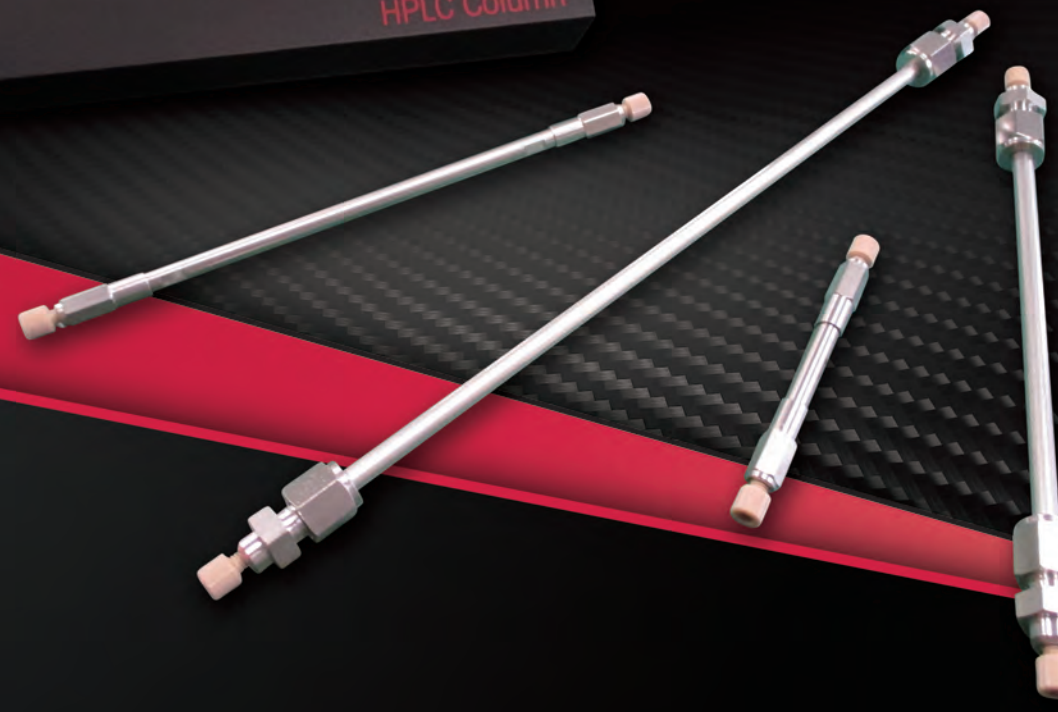
OSAKA SODA

HPLC Columns

CAPCELL PAK C18 MG/MGⅡ/MGⅢ/MGⅢ-H
CAPCELL PAK C18 AQ
CAPCELL PAK C18 ACR
CAPCELL PAK C8 DD
CAPCELL PAK ADME-HR/INERT ADME-HR
Proteonavi
CAPCELL PAK NH2 UG80
CAPCELL PAK SCX UG80
PC HILIC
CAPCELL PAK CR/CR-H



OSAKA SODA

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1 Chromatography Business of Osaka Soda

Delivering Highly Original "One-of-its-kind Columns"

Osaka Soda Co., Ltd. is a manufacturer of silica gel for HPLC, the company has focused on manufacturing technologies and quality improvement of silica gel, and collected a number of technologies and knowhow by forging ahead with research and development for more than 30 years.

In December 2017, Osaka Soda took over the chromatography business from Shiseido Co., Ltd., which added a new surface processing technology (polymer coating technology) to the manufacturing technologies and knowhow that OSAKA SODA had collected.

Since then, by focusing on consistent research and development ranging from silica gel substrates to columns, we have been striving to satisfy diverse customer needs by delivering highly unique products, where "each column is one-of-its-kind", with special attention to "performance", "quality" and "uniqueness".

Silica gel manufacturing technology
of Osaka Soda

Surface treatment technology
Polymer Coat Technology

Osaka Soda's Research and Development/Production Network

Osaka Soda Co., Ltd.
Comprehensive Research and Development Center

Amagasaki City, Hyogo Prefecture

The center performs research and development of silica gel for HPLC. In addition to basic research and new product development, the center also conducts technical studies, such as scale-up studies, in cooperation with the manufacturing plant since the center is situated next to the plant.

Sanyo Fine Co., Ltd.

Kyoto City

Manufactures HPLC equipment and columns. The company has acquired ISO 9001 international standard certification. The application laboratory also acquires various application data, and evaluates the performance of new products.

Osaka Soda Co., Ltd.
Amagasaki Plant

Amagasaki City, Hyogo Prefecture

Silica gel manufacturing plant for column packing material. Products are manufactured and controlled with the quality management system ISO 9001 based on the International Organization for Standardization (ISO). Modified silica gel is produced using GMP (Good Manufacturing Practice) compliant processes and quality control systems.

2 What is a CAPCELL PAK?

Polymer coated packing material "CAPCELL PAK"

The ODS (C18) and C8 columns, which are typical HPLC columns, often use silica gel substrate packing material.
This is because, silica gel-based packing material has a number of advantages, such as excellent pressure resistance and stability of solvents, high separation performance due to its sharp pore size distribution, and a wide range of samples to which this packing material is applied.
On the other hand, challenges include peak tailing due to the secondary interaction of silanol groups and durability under alkaline conditions.

Shiseido, which was the developer at that time, applied the powder surface processing technology cultivated for make-up foundation, etc. to silica gel-based packing material, and developed polymer coated silica gel packing material, in which the silica gel surface is coated with silicon polymer. This solved the problems with silica gel-based packing materials, such as the influence of residual silanol groups and durability under alkaline conditions, thus a high-performance silica gel-based packing material was developed.

■ Structure

Schematic diagram of the structural differences between polymer-coated C18 packing material and common C18 packing material is shown in Fig. 1.
Common C18 packing materials use a silane coupling agent to chemically bond alkyl groups directly to silanol groups on the surface of the silica gel substrate. While in polymer-coated C18 packing material, the silica gel substrate is completely coated with a uniform thin film of silicon polymer, and then bonded with an alkyl group (or bonded with an alkyl group and then completely covered with a uniform thin film of silicon polymer).

