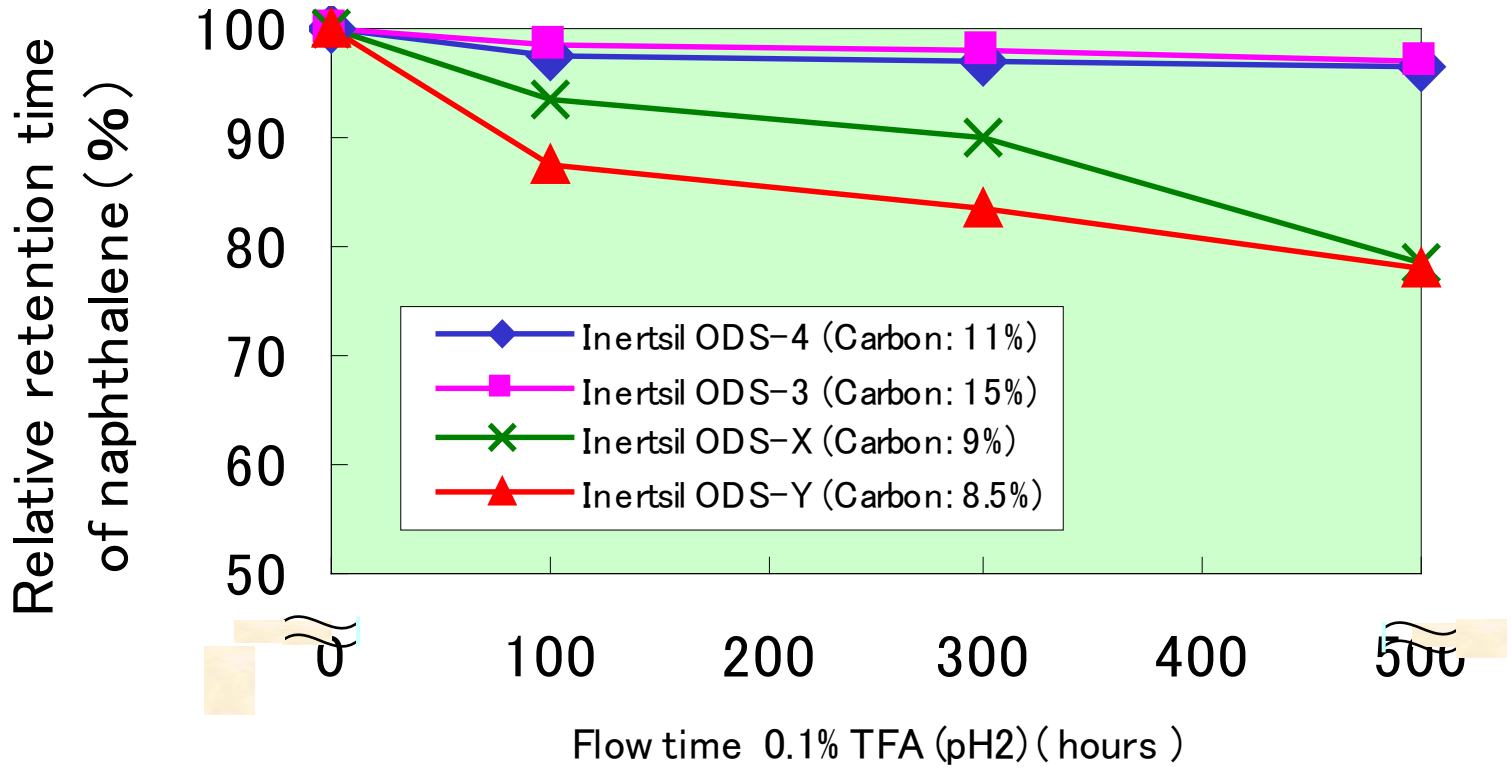


4. n-Amylbenzene

Inertsil ODS-SP



Comparison of durability between Inertsil ODS-4 and commercial ODS columns



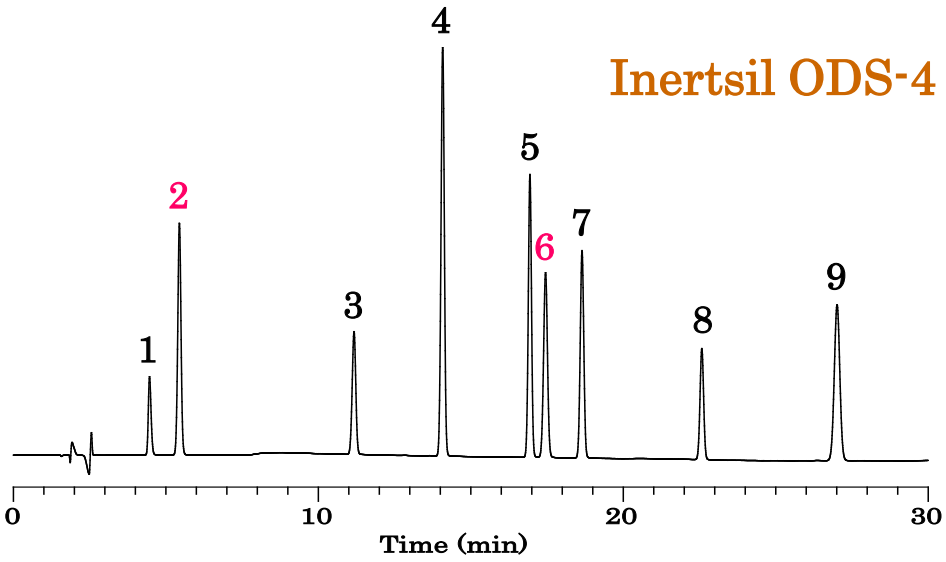
Durability test condition
Column: 4.6 mm I.D. x 150 mm
Test mobile phase:Acetonitrile : 0.1% TFA(pH2.0) =10 : 90
Flow rate: 1.0ml / min
