

# Inertsil ODS-HL Technical Data



# Inertsil ODS-HL

## Physical Properties

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|                 |                                     |
|-----------------|-------------------------------------|
| ●Silica         | : 3 Series High Purity Silica Gel   |
| ●Particle Size  | : 3 $\mu\text{m}$ , 5 $\mu\text{m}$ |
| ●Surface Area   | : 450 $\text{m}^2/\text{g}$         |
| ●Pore Size      | : 100 $\text{\AA}$ (10 nm)          |
| ●Pore Volume    | : 1.05 $\text{mL/g}$                |
| ●Bonded Phase   | : Octadecyl Groups                  |
| ●End-capping    | : <b>Yes</b>                        |
| ●Carbon Loading | : <b>23 %</b>                       |
| ●pH Range       | : 2 ~ 7.5                           |
| ●USP Code       | : L1                                |

\* **HL** : **H**igh **C**arbon **L**oad = **23 %**

# Benefits of Inertsil ODS-HL

## High Selectivity

- Offering unique separation pattern which a conventional C18 columns does not offer.

## Ultra High Retentivity

- Strong separation power compared to conventional C18 columns.
- Provides strong retentivity even under organic solvent rich mobile phases.

## High Inertness

- Delivers sharp peaks for bases and acids.

# GL Sciences' HPLC Column Selection Guide

## InertSustain C18

- First Choice C18 Column

## InertSustain AQ-C18

- Ideal for Maximizing Retention for Highly Polar Compounds in Reversed Phase Methods with Highly Aqueous Mobile Phases

## InertSustainSwift C18

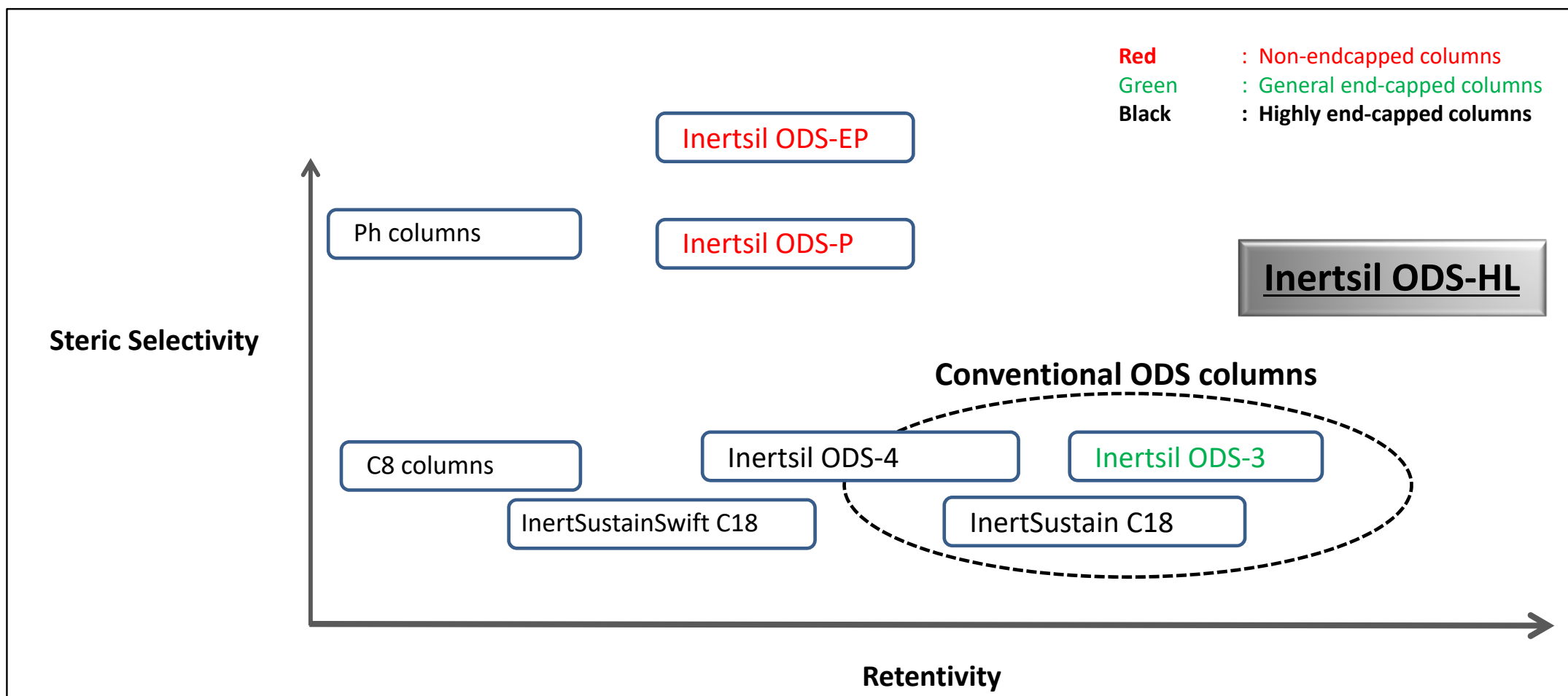
- Rapid Elution of Samples in Isocratic Methods and Rapid Column Equilibration Time in Gradient Methods

## Inertsil ODS-HL

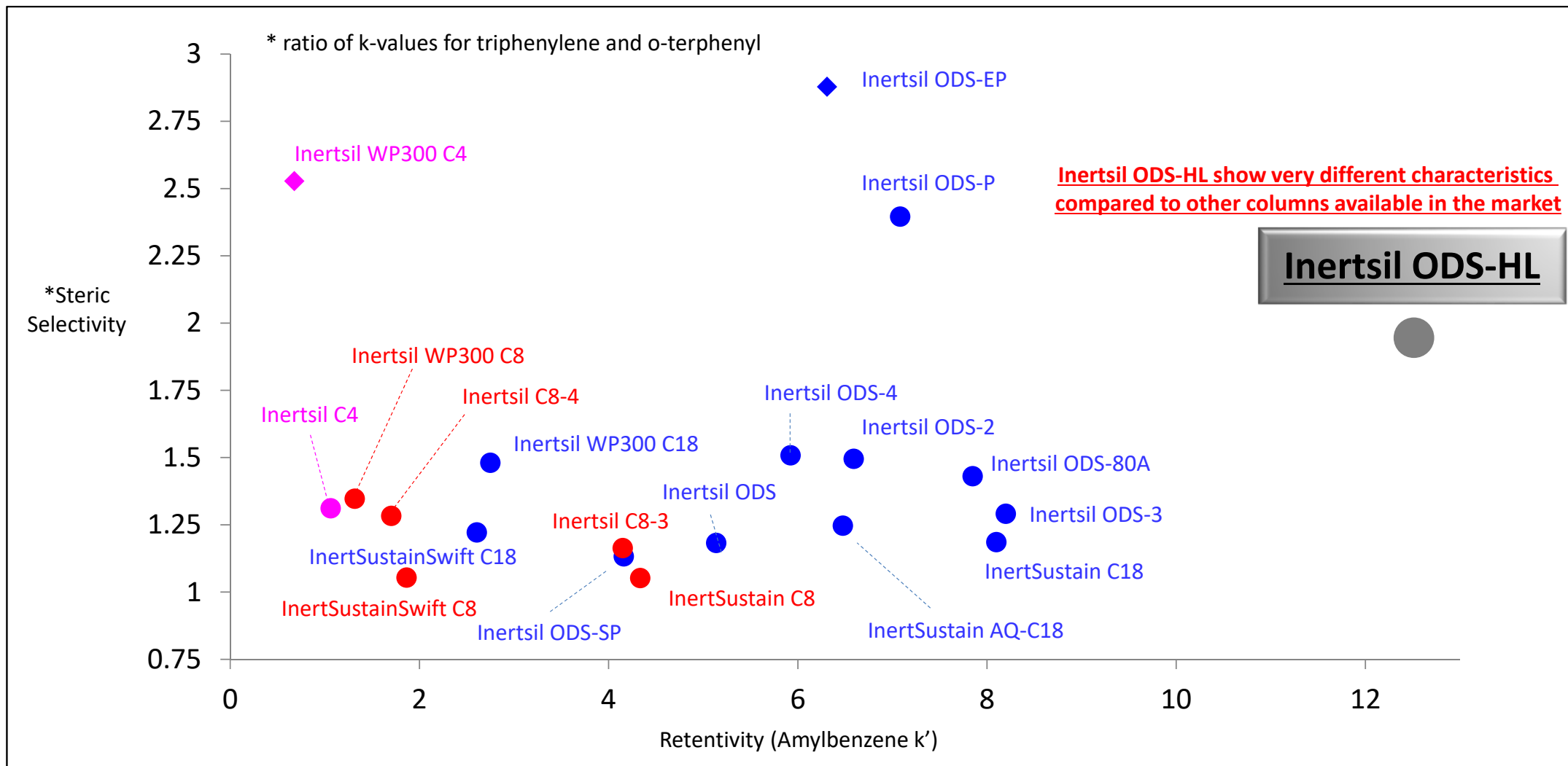
- Ultra High Retentivity, High-Density Bonding of C18 Phase
- Ideal for Separation of Basic Molecules & its Related Substances, Process Impurities

# Retention Characteristics of Inertsil ODS-HL

As shown from the following image, Inertsil ODS-HL offer both high selectivity and strong hydrophobic interaction. The Inertsil ODS-HL columns are fully end-capped which deliver sharp peaks for bases and acids. \* The following plot may not be representative of all phases in each category and for all analytes.



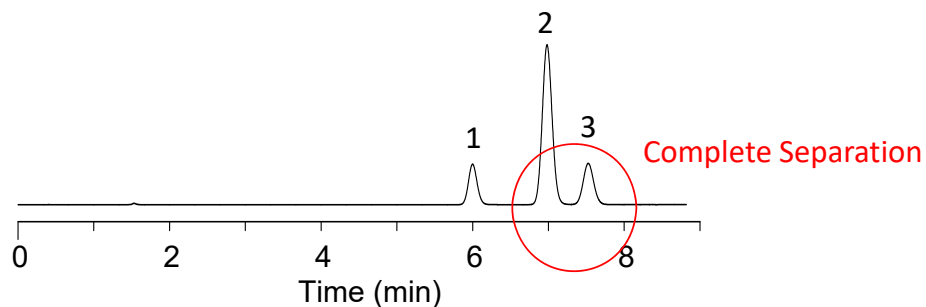
# Retention Characteristics of Inertsil ODS-HL



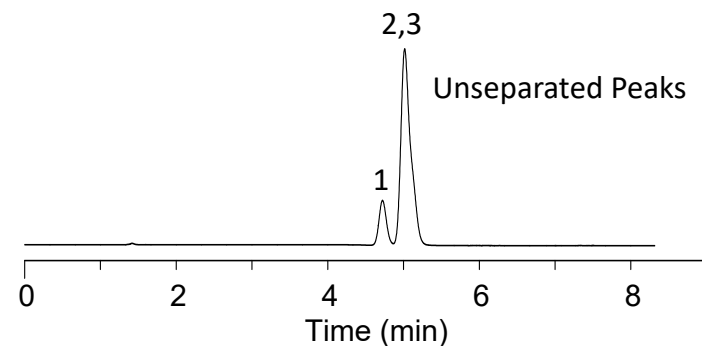
# Distinctive Separation Pattern via Inertsil ODS-HL

Hydrophobicity is the primary mechanism of analyte interaction with conventional C18 columns. For a given phase, retention time is proportional to the hydrophobicity of the molecule. Therefore, the separation of structurally similar analytes are often difficult to be achieved on conventional C18 columns. The densely bonded C18 groups on Inertsil ODS-HL creates superior planar recognition enabling complete separation for such analytes.

## **Inertsil ODS-HL** **(Carbon Loading 23 %)**

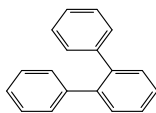


## **InertSustain C18** **(Carbon Loading 14 %)**

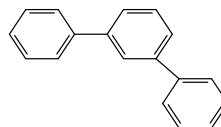


### **Conditions**

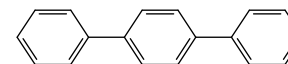
Column size : 5  $\mu$ m, 150 x 4.6 mm I.D.  
Eluent : A) CH<sub>3</sub>CN  
          B) H<sub>2</sub>O  
          A/B = 85/15, v/v  
Flow Rate : 1.0 mL/min  
Col. Temp. : 40 °C  
Detection : UV 254 nm



1. *o*-Terphenyl



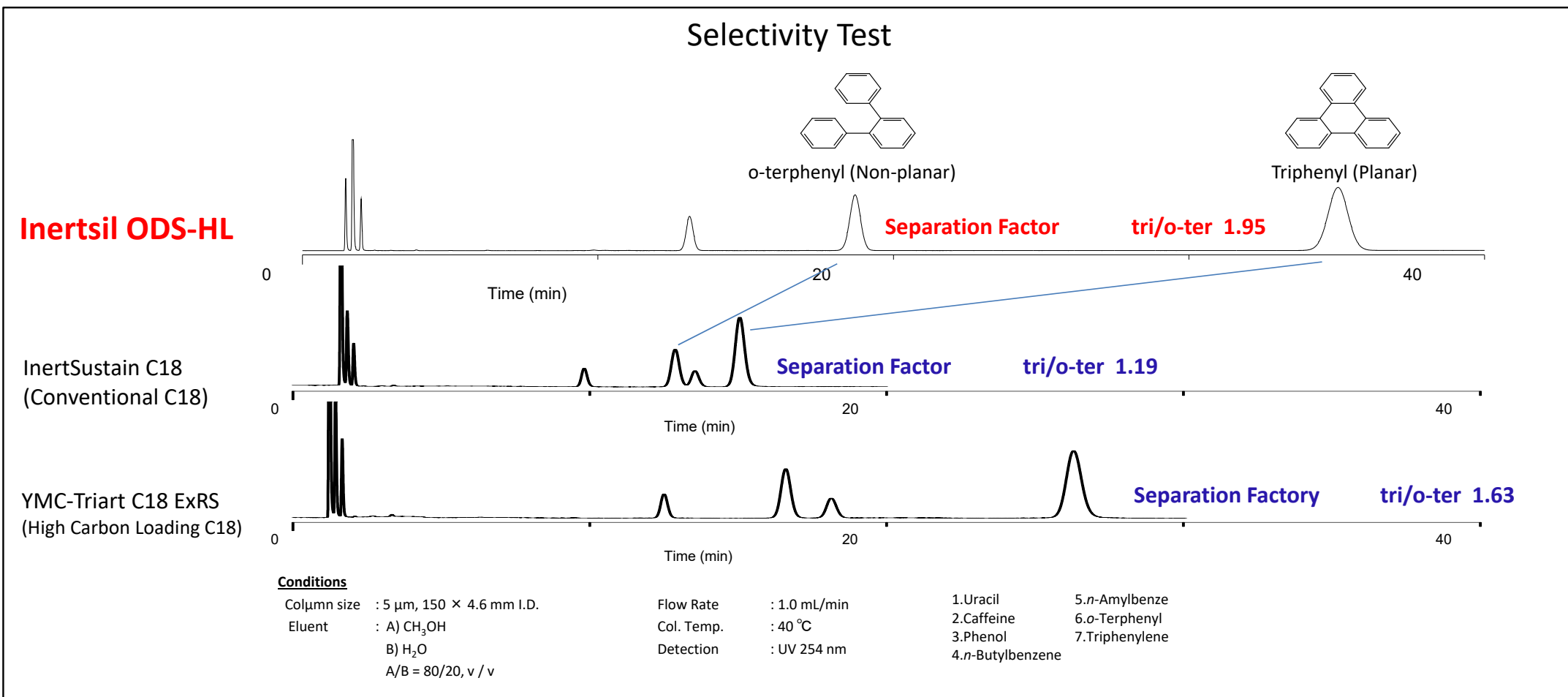
2. *m*-Terphenyl



3. *p*-Terphenyl

# Distinctive Separation Pattern via Inertsil ODS-HL

Stereoselectivity is indicated by *o*-Terphenyl and Triphenylene. *o*-Terphenyl has a twisted tertiary structure and Triphenylene has a planar structure. Inertsil ODS-HL elutes Triphenylene later against *o*-Terphenyl which proves the stereoselectivity to be very high. Inertsil ODS-HL not only provide high retentivity, but with high stereoselectivity.



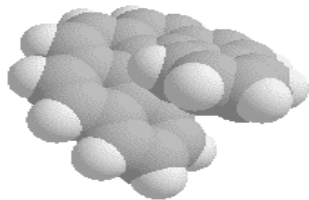
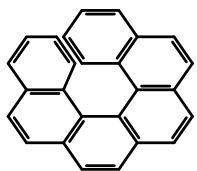


# Distinctive Separation Pattern via Inertsil ODS-HL

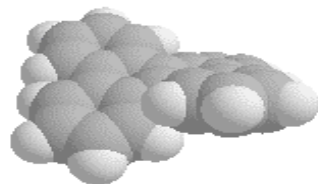
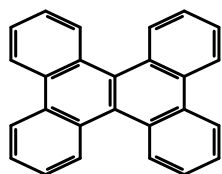
SRM 869 Column Selectivity Test Mixture for LC (PAHs), National Institute of Standards of Technology (NIST)

This test mixture is intended primarily for the characterization of C18 columns used in the reversed-phase liquid chromatographic separation of PAHs. The elution order of the three components changes with C18 stationary phase type. Monomerically bonded ("monomeric") C18 phases have been shown to give the elution order BaP  $\leq$  PhPh < TBN. Stationary phases prepared using polymeric surface modification procedures "polymeric" have the elution order PhPh < TBN  $\leq$  BaP. Stationary phases with intermediate properties (i.e., densely loaded monomeric or lightly loaded polymeric C18 phases) are indicated by the elution order PhPh < BaP < TBN).

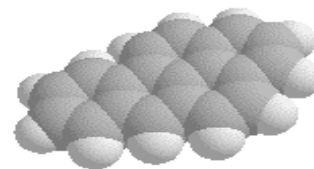
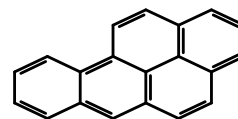
|   |                   |
|---|-------------------|
| Phenanthro[3,4-c]phenanthrene ( <b>PhPh</b> ) | <i>non-planar</i> |
| Tetrabenzonaphthalene ( <b>TBN</b> )          | <i>non-planar</i> |
| Benzo[a]pyrene ( <b>BaP</b> )                 | <i>planar</i>     |



**PhPh** (*non-planar*)



**TBN** (*non-planar*)



**BaP** (*planar*)

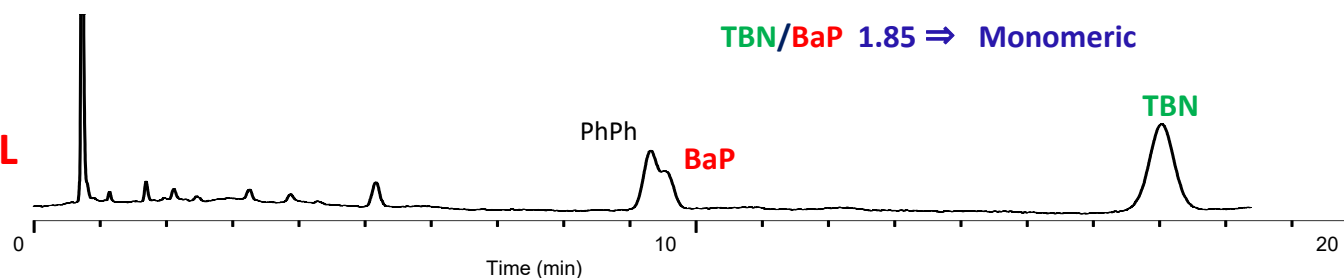
$a \geq 1.7$  : Monomeric  
 $1.7 > a > 1$  : Intermediate  
 $a \leq 1$  : Polymeric

# Distinctive Separation Pattern via Inertsil ODS-HL

As shown below, Inertsil ODS-HL is classified as a monomeric type C18 column. However, the retentivity of Inertsil ODS-HL is very strong compared to conventional ODS columns and offer unique separation pattern.

## SRM869 Results

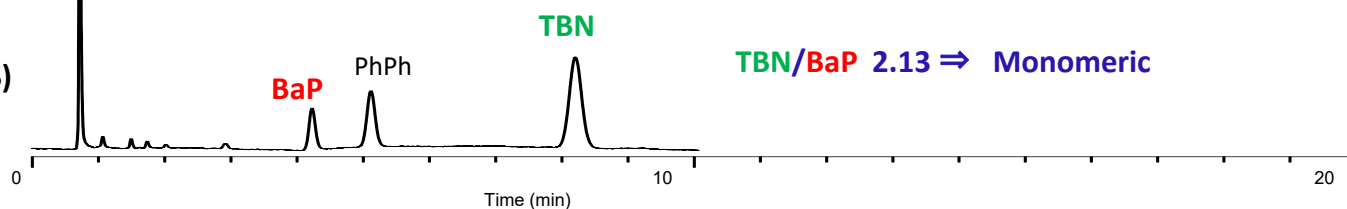
**Inertsil ODS-HL**



TBN/BaP 1.85  $\Rightarrow$  Monomeric

TBN

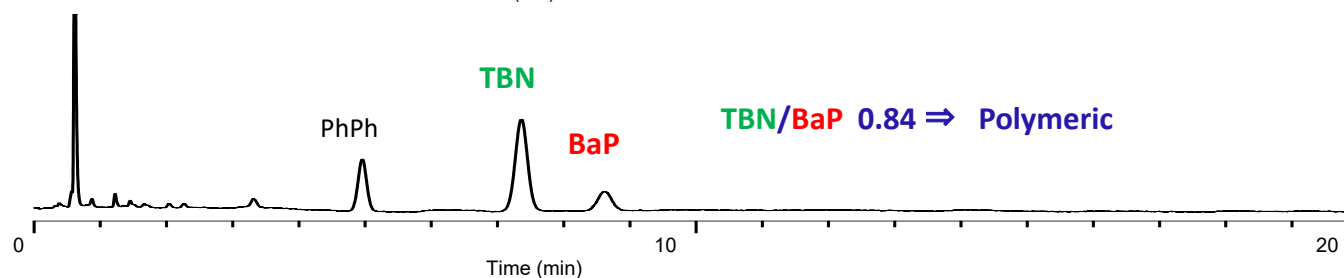
**InertSustain C18  
(Conventional ODS)**



TBN/BaP 2.13  $\Rightarrow$  Monomeric

TBN

**Inertsil ODS-P**



TBN/BaP 0.84  $\Rightarrow$  Polymeric

TBN

$a \geq 1.7$  : Monomeric  
 $1.7 > a > 1$  : Intermediate  
 $a \leq 1$  : Polymeric

### Conditions

Column size: 5  $\mu$ m, 150 x 4.6 mm I.D.

Eluent : A) CH<sub>3</sub>CN

B) H<sub>2</sub>O

A/B = 85/15, v / v

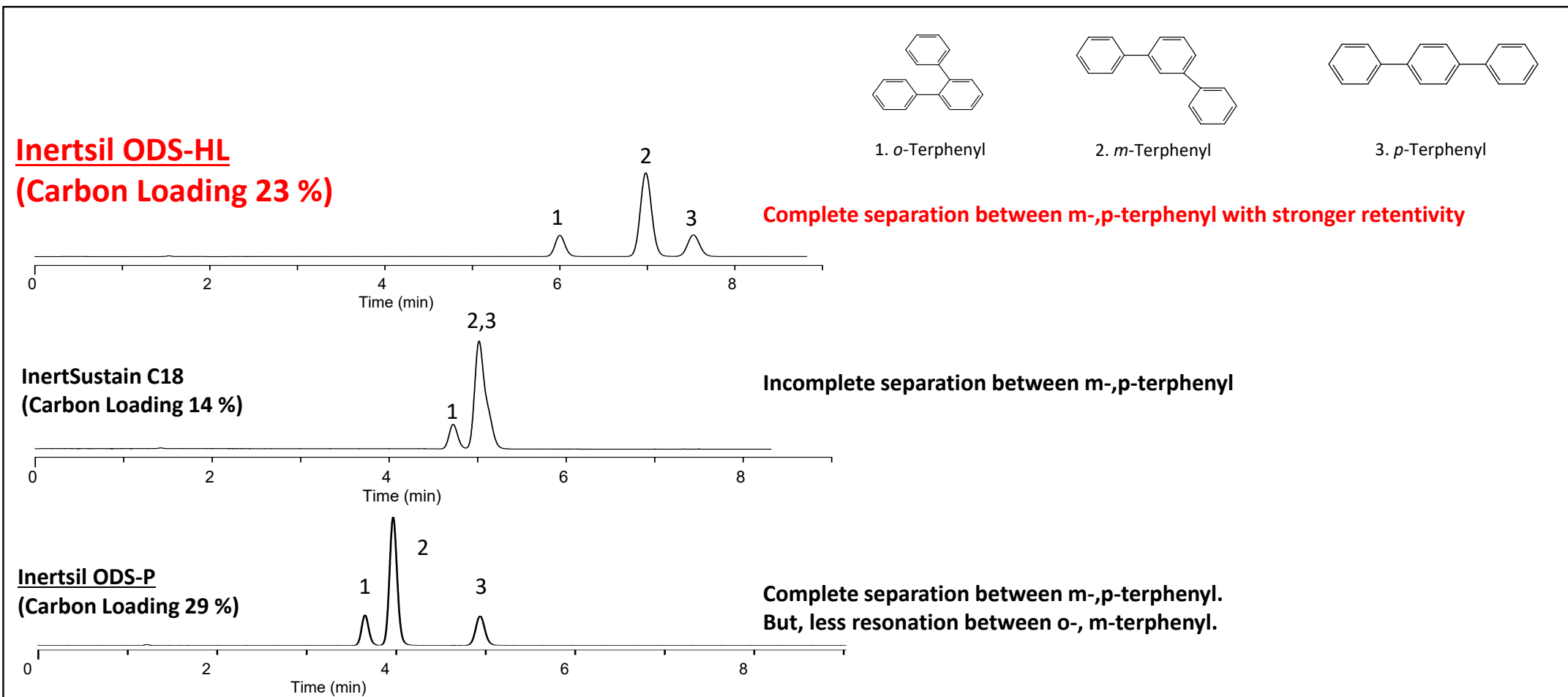
Flow Rate : 2.0 mL/min

Col. Temp. : 30 °C

Detection : UV 254 nm

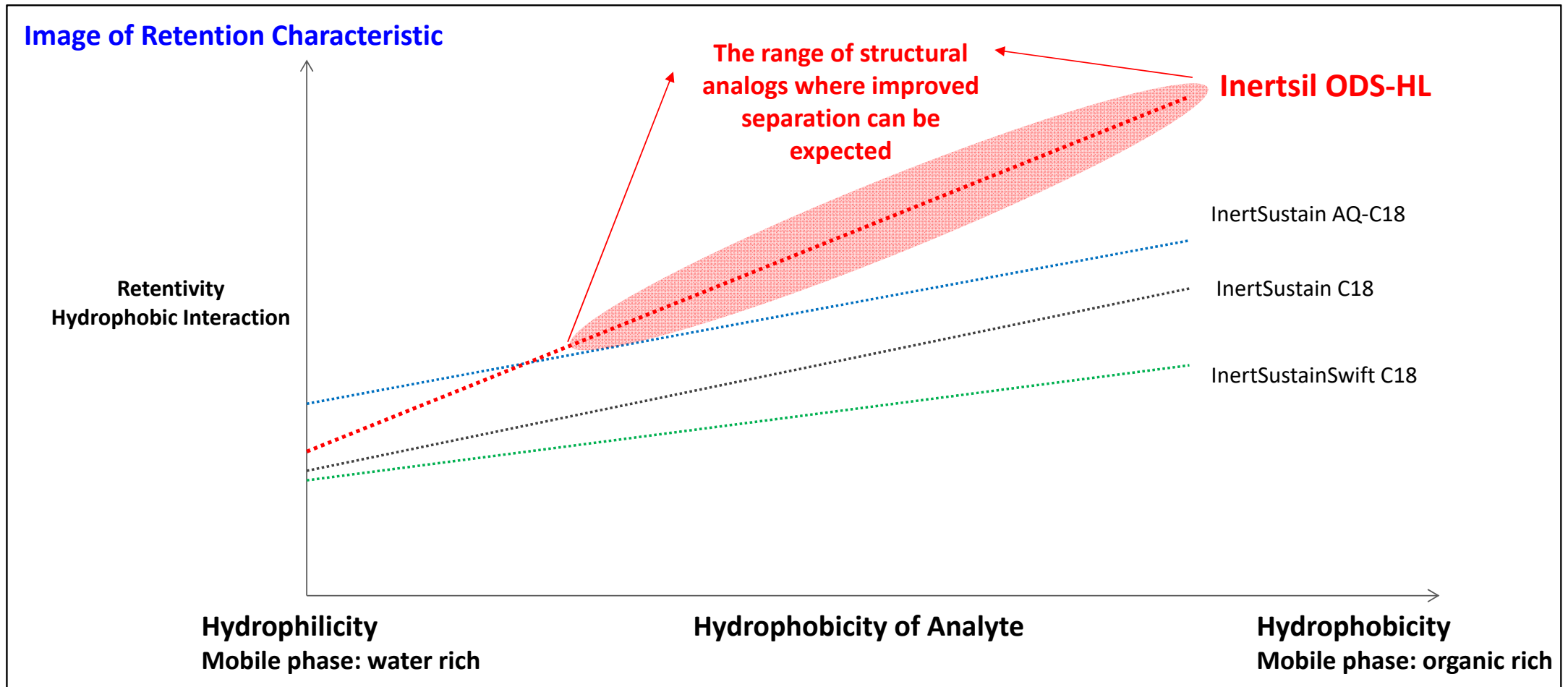
# Distinctive Separation Pattern via Inertsil ODS-HL

A polymeric type Inertsil ODS-P showed better resolution between *m*-, *p*-terphenyl due to the higher steric selectivity. On the other hand, Inertsil ODS-HL delivered complete separation with stronger retentivity. Inertsil ODS-HL can be a useful column for the separation of analytes that could not be achieved when using a convention ODS column.