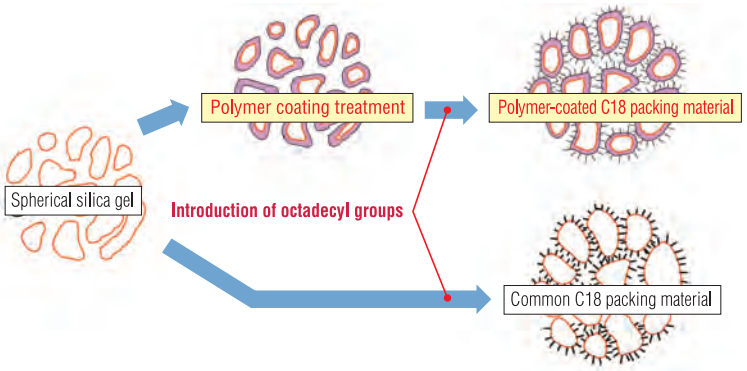


Fig. 1 Conceptual diagram of polymer-coated C18 packing material and common C18 packing material

■ Sealing of silanol groups

In C18 packing materials, although silanol groups are generally closed (caps at the ends) after introducing an octadecyl group, it is difficult to close the silanol groups completely.
As shown in Fig. 2 on the right, residual silanol groups that cannot be completely closed, may interact with basic compounds and adversely affect the peak shape.

Polymer coatings are also effective in sealing off silanol groups (refer to Fig. 3 on the right side). In the polymer coated packing materials of Osaka Soda, in addition to end caps, the influence of residual silanol groups has been reduced to the minimum.

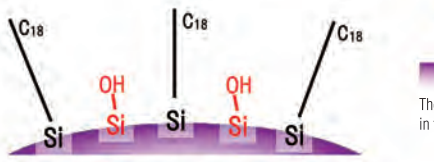
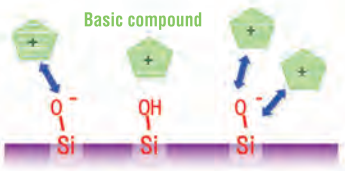
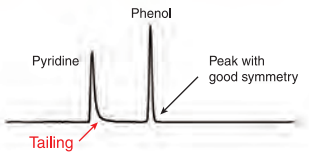


Fig. 2 Illustration of the packing material surface of a common C18 packing material



The silanol group is negatively charged and causes tailing in the peak shape of basic compounds.



Pyridine-phenol test
Pyridine is a basic compound and is a substance that is prone to tailing

Features of Polymer Coated Packing Materials

Common silica gel-based packing material

- Peak is sharp
- Excellent pressure resistance
- Usable pH range is acidic to neutral (pH = 2 to 7)
- Negative effect of silanol and metal impurities

Polymer-coated silica gel-based packing material

- Peak is sharp
- Excellent pressure resistance
- Usable pH range is acidic to alkaline (pH = 1 to 10*)
  * There are slight variations depending on the type of column.
- Impact of silanols and metal impurities are kept to a minimum
- The retention characteristics of the packing material can be controlled with the type of polymer coat and synthesis method

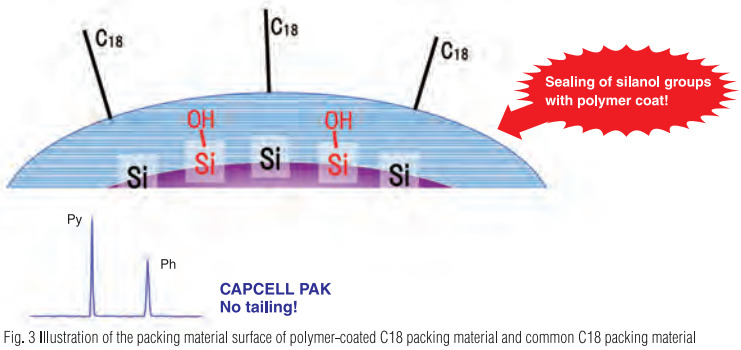


Fig. 3 Illustration of the packing material surface of polymer-coated C18 packing material and common C18 packing material

Product Introduction Column selection

1st Choice Column of Osaka Soda

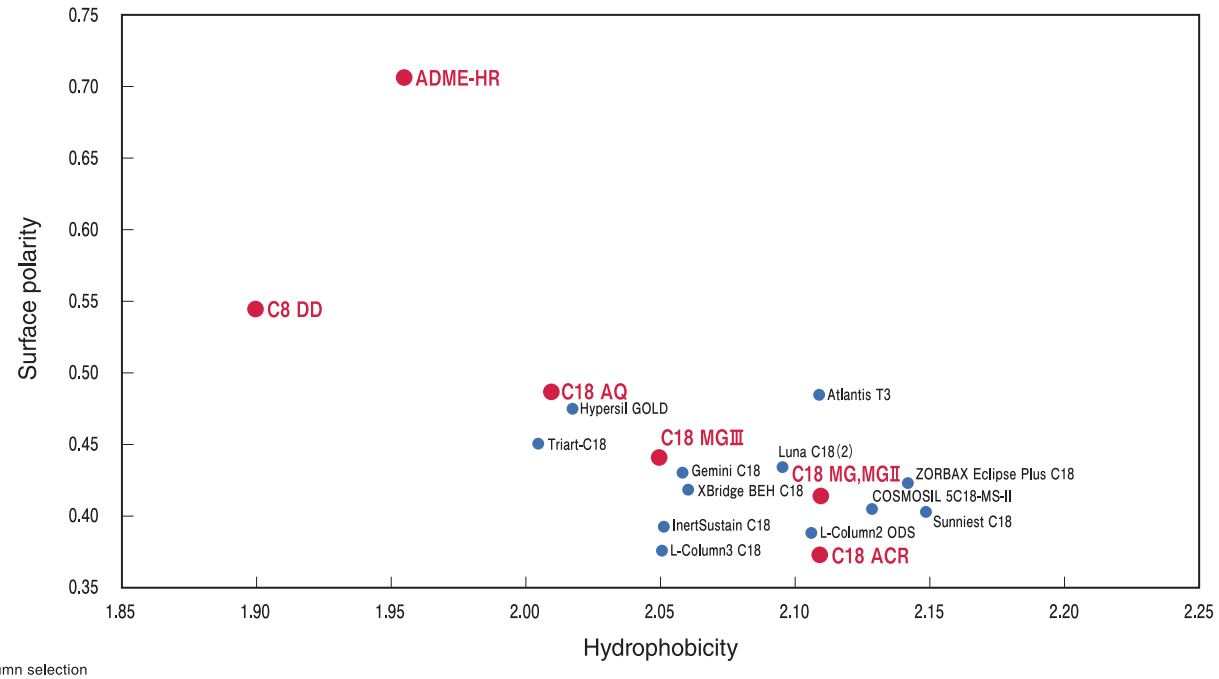
CAPCELL PAK C18 MG Ⅱ
Optimized balance of hydrophobicity and surface polarity.
Osaka Soda's 1st Choice C18 Column, which is highly versatile.