Column temperature: R.T.

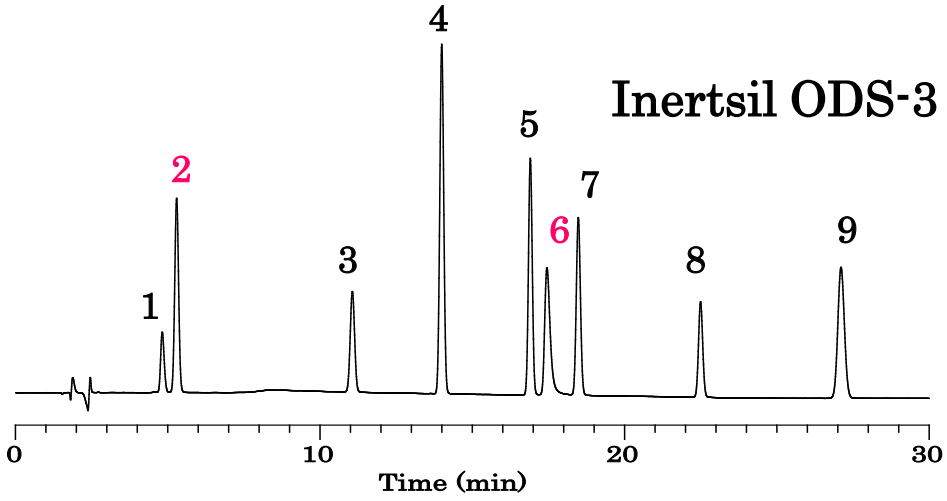
Analysis of food additives

Analytical Conditions

Column Size : 150 × 4.6 mmI.D. 5μm
Eluent : A=CH3CN ; B=25mM Acetate Buffer (pH4.6)
A/B=10/90(4min Hold) ---16min --- 40/60
Flow rate : 1mL/min
Detector : UV 238nm
Col.Temp. : 40 ℃
Sample size : 10 μL (each 50μg / mL)