# Ultra High Retentivity of Inertsil ODS-HL

The higher the hydrophobicity of analyte, stronger the retention on Inertsil ODS-HL columns. For the retention of hydrophilic analytes, InertSustain AQ-C18 columns are appropriate. \* The following plot may not be representative of all phases in each category and for all analytes.

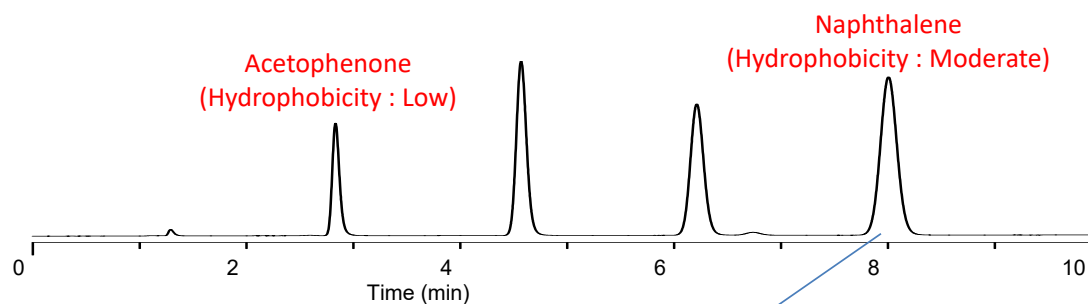


# Ultra High Retentivity of Inertsil ODS-HL

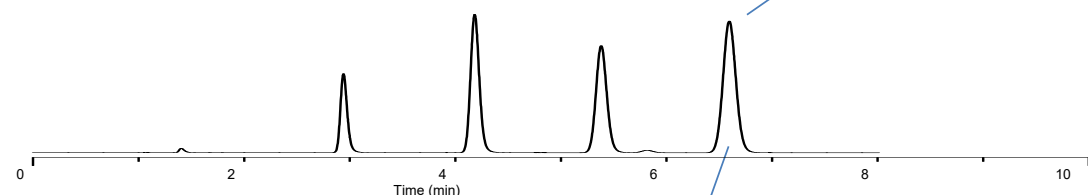
The higher the hydrophobicity of analyte, stronger the retention on Inertsil ODS-HL columns. Inertsil ODS-HL columns strongly retain highly hydrophobic analytes compared to conventional ODS columns.

## Retentivity (1) (Hydrophobic analytes)

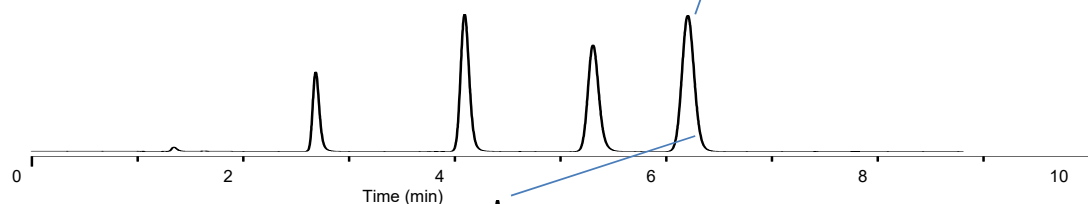
### Inertsil ODS-HL



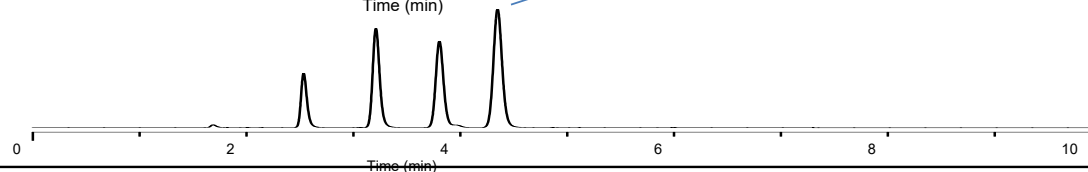
### InertSustain AQ-C18



### InertSustain C18 (Conventional ODS)



### InertSustainSwift C18



#### Conditions

Column Size : 5  $\mu$ m, 150 x 4.6 mm I.D.  
Eluent : A) CH<sub>3</sub>CN  
          B) H<sub>2</sub>O  
          A/B = 65/35, v/v  
Flow Rate : 1.0 mL/min  
Col. Temp. : 40 °C  
Detection : UV 254 nm

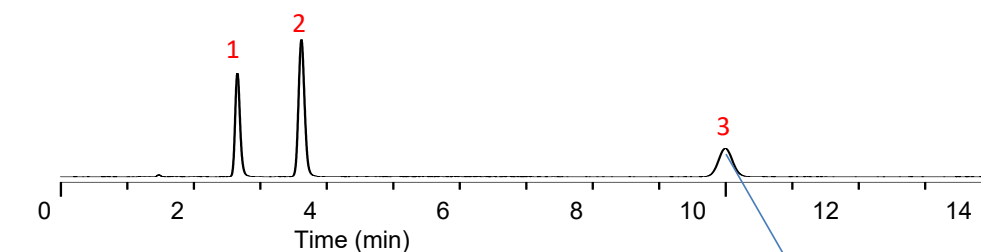
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene

# Ultra High Retentivity of Inertsil ODS-HL

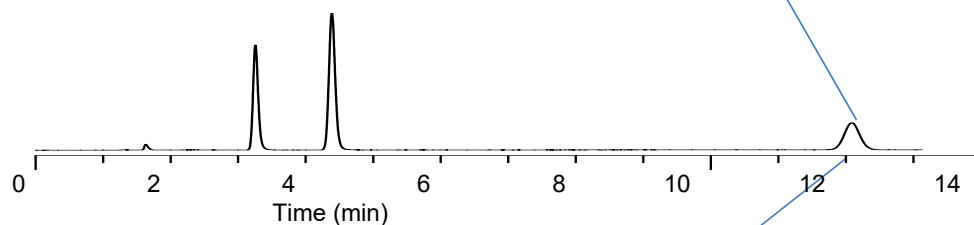
For the analysis of highly polar analytes under water rich mobile phases, InertSustain AQ-C18 columns provide stronger retention. Under 100 % water mobile phase, InertSustain AQ-C18 columns are highly recommended as it delivers stronger retention of highly polar analytes. Inertsil ODS-HL may cause dewetting phenomenon under such mobile phase.

## Retentivity (2) (Highly Polar analytes)

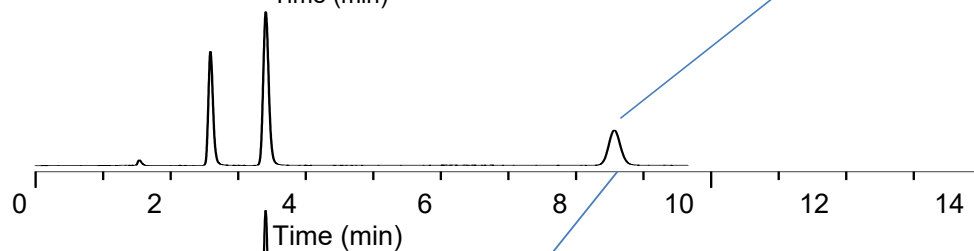
### Inertsil ODS-HL



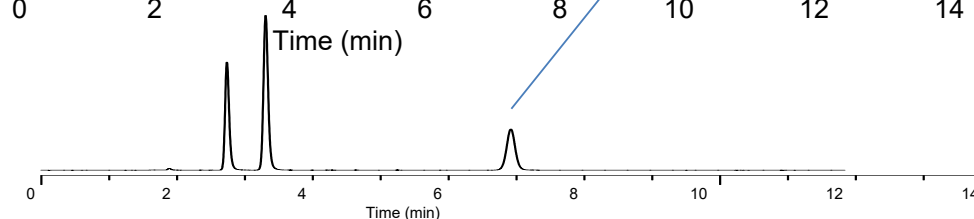
### InertSustain AQ-C18



### InertSustain C18 (Conventional ODS)



### InertSustainSwift C18



#### Conditions

Column size : 5  $\mu$ m, 150 x 4.6 mm I.D.

Eluent : H<sub>2</sub>O (100 %)

Flow Rate : 1.0 mL/min

Col. Temp. : 40 °C

Detection : UV 254 nm

#### Sample:

1.Cytosine

2.Uracil

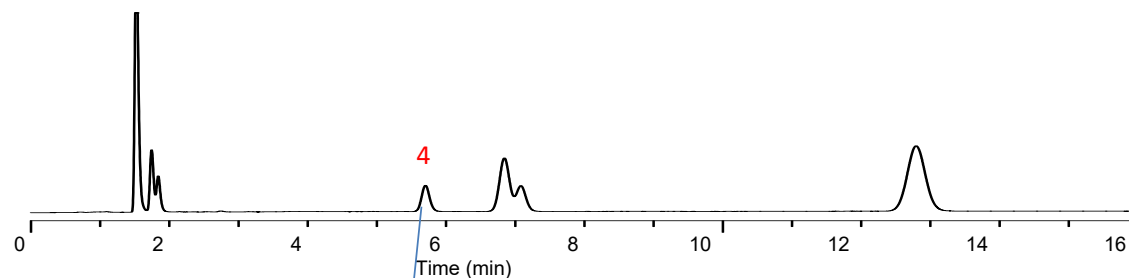
3.Thymine

# Ultra High Retentivity of Inertsil ODS-HL

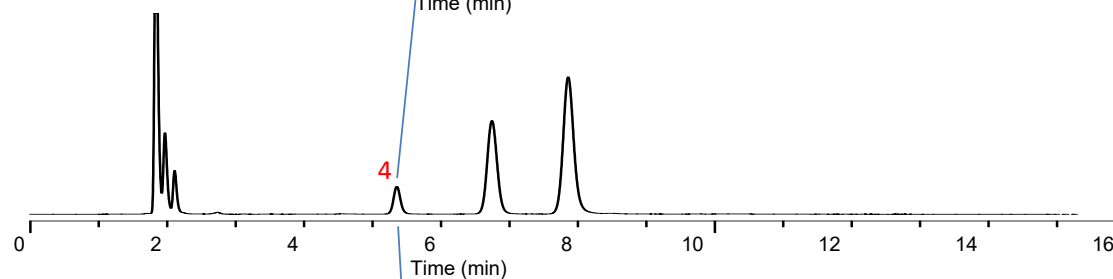
As shown below, Inertsil ODS-HL can be used under organic solvent rich mobile phases without sacrificing retentivity.

## Retentivity (3-1) (Under various Methanol Concentration)

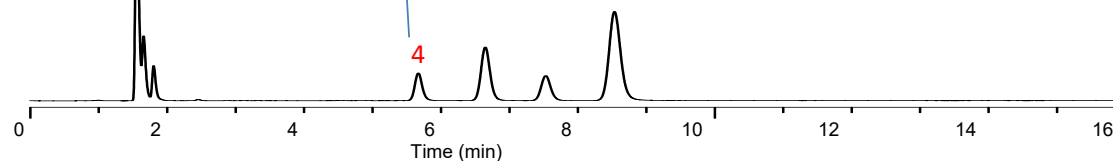
### Inertsil ODS-HL (90 % Methanol)



### InertSustainSwift C18 (80 % Methanol)



### XBridge C18 (80 % Methanol)



#### Conditions

Column size : 5  $\mu$ m, 150 x 4.6 mm I.D.  
Eluent : A) CH<sub>3</sub>OH  
          B) H<sub>2</sub>O  
Flow Rate : 1.0 mL/min  
Col. Temp. : 40 °C  
Detection : UV 254 nm

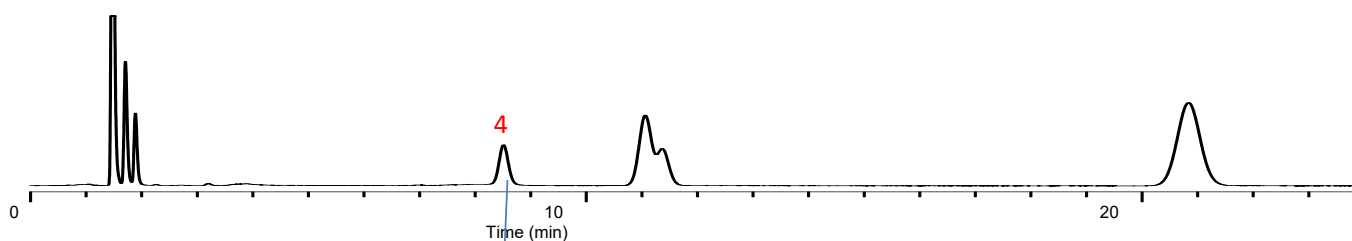
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenzene
6. o-Terphenyl
7. Triphenylene

# Ultra High Retentivity of Inertsil ODS-HL

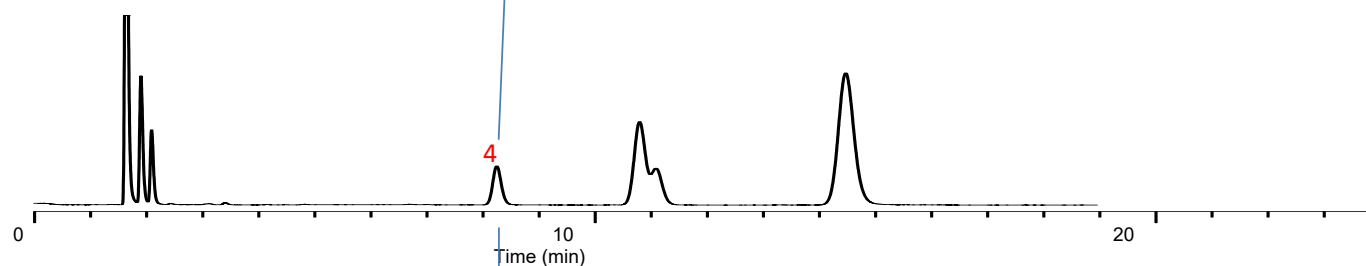
As shown below, Inertsil ODS-HL can be used under organic solvent rich mobile phases without sacrificing retentivity.

## Retentivity (3-2) (Under various Methanol Concentration)

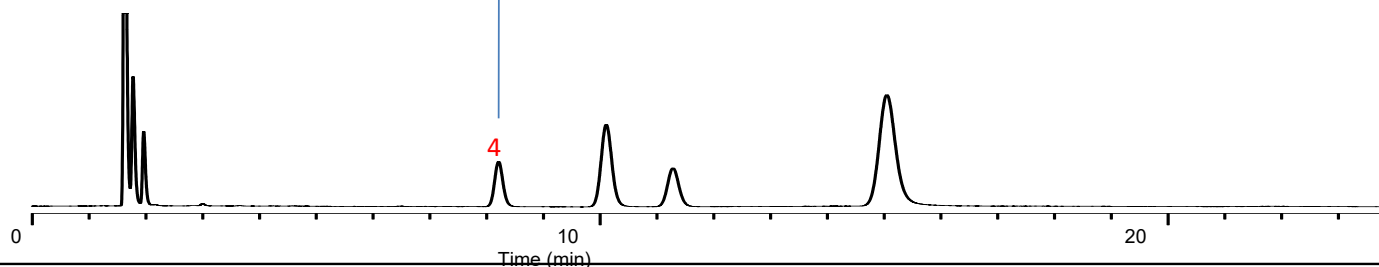
### Inertsil ODS-HL (85 % Methanol)



### Inertsil ODS-4 (80 % Methanol)



### L-column 2 ODS (80 % Methanol)



#### Conditions

Column size : 5  $\mu$ m, 150 x 4.6 mm I.D.  
Eluent : A) CH<sub>3</sub>OH  
          B) H<sub>2</sub>O  
Flow Rate : 1.0 mL/min  
Col. Temp. : 40 °C  
Detection : UV 254 nm

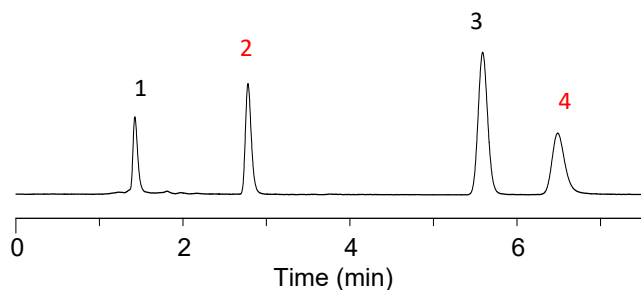
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenzene
6. o-Terphenyl
7. Triphenylene



# High Inertness

Commercially available high carbon loading ODS columns often show severe tailing of peaks due to the insufficient end-capping of free silanols. Inertsil ODS-HL columns offer superior peak shapes for not only for bases but for acids as well due to the high-end end-capping technology from GL Sciences.

## Basic Compound Test

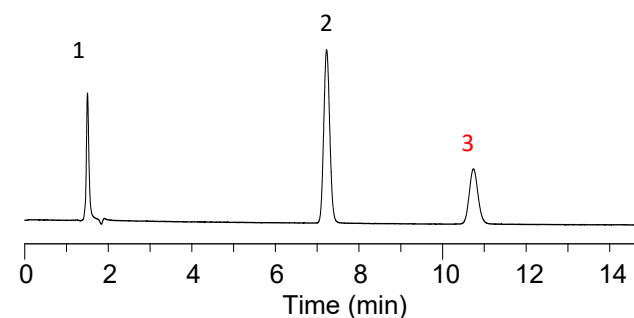


### Conditions

Column : 5  $\mu$ m, 150  $\times$  4.6 mm I.D.  
Eluent : A) CH<sub>3</sub>CN  
          B) 25 mM K<sub>2</sub>HPO<sub>4</sub> (pH 7.0)  
          A/B = 30/70, v/v  
Flow Rate : 1.0 mL/min  
Col.Temp. : 40  $^{\circ}$ C  
Detection : UV 230 nm

Sample :  
1. Uracil  
2. Pyridine  
3. Phenol  
4. Berberine

## Acidic Compound Test



### Conditions

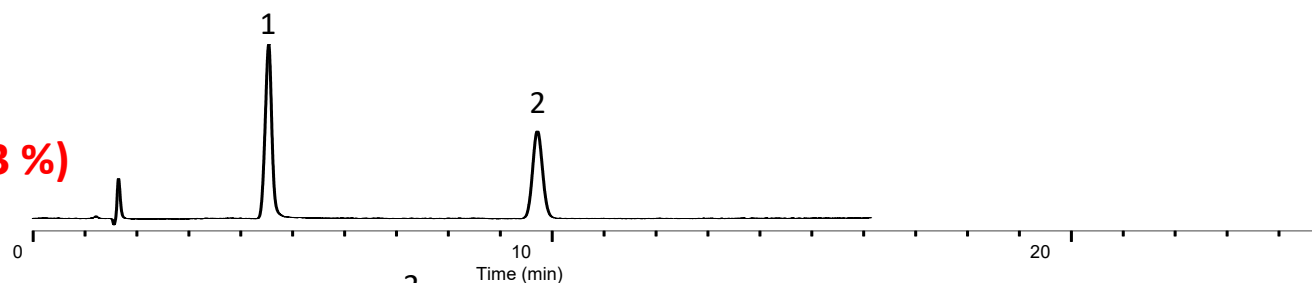
Column : 5  $\mu$ m, 150  $\times$  4.6 mm I.D.  
Eluent : A) CH<sub>3</sub>CN  
          B) 0.1% H<sub>3</sub>PO<sub>4</sub>  
          A/B = 25/75, v/v  
Flow Rate : 1.0 mL/min  
Col.Temp. : 40  $^{\circ}$ C  
Detection : UV 230 nm

Sample :  
1. Uracil  
2. Phenol  
3. Salicylic acid

# High Inertness

Inertsil ODS-HL provide sharp peak shape for basic analytes, while Inertsil ODS-P show adsorption to the packing material as it is a non-encapped column.

**Inertsil ODS-HL**  
(Carbon Loading 23 %)

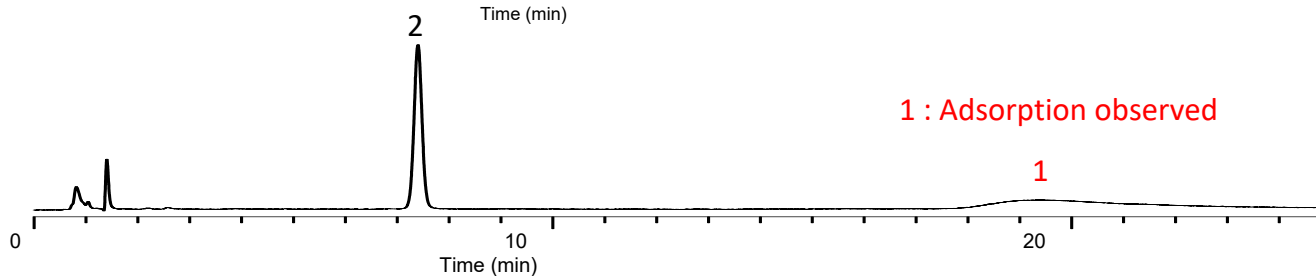


#### Conditions

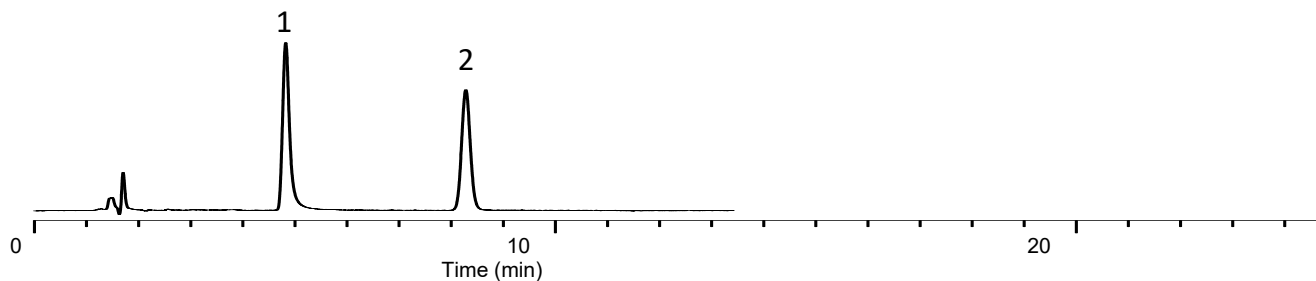
Column size : 5  $\mu$ m, 150 x 4.6 mm I.D.  
Eluent : A) CH<sub>3</sub>OH  
          B) H<sub>2</sub>O  
          A / B = 30/70, v/v  
Flow Rate : 1.0 mL/min  
Col. Temp. : 40 °C  
Detection : UV 254 nm

Sample:  
1. Pyridine  
2. Phenol

**Inertsil ODS-P**  
(Carbon Loading 29 %)



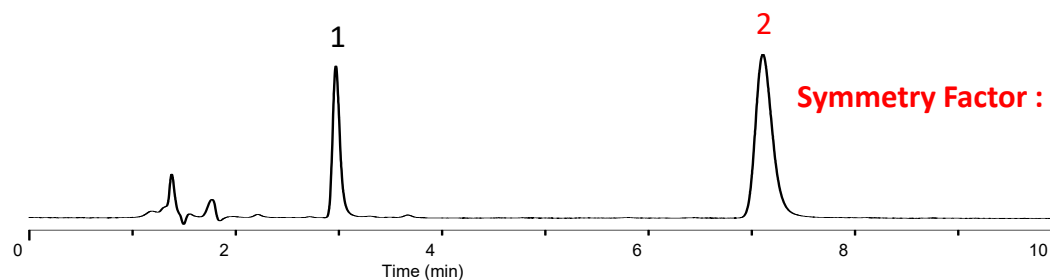
**InertSustain C18**  
(Carbon Loading 14 %)



# High Inertness

Inertsil ODS-HL provide sharp peak shape for strong basic analytes as well, while other column brands failed.

**Inertsil ODS-HL**  
**(Carbon Loading 23 %)**



**Symmetry Factor : 1.28**

## Conditions

Column size : 5  $\mu$ m, 150 x 4.6 mm I.D.