CAPCELL PAK ADME-HR
Osaka Soda's original reversed-phase column into which the Adamantyl group has been introduced. The mobile phase can be the same as the C18 column.
Osaka Soda's New 1st Choice with moderate hydrophobicity, high surface polarity and specific selectivity.

Column Features of Osaka Soda

Product grade	Features
CAPCELL PAK C18 MG	Hydrophobicity and surface polarity is well-balanced with high versatility. Suitable for general purpose analysis including chelating compound.
CAPCELL PAK C18 MG Ⅱ	1st Choice C18 Column of Osaka Soda. Suitable for analysis of basic compounds under neutral conditions.
CAPCELL PAK C18 MG Ⅲ CAPCELL PAK C18 MG Ⅲ-H	1st Choice C18 Column of LC-MS. Good reproducibility of analysis for basic compounds under low bleed and acidic conditions. MG Ⅲ-H columns, which have high pressure resistance (50 MPa), are also lined-up.
CAPCELL PAK C18 AQ	C18 column with high surface polarity, suitable for polar compounds. Can be used for stable analysis with 100% aqueous mobile phase.
CAPCELL PAK C18 ACR	C18 column with excellent acid resistance (usable pH range is 1 to 10) Has high stereoselectivity, which is a characteristic of polymeric C18 columns.
CAPCELL PAK C8 DD	C8 column with acidic and basic resistance. Has a high surface polarity equivalent to C18 AQ.
CAPCELL PAK ADME-HR	Original column of Osaka Soda into which the Adamantyl group has been introduced. Has high surface polarity and specific selectivity. Has high selectivity for polar groups.
CAPCELL PAK INERT ADME-HR	Type in which ADME-HR packing material packed in a metal-free (PEEK) column. Suitable for analysis of nucleotides, etc.
Proteonavi(C4)	300Å C4 column developed for protein and peptide analysis. High retention and durability despite being a C4 column.
CAPCELL PAK NH2 UG80	Polymer-coated NH2 column. Has high durability and can be used in HILIC and weak anion exchange mode, depending on the mobile phase condition.
CAPCELL PAK SCX UG80	Polymer-coated strong cation exchange (SCX) column. Shows retention behavior of ion-exchange action and hydrophobic interaction.
PC HILIC	A HILIC column in which a component of the cell membrane (phosphorylcholine group) is introduced.
CAPCELL PAK CR CAPCELL PAK CR-H	Mixed mode column with a mix of SCX and C18 packing materials. Suitable for high sensitivity analysis of basic compounds by LC-MS. CR-H has a high pressure resistance specification of 50 MPa.

Hydrophobicity and surface polarity parameters (reversed-phase column)



Column Specification List

Mode	Type	Product name	USP class No.	Particle Size (μm)	Pore Size (Å)	pH range	Pressure resistance *1 (MPa)	End- fitting Style	Listed page
Reversed-phase	C18	CAPCELL PAK C18 MG	L1	3 5	100	2 - 10	20	Waters-compatible type (W type)	P.6
		CAPCELL PAK C18 MG Ⅱ		3 5	100	2 - 10	20	Waters-compatible type (W type)	P.9
		CAPCELL PAK C18 MG Ⅲ		3 5	100	2 - 10	20	Waters-compatible type (W type)	P.12
		CAPCELL PAK C18 MG Ⅲ-H		3	100	2 - 10	50	Parker type (UP type)	P.12
		CAPCELL PAK C18 AQ		3 5	80	2 - 9	20	Waters-compatible type (W type)	P.15
		CAPCELL PAK C18 ACR		3 5	80	1 - 10	20	Waters-compatible type (W type)	P.18
	C8	CAPCELL PAK C8 DD	L7	3 5	80	1.5 - 10	20	Waters-compatible type (W type)	P.21
	ADME	CAPCELL PAK ADME-HR	–	2 3 5	100	2 - 9	100 20	Parker type (UP type)	P.24
		CAPCELL PAK INERT ADME-HR		3	100	2 - 9	50	Parker type (UP type)	P.24
	C4	Proteonavi	L26	5	300	2 - 10	20	Waters-compatible type (W type)	P.28
Normal phase, weak anion exchange, HILIC	NH2	CAPCELL PAK NH2 UG80	L8	5	80	2 - 8	20	Waters-compatible type (W type)	P.31
Strong cation exchange	SCX	CAPCELL PAK SCX UG80	L9	5	80	2 - 7	20	Waters-compatible type (W type)	P.34
HILIC	PC	PC HILIC	–	3 5	100	3 - 7.5	20	Waters-compatible type (W type)	P.37
Mix (reversed-phase + strong cation exchange)	CR	CAPCELL PAK CR	–	3 5	–	2 - 7	20	Waters-compatible type (W type)	P.40
		CAPCELL PAK CR-H		3	–	2 - 7	50	Parker type (UP type)	P.40

*1 Pressure resistance is a guide for analytical size (1.0 mm to 8.0 mm inner diameter) columns. For preparative sizes (inner diameter of 10 mm or more), use approximately 10 MPa as a guide.

CAPCELL PAK C18 MG Series

C18 Column with a focus on versatility and quality control

CAPCELL PAK C18 MG Series focuses on “versatility” and seeks to achieve a balance between hydrophobicity and surface polarity. Can be applied to a wide range of compounds from low to high polarity.
To better match the customer’s requirements, the company offers 3 types while maintaining versatility. You can select the one that is the best for your application. In MG Series, since all 3 types are available as validation support columns, 3 lots of packing materials are always available. Differences between the lots can also be checked when examining the analysis conditions, which makes this series quite suitable for routine analysis such as quality control.

