GL Sciences’ Newest and Most Advanced ODS Phase—New For 2009

Inertsil® ODS-4

State-of-the-art C18 HPLC Columns

Improved Peak Shapes and Heights
Enhancing Sensitivity
High Resolution
Fast Equilibration
Compatible with 100% Aqueous Eluents
Ultimate deactivation techniques enabling the highest inertness with the silica base HPLC column allow analyses of trace amount of most demanding basic and acidic compounds.

Enhanced deactivation has made the column feature much easier to use!

**Inertsil® ODS-4**

**Enhancing Sensitivity and High Separation Efficiency**

Strictly classified particle size with narrow distribution width and ideally designed carbon loading and its procedure allow us to guarantee the high plate count of +100,000/m. Combined with synergistic effect from the improved peak shapes based on the highest inertness of packing material, Inertsil ODS-4 can be used as a tool for enhancing sensitivity and high separation efficiency.

**Excellent peak shapes for both strong acidic and basic compounds**

Our newly-developed endcapping technique ideally deactivates the silanol groups, suppressing the adsorption of common basic compounds as well as strong ones, which leads to sharper peaks. Moreover, the new endcapping technique prevents the adsorption of strong acidic compounds as a surface of the packing material becomes neutral.

**Excellent analysis stability of strong metal chelating compounds**

In order to stably analyze strong metal chelating compounds, samples were injected repeatedly before the analysis to mask the adsorption active sites on the surface of the packing material or addition of EDTA to the eluent were required. Column equilibration was also time-consuming. Since the trace amount of metals has been eliminated from the surface of the packing material, it allows a stable analysis from the 1st injection requiring no masking process.

**Excellent analysis stability under 100% aqueous eluents**

Inertsil ODS-4 minimizes the dewetting phenomenon while maintaining the same retention characteristics to that of common ODS columns. Therefore, Inertsil ODS-4 can be used at ease under 100% aqueous eluents. Furthermore, the packing material that achieves a stable analysis using 100% aqueous eluents provides another advantage: which reduces the column equilibration time returning to an initial eluent condition in gradient.

**Bonded Phase Structure**

- **Silica gel**: Highly-pure spherical silica gel
- **Purity**: 99.999%
- **Particle size**: 3 µm, 5 µm
- **Surface area**: 450 m²/g
- **Pore size**: 100 Å (10 nm)
- **Pore volume**: 1.05 mL/g
- **Bonded phase**: Octadecyl group
- **Endcapped**: Yes
- **Carbon loading**: 11%
- **USP Code**: L1
Comparison of inertness to Dextromethorphan between Inertsil® ODS-4 and commercially available ODS columns

Dextromethorphan, a strong basic compound, can be adsorbed by trace amount of residual silanols on the surface of the packing material, resulting in poor peak shapes with the traditional endcapping technique. Due to its newly-developed powerful deactivation, adsorption of compounds are much less and thus enables highly qualitative analysis of strong basic compounds.

**ODS-4**

**Inertsil® ODS-4**

- **System**: GL-7400 HPLC system
- **Column**: 5 µm, 250×4.6 mm I.D.
- **Eluent**: A) CH3CN
  B) 25 mM KH2PO4
  pH 7.0 : 25 mM KH2PO4
  A : B = 40 : 60, v:v
- **Flow Rate**: 1.0 mL/min
- **Col. Temp.**: 40 °C
- **Detection**: UV 220 nm
- **Injection Vol.**: 1.0 µL
- **Sample**: 1. Phenol (0.105 mg/mL)
  2. Dextromethorphan (0.1 mg/mL)

**Analysis of Antihistamines by LC/MS/MS**

Antihistamines are strongly basic and therefore will easily be adsorbed to the residual silanols on the packing material, resulting in deterioration of peak shapes. Generally, in HPLC analysis of strong basic compounds, highly-concentrated buffer or ion-pair reagents are introduced to the eluent to prevent adsorption of strong basic samples on the packing material. However, in LC/MS (/MS), such eluent conditions are not recommended and a packing material with superb inertness is required.

Inertsil ODS-4 prevents the adsorption of strong basic compounds without using the above mentioned eluents. This feature also makes Inertsil ODS-4 an ideal column for LC/MS (/MS) as well.