Eluent : A) CH<sub>3</sub>CN

B) 25mM potassium phosphate (pH7.0)

A/B = 30/70, v/v

Flow Rate: 1.0 mL/min

Col. Temp.: 40 °C

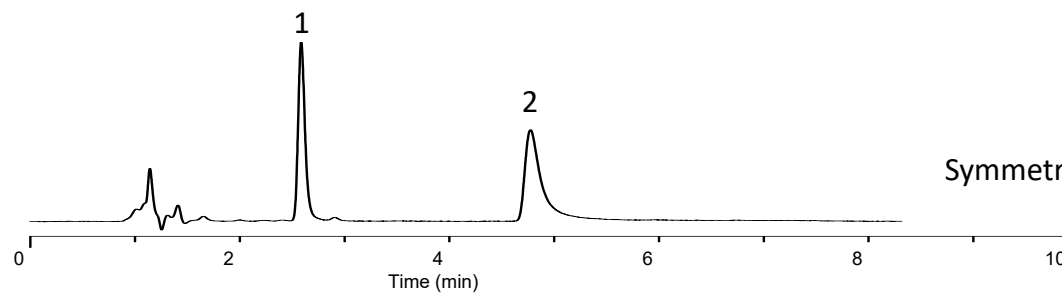
Detection: UV 230 nm

Sample;

1. Pyridine

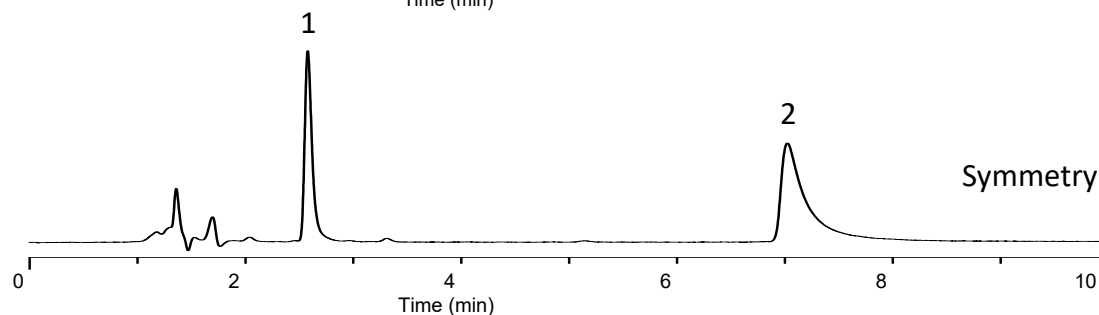
2. Berberine

**YMC-Triart C18 ExRS**  
**(Carbon Loading 25 %)**



Symmetry Factor : 2.47

**Develosil HSR C18**  
**(Carbon Loading 22 %)**

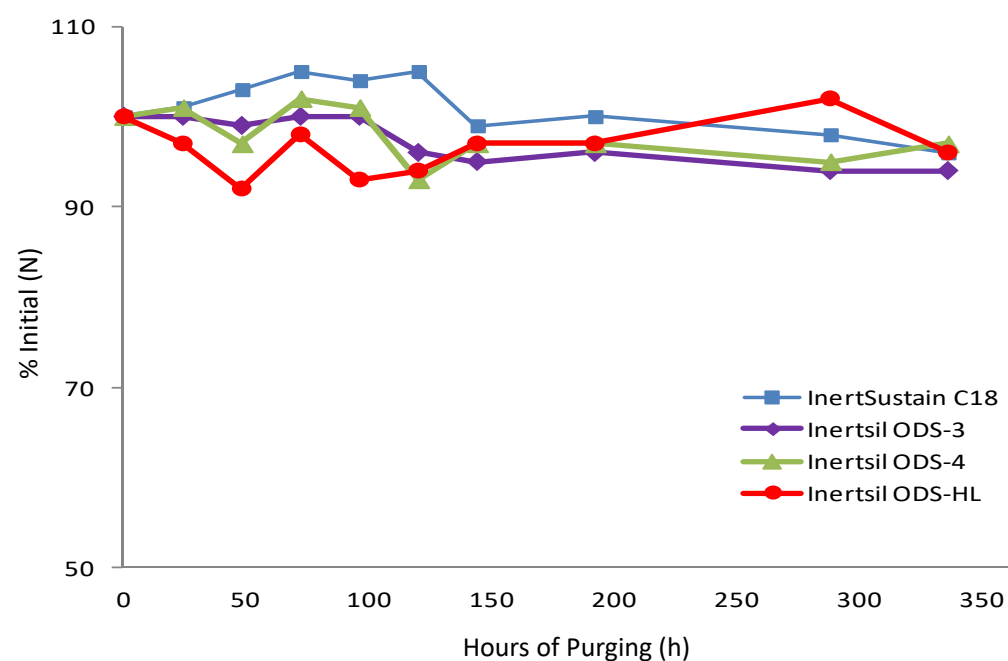
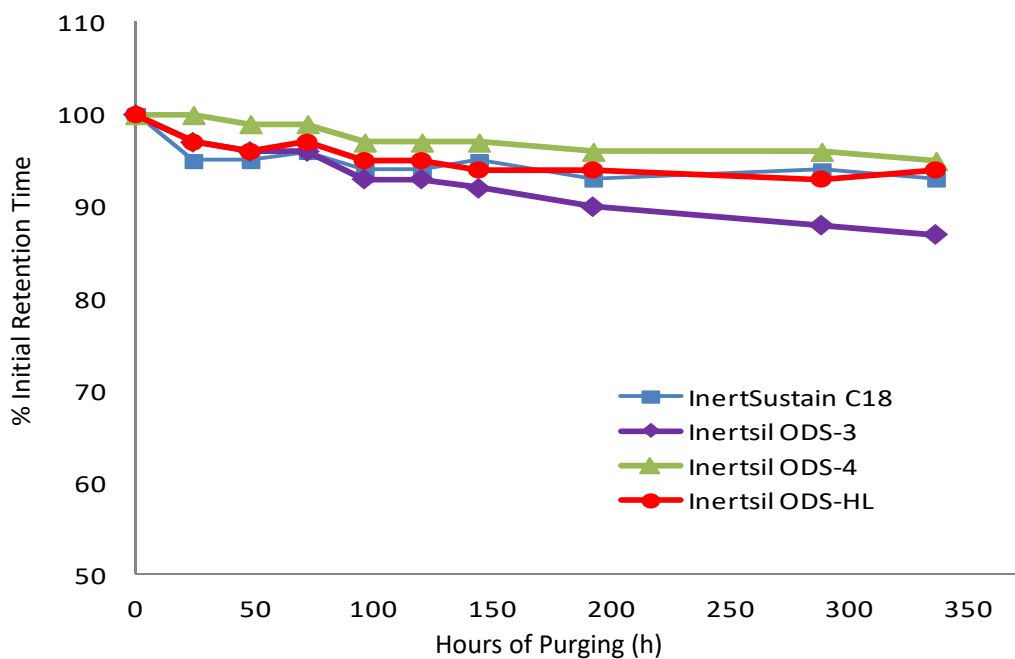


Symmetry Factor : 4.12

# High Durability

As shown below, Inertsil ODS-HL maintained high durability as InertSustain C18 and Inertsil ODS-4.

## Low pH Resistance Test

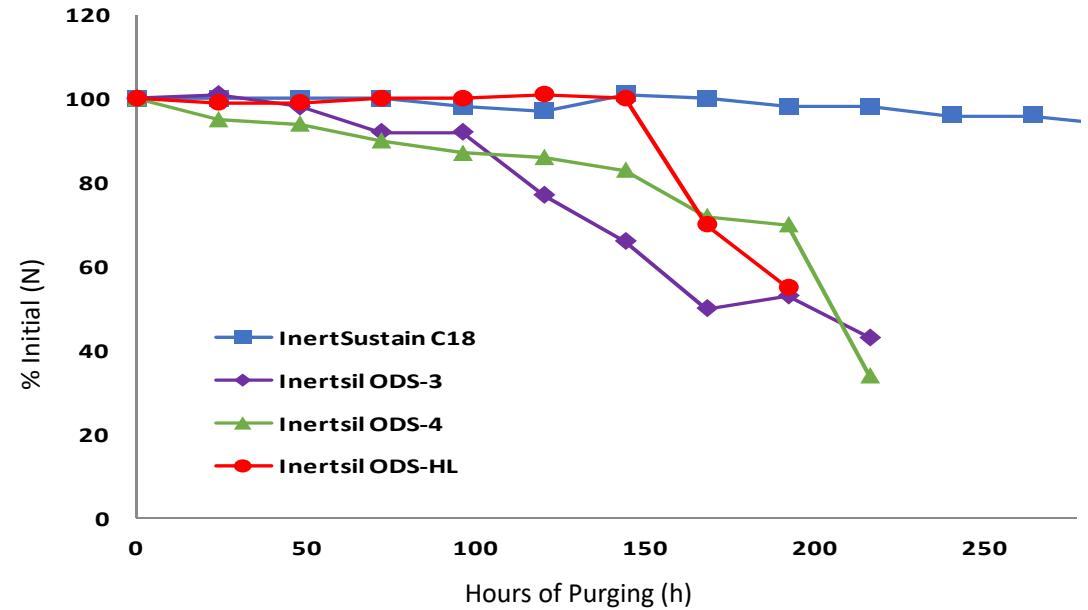
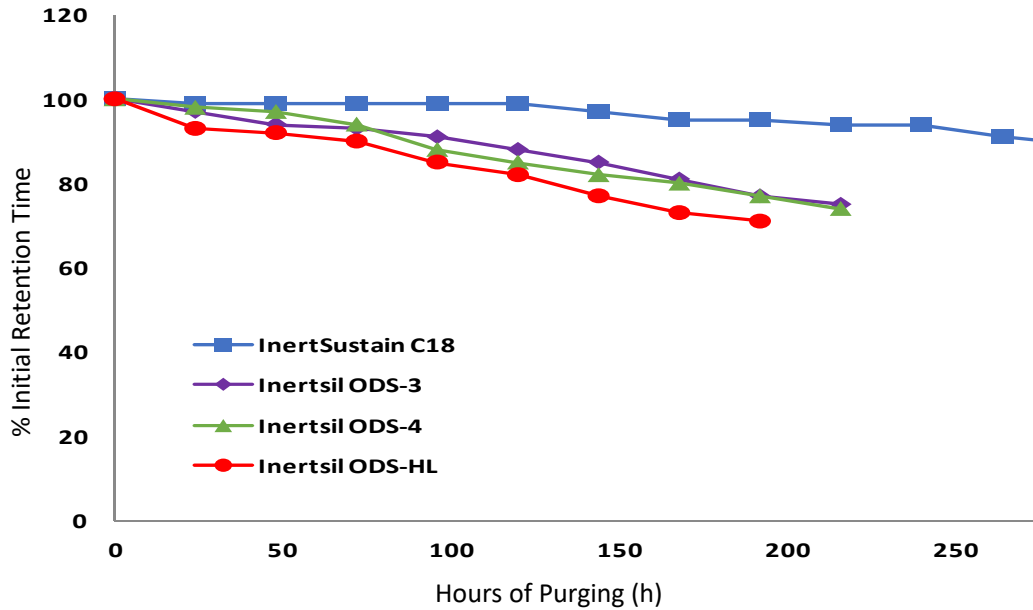


Storing condition in the oven at 60 C : CH<sub>3</sub>CN/H<sub>2</sub>O/TFA(10/90/1), pH=1

# High Durability

As shown below, Inertsil ODS-HL maintained high durability as Inertsil ODS-4 and Inertsil ODS-3.

## High pH Resistance Test



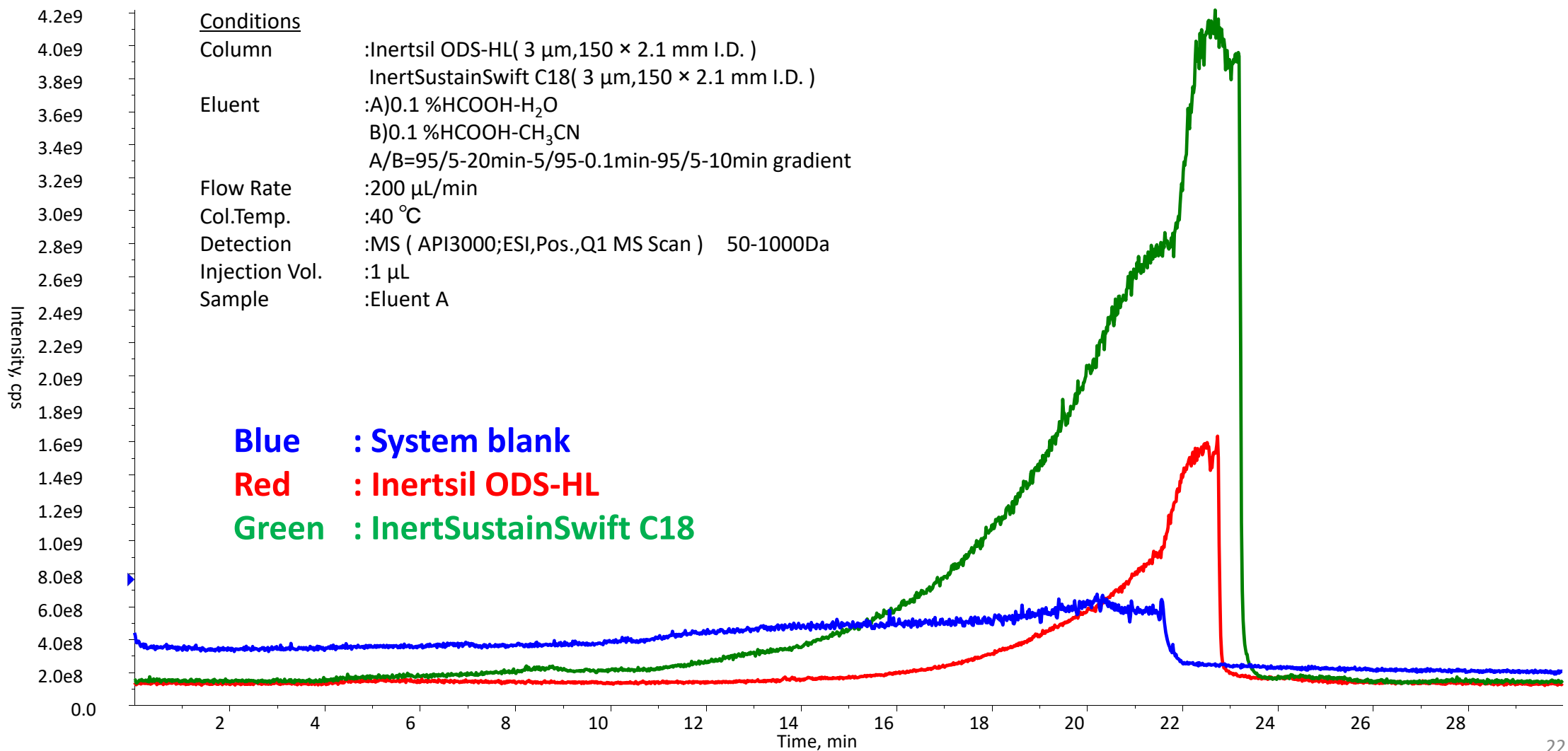
Purging solvent : 50mM TEA (pH 10.0) / CH3OH (70/30), 50 C at 1.0 ml/min

# Low Bleed for LC-MS Compatibility

## Conditions

Column :Inertsil ODS-HL( 3  $\mu$ m,150  $\times$  2.1 mm I.D. )  
InertSustainSwift C18( 3  $\mu$ m,150  $\times$  2.1 mm I.D. )  
Eluent :A)0.1 %HCOOH-H<sub>2</sub>O  
B)0.1 %HCOOH-CH<sub>3</sub>CN  
A/B=95/5-20min-5/95-0.1min-95/5-10min gradient  
Flow Rate :200  $\mu$ L/min  
Col.Temp. :40  $^{\circ}$ C  
Detection :MS ( API3000;ESI,Pos.,Q1 MS Scan ) 50-1000Da  
Injection Vol. :1  $\mu$ L  
Sample :Eluent A

**Blue** : System blank  
**Red** : Inertsil ODS-HL  
**Green** : InertSustainSwift C18



# Sample Loading Capacity

## Comparison of Sample Loading Capacity

### Sample Preparation

Alkylphenol C2~4

1. 4-Ethylphenol : 0.25 mol/L
2. *p*-n-Propylphenol : 1 mol/L
3. 4-n-Butylphenol : 0.25 mol/L

### LC conditions

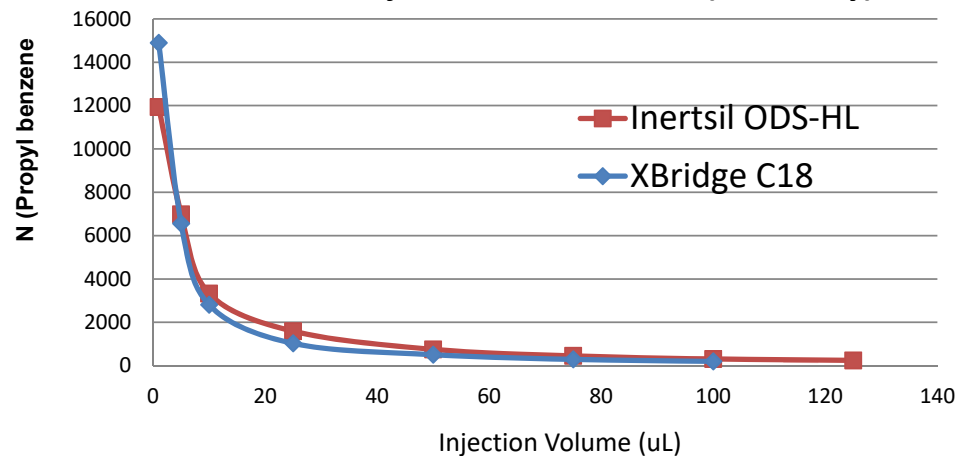
|                |   |                    |
|----------------|---|--------------------|
| Column         | : Inertsil ODS-HL                                 | 5 μm, 4.6 x 250 mm |
|                | XBridge C18                                       | 5 μm, 4.6 x 250 mm |
| Eluent         | : A)H <sub>2</sub> O, B)CH <sub>3</sub> OH        |                    |
|                | A/B=30/70-15 min-0/100-0.1 min-30/70-10 min-30/70 |                    |
| Flow Rate      | : 1.0 mL/min                                      |                    |
| Col.Temp.      | : 40 °C   |                    |
| Detection      | : 300 nm  |                    |
| Injection Vol. | : 1,5,10,25,50,75,100,125 μL                      |                    |

# Sample Loading Capacity

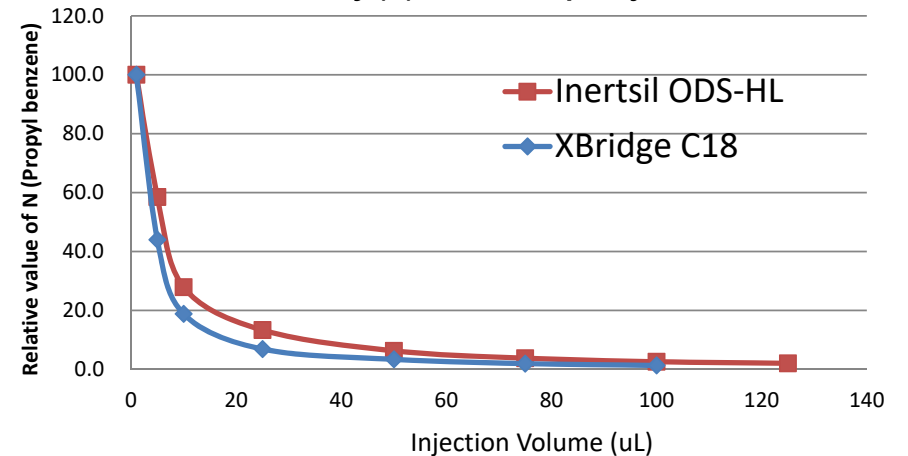
Concentrated standards were injected with various injection volumes separately to evaluate the sample loading capacity. The efficiency (N) decreases as the injection volume increases. However, Inertsil ODS-HL is less affected by the increase in injection volumes due to the high surface area of silica gel with the C18 groups densely bonded. (Inertsil ODS-HL, Carbon Loading : 23 %, XBridge C18, Carbon Loading : 18 %)

## Comparison of Sample Loading Capacity

Injection Volume vs N (Efficiency)



A plot of relative value when the efficiency (N) is 100 at 1  $\mu$ L injection volume





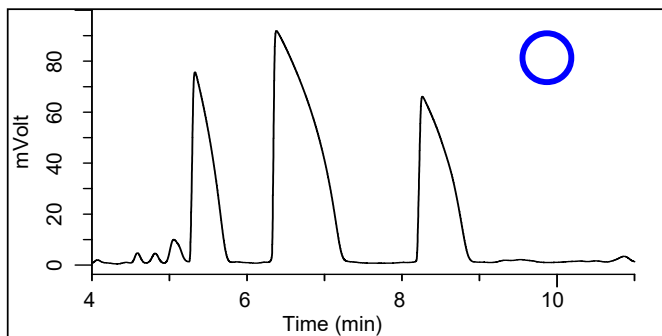
# Sample Loading Capacity

As proven below, Inertsil ODS-HL is optimized for preparative and process scale applications.

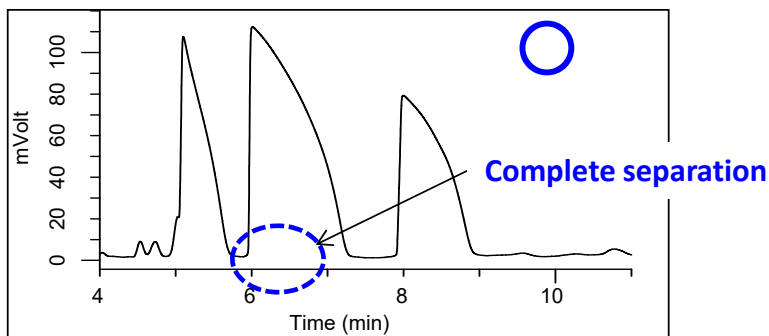
## Comparison of Sample Loading Capacity

### Inertsil ODS-HL

50  $\mu$ L

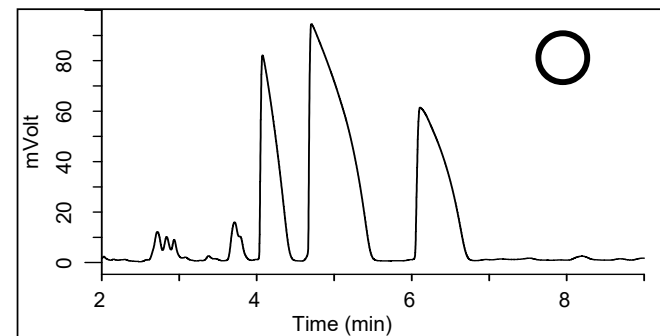


100  $\mu$ L

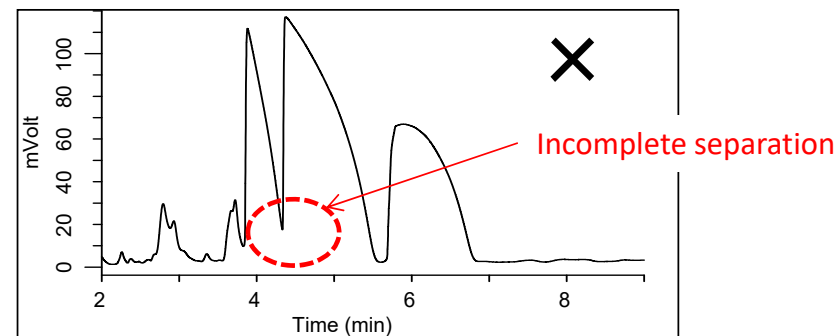


### XBridge C18

50  $\mu$ L



100  $\mu$ L



# Summary of Inertsil ODS-HL

## Alternative Selectivity to Conventional C18 columns

- Appropriate to use when observing separation issues with standard C18 columns.
- Perfect for basic molecules & its related substances, process impurities.

## Outstanding Alternative to Other High Carbon Loading C18 columns

- Ideal selection when observing separation issues or poor peak shapes on other high carbon loading C18 columns.

## Optimized for Preparative and LC-MS applications

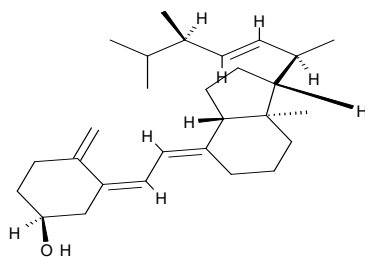
- For preparative applications, high surface area & carbon load leads to maximum sample loading capacity.
- For LC-MS applications, retention can be maintained whilst reducing the aqueous content of the mobile phase, thus increasing sensitivity.

# Application : Vitamin D2, D3

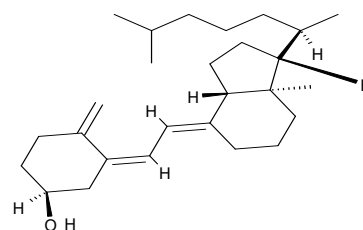
Structurally similar analytes are difficult to be separated on conventional ODS columns. A classic example is illustrated below using Vitamin D2 and D3. Inertsil ODS-HL is an ideal selection for such applications delivering complete separation.

## Condition

Column : 3  $\mu$ m, 2.1 x 150 mm  
Eluent : CH<sub>3</sub>OH  
Flow Rate : 0.3 mL/min  
Col.Temp. : 25 °C  
Detection : 265 nm  
Injection Vol. : 5  $\mu$ L  
Analyte : 5  $\mu$ g/mL each

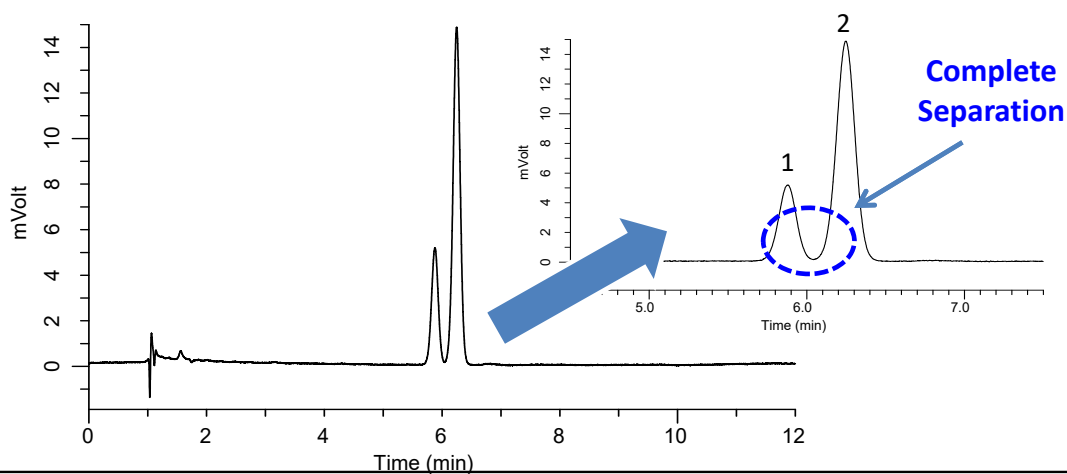


1.Vitamin D<sub>2</sub> (calciferol)

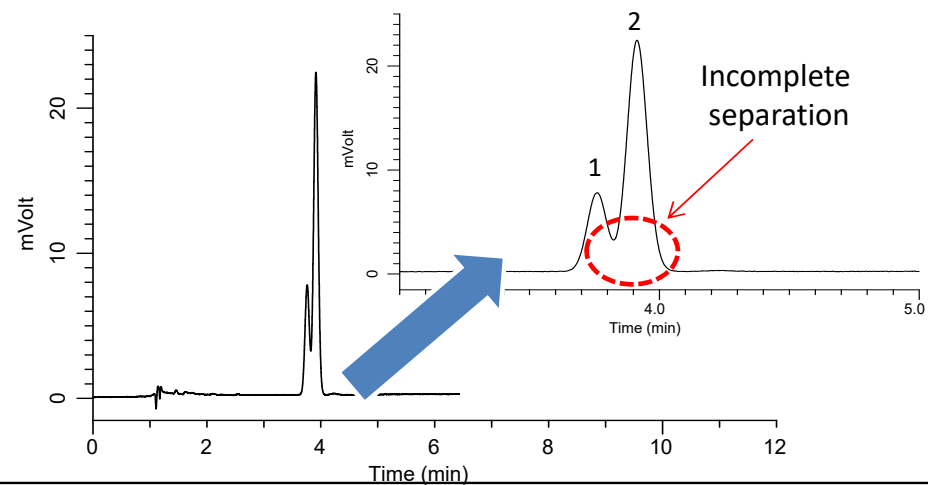


2.Vitamin D<sub>3</sub> (cholecalciferol)

## Inertsil ODS-HL



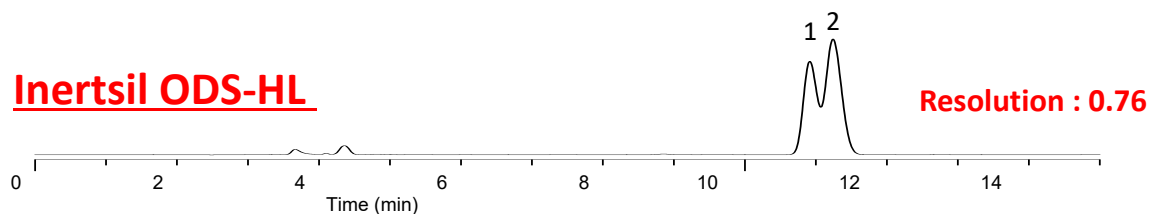
## InertSustain C18



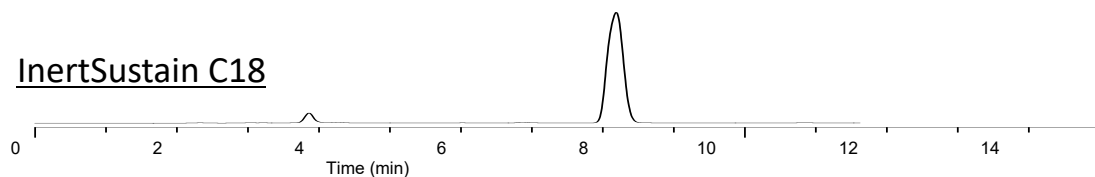
# Application : Octadecenoic Acid Methyl Ester, cis/trans-isomers

Cis- and trans-isomers of long-chain fatty acids were injected to evaluate the separation on the following C18 columns. As shown below, although complete separation was not achieved, Inertsil ODS-HL delivered the best separation.