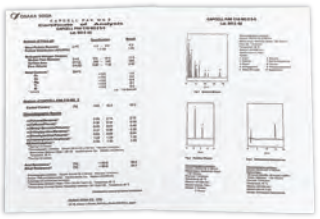
■ MG Series feature comparison

There are 3 types of MG Series: MG, MGⅡ and MGⅢ. The features of each are summarized in the table. You can select the most suitable type that matches your application.
If you are not sure which type is suitable, please feel free to contact us.

Application	MG	MGⅡ	MGⅢ/ MGⅢ-H
Analysis of general neutral compounds	◎	◎	◎
Separation of basic compounds under neutral conditions	×	◎	○
Separation of basic compounds under acidic conditions	○	○	◎
Separation of chelating compounds	◎	○	○
Bleeding in LC-MS	△	○	◎

■ Validation support column

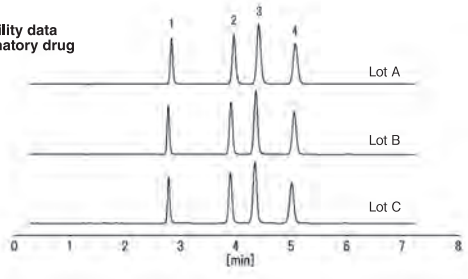
In the CAPCELL PAK C18 MG Series, production control of the packing material is done thoroughly for the validation support columns, by establishing “standard for silica gel that is used as substrate” and “standards for parameters of packing materials”. Differences between lots has been minimized with the thorough quality control. In addition, 3 lots are always available for validation. The MG series can be used for routine analysis with confidence.



Results report

CAPCELL PAK C18 MG (S5)

Example of lot reproducibility data
Non-steroidal anti-inflammatory drug

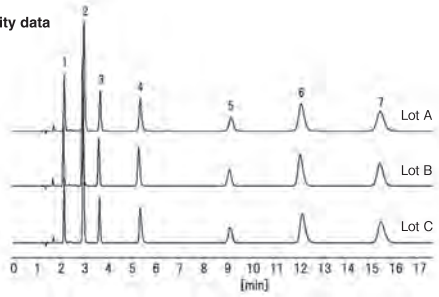


HPLC Conditions

Column : CAPCELL PAK C_{18} MG S5; 4.6 mm i.d. x 150 mm
Mobile phase : 0.1 vol% H_3PO_4 / CH_3CN = 40 / 60
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 230 nm
Inj. vol. : 5 μL
Sample : 1. Ketoprofen 2. Flurbiprofen 3. Indometacin 4. Ibuprofen

CAPCELL PAK C18 MGⅡ (S5)

Example of lot reproducibility data
Seven types of basic drugs

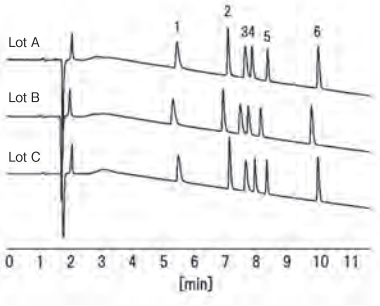


HPLC Conditions

Column : CAPCELL PAK C_{18} MGⅡ S5 ; 4.6 mm i.d. x 150 mm
Mobile phase : 20 mmol/L Phosphate buffer (K_2HPO_4 : KH_2PO_4 = 1 : 1 in molar ratio) / CH_3OH = 25 / 75
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 220 nm
Inj. vol. : 5 μL
Sample : 1. Procaine 2. Yohimbine 3. Lidocaine 4. Diphenhydramine
5. Diphenidol 6. Amitriptyline 7. Clomipramine

CAPCELL PAK C18 MGⅢ (S3)

Example of lot reproducibility data
Standard peptides



HPLC Conditions

Column : CAPCELL PAK C_{18} MGⅢ S3 ; 4.6 mm i.d.× 150 mm
Mobile phase : A) 0.1 % HCOOH / CH_3CN = 90 / 10
B) 0.1 % HCOOH / CH_3CN = 50 / 50
B 0 %(0 min) -> 50 %(15 min) -> 0 %(15.1 min) Gradient
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 210 nm
Inj. vol. : 10 μL
Sample : 1. Bradykinin 2. Angiotensin Ⅱ 3. Neurotensin
4. Angiotensin Ⅰ 5. Oxytocin 6. Leucin-Enkephalin

CAPCELL PAK C18 MG

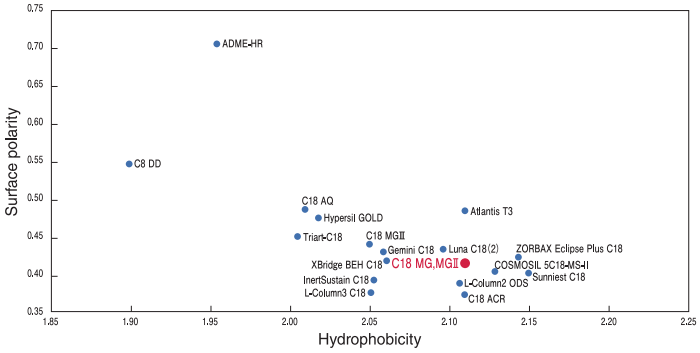
C18 column with highly versatile parameters and optimal surface treatment for chelating compounds

CAPCELL PAK C18 MG is a highly versatile C18 column with a good balance between hydrophobicity and surface polarity, the application of which is extended to the analysis of chelating compounds by using metal-free filling technology and surface processing. This C18 column is optimal for those who want to use the column as the 1st Choice column similar to MGⅡ, and those who want to apply the column in the analysis of chelating compounds.

Physical properties

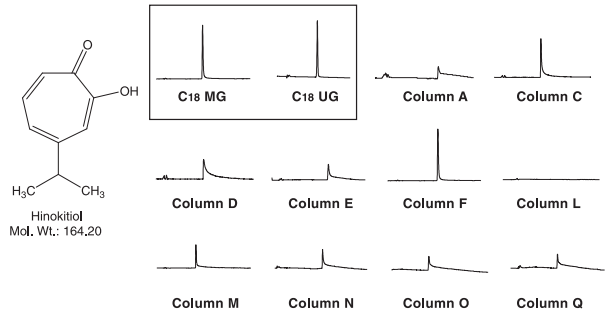
Functional group	Pore Size (Å)	Particle Size (μm)	Surface Area (m^2/g)	% of Carbon	Density (μmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
C18 (octadecyl groups)	100	3	300	16	2.6	20	2~10	L1
C18 (octadecyl groups)	100	5	300	16	2.6	20	2~10	L1

Hydrophobicity and surface polarity



Ideal for chelating compounds

The adsorption of chelating compounds has been minimized using metal-free filling technology and original surface treatment. Even compounds with strong coordination such as Hinokitiol are sharply eluted.