Sample:
1. Chlorpheniramine (0.1 mg/L)
2. Clemastine (0.1 mg/L)
3. Clematine (0.1 mg/L)
4. Diphenhydramine (0.1 mg/L)
5. Diphenhydramine (0.1 mg/L)
6. Diphenhydramine (0.1 mg/L)
7. Diphenhydramine (0.1 mg/L)
8. Diphenhydramine (0.1 mg/L)
9. Triprolidine (0.1 mg/L)

**System**: LC800 HPLC system

Sample: 4000 Q TRAP®

Column: Inertsil ODS-4 (3 µm, 150 × 21 mm I.D.)

Eluent: A) CH3OH
  B) 2 mM CH3COONa
  A : B = 40 : 60 - 10 min: 95-5 - 5 min: 95/5

Flow Rate: 0.2 mL/min

Col. Temp: 40 °C

Injection Vol.: 10 µL
Comparison of inertness to Brilliant Blue FCF between Inertsil® ODS-4 and commercially available ODS columns

Inertsil® ODS-4

Haloacetic acid is a harmful substance generated when tap water is chlorinated. With its strong acidity, it is easily adsorbed at basic sites on the surface of the packing material. High-sensitivity analysis by LC/MS/MS (ESI, Negative, MRM) have received attention in these years. In accordance with the popularity, a column free of adsorption has been greatly required since the adsorption of even a very small amount can adversely affect the precision of such highly sensitive quantitative analyses.

Analysis of Haloacetic Acids by LC/MS/MS


System: LC-900 HPLC system Column: Inertil ODS-4 (3 mm. 150 × 2 mm I.D.) Eluent: A) CH3CN B) 0.1% HCOOH A/B = 5/95 - 25 min 95/25 min - 95/5 5 min 95/5 Flow Rate: 0.2 mL/min Cal. Temp: 40 °C Detection: LC-MS-MS (ESI, Negative, MRM) Injection Vol.: 10 μL
Analysis of Haloacetic Acids by LC/MS/MS

Inertsil® ODS-4

Comparison of inertness to Hinokitiol between Inertsil® ODS-4 and commercially available ODS columns

Hinokitiol having very strong chelating characteristics, is easily adsorbed with trace metal remaining on a packing material surface. SunFire C18 in the figure below tend to show a better peak shape every time a new injection is provided, since each new injection covers up more of the adsorption active sites. Inertsil ODS-4 provides very quantitative peaks from the 1st injection since it has completely removed metals from the surface of the packing material.

Inertsil ODS-4

System : GL-7400 HPLC system
Column : 5 μm, 250 × 4.6 mm I.D.
Eluent : A: CH3CN
B: 0.1% H3PO4
A:B = 40:60, v/v
Flow Rate : 1.0 mL/min
Col Temp : 40°C
Detection : UV 254 nm
Injection Vol : 1.0 μL
Sample : β-Thujaplicin (Hinokitiol): 0.1 mg/mL

Symmetry® C18
SunFire™ C18
Atlantis® T3

Analysis of Tetracyclines by LC/MS/MS

Tetracyclines are antibiotics broadly used as pharmaceuticals for animals, and the residues in livestock and sea product are a major issue today. High-sensitivity analysis by LC/MS (MS) has received attention in these years. As tetracyclines have a very strong chelating characteristics, it has been anticipated that the adsorption on the column deteriorates quantitative precision. Inertsil ODS-4 is an ideal column for LC/MS (MS) analyses of chelating compounds as well since it has completely removed metals from the surface of the packing material.

System : LC800 HPLC system
Column : Inertsil ODS-4 (3 μm, 75 × 2.1 mm I.D.)
Eluent : A: 0.1% CH3OH
B: 0.1% H3C03OH
A:B = 20:80 - 4.5 min 25:75 - 5 min 95:5
Flow Rate : 0.2 mL/min
Col Temp : 40°C
Detection : LC/MS/MS (ESI, Positive, MRM)
Injection Vol : 10 μL
Sample : 1. Tetracycline (TC) (100 μg/L)
2. Oxytetracycline (OTC) (100 μg/L)
3. Chlorotetracycline (CTC) (100 μg/L)
4. Doxycycline (DC) (100 μg/L)
Comparison of analyses under 100% Aqueous Eluents

Under the condition of mobile phase containing very little organic solvent, mobile phase can easily come out from pores in the packing material, resulting in the dewetting phenomenon. As shown in the figures below, such water repellency makes the analysis results unstable over the retention time. Inertsil ODS-4, with an ideal chemical processing, minimizes such dewetting phenomenon, achieving very trustable elution with 100% aqueous eluents.