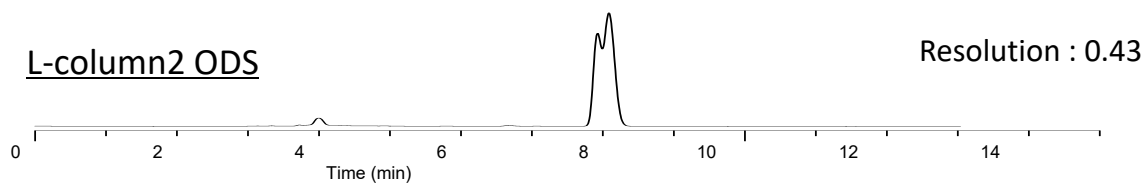
## Inertsil ODS-HL



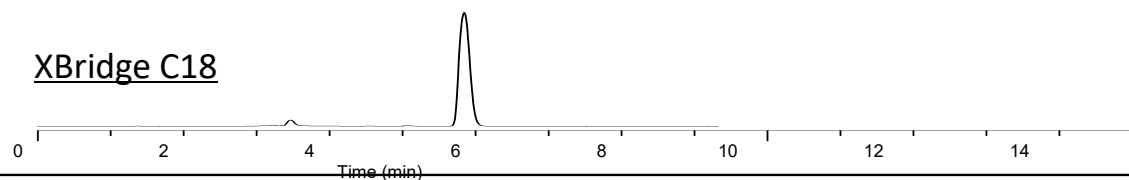
## InertSustain C18



## L-column2 ODS

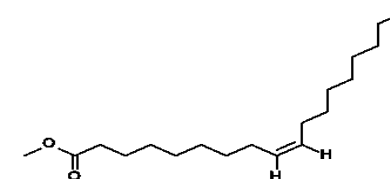


## XBridge C18

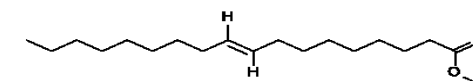


### Condition

Column size : 5  $\mu$ m, 4.6 x 250 mm  
Eluent : CH<sub>3</sub>OH  
Flow Rate : 1.0 mL/min  
Detection : 205 nm  
Col.Teml : 30  $^{\circ}$ C  
Injection.Vol. : 10  $\mu$ L  
Analyte : 5 mM in CH<sub>3</sub>OH each



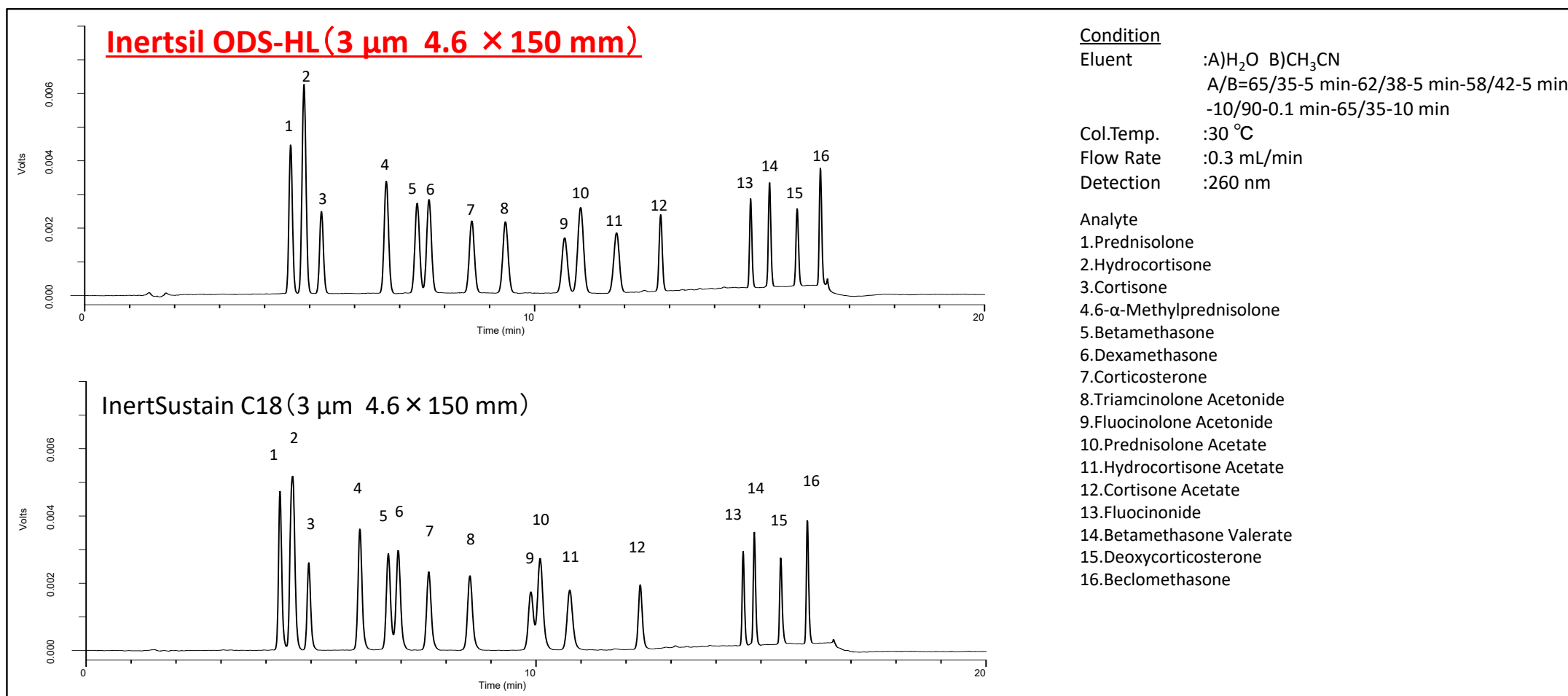
1. cis9-C18:1 methyl ester  
(Methyl Oleate)



2. trans9-C18:1 methyl ester  
(Methyl Elaidate)

# Application : Adrenal Cortical Hormones

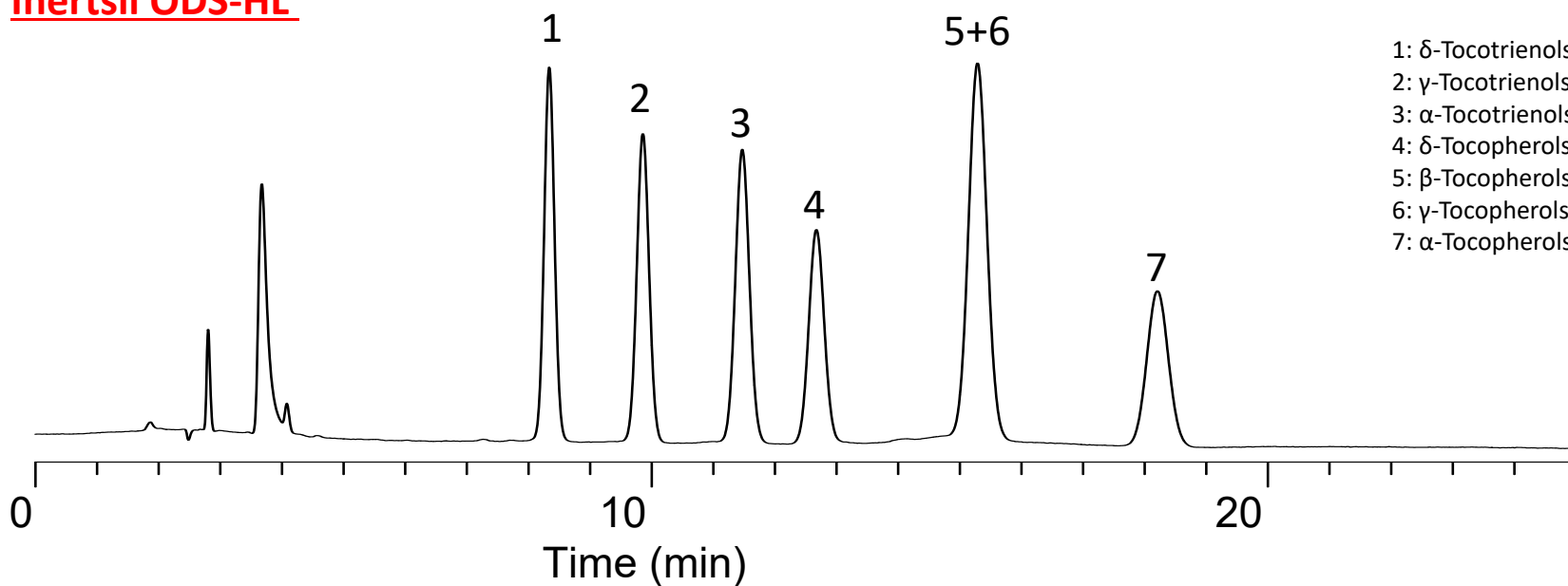
Simultaneous analysis of adrenal cortical hormones were operated using Inertsil ODS-HL and conventional C18 column. Inertsil ODS-HL achieved complete baseline separation on all 16 analytes.



# Application : Tocotrienols, Tocopherols

Highly hydrophobic vitamin E were analyzed under 100 % methanol using Inertsil ODS-HL and all compounds were well retained. All compounds were well separated except between  $\beta$ -Tocopherol and  $\gamma$ -Tocopherol.

**Inertsil ODS-HL**



## Condition

Column size :5  $\mu$ m, 4.6 x 250 mm  
Eluent :CH<sub>3</sub>OH  
Flow Rate :1.0 mL/min  
Detection :210 nm  
Col.Teml :30 °C  
Injection.Vol. :5  $\mu$ L  
Analyte :0.01 mg/mL in CH<sub>3</sub>OH each

1:  $\delta$ -Tocotrienols  
2:  $\gamma$ -Tocotrienols  
3:  $\alpha$ -Tocotrienols  
4:  $\delta$ -Tocopherols  
5:  $\beta$ -Tocopherols  
6:  $\gamma$ -Tocopherols  
7:  $\alpha$ -Tocopherols

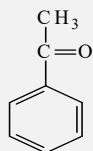
# List of Compared Columns

| Brand   | Column size (mm) | Particle size (μm) | Surface area (m <sup>2</sup> /g) | Pore size (Å) | Pore size (mL/g) | Carbon loading (%) | pH range |
|---|------------------|--------------------|----------------------------------|---------------|------------------|--------------------|----------|
| <b>GL Sciences<br/>Inertsil ODS-HL</b>                    | 4.6 × 150        | 3, 5               | 450                              | 100           | 1.05             | 23.0               | 2.0-7.5  |
| YMC<br><b>Triart C18 ExRS plus (High Carbon)</b>          | 4.6 × 150        | 5                  | 430                              | 80            | —                | 25.0               | 1.0-12.0 |
| YMC<br><b>YMC-Pack Pro C18 RS (High Carbon)</b>           | 4.6 × 150        | 5                  | —                                | 80            | —                | 22.0               | 1.0-10.0 |
| Nomura Chemical<br><b>Develosil HSR C18 (High Carbon)</b> | 4.6 × 150        | 5                  | 450                              | 80            | 1.15             | 22.0               | 1.0-10.0 |
| CERI<br><b>L-column 2 ODS (Conventional type)</b>         | 4.6 × 150        | 5                  | 340                              | 120           | —                | 17.0               | 2.0-9.0  |
| Phenomenex<br><b>Luna C18(2) (Conventional type)</b>      | 4.6 × 150        | 5                  | 400                              | 100           | —                | 17.5               | 1.5-10.0 |
| ACT<br><b>ACE 5 C18 (Conventional type)</b>               | 4.6 × 150        | 5                  | 300                              | 100           | —                | 15.5               | 1.5-10.0 |
| Waters<br><b>XBridge C18 (Conventional type)</b>          | 4.6 × 150        | 5                  | 185                              | 130           | —                | 18.0               | 1.0-12.0 |
| Imtakt<br><b>Cadenza CD-C18 (Conventional type)</b>       | 4.6 × 150        | 3                  | —                                | 120           | —                | —                  | 1.5-9.0  |

# Comparison of Performance

## (1) Naphthalene Test (Shipping Inspection Test)

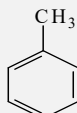
The performance of each column was evaluated using Naphthalene by checking the efficiency, peak symmetry and column back pressure.



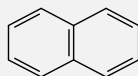
1. Acetophenone



2. Benzene



3. Toluene



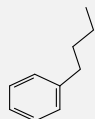
4. Naphthalene

### Conditions

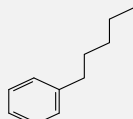
|               |  |
|---------------|--|
| Eluent        | : A) CH <sub>3</sub> CN<br>B) H <sub>2</sub> O<br>A/B = 65/35, v/v |
| Flow Rate     | : 1.0 mL/min   |
| Col. Temp.    | : 40 °C  |
| Detection     | : UV 254 nm  |
| Injection Vol | : 2.5 µL   |
| Sample        | : 1. Acetophenone 2. Benzene 3. Toluene 4. Naphthalene             |

## (2) Selectivity Test

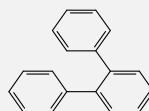
Sample No.4, n-Butylbenzene and Sample No.5, n-Amylbenzene were used to determine the hydrophobic property of the column. n-Amylbenzene elutes later against n-Butylbenzene when the hydrophobicity of the column is high. Stereoselectivity is indicated by Sample No.6, o-Terphenyl and Sample No.7, Triphenylene. O-Terphenyl has a twisted tertiary structure and Triphenylene has a planar structure. Triphenylene elutes later against o-Terphenyl when the stereoselectivity of the column is high.



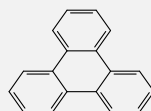
4. n-Butylbenzene



5. n-Amylbenzene



6. o-Terphenyl



7. Triphenylene

### Conditions

|            |   |
|------------|---|
| Eluent     | : A) CH <sub>3</sub> OH<br>B) H <sub>2</sub> O<br>A/B = 80/20, v / v                                      |
| Flow Rate  | : 1.0 mL/min  |
| Col. Temp. | : 40 °C   |
| Detection  | : UV 254 nm   |
| Sample     | : 1. Uracil 2. Caffeine 3. Phenol<br>4. n-Butylbenzene 5. n-Amylbenzene<br>6. o-Terphenyl 7. Triphenylene |



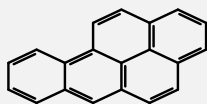
# Comparison of Performance

## (3) SRM 869 Column Selectivity Test

This test mixture is intended primarily for the characterization of C18 columns used in the reversed-phase liquid chromatographic separation of PAHs. The elution order of the three components changes with C18 stationary phase type. Monomerically bonded ("monomeric") C18 phases have been shown to give the elution order BaP  $\leq$  PhPh < TBN. Stationary phases prepared using polymeric surface modification procedures "polymeric" have the elution order PhPh < TBN  $\leq$  BaP. Stationary phases with intermediate properties (i.e., densely loaded monomeric or lightly loaded polymeric C18 phases) are indicated by the elution order PhPh < BaP < TBN).

### Conditions

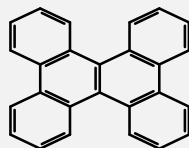
|            |  |
|------------|--|
| Eluent     | : A) CH <sub>3</sub> CN<br>B) H <sub>2</sub> O<br>A/B = 85/15, v/v |
| Flow Rate  | : 2.0 mL/min   |
| Col. Temp. | : 30 °C  |
| Detection  | : UV 254 nm  |
| Sample     | : 1. BaP 2. PhPh 3. TBN  |



1. Benzo[a]pyrene  
(BaP)



2. Phenanthro[3,4-c]phenanthrene  
(PhPh)

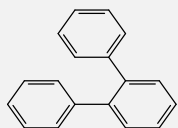


3. Tetrabenzonaphthalene  
(TBN)

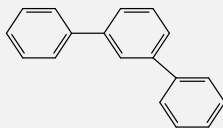
# Comparison of Performance

## (4) Separation of Isomeric Terphenyls

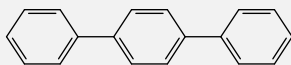
Isomeric terphenyls were injected to evaluate the stereoselectivity of each column.



1. o-Terphenyl



2. m-Terphenyl



3. p-Terphenyl

### Conditions

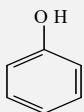
|               |  |
|---------------|--|
| Eluent        | : A) CH <sub>3</sub> CN<br>B) H <sub>2</sub> O<br>A/B = 80/20, v/v |
| Flow Rate     | : 1.0 mL/min   |
| Col. Temp.    | : 40 °C  |
| Detection     | : UV 254 nm  |
| Injection Vol | : 2.5 µL   |
| Sample        | : 1. o-Terphenyl<br>2. m-Terphenyl<br>3. p-Terphenyl               |

## (5) Pyridine, Phenol Test

Columns with insufficient end-capping will show tailing of Pyridine. The degree of inertness to basic compound was evaluated.



1. Pyridine



2. Phenol

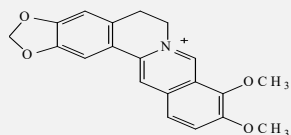
### Conditions

|            |  |
|------------|--|
| Eluent     | : A) CH <sub>3</sub> OH<br>B) H <sub>2</sub> O<br>A/B = 30/70, v/v |
| Flow Rate  | : 1.0 mL/min   |
| Col. Temp. | : 40 °C  |
| Detection  | : UV 254 nm  |
| Sample     | : 1. Pyridine<br>2. Phenol   |

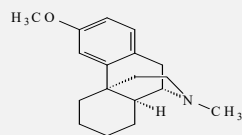
# Comparison of Performance

## (6), (7) Strong Basic Compound Test

Dextromethorphan and Berberine chloride are strong basic compounds. Severe tailing can be confirmed when the packing material contains residual silanol groups.



4. Berberine chloride



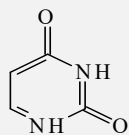
5. Dextromethorphan

### Conditions

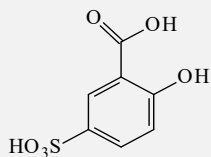
|            |   |
|------------|---|
| Eluent     | : A) CH <sub>3</sub> CN<br>B) 25mM K <sub>2</sub> HPO <sub>4</sub> (pH 7.0, KH <sub>2</sub> PO <sub>4</sub> )<br>A/B = 30/70, v/v |
| Flow Rate  | : 1.0 mL/min  |
| Col. Temp. | : 40 °C   |
| Detection  | : UV 230 nm   |
| Sample (6) | : 1.Uracil 2.Pyridine 3.Phenol<br>4.Berberine chloride 5. Dextromethorphan  |
| Sample (7) | : 1.Pyridine 2. Berberine chloride  |

## (8) Acidic Compound Test

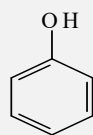
The degree of inertness to acidic compound was evaluated.



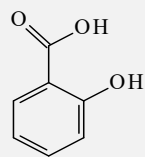
1. Uracil



2. 5-Sulfosalicylic acid



3. Phenol



4. Salicylic acid

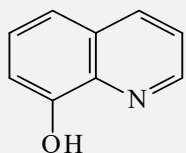
### Conditions

|            |   |
|------------|---|
| Eluent     | : A) CH <sub>3</sub> CN<br>B) 0.1% Phosphoric acid<br>A/B = 25/75, v/v    |
| Flow Rate  | : 1.0 mL/min  |
| Col. Temp. | : 40 °C   |
| Detection  | : UV 230 nm   |
| Sample     | : 1. Uracil<br>2. 5-Sulfosalicylic acid<br>3. Phenol<br>4. Salicylic acid |

# Comparison of Performance

## (9) Chelating Compound Test

8-Quinololinol is a strong chelating compound, which coordinately binds with the surface of residual trace metal impurities, resulting in severe tailing.



3. 8-Quinololinol

### Conditions

|            |   |
|------------|---|
| Eluent     | : A) CH <sub>3</sub> CN<br>B) 0.1% Phosphoric acid<br>A/B = 5/95, v / v |
| Flow Rate  | : 1.0 mL/min  |
| Col. Temp. | : 40 °C   |
| Detection  | : UV 254 nm   |
| Sample     | : 1. Uracil<br>2. Thymine<br>3. 8-Quinololinol                          |

## (10) Dewetting Test

When analyzing hydrophilic compounds under water rich mobile phase condition, once the pump is stopped, the hydrophobic bonded group pushes the aqueous mobile phase out off the pore in an irreversible fashion, in what has become known as the dewetting phenomenon.

### Testing Procedure:

- 1) Equilibrated the column with 90 % Acetonitrile.
- 2) Conduct Analysis (Upper chromatogram in the following pages)
- 3) Stop flow for 5 minutes.
- 4) 20 mM Ammonium acetate is introduced into column.
- 5) Conduct Analysis (Lower chromatogram in the following pages)

### Conditions

|            |  |
|------------|--|
| Eluent     | : 20 mM Ammonium acetate                 |
| Flow Rate  | : 1.0 mL/min                             |
| Col. Temp. | : 30 °C                                  |
| Detection  | : UV 254 nm                              |
| Sample     | : 1. Cytosine<br>2. Uracil<br>3. Thymine |

# Comparison of Performance 1/32

(1) Naphthalene Test

(2) Selectivity Test

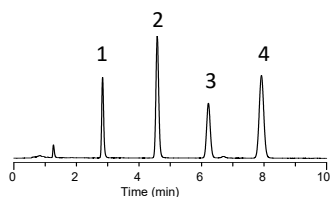
(3) SRM 869 Test

(4) Isomeric Terphenyls

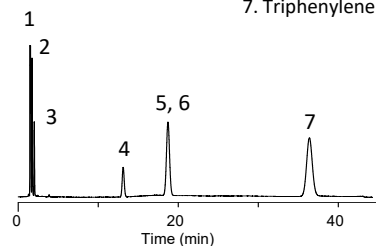
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

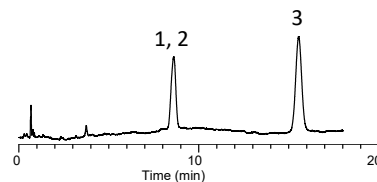
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



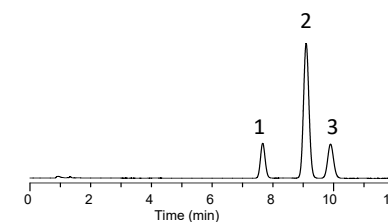
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



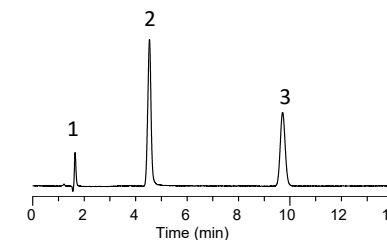
1. BaP
2. PhPh
3. TBN



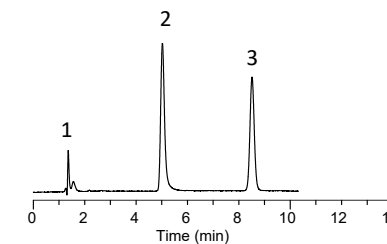
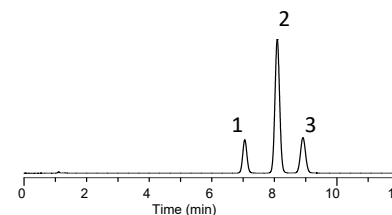
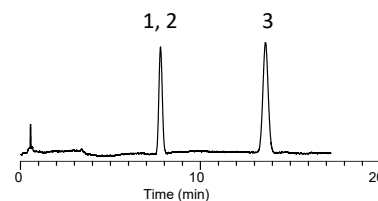
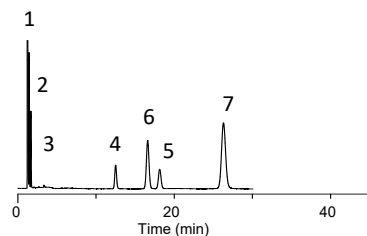
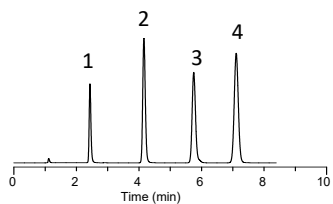
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**Triart C18 ExRS Plus (5 μm)**



# Comparison of Performance 2/32

(1) Naphthalene Test

(2) Selectivity Test

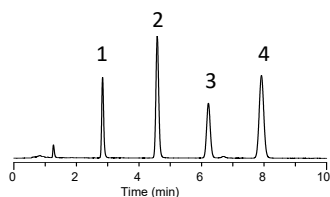
(3) SRM 869 Test

(4) Isomeric Terphenyls

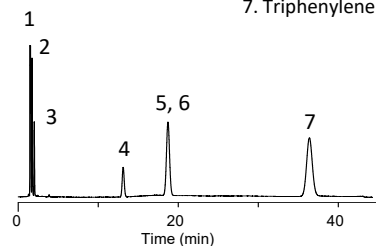
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

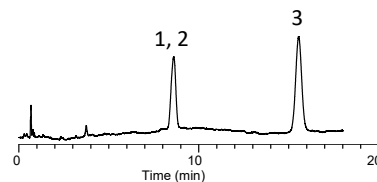
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



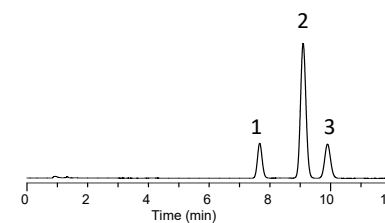
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



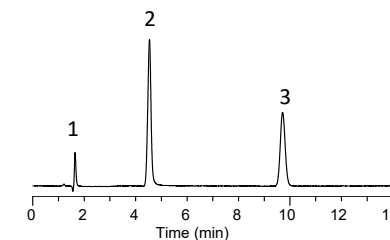
1. BaP
2. PhPh
3. TBN



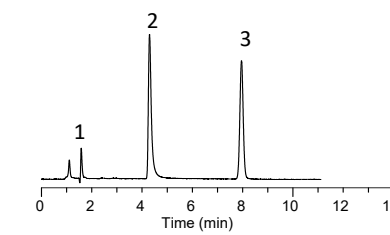
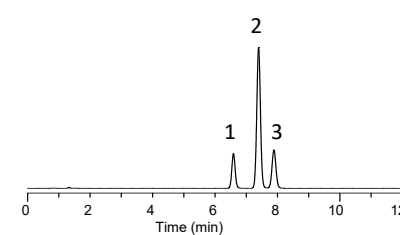
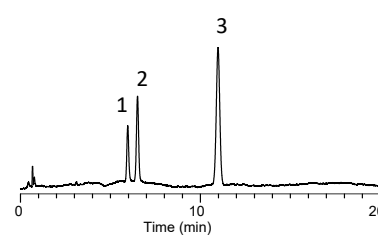
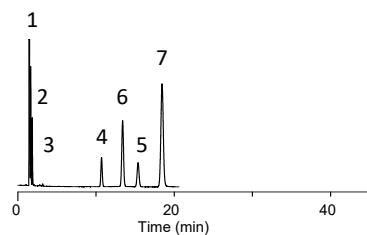
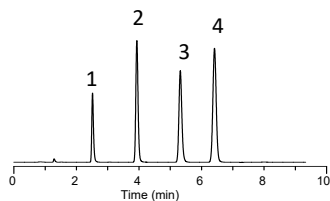
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**YMC-Pack Pro C18 RS (5 μm)**



# Comparison of Performance 3/32

(1) Naphthalene Test

(2) Selectivity Test

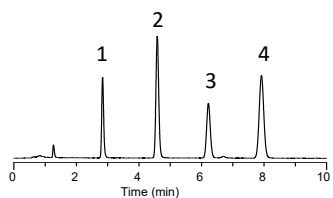
(3) SRM 869 Test

(4) Isomeric Terphenyls

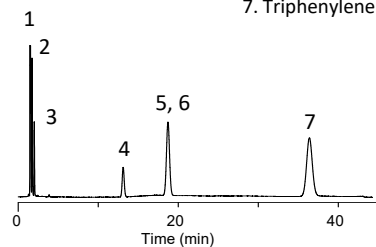
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

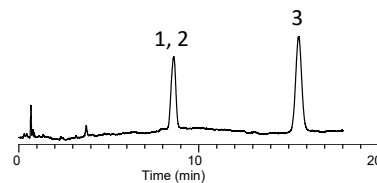
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



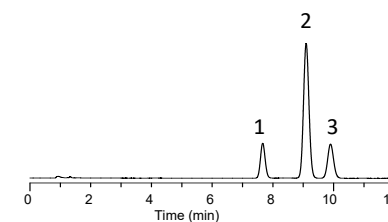
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