1. Sodium Saccharin
2. p-Hydroxy benzoic acid
3. Sorbic acid
4. Benzoic acid
5. p-Hydorxy benzoic acid methyl ester
6. Dehydroacetic Acid
7. p-Toluic acid
8. p-Hydroxy benzoic acid ethyl ester
9. p-Hydroxy benzoic acid n-propyl ester





Features of Inertsil ODS-4

- **Perfect End-capping technique**

A newly developed state-of-the-art end-capping technology ideally deactivates the residual silanol groups, resulting in preventing adsorption of highly basic compounds. In addition, since the surface of the packing material is neutral, adsorption of neutral and highly acidic compounds does not occur.

- **Intensive elimination of trace metals has been acheeved on the silica gel surface.**

When analyzing chelating compounds, it can be analyzed without any masking operations to those metals that are exposed on the surface of the packing material.

- **Extreme durability to acidic mobile phase conditions**
- **High stability to 100% aqueous mobile phase conditions**

Ordering Information

Analytical / Preparative Column

ID (mm)	1.0	1.5	2.1	3.0	4.0	4.6
Length (mm)	Cat.No	Cat.No	Cat.No	Cat.No	Cat.No	Cat.No
30	5020-81011	5020-81021	5020-03911	5020-03921	5020-03931	5020-03941
50	5020-81012	5020-81022	5020-03912	5020-03922	5020-03932	5020-03942
75	5020-81013	5020-81023	5020-03913	5020-03923	5020-03933	5020-03943
100	5020-81014	5020-81024	5020-03914	5020-03924	5020-03934	5020-03944
150	5020-81015	5020-81025	5020-03915	5020-03925	5020-03935	5020-03945
250	5020-81016	5020-81026	5020-03916	5020-03926	5020-03936	5020-03946

ID (mm)	6.0	7.6	10.0	20.0
Length (mm)	Cat.No	Cat.No	Cat.No	Cat.No
Guard 50	5020-03957	5020-03967	5020-81057	5020-81067
100	5020-03954	5020-03964	5020-81054	5020-81064
150	5020-03955	5020-03965	5020-81055	5020-81065
250	5020-03956	5020-03966	5020-81056	5020-81066

2um and 3um to be released in early 2009!