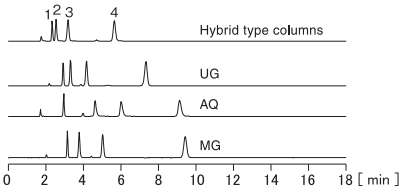
HPLC Conditions

Column : CAPCELL PAK C_{18} MG S5 ; 4.6 mm i.d.× 150 mm
Mobile phase : 20 mmol/L Phosphate buffer, 1 mmol/L EDTA (K_2HPO_4 : KH_2PO_4 = 1 : 1 in molar ratio) / CH_3CN = 60 / 40
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 320 nm
Inj. vol. : 10 μL
Sample : Hinokitiol (100 μg/mL)

Suitable for a wide range of compounds, from polar to hydrophobic

High retention and separation performance for a wide range of polar compounds

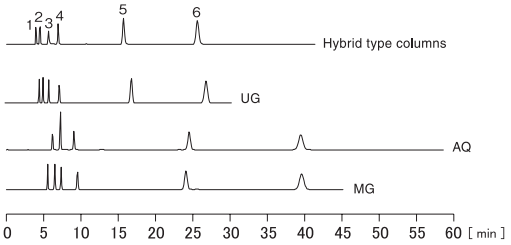
Retention of basic compounds



HPLC Conditions

Mobile phase : 25 mmol/L Na_2HPO_4 (pH 7.3) / CH_3OH = 50 / 50
Flow rate : 1.0 mL/min
Detection : UV 210 nm
Inj. vol. : 5 μL
Sample : 1. Caffeine (60 μg/mL)
2. Procainamide (130 μg/mL)
3. N-Acetylprocainamide (200 μg/mL)
4. Procaine (500 μg/mL)

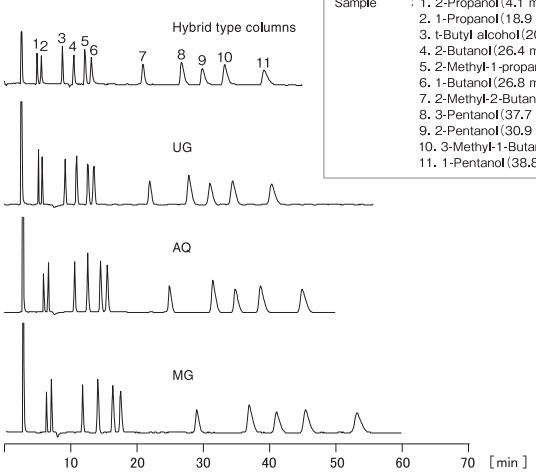
Retention of acidic compounds



HPLC Conditions

Column size : 4.6 mm i.d.× 250 mm
Mobile phase : 10 vol% CH_3OH (0.1 vol% Phosphoric acid)
Flow rate : 1.0 mL/min
Detection : UV 210 nm
Inj. vol. : 5 μL
Sample : 1. Fumaric acid (50 μg/mL)
2. Gallic acid (50 μg/mL)
3. Acrylic acid (200 μg/mL)
4. Itaconic acid (200 μg/mL)
5. p-Hydroxybenzoic acid (250 μg/mL)
6. Vanillic acid (250 μg/mL)

Retention of neutral compounds



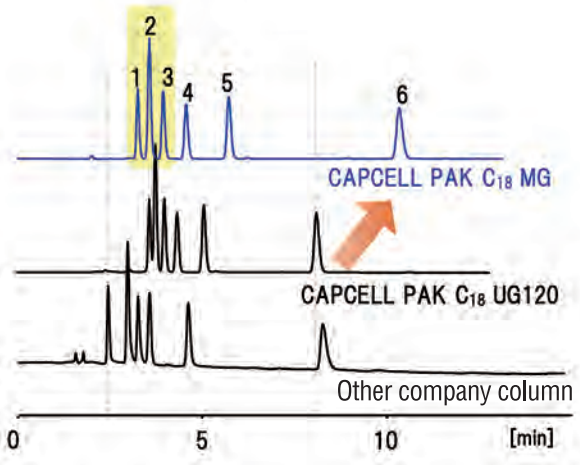
HPLC Conditions

Column size : 4.6 mm i.d.× 250 mm
Mobile phase : 15 vol% CH_3OH
Flow rate : 1.0 mL/min
Detection : RI
Inj. vol. : 5 μL
Sample : 1. 2-Propanol (4.1 mg/g)
2. 1-Propanol (18.9 mg/g)
3. t-Butyl alcohol (20.0 mg/g)
4. 2-Butanol (26.4 mg/g)
5. 2-Methyl-1-propanol (26.8 mg/g)
6. 1-Butanol (26.8 mg/g)
7. 2-Methyl-2-Butanol (23.0 mg/g)
8. 3-Pentanol (37.7 mg/g)
9. 2-Pentanol (30.9 mg/g)
10. 3-Methyl-1-Butanol (38.5 mg/g)
11. 1-Pentanol (38.8 mg/g)

CAPCELL PAK C18 MG

Comparison of organic acid retention

CAPCELL PAK C18 MG is a highly versatile column with an optimal balance of hydrophobicity and surface polarity. Has good retention capacity even for highly polar organic acids and is excellent for separation.