Testing procedure
Introduce 100% water for 20 minutes.
↓ Analysis (upper chromatograms)
Stop flow for 15 minutes.
Introduce eluent for 30 minutes.
↓ Stop flow for 15 minutes.
Introduce eluent for 15 minutes.
↓ Analysis (lower chromatograms)
System: GL-740 HPLC system
Column: 5 μm, 250×46 mm I.D.
Eluent: H2O
Flow Rate: 10 mL/min
Col. Temp.: 40 °C
Detection: UV 254 nm
Sample: 1. Cytosine
2. Uracil
3. Guanine
4. Thymine
5. Adenine

Analytical Column Ordering Information

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Preparative Column Ordering Information

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Cartridge Guard Column Ordering Information

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* The joint is Waters 1/16” type. * For other column sizes, please contact us.

* The joint is Waters 1/16” type. * For other column sizes, please contact us.

* The only joint available is Waters 1/16” type. * Please specify the packing material and the particle size in your order.

* We also have other guard column (GL-cart) as well. Please inquire for further details.
Applications

Food additives

System: GL-7400 HPLC system
Column: Inertsil ODS-4 (5 μm, 150 × 4.6 mm I.D.)
Eluent: A) CH₃CN
    B) 0.1% H₂PO₄
    A/B = 1.97 - 20 min - 75/25
Flow Rate: 1.0 mL/min
Col. Temp: 40 °C
Detection: UV 238 nm
Injection Vol: 10 μL
Sample: Food additives

1. Sodium Saccharin (50 mg/L)
2. p-Hydroxy benzoic acid (50 mg/L)
3. Sorbic acid (50 mg/L)
4. Benzoic acid (50 mg/L)
5. p-Hydroxy benzoic acid methyl ester (50 mg/L)
6. Dihydroxy Acetic Acid (50 mg/L)
7. p-Toluic acid (50 mg/L)
8. p-Hydroxy benzoic acid ethyl ester (50 mg/L)
9. p-Hydroxy benzoic acid n-propyl ester (50 mg/L)

Nucleic acid bases

System: GL-7400 HPLC system
Column: Inertsil ODS-4 (5 μm, 150 × 4.6 mm I.D.)
Eluent: 0.1M KH₂PO₄, 0.2M NaClO₃ (pH 2.0, H₂PO₄)
Flow Rate: 1.0 mL/min
Col. Temp: 40 °C
Detection: UV 254 nm
Injection Vol: 1 μL
Sample: Nucleobase

1. Cytosine (25 mg/L)
2. Uracil (25 mg/L)
3. Guanine (25 mg/L)
4. Adenine (25 mg/L)
5. Cytidine (25 mg/L)
6. Uridine (25 mg/L)
7. Thymine (25 mg/L)
8. Adenosine (50 mg/L)
9. Guanosine (50 mg/L)
10. Thymidine (50 mg/L)

Efficient ingredients in a cold medicine

System: GL-7400 HPLC system
Column: Inertsil ODS-4 (5 μm, 150 × 4.6 mm I.D.)
Eluent: A) CH₃CN
    B) 10 mM CH₃COONH₄ (pH 7.0, CH₃COOH)
    A/B = 60/40 , v/v
Flow Rate: 0.2 mL/min
Col. Temp: 40 °C
Detection: UV 220 nm
Injection Vol: 50 μL
Sample: Anti-Cold medicine

1. Maleic acid (50 mg/L)
   (Derived chlorpheniramine maleate)
2. Acetaminophen (50 mg/L)
3. Caffeine (50 mg/L)
4. Chlorpheniramine (50 mg/L)
5. Rhamnolipids (50 mg/L)
6. Bromovalerylurea (50 mg/L)
7. Apronilide (50 mg/L)
8. Isoproplantipyrine (50 mg/L)
9. Ibuprofen (50 mg/L)

Tricyclic antidepressant

System: LC800 HPLC system
Column: Inertsil ODS-4 (5 μm, 100 × 2.1 mm I.D.)
Eluent: A) CH₃CN
    B) 10 mM CH₃COONH₄ (pH 7.0, CH₃COOH)
    A/B = 60/40 , v/v
Flow Rate: 0.2 mL/min
Col. Temp: 40 °C
Detection: LC/MS/MS (ESI Positive, MRM)
Injection Vol: 1 μL
Sample: Antidepressant agent

1. Imipramine (100 mg/L)
2. Clomipramine (100 mg/L)
3. Amitriptyline (100 mg/L)
4. Mianserin (100 mg/L)
Concerning the countries that are not listed above, please contact us directly.