*** End-fitting is Waters 1/16” type.**

*** For other column sizes, please send us an enquiry. (Upon request)**

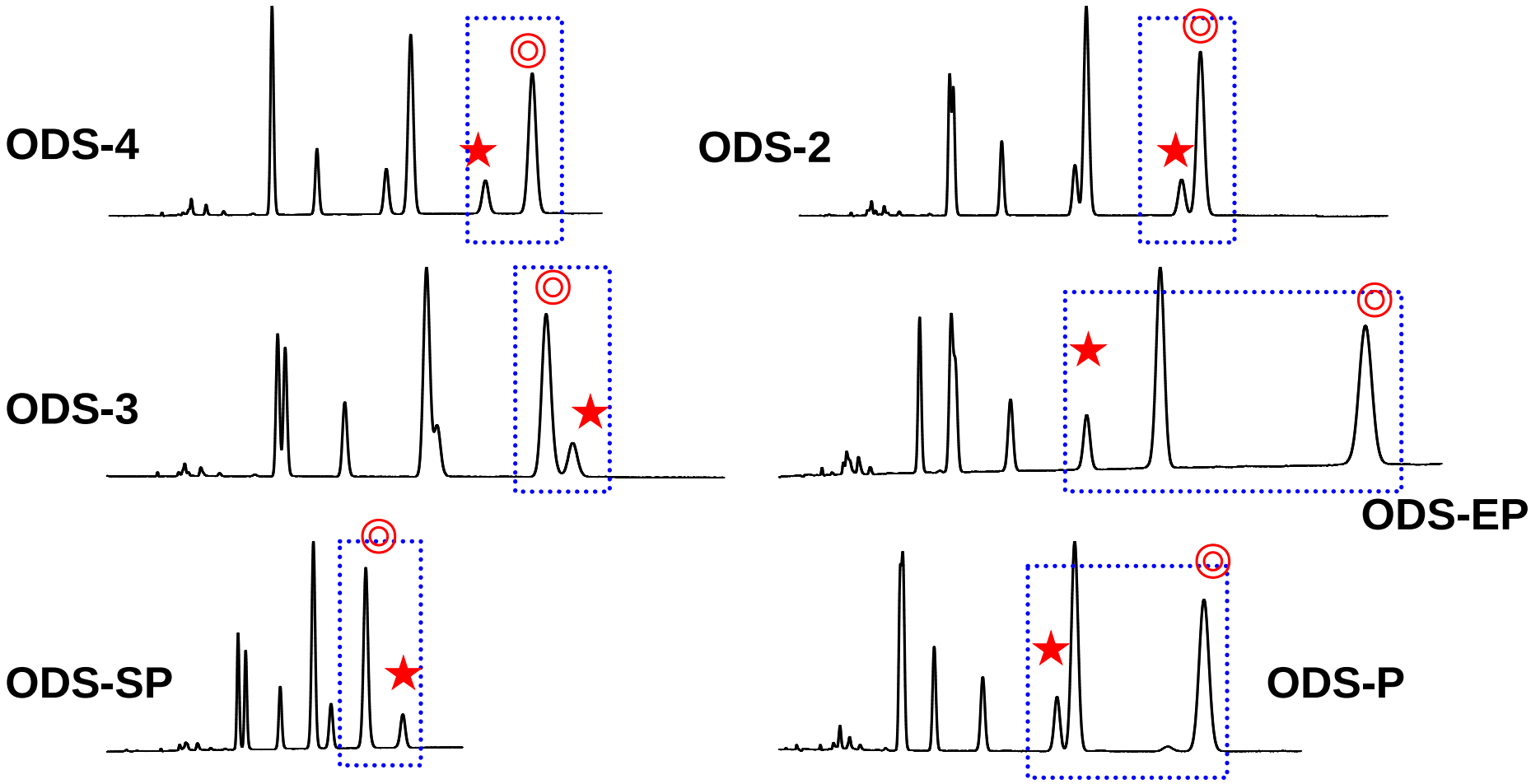
Inertsil Series ODS columns

Specification of various ODS columns

Packing Material	Base Silica gel (Spherical)			Chemical Treatment		
	Surface Area	Pore Size	Purity	Carbon Loading	Bonded-phase Structure	End-capping
Inertsil ODS-4	450 m^2/g	100Å	99.999%	11%	Monomeric	★★★★★
Inertsil ODS-3	450 m^2/g	100Å	99.999%	15%	Monomeric	★★★★☆
Inertsil ODS-P	450 m^2/g	100Å	99.999%	29%	Polymeric	No
Inertsil ODS-EP	450 m^2/g	100Å	99.999%	9%	Embedded	No
Inertsil ODS-SP	450 m^2/g	100Å	99.999%	8.5%	Monomeric	★★★★½
Inertsil ODS-2	320 m^2/g	150Å	99.999%	18.5%	Intermediate	★★★☆☆
Inertsil ODS-80A	450 m^2/g	80Å	99.99%	17.5%	Monomeric	★★★☆☆

Selectivity of various ODS (C18) columns

Mixture of samples: Alkylbenzene & PAHs



Analysis of cold drugs

Analytical Conditions

Column Size : 150 × 4.6 mmI.D. 5μm
Eluent : A=CH3CN ; B=0.1% H3PO4
A/B=3/97 ---20min --- 75/25
Flow rate : 1mL/min
Detector : UV 210nm
Col.Temp. : 40 ℃
Sample size : 10 μL (each 10μg / mL)

1. Maleic acid
2. Acetaminophen
3. Caffeine
4. Chlorpheniramine
5. Ethenzamide
6. Bromovalerylurea
7. Apronalide
8. Isopropylantipyrine
9. Ibuprofen