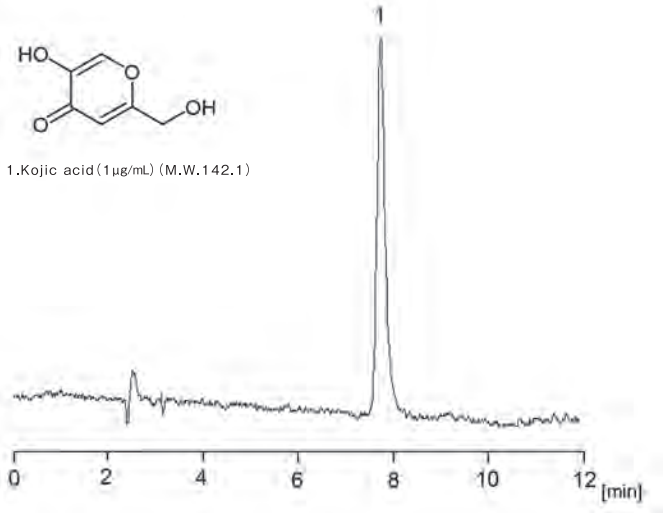


HPLC Conditions

Column : CAPCELL PAK C18 MG S5 ; 4.6 mm i.d.× 250 mm
Mobile phase : 0.1 vol% H_3PO_4, H_2O / CH_3CN = 97.5 / 2.5
Flow rate : 1.0 mL/min
Detection : UV 210 nm
Sample : 1. Malomic acid
2. Lactic acid
3. Acetic acid
4. Citric acid
5. Succinic acid
6. Propionic acid

Kojic acid

Kojic acid is a compound with weak antibacterial properties found in malted rice. Since Kojic acid shows coordination to metal ions, CAPCELL PAK C18 MG is recommended. Adequate retention and good peak shape were obtained with CAPCELL PAK C18 MG S5.



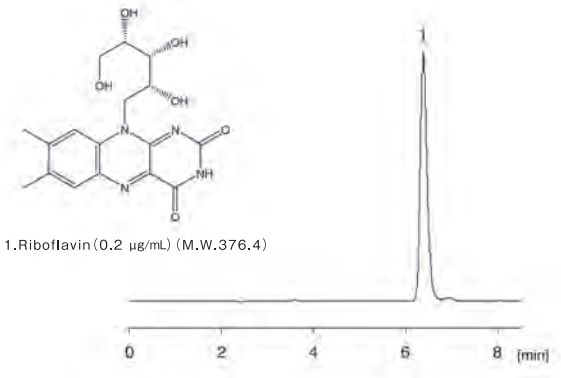
1.Kojic acid (1 µg/mL) (M.W.142.1)

HPLC Conditions

Column : CAPCELL PAK C18 MG S5 ; 4.6 mm i.d.× 250 mm
Mobile phase : 20 mmol/L KH_2PO_4 / CH_3OH = 95 / 5
Flow rate : 1.0 mL/min
Temperature : 35 ℃
Detection : PDA 273 nm
Inj. vol. : 10 µL
Sample dissolved in : Mobile phase

Riboflavin (Vitamin B2)

Riboflavin is a water-soluble vitamin that appears yellow in an aqueous solution and is widely used as a food additive.
An example of riboflavin (vitamin B2) analysis using CAPCELL PAK C18 MG S5 performed in accordance with the Chinese National Standard GB5413.12-2010 is shown below. A good peak shape and adequate retention were obtained.



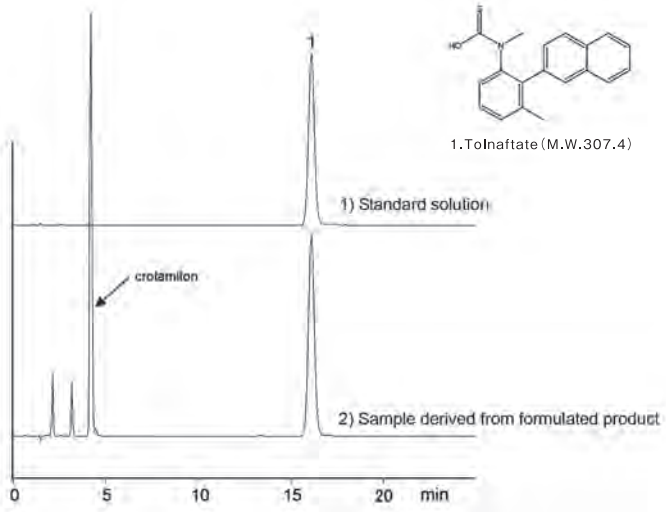
1.Riboflavin (0.2 µg/mL) (M.W.376.4)

HPLC Conditions

Column : CAPCELL PAK C18 MG S5 ; 4.6 mm i.d.× 250 mm
Mobile phase : 50 mmol/L CH_3COONa (adjusted at pH 4.7 with acetic acid) / CH_3OH = 65 / 35
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : FL Ex. 462 nm, Em. 522 nm
Inj. vol. : 20 µL
Sample dissolved in : Mobile phase

Formulation Tolnaftate

Tolnaftate is an antibacterial drug that acts selectively on Trichophyton fungus and can penetrate the stratum corneum. The following is an example of analysis, where crotamiton, having a local stimulant action and an analgesic effect to soothe itchiness, is simultaneously measured using CAPCELL PAK C18 MG S5.



1.Tolnaftate (M.W.307.4)

HPLC Conditions

Column : CAPCELL PAK C18 MG S5 ; 2.0 mm i.d.× 150 mm
Mobile phase : H_2O / CH_3CN = 30 / 70
Flow rate : 200 µL/min
Temperature : 40 ℃
Detection : UV 250 nm
Inj. vol. : 1 µL
Sample dissolved in : 1) Mobile phase, 200 µg/mL
2) 0.1 g of product was dissolved in methanol, and sonicated for two minutes, and left until being separated to two layers. The upper layer was introduced to HPLC.