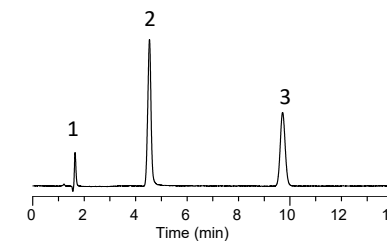
1. BaP
2. PhPh
3. TBN



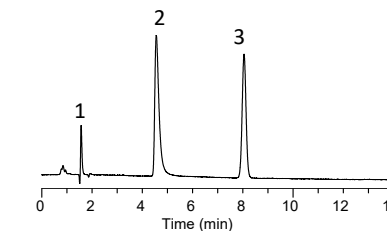
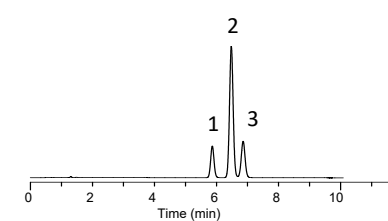
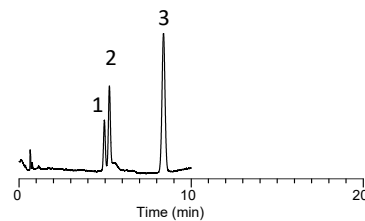
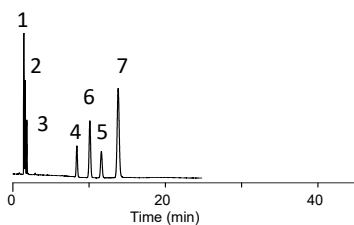
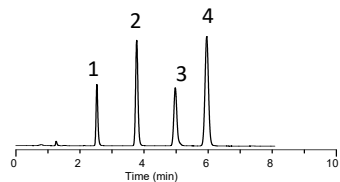
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**Develosil HSR C18 (5 μm)**



# Comparison of Performance 4/32

(1) Naphthalene Test

(2) Selectivity Test

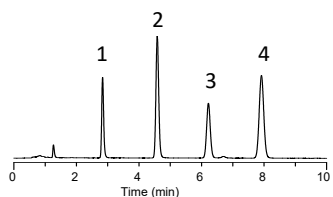
(3) SRM 869 Test

(4) Isomeric Terphenyls

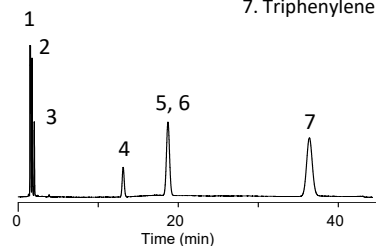
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

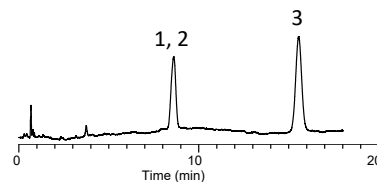
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



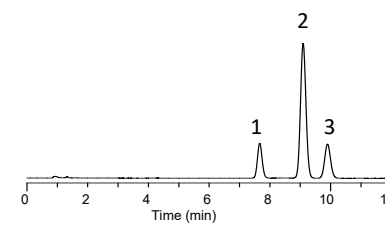
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



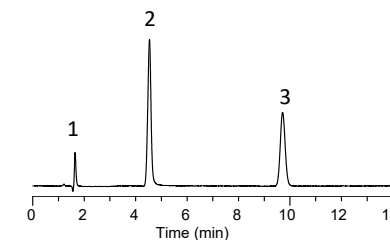
1. BaP
2. PhPh
3. TBN



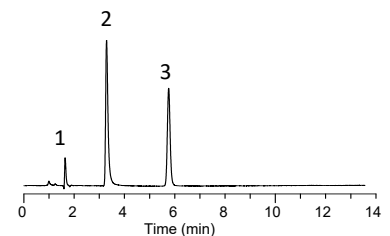
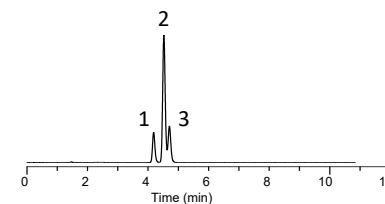
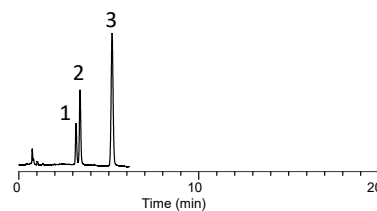
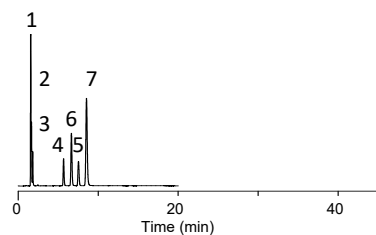
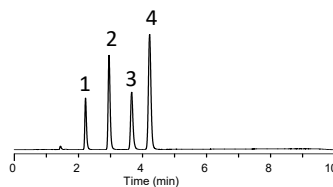
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**XBridge C18 (5 μm)**





# Comparison of Performance 5/32

(1) Naphthalene Test

(2) Selectivity Test

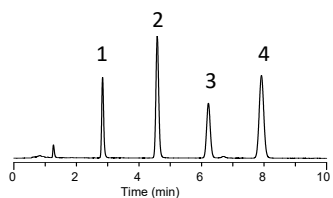
(3) SRM 869 Test

(4) Isomeric Terphenyls

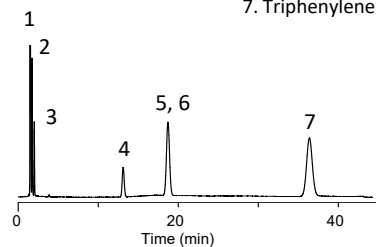
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

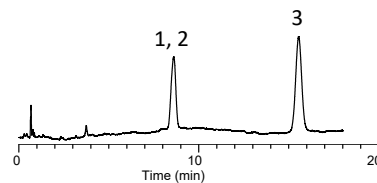
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



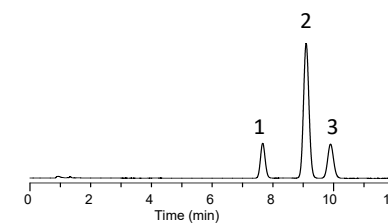
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



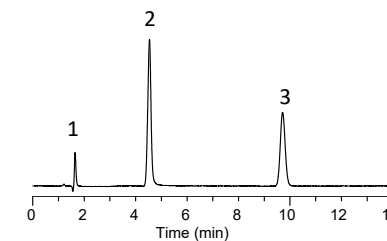
1. BaP
2. PhPh
3. TBN



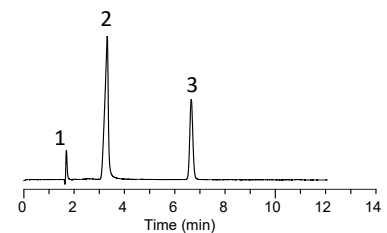
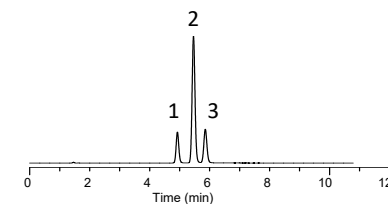
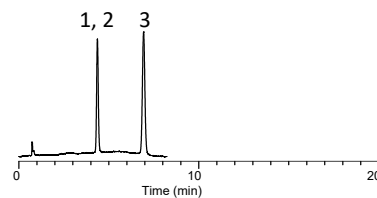
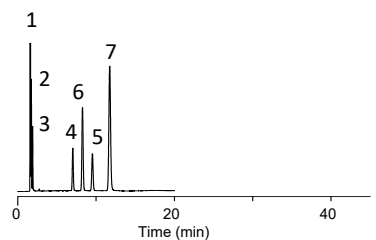
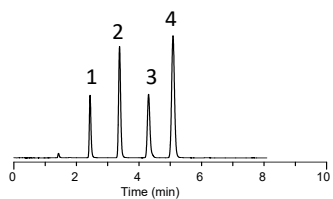
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**ACE C18 (5 μm)**



# Comparison of Performance 6/32

(1) Naphthalene Test

(2) Selectivity Test

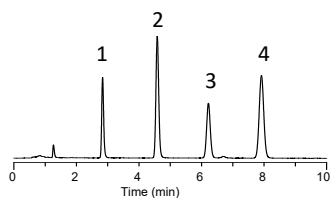
(3) SRM 869 Test

(4) Isomeric Terphenyls

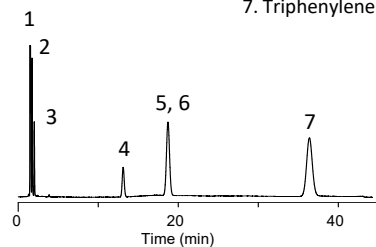
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

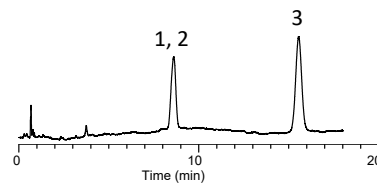
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



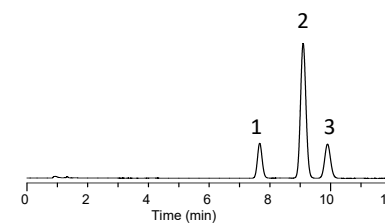
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



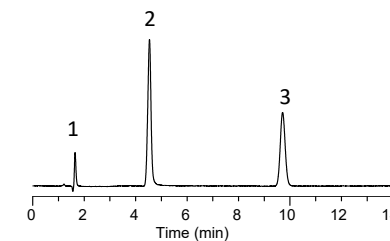
1. BaP
2. PhPh
3. TBN



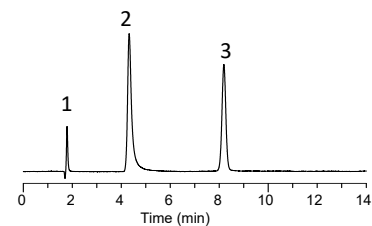
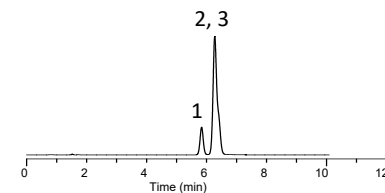
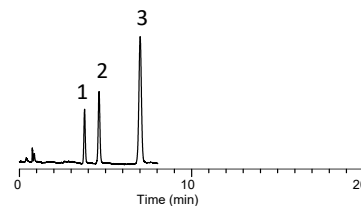
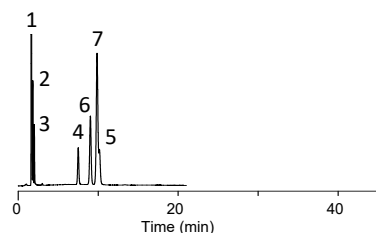
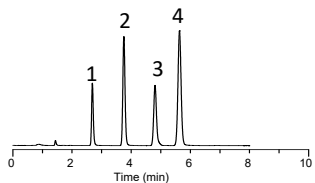
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**Luna C18(2) (5 μm)**



# Comparison of Performance 7/32

(1) Naphthalene Test

(2) Selectivity Test

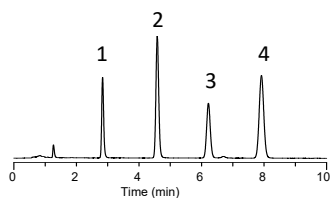
(3) SRM 869 Test

(4) Isomeric Terphenyls

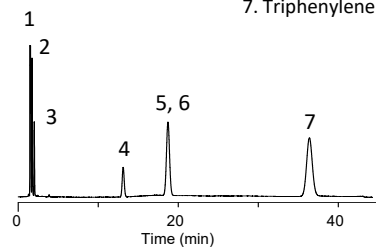
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

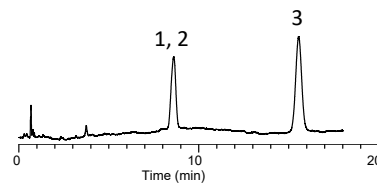
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



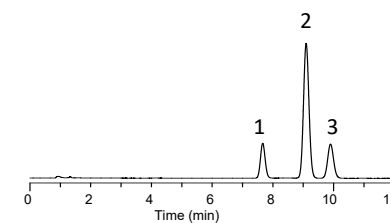
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



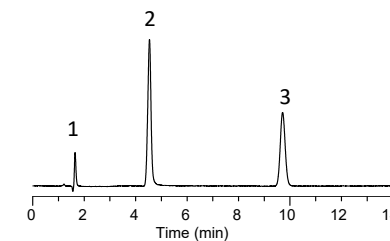
1. BaP
2. PhPh
3. TBN



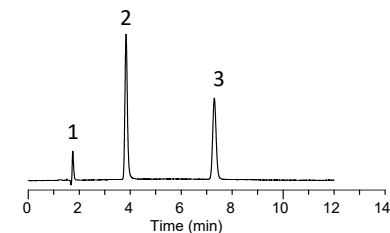
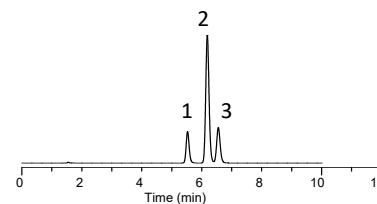
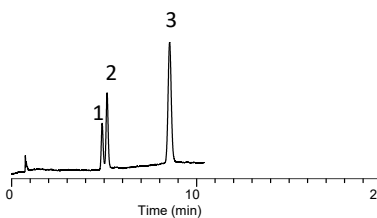
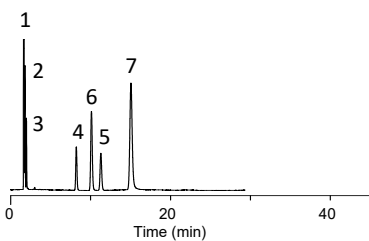
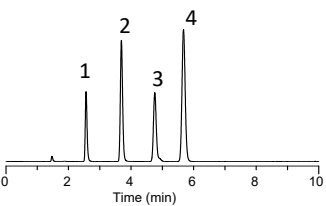
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**L-column2 ODS (5 μm)**



# Comparison of Performance 8/32

(1) Naphthalene Test

(2) Selectivity Test

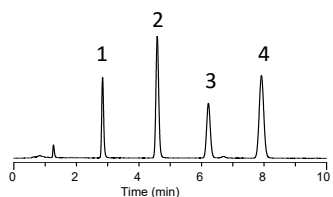
(3) SRM 869 Test

(4) Isomeric Terphenyls

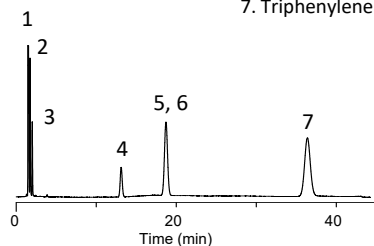
(5) Pyridine Test

**Inertsil ODS-HL (3 μm)**

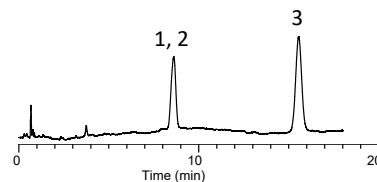
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



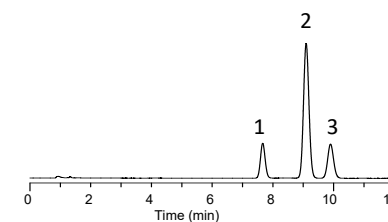
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



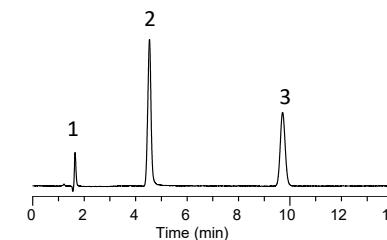
1. BaP
2. PhPh
3. TBN



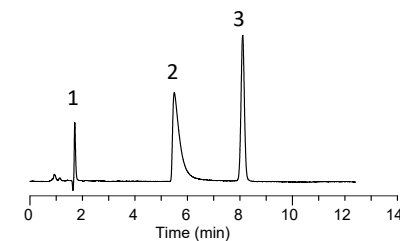
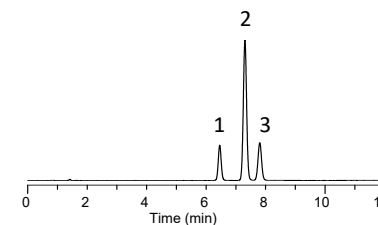
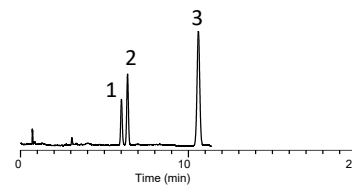
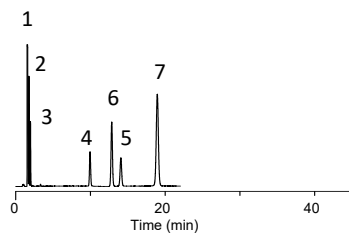
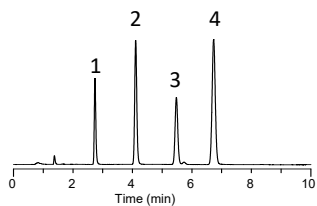
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



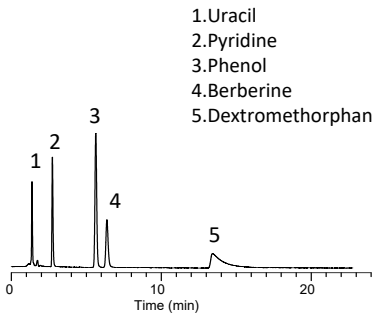
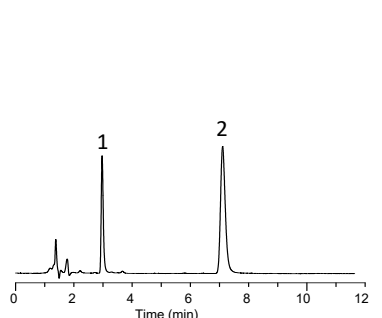
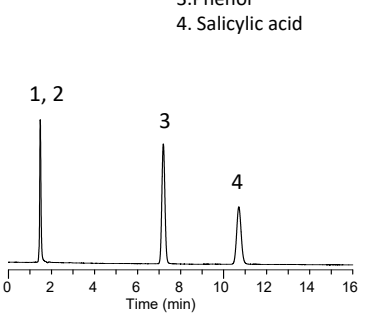
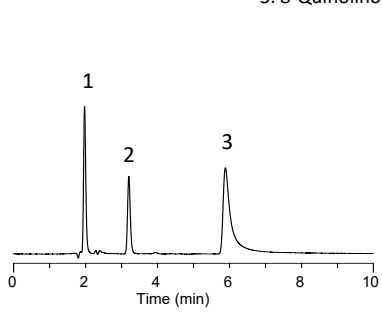
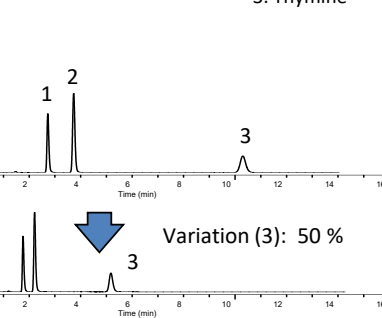
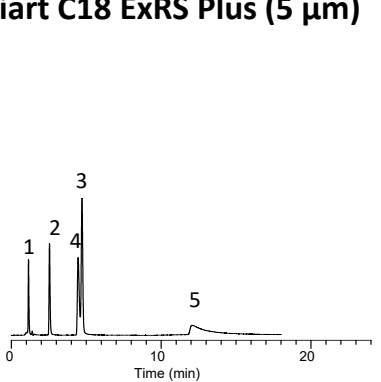
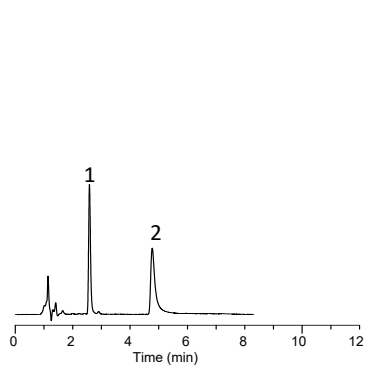
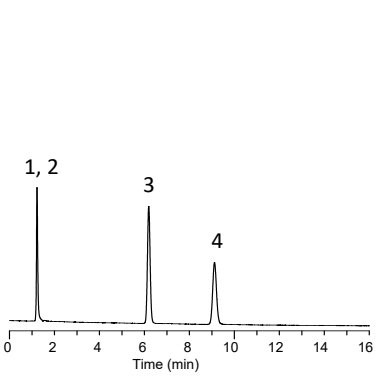
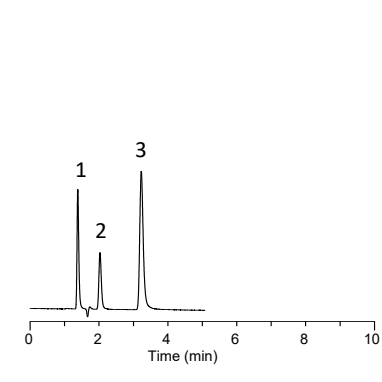
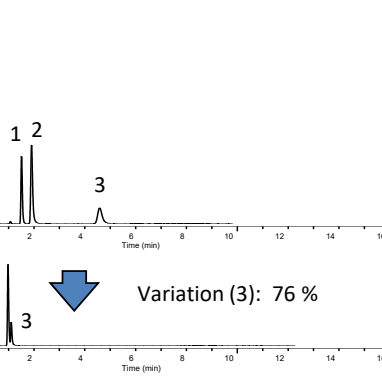
1. Uracil
2. Pyridine
3. Phenol



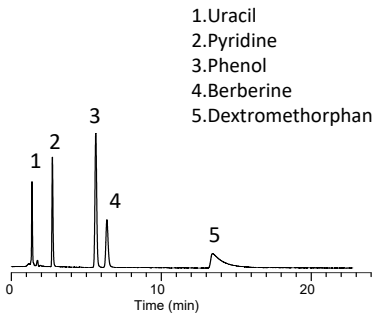
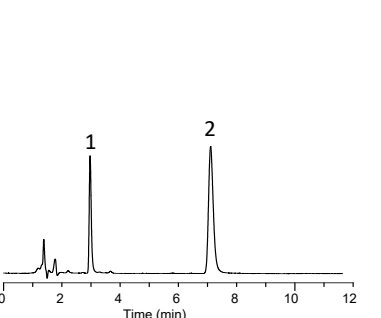
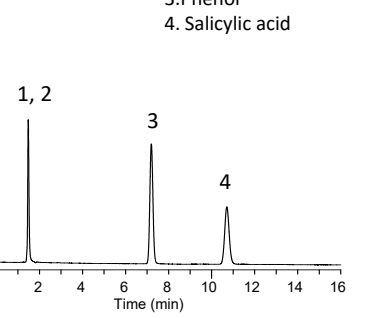
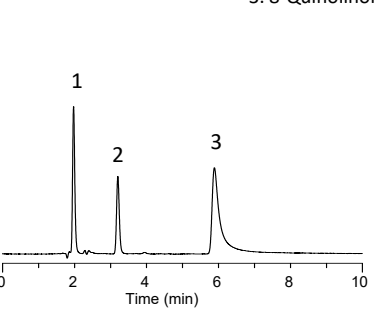
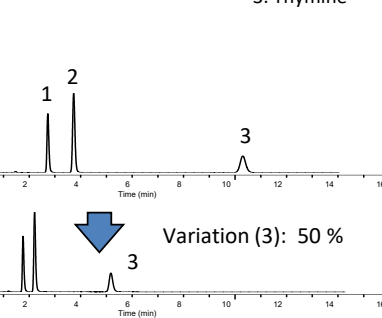
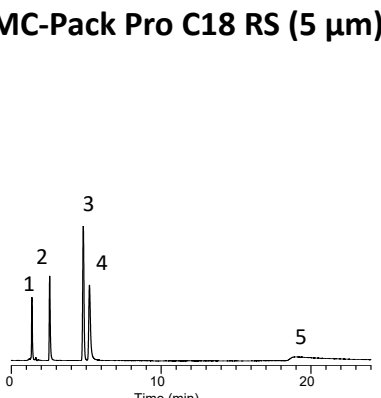
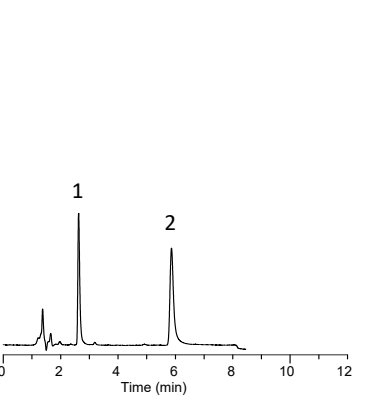
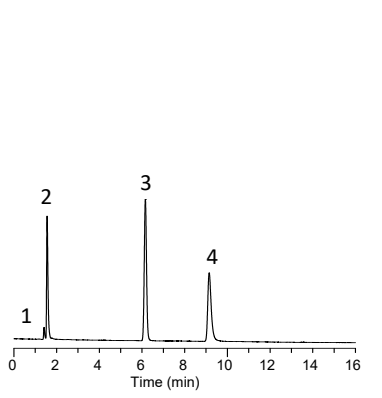
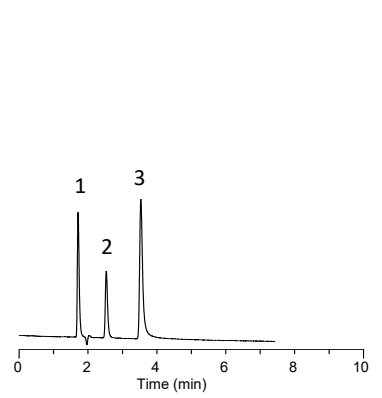
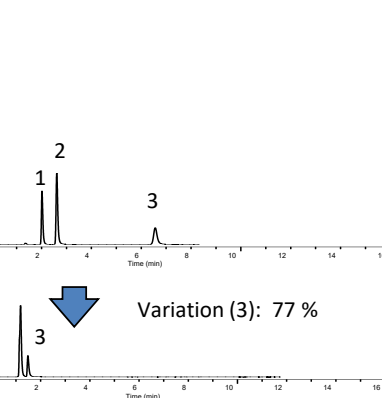
**Cadenza CD-C18 (3 μm)**



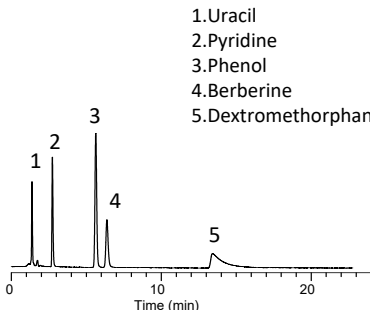
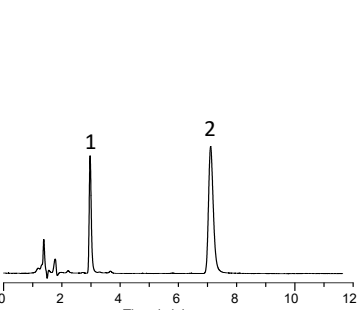
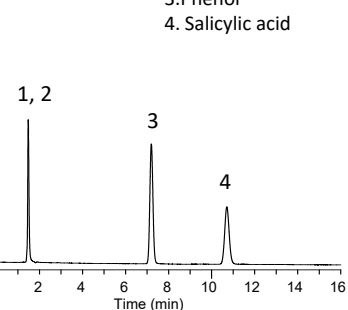
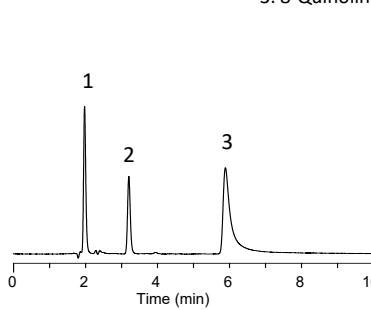
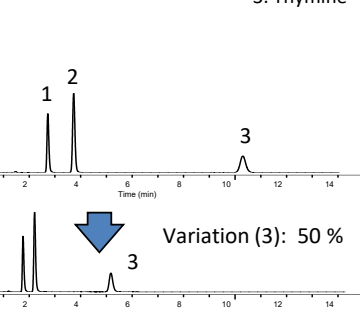
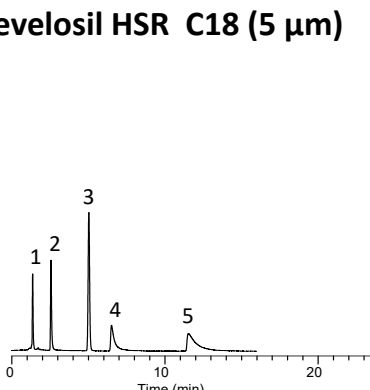
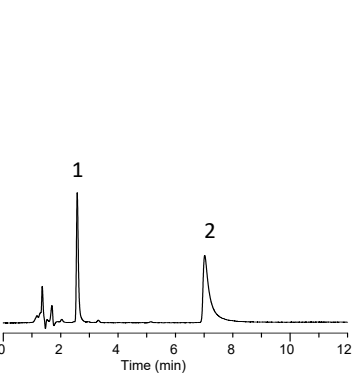
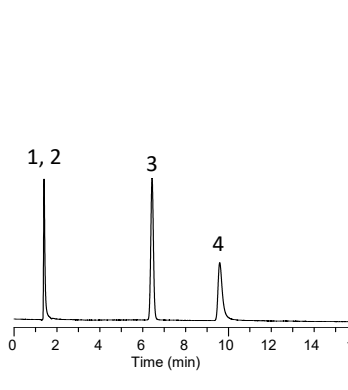
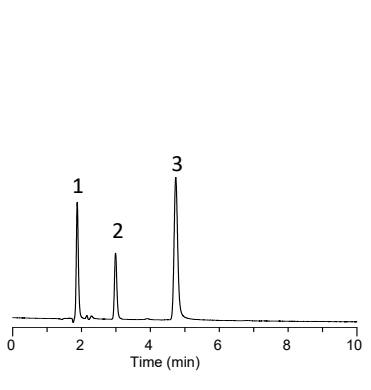
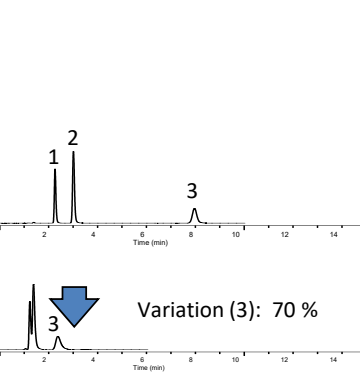
# Comparison of Performance 9/32

| (6) Strong Basic Compound Test  | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test  | (10) Dewetting Test  |
|---|---|--|--|--|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <ol style="list-style-type: none"> <li>1.Uracil</li> <li>2.Pyridine</li> <li>3.Phenol</li> <li>4.Berberine</li> <li>5.Dextromethorphan</li> </ol>  | <ol style="list-style-type: none"> <li>1.Pyridine</li> <li>2.Berberine</li> </ol>  | <ol style="list-style-type: none"> <li>1.Uracil</li> <li>2. 5-μL fosalicylic acid</li> <li>3.Phenol</li> <li>4. Salicylic acid</li> </ol>  | <ol style="list-style-type: none"> <li>1. Uracil</li> <li>2. Thymine</li> <li>3. 8-Quinolinol</li> </ol>  | <ol style="list-style-type: none"> <li>1. Cytosine</li> <li>2. Uracil</li> <li>3. Thymine</li> </ol>  |
| <p><b>Triart C18 ExRS Plus (5 μm)</b></p>    |   |   |    |    |

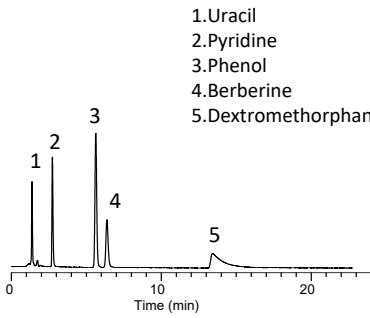
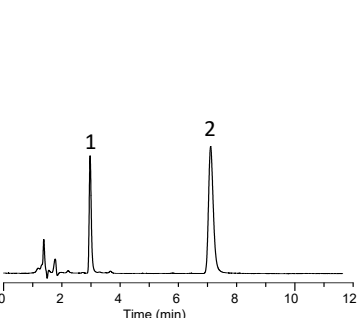
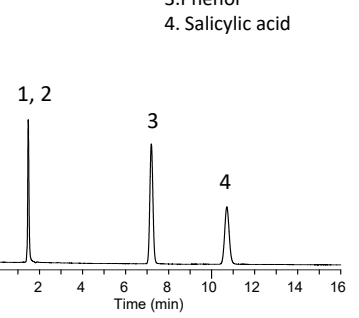
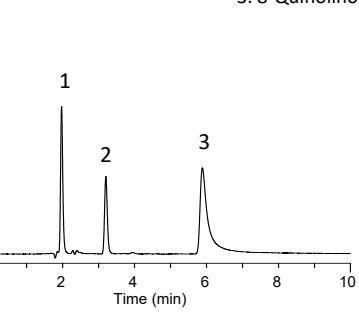
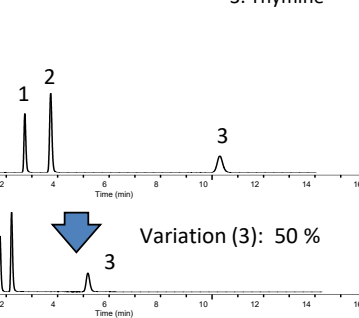
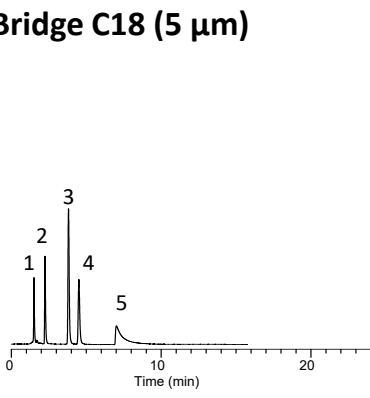
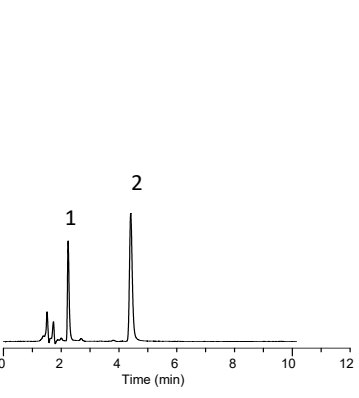
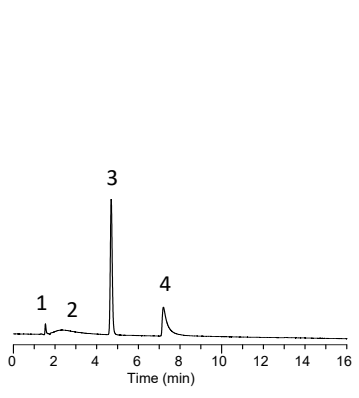
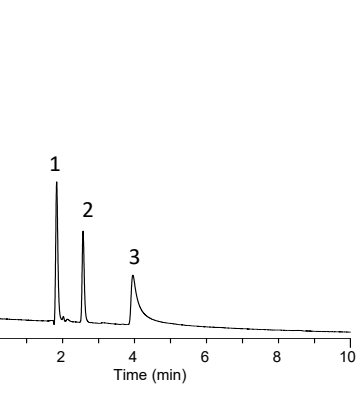
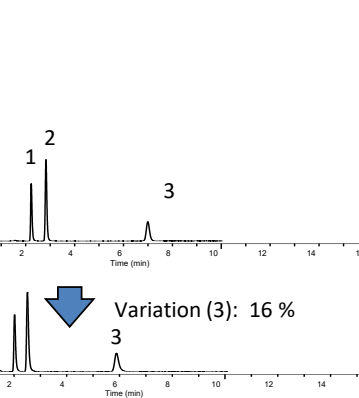
# Comparison of Performance 10/32

| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test   | (10) Dewetting Test   |
|--|---|--|---|---|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-μL fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  |
| <p><b>YMC-Pack Pro C18 RS (5 μm)</b></p>    |                                   |   |   |   |

# Comparison of Performance 11/32

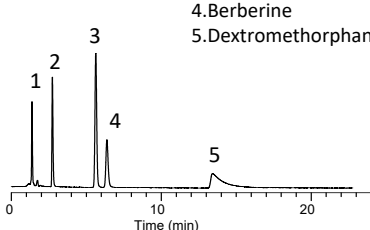
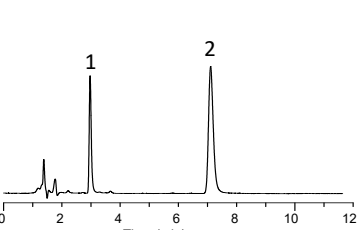
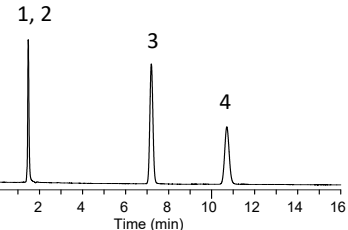
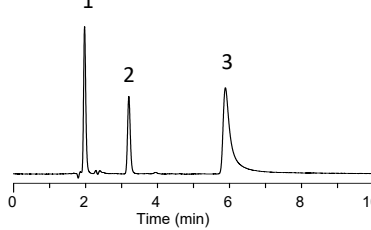
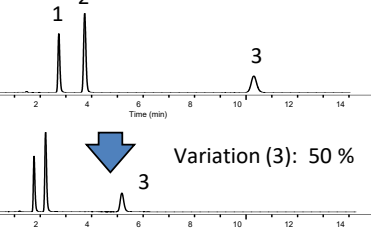
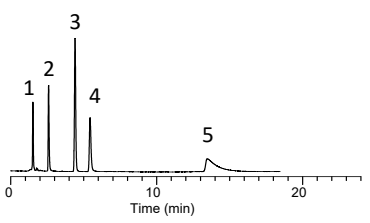
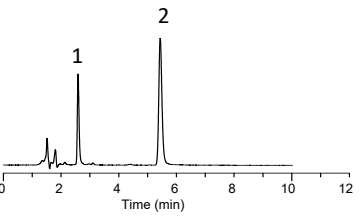
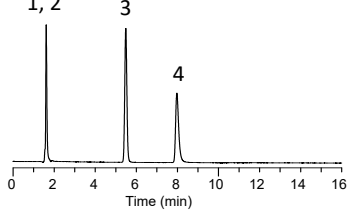
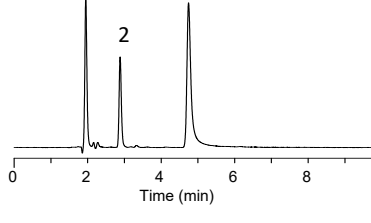
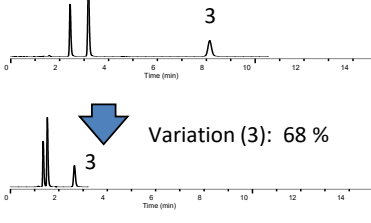
| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test   | (10) Dewetting Test   |
|--|---|--|---|---|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-μL fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  |
| <p><b>Develosil HSR C18 (5 μm)</b></p>    |                                   |   |   |   |

# Comparison of Performance 12/32

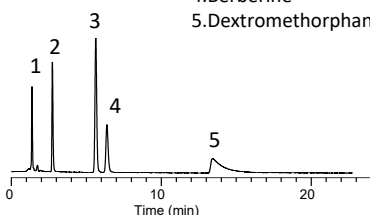
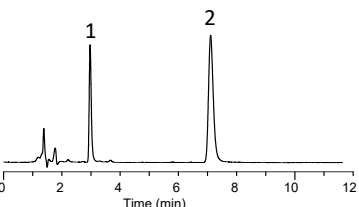
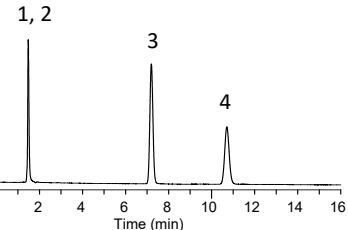
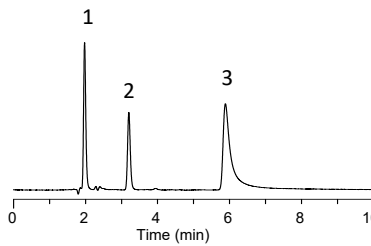
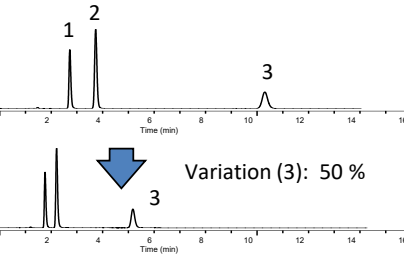
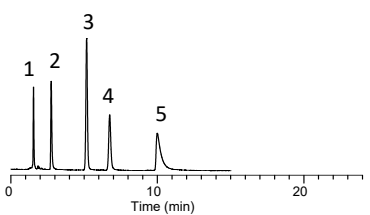
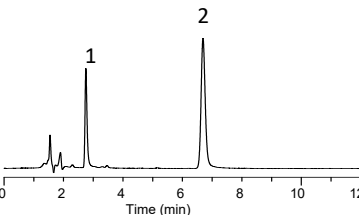
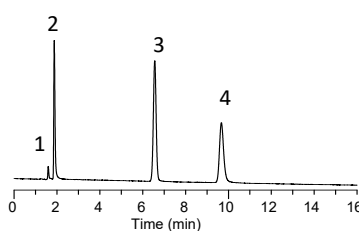
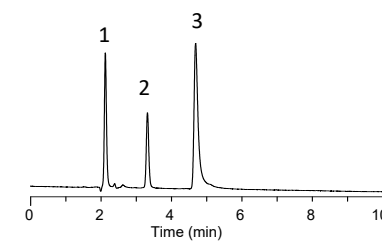
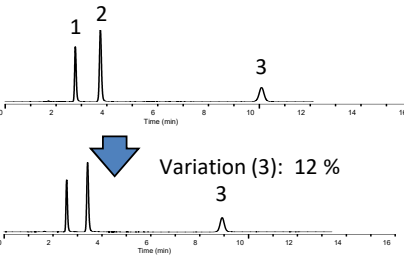
| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test   | (10) Dewetting Test   |
|--|---|--|---|---|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-μL fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  |
| <p><b>XBridge C18 (5 μm)</b></p>    |                                   |   |   |   |



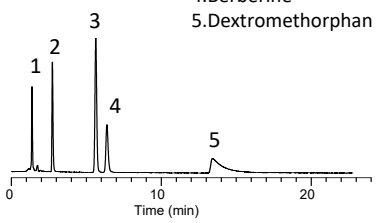
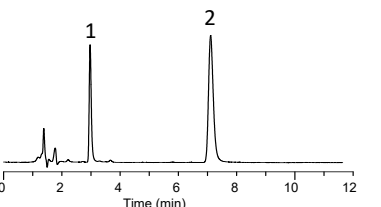
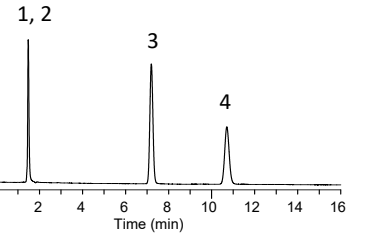
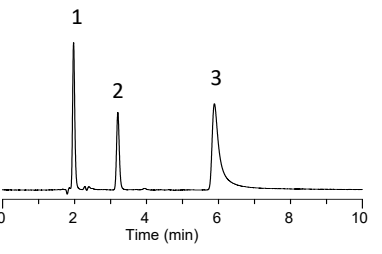
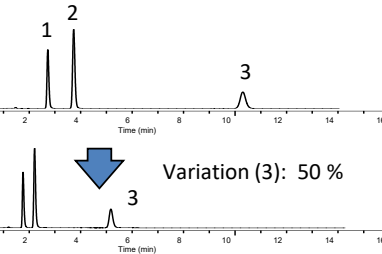
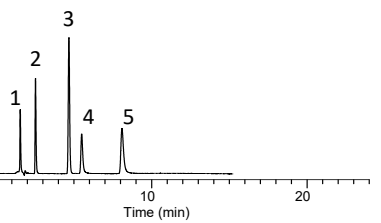
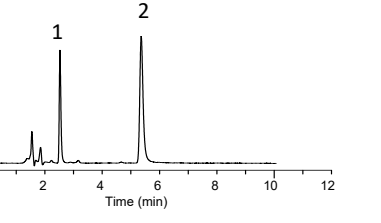
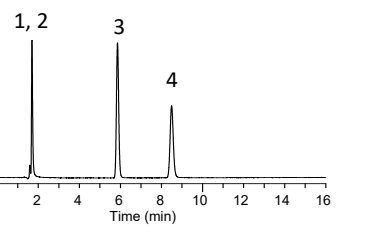
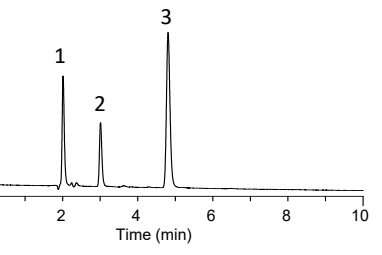
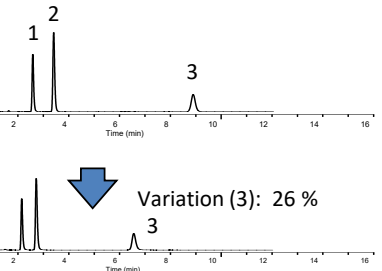
# Comparison of Performance 13/32

| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test   | (10) Dewetting Test   |
|--|---|--|---|---|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-μL fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  |
| <p><b>ACE C18 (5 μm)</b></p>   |                                  |    |    |    |

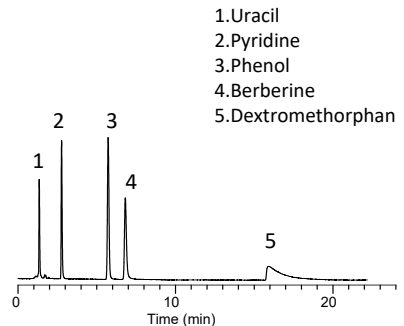
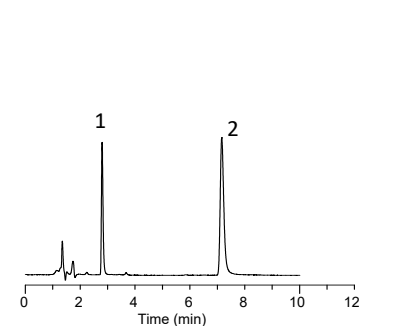
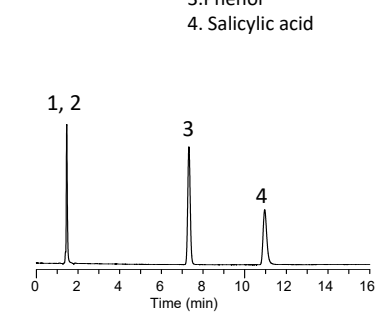
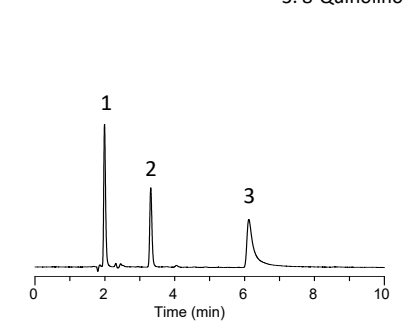
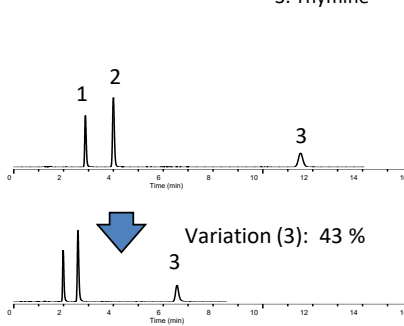
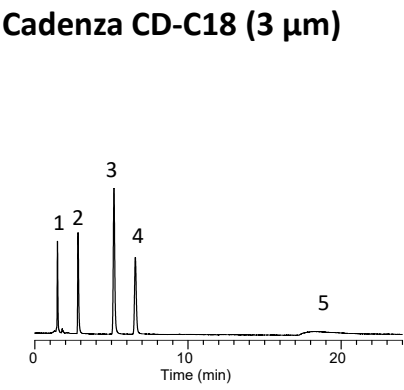
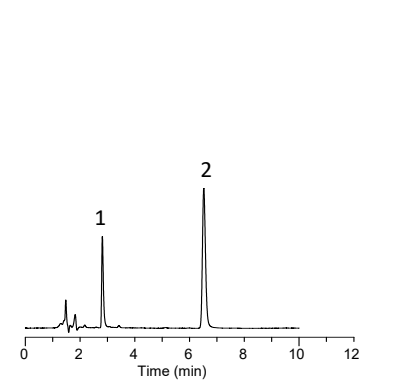
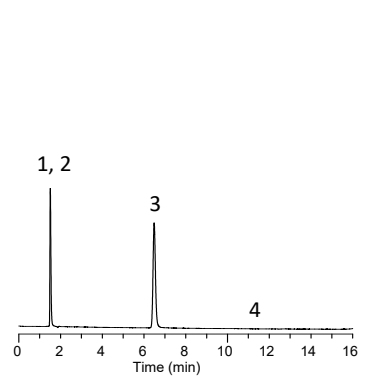
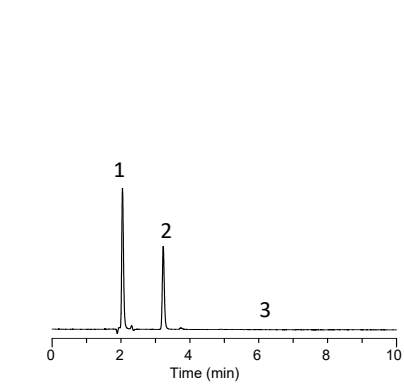
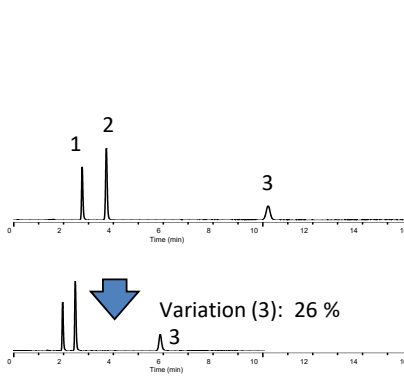
# Comparison of Performance 14/32

| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test   | (10) Dewetting Test   |
|--|---|--|---|---|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-μL fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  |
| <p><b>Luna C18(2) (5 μm)</b></p>   |                                  |    |    |    |

# Comparison of Performance 15/32

| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test  | (9) Chelating Compound Test   | (10) Dewetting Test   |
|--|---|---|---|---|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-<math>\mu</math>L-fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  |
| <p><b>L-column2 ODS (5 μm)</b></p>   |                                  |   |    |    |

# Comparison of Performance 16/32

| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test   | (10) Dewetting Test  |
|--|---|--|---|--|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-μL fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  <p>Variation (3): 43 %</p> |
| <p><b>Cadenza CD-C18 (3 μm)</b></p>   |                                   |   |   |  <p>Variation (3): 26 %</p>  |

# Comparison of Performance 17/32

(1) Naphthalene Test

(2) Selectivity Test

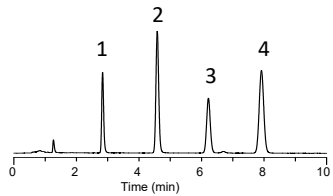
(3) SRM 869 Test

(4) Isomeric Terphenyls

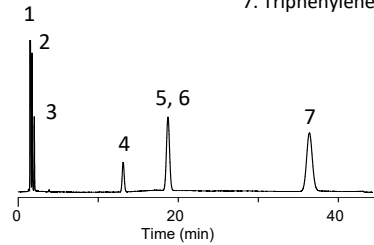
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

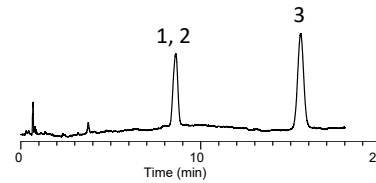
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



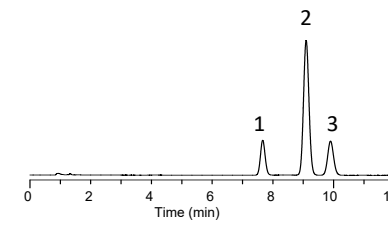
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



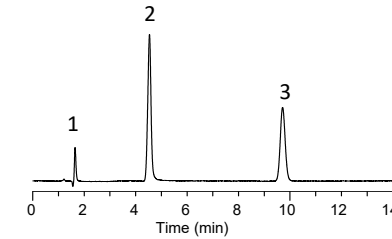
1. BaP
2. PhPh
3. TBN



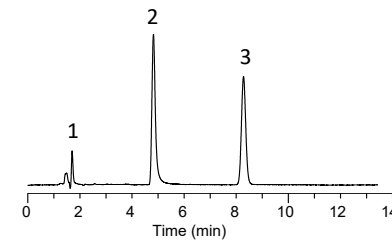
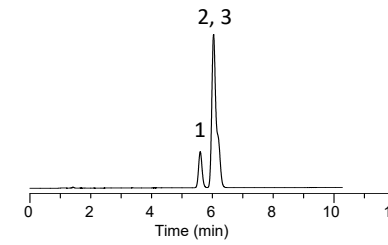
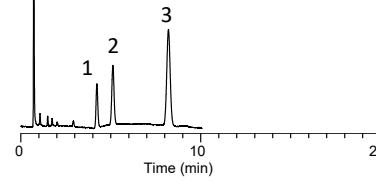
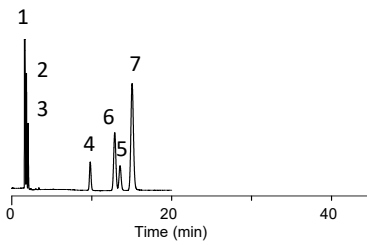
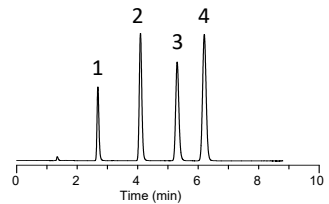
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**InertSustain C18 (5 μm)**



# Comparison of Performance 18/32

## (1) Naphthalene Test

## (2) Selectivity Test

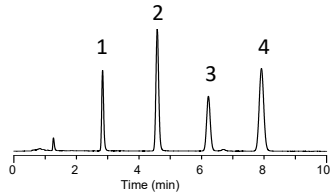
## (3) SRM 869 Test

## (4) Isomeric Terphenyls

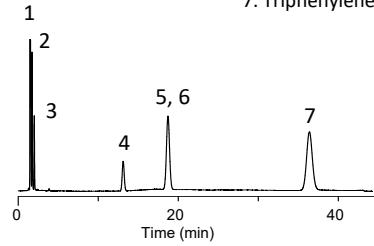
## (5) Pyridine Test

### Inertsil ODS-HL (5 μm)

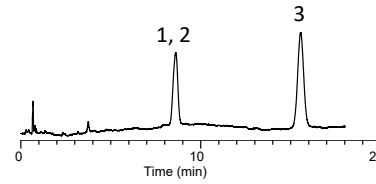
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



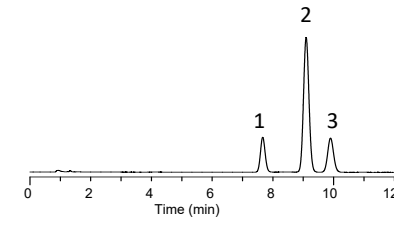
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



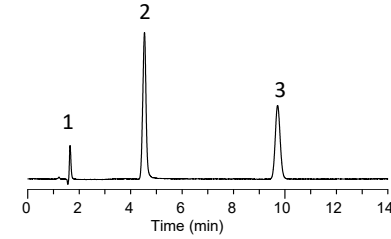
1. BaP
2. PhPh
3. TBN



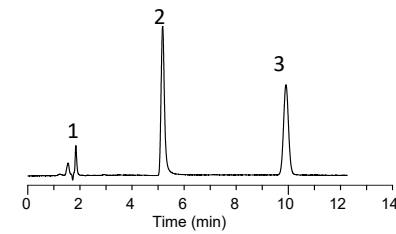
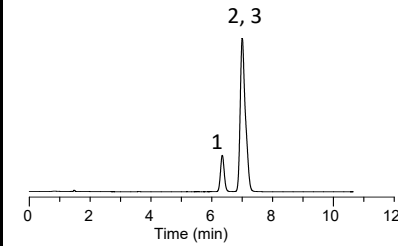
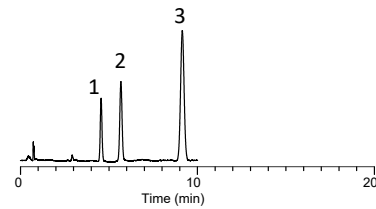
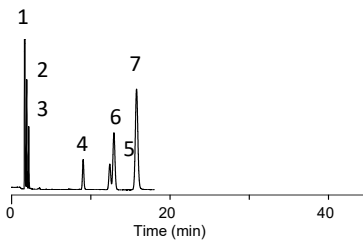
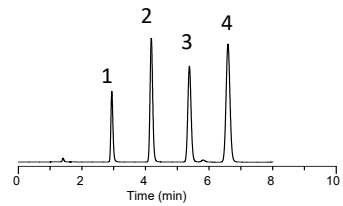
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