CAPCELL PAK C18 MG Lineup

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
90923	CAPCELL PAK C18 MG(S3)0.3X150	3	0.3	150	Validation support column
90933	CAPCELL PAK C18 MG(S3)0.5X150	3	0.5	150	Validation support column
90841	CAPCELL PAK C18 MG(S3)1.0X35	3	1.0	35	Validation support column
90842	CAPCELL PAK C18 MG(S3)1.0X50	3	1.0	50	Validation support column
90846	CAPCELL PAK C18 MG(S3)1.0X75	3	1.0	75	Validation support column
90847	CAPCELL PAK C18 MG(S3)1.0X100	3	1.0	100	Validation support column
90848	CAPCELL PAK C18 MG(S3)1.0X150	3	1.0	150	Validation support column
90831	CAPCELL PAK C18 MG(S3)1.5X35	3	1.5	35	Validation support column
90832	CAPCELL PAK C18 MG(S3)1.5X50	3	1.5	50	Validation support column
90836	CAPCELL PAK C18 MG(S3)1.5X75	3	1.5	75	Validation support column
90837	CAPCELL PAK C18 MG(S3)1.5X100	3	1.5	100	Validation support column
90838	CAPCELL PAK C18 MG(S3)1.5X150	3	1.5	150	Validation support column
90820	CAPCELL PAK C18 MG(S3)2.0X20	3	2.0	20	Validation support column
90821	CAPCELL PAK C18 MG(S3)2.0X35	3	2.0	35	Validation support column
90822	CAPCELL PAK C18 MG(S3)2.0X50	3	2.0	50	Validation support column
90826	CAPCELL PAK C18 MG(S3)2.0X75	3	2.0	75	Validation support column
90827	CAPCELL PAK C18 MG(S3)2.0X100	3	2.0	100	Validation support column
90828	CAPCELL PAK C18 MG(S3)2.0X150	3	2.0	150	Validation support column
90811	CAPCELL PAK C18 MG(S3)3.0X35	3	3.0	35	Validation support column
90812	CAPCELL PAK C18 MG(S3)3.0X50	3	3.0	50	Validation support column
90816	CAPCELL PAK C18 MG(S3)3.0X75	3	3.0	75	Validation support column
90817	CAPCELL PAK C18 MG(S3)3.0X100	3	3.0	100	Validation support column
90818	CAPCELL PAK C18 MG(S3)3.0X150	3	3.0	150	Validation support column
90801	CAPCELL PAK C18 MG(S3)4.6X35	3	4.6	35	Validation support column
90802	CAPCELL PAK C18 MG(S3)4.6X50	3	4.6	50	Validation support column
90806	CAPCELL PAK C18 MG(S3)4.6X75	3	4.6	75	Validation support column
90807	CAPCELL PAK C18 MG(S3)4.6X100	3	4.6	100	Validation support column
90808	CAPCELL PAK C18 MG(S3)4.6X150	3	4.6	150	Validation support column
12301	GUARD CARTRIDGE CAPCELL PAK C18 MG(S3)2.0X10(2PCS)	3	2.0	10	Guard Cartridge Column
12303	GUARD CARTRIDGE CAPCELL PAK C18 MG(S3)2.0X20(2PCS)	3	2.0	20	Guard Cartridge Column
12305	GUARD CARTRIDGE CAPCELL PAK C18 MG(S3)4.0X10(2PCS)	3	4.0	10	Guard Cartridge Column
12307	GUARD CARTRIDGE CAPCELL PAK C18 MG(S3)4.0X20(2PCS)	3	4.0	20	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder
12414	For CARTRIDGE HOLDER 20L	-	-	20	Cartridge holder

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
90903	CAPCELL PAK C18 MG(S5)0.3X150	5	0.3	150	Validation support column
90913	CAPCELL PAK C18 MG(S5)0.5X150	5	0.5	150	Validation support column
90501	CAPCELL PAK C18 MG(S5)1.0X35	5	1.0	35	Validation support column
90502	CAPCELL PAK C18 MG(S5)1.0X50	5	1.0	50	Validation support column
90500	CAPCELL PAK C18 MG(S5)1.0X75	5	1.0	75	Validation support column
90505	CAPCELL PAK C18 MG(S5)1.0X100	5	1.0	100	Validation support column
90503	CAPCELL PAK C18 MG(S5)1.0X150	5	1.0	150	Validation support column
90504	CAPCELL PAK C18 MG(S5)1.0X250	5	1.0	250	Validation support column
90401	CAPCELL PAK C18 MG(S5)1.5X35	5	1.5	35	Validation support column
90402	CAPCELL PAK C18 MG(S5)1.5X50	5	1.5	50	Validation support column
90400	CAPCELL PAK C18 MG(S5)1.5X75	5	1.5	75	Validation support column
90405	CAPCELL PAK C18 MG(S5)1.5X100	5	1.5	100	Validation support column
90403	CAPCELL PAK C18 MG(S5)1.5X150	5	1.5	150	Validation support column
90404	CAPCELL PAK C18 MG(S5)1.5X250	5	1.5	250	Validation support column
90306	CAPCELL PAK C18 MG(S5)2.0X20	5	2.0	20	Validation support column
90301	CAPCELL PAK C18 MG(S5)2.0X35	5	2.0	35	Validation support column
90307	CAPCELL PAK C18 MG(S5)2.0X50	5	2.0	50	Validation support column
90302	CAPCELL PAK C18 MG(S5)2.0X75	5	2.0	75	Validation support column
90305	CAPCELL PAK C18 MG(S5)2.0X100	5	2.0	100	Validation support column
90303	CAPCELL PAK C18 MG(S5)2.0X150	5	2.0	150	Validation support column
90304	CAPCELL PAK C18 MG(S5)2.0X250	5	2.0	250	Validation support column
90201	CAPCELL PAK C18 MG(S5)3.0X35	5	3.0	35	Validation support column
90205	CAPCELL PAK C18 MG(S5)3.0X50	5	3.0	50	Validation support column
90206	CAPCELL PAK C18 MG(S5)3.0X75	5	3.0	75	Validation support column
90202	CAPCELL PAK C18 MG(S5)3.0X100	5	3.0	100	Validation support column
90203	CAPCELL PAK C18 MG(S5)3.0X150	5	3.0	150	Validation support column
90204	CAPCELL PAK C18 MG(S5)3.0X250	5	3.0	250	Validation support column
90101	CAPCELL PAK C18 MG(S5)4.6X35	5	4.6	35	Validation support column
90105	CAPCELL PAK C18 MG(S5)4.6X50	5	4.6	50	Validation support column
90106	CAPCELL PAK C18 MG(S5)4.6X75	5	4.6	75	Validation support column
90102	CAPCELL PAK C18 MG(S5)4.6X100	5	4.6	100	Validation support column
90103	CAPCELL PAK C18 MG(S5)4.6X150	5	4.6	150	Validation support column
90104	CAPCELL PAK C18 MG(S5)4.6X250	5	4.6	250	Validation support column
90605	CAPCELL PAK C18 MG(S5)6.0X35	5	6.0	35	Validation support column
90608	CAPCELL PAK C18 MG(S5)6.0X150	5	6.0	150	Validation support column
90609	CAPCELL PAK C18 MG(S5)6.0X250	5	6.0	250	Validation support column
90601	CAPCELL PAK C18 MG(S5)10X20	5	10	20	
90602	CAPCELL PAK C18 MG(S5)10X50	5	10	50	
90603	CAPCELL PAK C18 MG(S5)10X150	5	10	150	
90604	CAPCELL PAK C18 MG(S5)10X250	5	10	250	
90698	CAPCELL PAK C18 MG(S5)15X30	5	15	30	
90697	CAPCELL PAK C18 MG(S5)15X50	5	15	50	
90700	CAPCELL PAK C18 MG(S5)15X250	5	15	250	
90701	CAPCELL PAK C18 MG(S5)20X35	5	20	35	
90702	CAPCELL PAK C18 MG(S5)20X50	5	20	50	
90696	CAPCELL PAK C18 MG(S5)20X75	5	20	75	
90699	CAPCELL PAK C18 MG(S5)20X100	5	20	100	
90703	CAPCELL PAK C18 MG(S5)20X150	5	20	150	
90704	CAPCELL PAK C18 MG(S5)20X250	5	20	250	
90706	CAPCELL PAK C18 MG(S5)30X30	5	30	30	
90707	CAPCELL PAK C18 MG(S5)30X50	5	30	50	
90708	CAPCELL PAK C18 MG(S5)30X75	5	30	75	
90705	CAPCELL PAK C18 MG(S5)30X100	5	30	100	
90710	CAPCELL PAK C18 MG(S5)30X150	5	30	150	
90709	CAPCELL PAK C18 MG(S5)30X250	5	30	250	
90720	CAPCELL PAK C18 MG(S5)50X50	5	50	50	
90722	CAPCELL PAK C18 MG(S5)50X250	5	50	250	
12497	GUARD CARTRIDGE CAPCELL PAK C18 MG(S5)2.0X10(2PCS)	5	2.0	10	Guard Cartridge Column
12218	GUARD CARTRIDGE CAPCELL PAK C18 MG(S5)2.0X20(2PCS)	5	2.0	20	Guard Cartridge Column
12496	GUARD CARTRIDGE CAPCELL PAK C18 MG(S5)4.0X10(2PCS)	5	4.0	10	Guard Cartridge Column
12493	GUARD CARTRIDGE CAPCELL PAK C18 MG(S5)4.0X20(2PCS)	5	4.0	20	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder
12414	For CARTRIDGE HOLDER 20L	-	-	20	Cartridge holder