### InertSustain AQ-C18 (5 μm)



# Comparison of Performance 19/32

(1) Naphthalene Test

(2) Selectivity Test

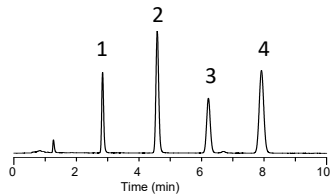
(3) SRM 869 Test

(4) Isomeric Terphenyls

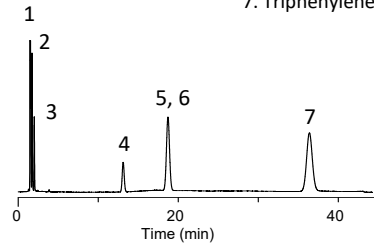
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

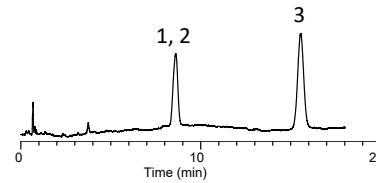
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



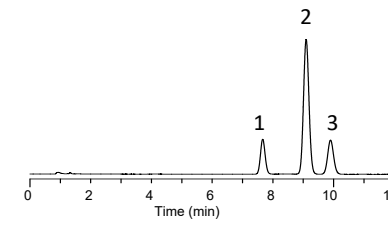
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



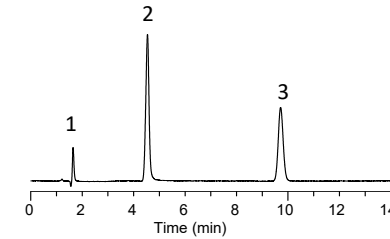
1. BaP
2. PhPh
3. TBN



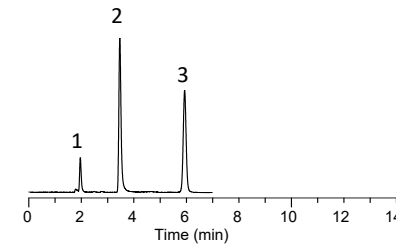
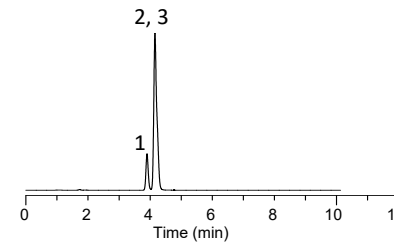
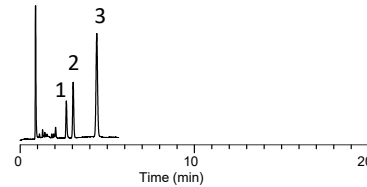
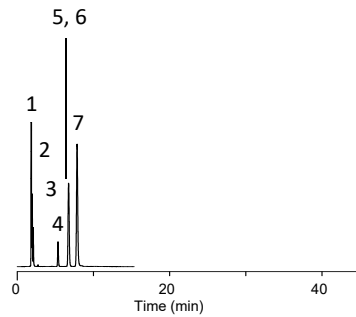
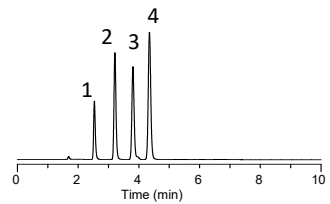
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**InertSustainSwift C18 (5 μm)**



# Comparison of Performance 20/32

(1) Naphthalene Test

(2) Selectivity Test

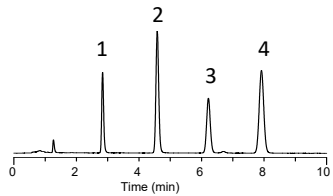
(3) SRM 869 Test

(4) Isomeric Terphenyls

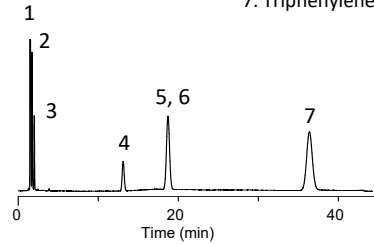
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

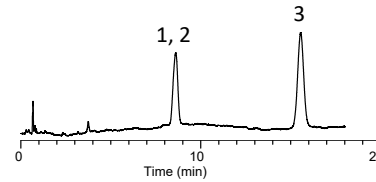
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



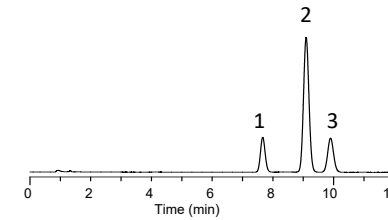
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



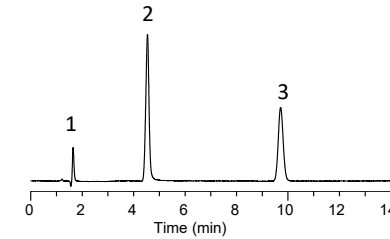
1. BaP
2. PhPh
3. TBN



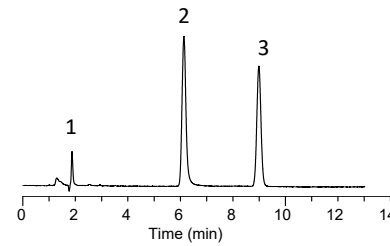
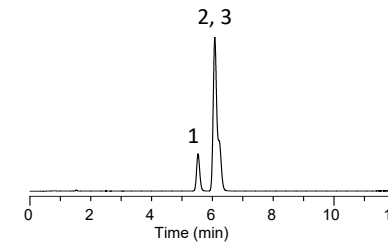
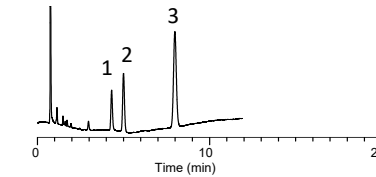
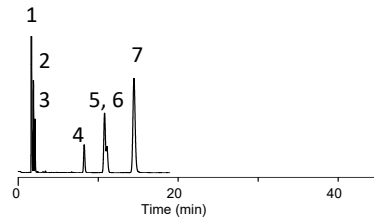
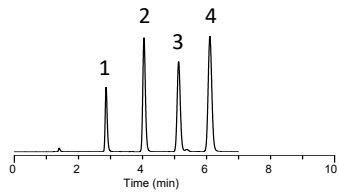
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**Inertsil ODS-4 (5 μm)**





# Comparison of Performance 21/32

(1) Naphthalene Test

(2) Selectivity Test

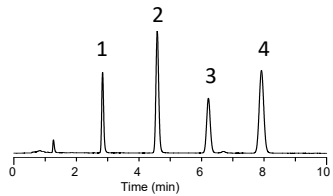
(3) SRM 869 Test

(4) Isomeric Terphenyls

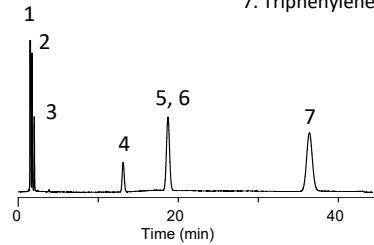
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

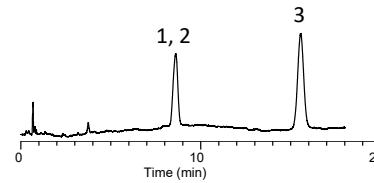
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



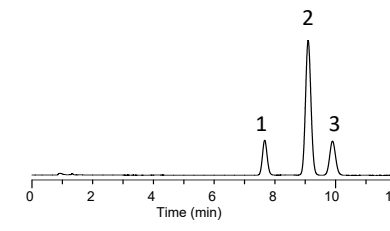
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



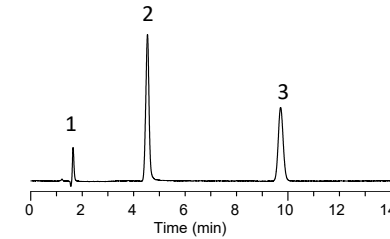
1. BaP
2. PhPh
3. TBN



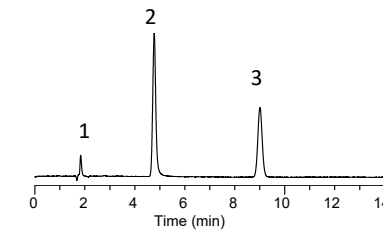
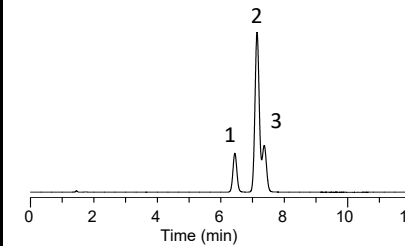
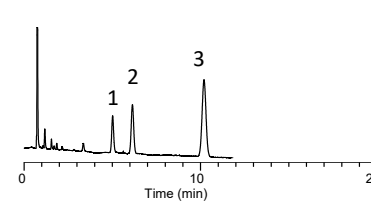
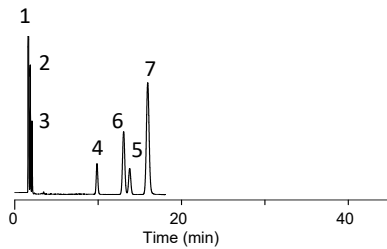
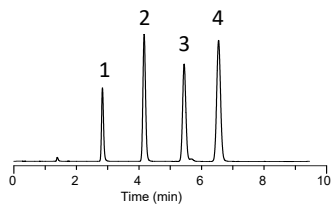
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**Inertsil ODS-3 (5 μm)**



# Comparison of Performance 22/32

(1) Naphthalene Test

(2) Selectivity Test

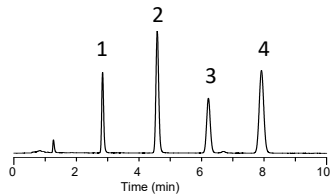
(3) SRM 869 Test

(4) Isomeric Terphenyls

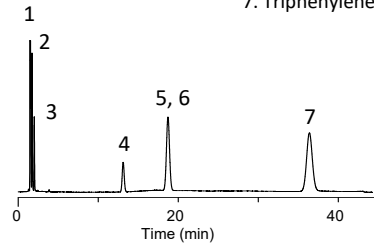
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

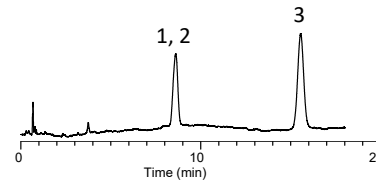
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



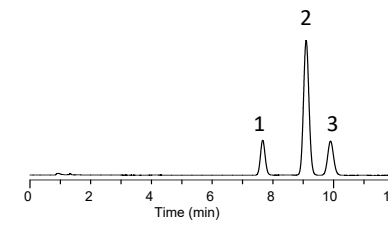
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



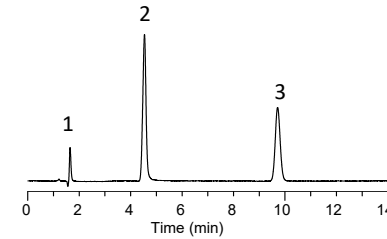
1. BaP
2. PhPh
3. TBN



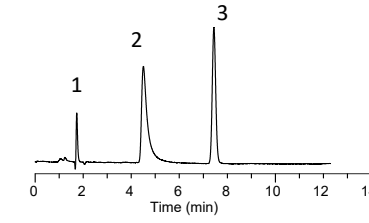
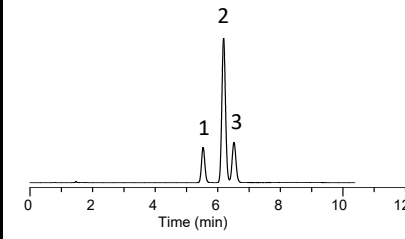
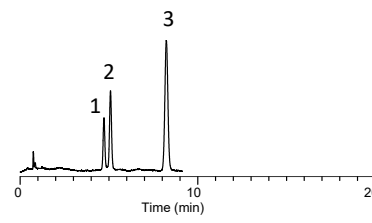
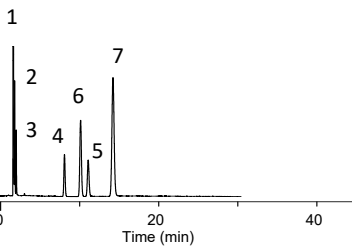
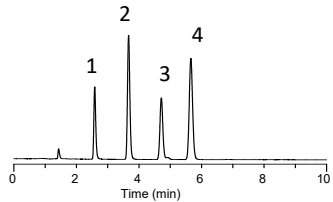
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**Inertsil ODS-2 (5 μm)**



# Comparison of Performance 23/32

(1) Naphthalene Test

(2) Selectivity Test

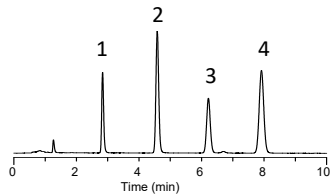
(3) SRM 869 Test

(4) Isomeric Terphenyls

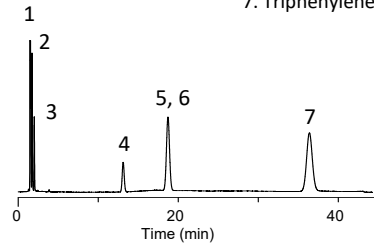
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

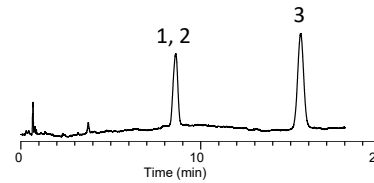
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



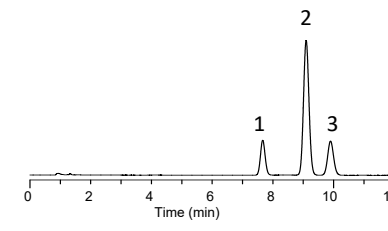
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



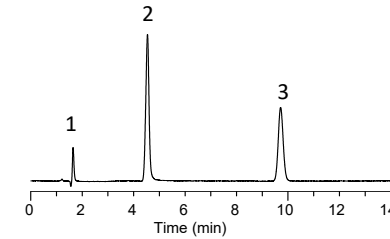
1. BaP
2. PhPh
3. TBN



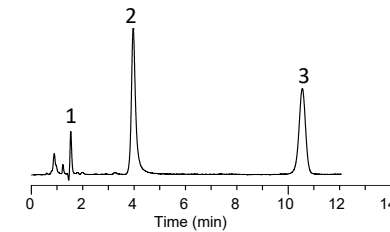
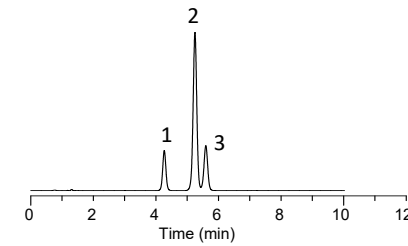
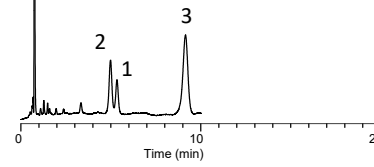
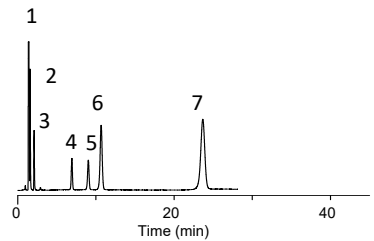
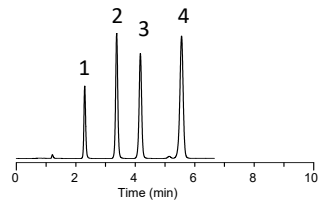
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



1. Uracil
2. Pyridine
3. Phenol



**Inertsil ODS-EP (5 μm)**



# Comparison of Performance 24/32

(1) Naphthalene Test

(2) Selectivity Test

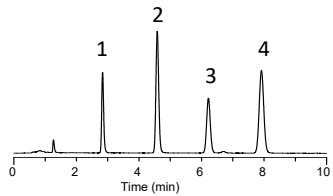
(3) SRM 869 Test

(4) Isomeric Terphenyls

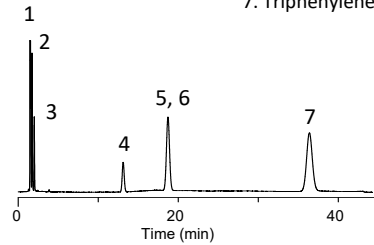
(5) Pyridine Test

**Inertsil ODS-HL (5 μm)**

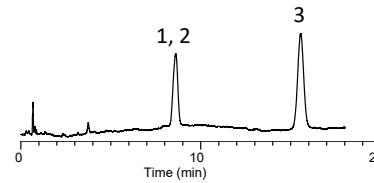
1. Acetophenone
2. Benzene
3. Toluene
4. Naphthalene



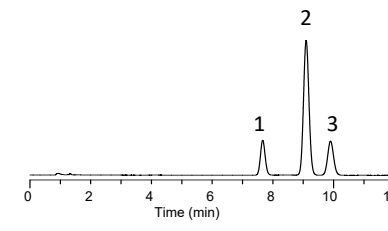
1. Uracil
2. Caffeine
3. Phenol
4. n-Butylbenzene
5. n-Amylbenze
6. o-Terphenyl
7. Triphenylene



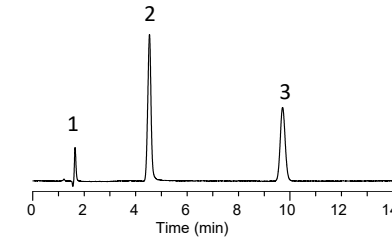
1. BaP
2. PhPh
3. TBN



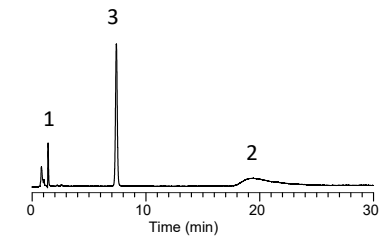
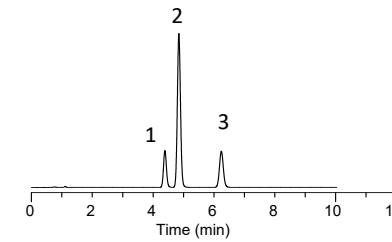
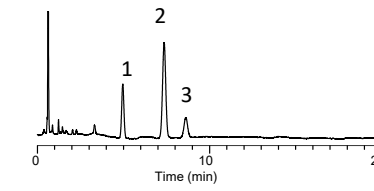
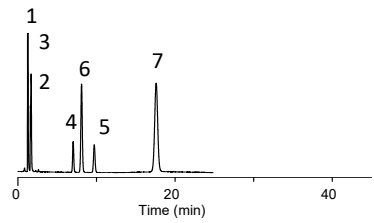
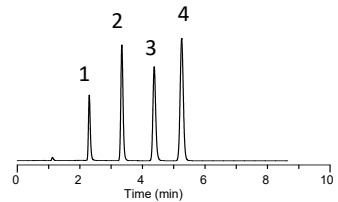
1. o-Terphenyl
2. m-Terphenyl
3. p-Terphenyl



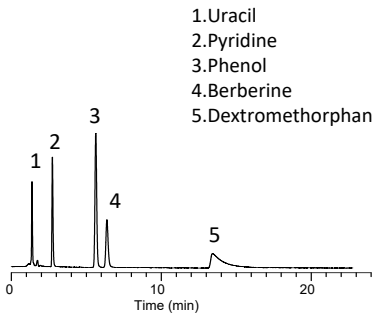
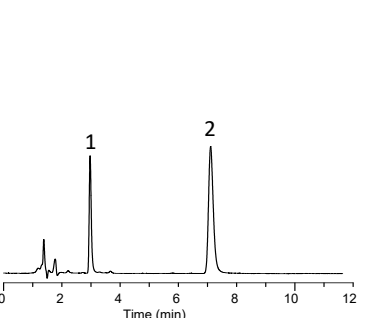
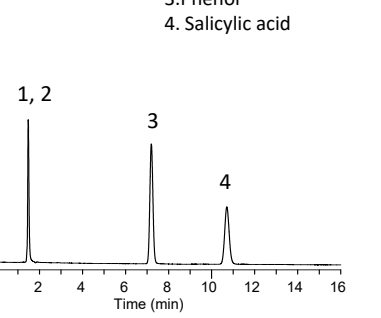
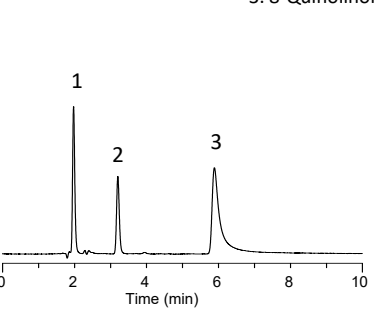
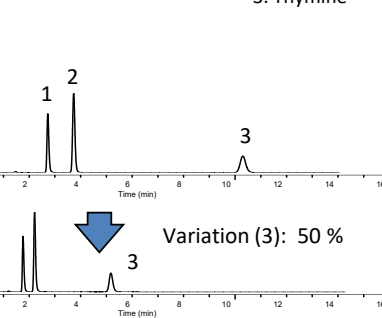
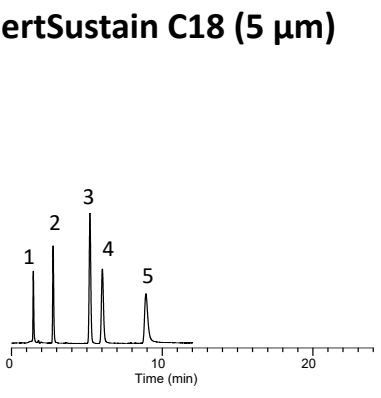
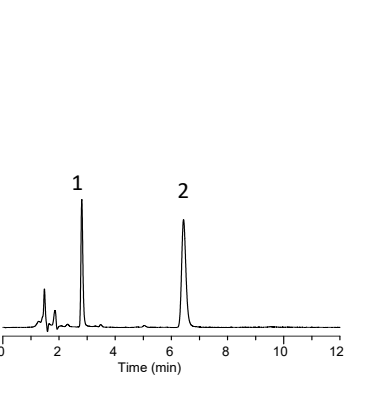
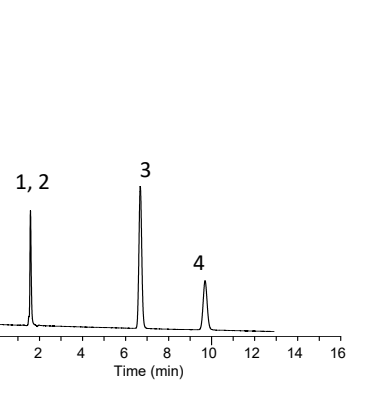
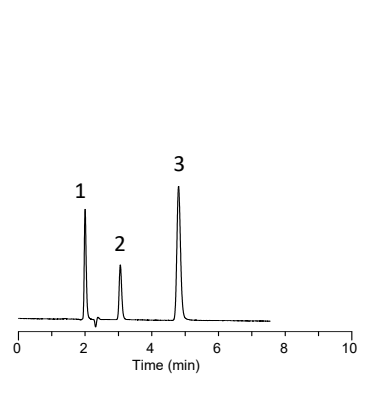
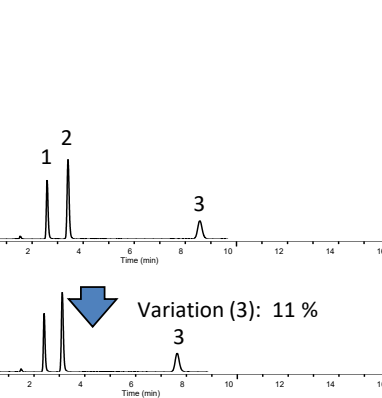
1. Uracil
2. Pyridine
3. Phenol



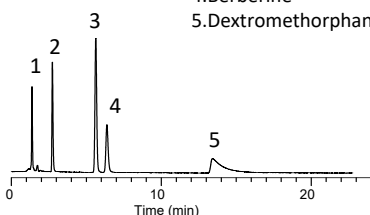
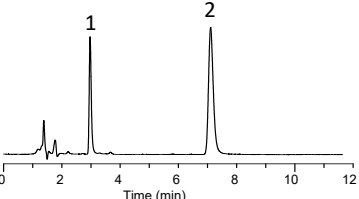
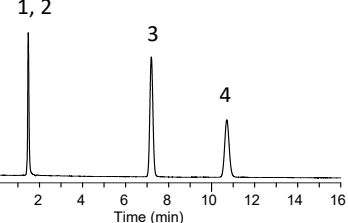
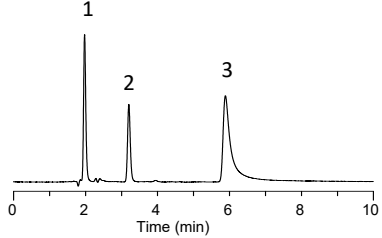
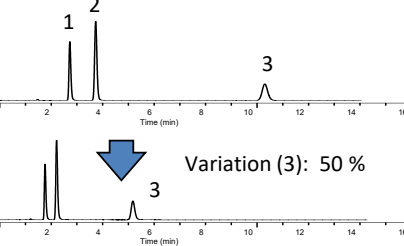
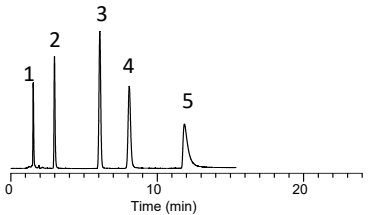
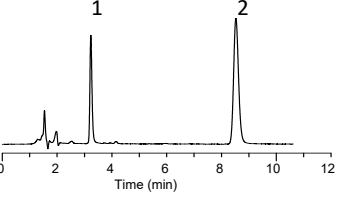
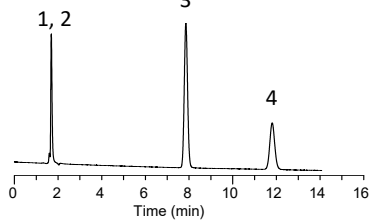
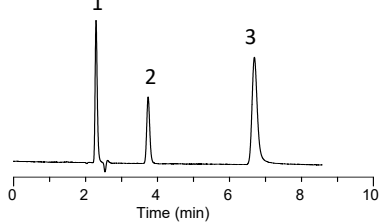
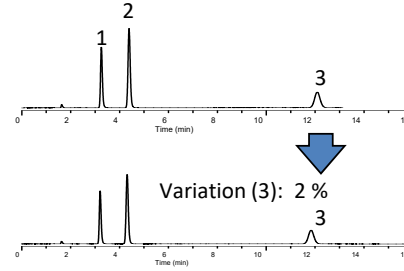
**Inertsil ODS-P (5 μm)**



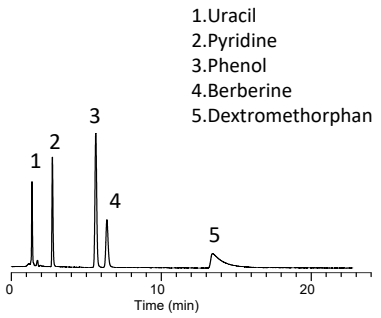
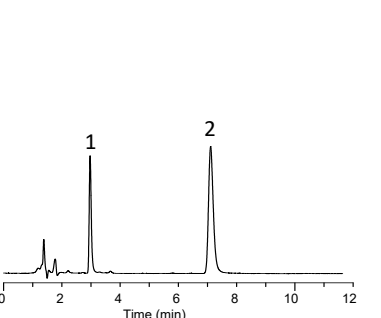
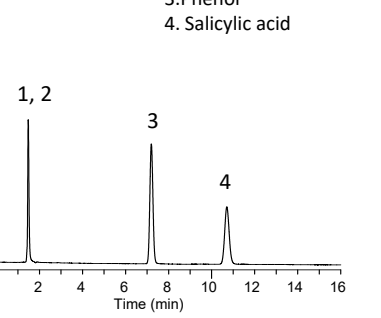
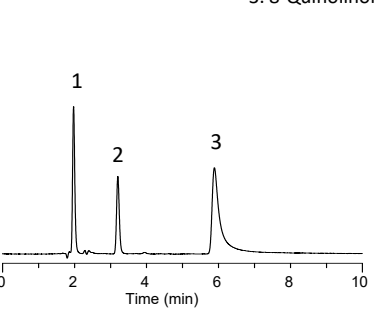
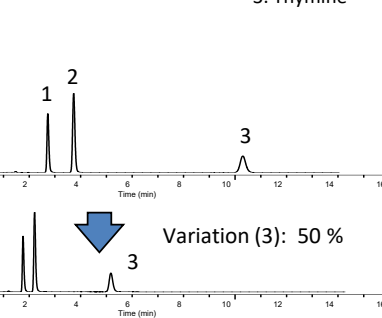
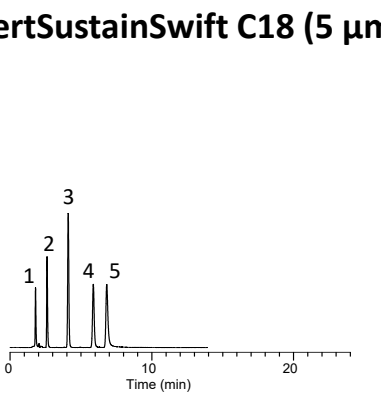
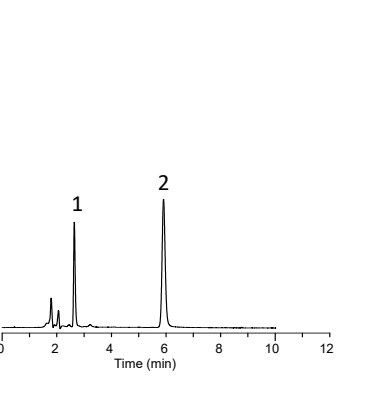
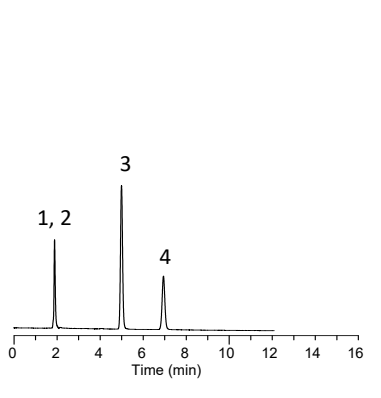
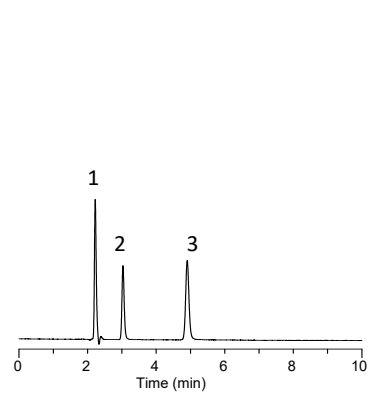
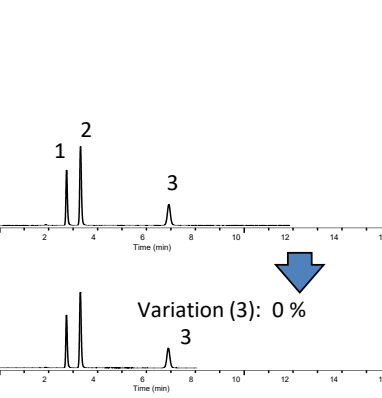
# Comparison of Performance 25/32

| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test   | (10) Dewetting Test   |
|--|---|--|---|---|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-μL fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  |
| <p><b>InertSustain C18 (5 μm)</b></p>   |                                   |   |   |   |

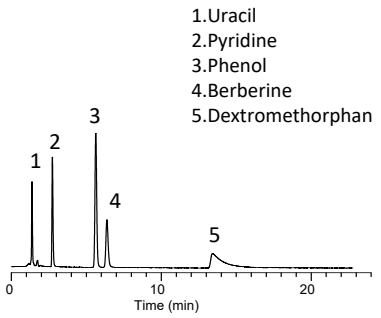
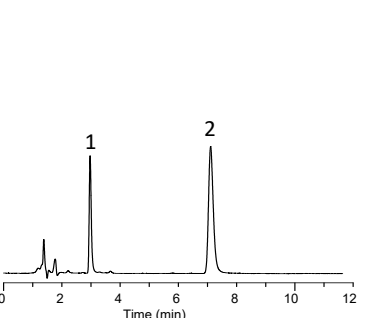
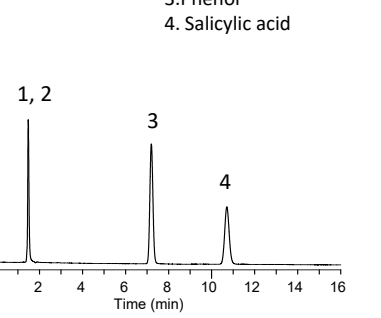
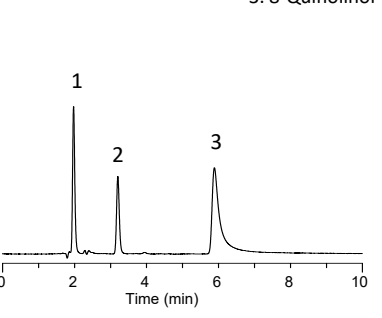
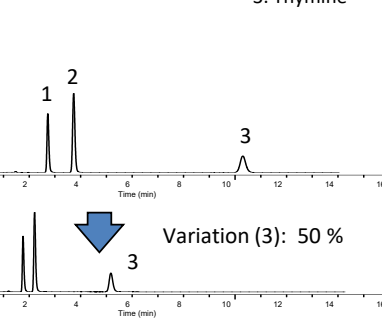
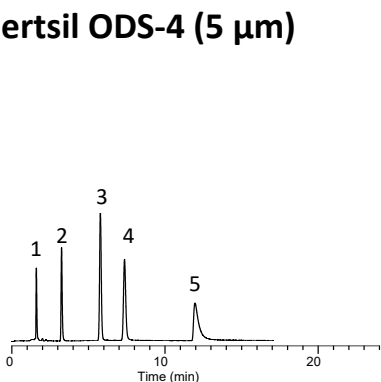
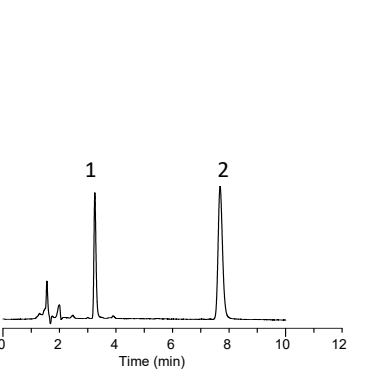
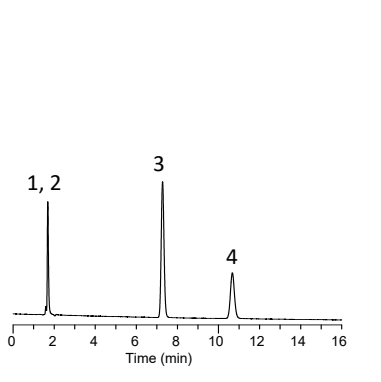
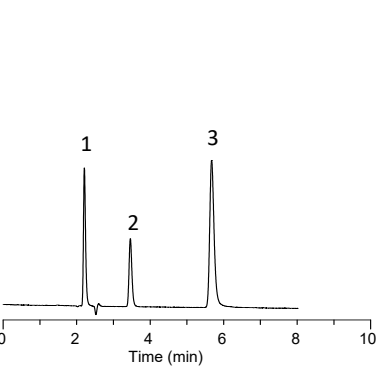
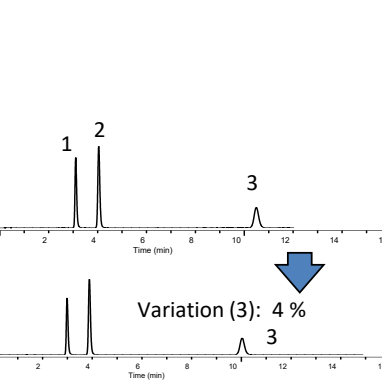
# Comparison of Performance 26/32

| (6) Strong Basic Compound Test  | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test  | (10) Dewetting Test  |
|---|---|--|--|--|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <ol style="list-style-type: none"> <li>1.Uracil</li> <li>2.Pyridine</li> <li>3.Phenol</li> <li>4.Berberine</li> <li>5.Dextromethorphan</li> </ol>  | <ol style="list-style-type: none"> <li>1.Pyridine</li> <li>2.Berberine</li> </ol>  | <ol style="list-style-type: none"> <li>1.Uracil</li> <li>2. 5-μL fosalicylic acid</li> <li>3.Phenol</li> <li>4. Salicylic acid</li> </ol>  | <ol style="list-style-type: none"> <li>1. Uracil</li> <li>2. Thymine</li> <li>3. 8-Quinolinol</li> </ol>  | <ol style="list-style-type: none"> <li>1. Cytosine</li> <li>2. Uracil</li> <li>3. Thymine</li> </ol>  |
| <p><b>InertSustain AQ-C18 (5 μm)</b></p>    |    |    |   |   |

# Comparison of Performance 27/32

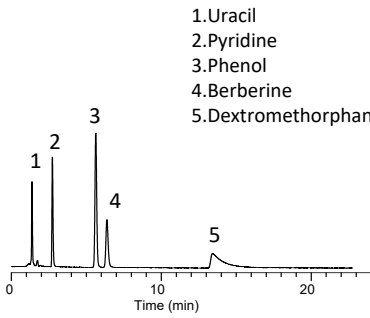
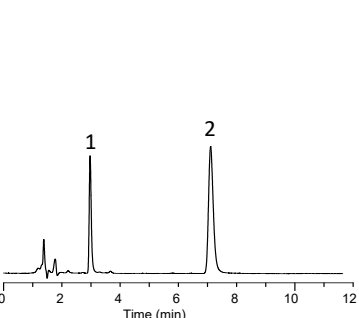
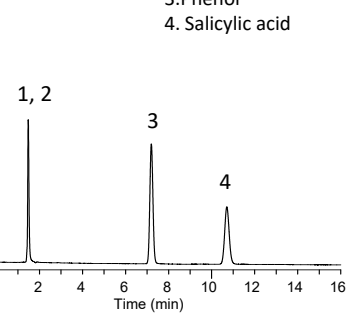
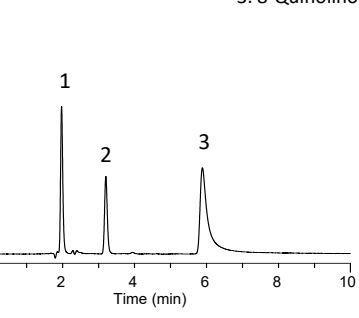
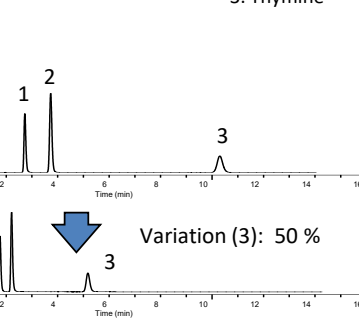
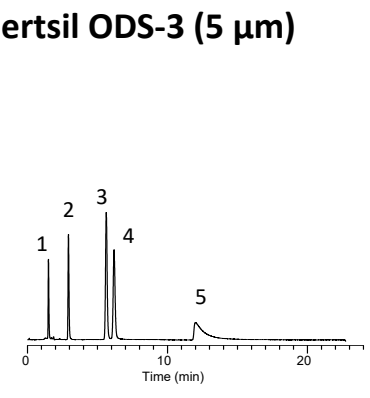
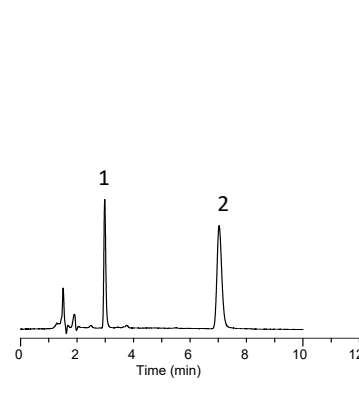
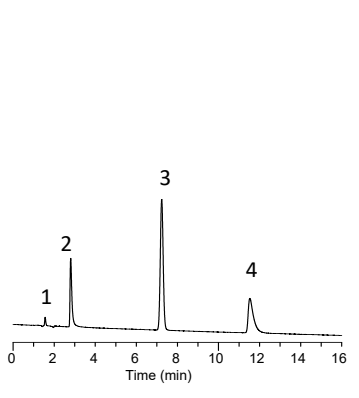
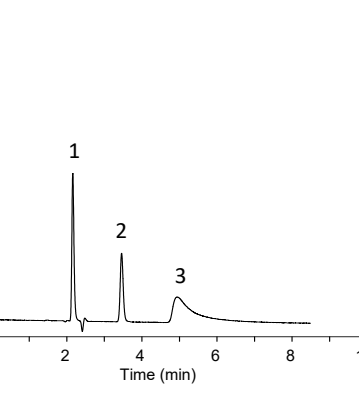
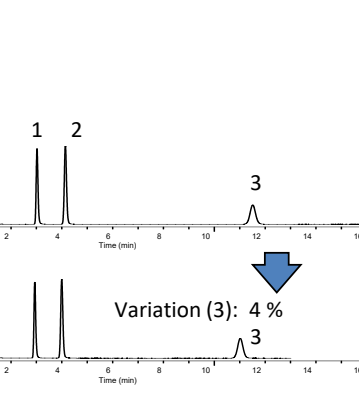
| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test   | (10) Dewetting Test   |
|--|---|--|---|---|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-μL fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  |
| <p><b>InertSustainSwift C18 (5 μm)</b></p>    |                                   |   |   |   |

# Comparison of Performance 28/32

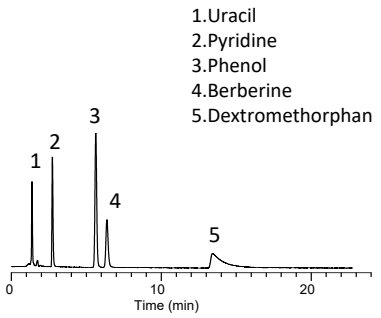
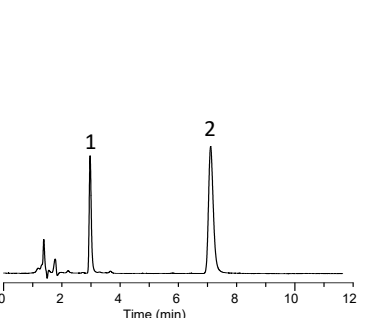
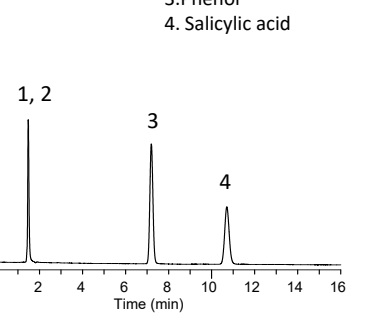
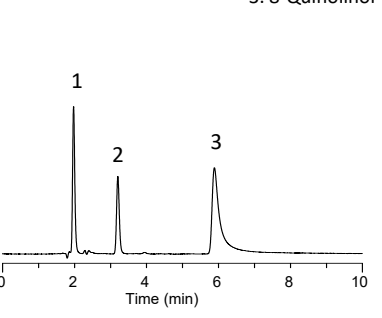
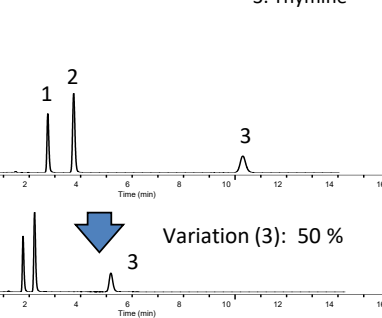
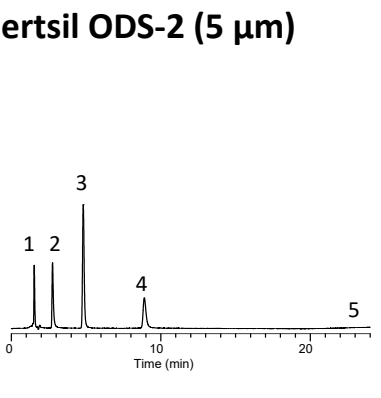
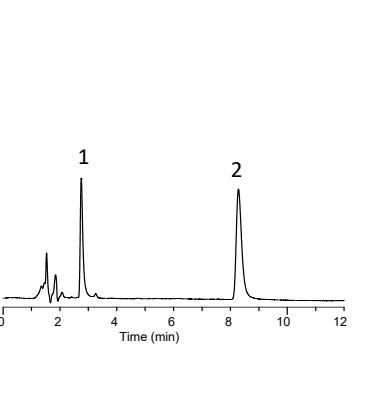
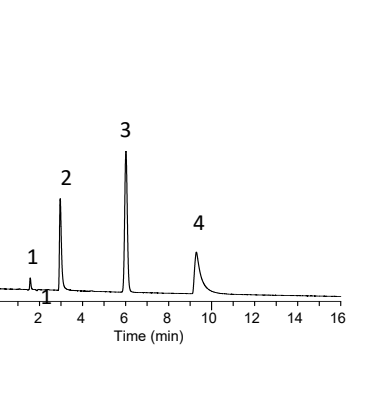
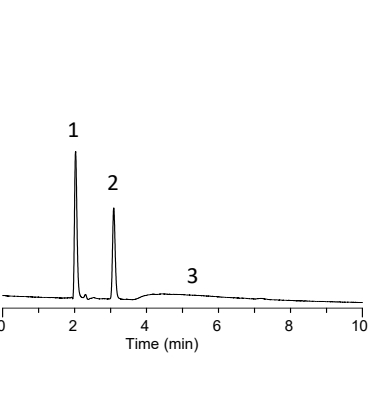
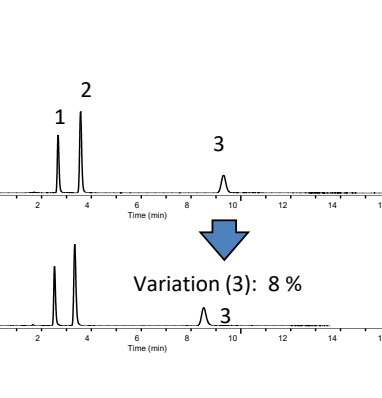
| (6) Strong Basic Compound Test  | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test  | (10) Dewetting Test  |
|---|---|--|--|--|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <ol style="list-style-type: none"> <li>1.Uracil</li> <li>2.Pyridine</li> <li>3.Phenol</li> <li>4.Berberine</li> <li>5.Dextromethorphan</li> </ol>  | <ol style="list-style-type: none"> <li>1.Pyridine</li> <li>2.Berberine</li> </ol>  | <ol style="list-style-type: none"> <li>1.Uracil</li> <li>2. 5-μL fosalicylic acid</li> <li>3.Phenol</li> <li>4. Salicylic acid</li> </ol>  | <ol style="list-style-type: none"> <li>1. Uracil</li> <li>2. Thymine</li> <li>3. 8-Quinolinol</li> </ol>  | <ol style="list-style-type: none"> <li>1. Cytosine</li> <li>2. Uracil</li> <li>3. Thymine</li> </ol>  |
| <p><b>Inertsil ODS-4 (5 μm)</b></p>    |   |   |    |    |



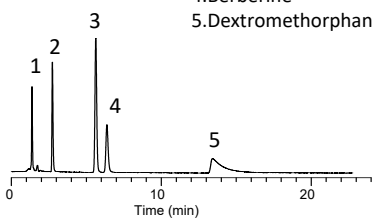
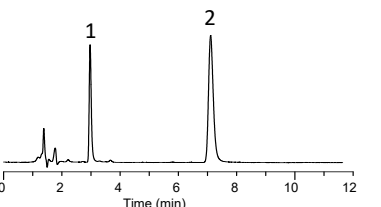
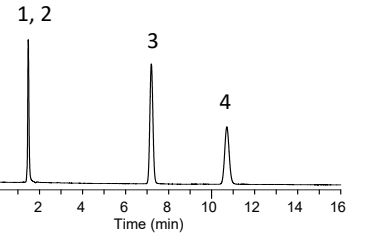
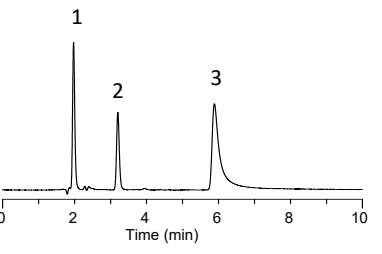
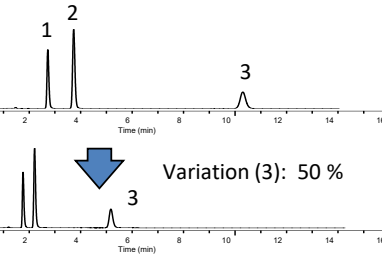
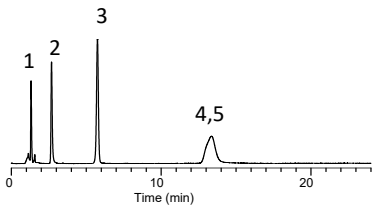
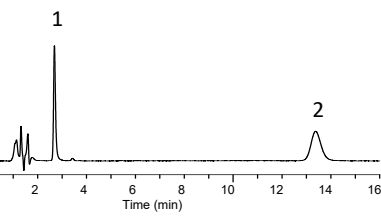
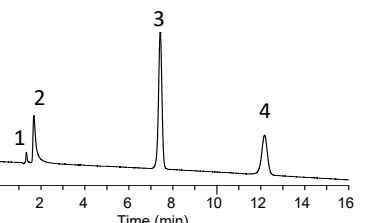
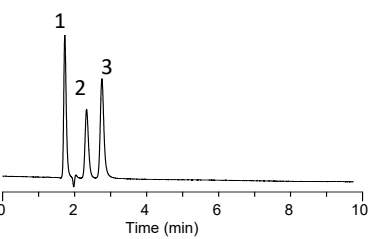
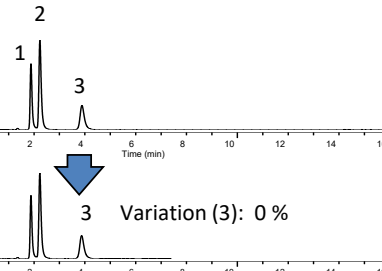
# Comparison of Performance 29/32

| (6) Strong Basic Compound Test  | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test  | (10) Dewetting Test  |
|---|---|--|--|--|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <ol style="list-style-type: none"> <li>1.Uracil</li> <li>2.Pyridine</li> <li>3.Phenol</li> <li>4.Berberine</li> <li>5.Dextromethorphan</li> </ol>  | <ol style="list-style-type: none"> <li>1.Pyridine</li> <li>2.Berberine</li> </ol>  | <ol style="list-style-type: none"> <li>1.Uracil</li> <li>2. 5-μL fosalicylic acid</li> <li>3.Phenol</li> <li>4. Salicylic acid</li> </ol>  | <ol style="list-style-type: none"> <li>1. Uracil</li> <li>2. Thymine</li> <li>3. 8-Quinolinol</li> </ol>  | <ol style="list-style-type: none"> <li>1. Cytosine</li> <li>2. Uracil</li> <li>3. Thymine</li> </ol>  |
| <p><b>Inertsil ODS-3 (5 μm)</b></p>    |   |   |    |    |

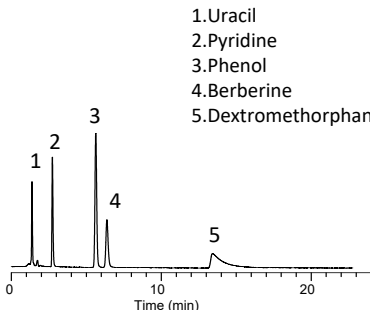
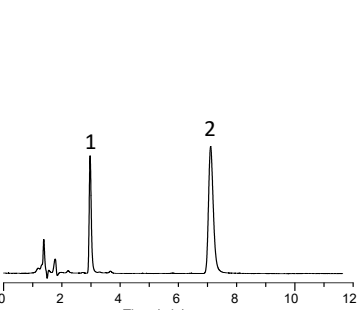
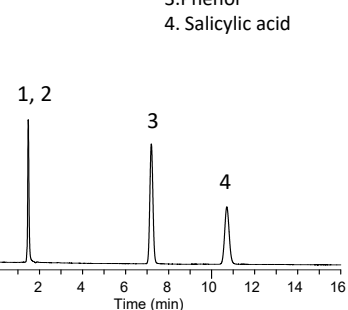
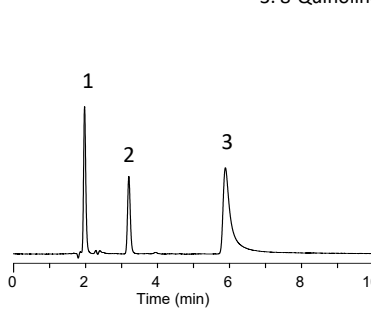
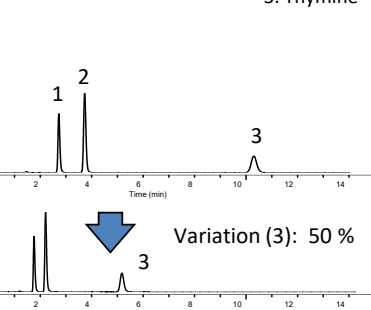
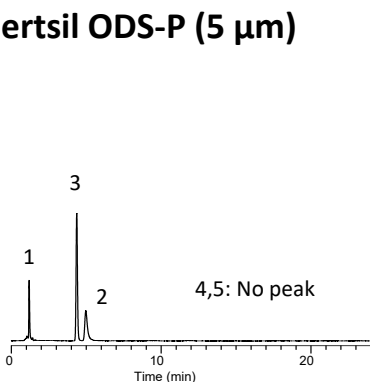
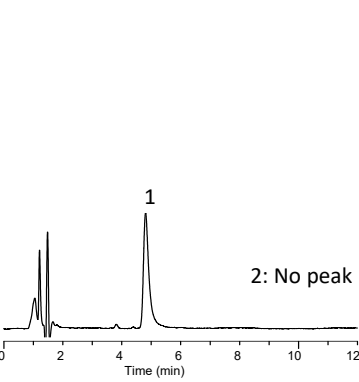
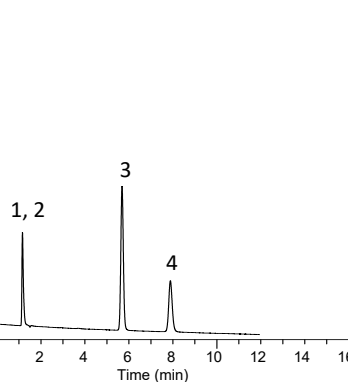
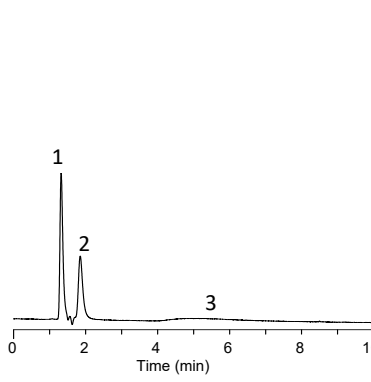
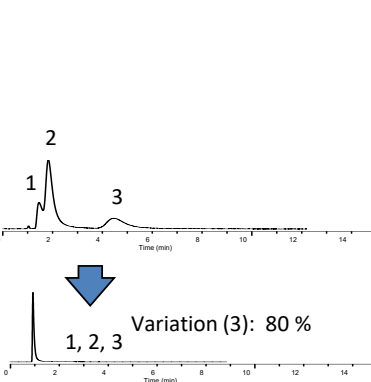
# Comparison of Performance 30/32

| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test   | (10) Dewetting Test   |
|--|---|--|---|---|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-μL fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  |
| <p><b>Inertsil ODS-2 (5 μm)</b></p>   |                                   |   |   |   |

# Comparison of Performance 31/32

| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test   | (10) Dewetting Test   |
|--|---|--|---|---|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-μL fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  |
| <p><b>Inertsil ODS-EP (5 μm)</b></p>   |                                  |    |    |    |

# Comparison of Performance 32/32

| (6) Strong Basic Compound Test   | (7) Strong Basic Compound Test  | (8) Acidic Compound Test   | (9) Chelating Compound Test   | (10) Dewetting Test   |
|--|---|--|---|---|
| <p><b>Inertsil ODS-HL (5 μm)</b></p> <p>1.Uracil<br/>2.Pyridine<br/>3.Phenol<br/>4.Berberine<br/>5.Dextromethorphan</p>  | <p>1.Pyridine<br/>2.Berberine</p>  | <p>1.Uracil<br/>2. 5-μL fosalicylic acid<br/>3.Phenol<br/>4. Salicylic acid</p>  | <p>1. Uracil<br/>2. Thymine<br/>3. 8-Quinolinol</p>  | <p>1. Cytosine<br/>2. Uracil<br/>3. Thymine</p>  |
| <p><b>Inertsil ODS-P (5 μm)</b></p>   | <p>2: No peak</p>                 |   |   |   |