CAPCELL PAK C18 MG Ⅱ

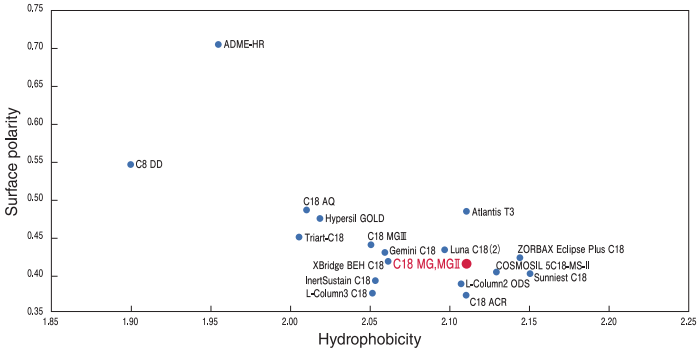
1st Choice C18 Column of Osaka Soda

CAPCELL PAK C18 MG Ⅱ is 1st Choice C18 column of Osaka Soda, in which low silanol activity and high separation performance are achieved by applying Ultimate Polymer Coating, the original new coating technology of our company. This column can be applied to the analysis of a wide range of compounds, including the analysis of basic compounds under neutral conditions.

Physical properties

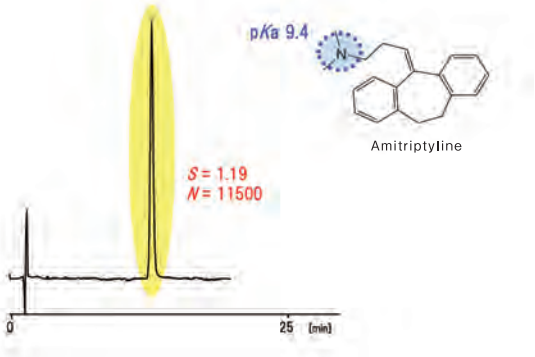
Functional group	Pore Size (Å)	Particle Size (μm)	Surface Area (m^2/g)	% of Carbon	Density (μmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
C18 (octadecyl groups)	100	3	300	16	2.6	20	2~10	L1
C18 (octadecyl groups)	100	5	300	16	2.6	20	2~10	L1

Hydrophobicity and surface polarity



Analysis of basic compounds under neutral conditions

Development and application of the new polymer coating technology has enabled the analysis of basic compounds under neutral conditions and has reduced the influence of silanol to a minimum.



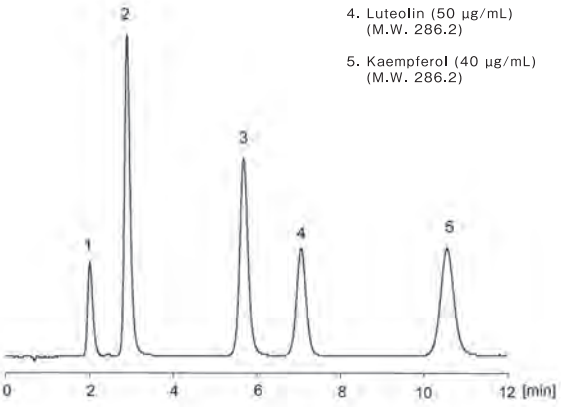
HPLC Conditions

Column : CAPCELL PAK C18 MGⅡ S5
Mobile phase : (pH 7) 50 mmol/L Phasphate buffer / CH_3OH = 25 / 75
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 254 nm
Sample : Amitriptyline

Flavonoid

An analysis example of 5 components: Rutin, myricetin, quercetin, luteolin and kaempferol using CAPCELL PAK C18 MG Ⅱ S3 is shown.

1. Rutin (50 μg/mL) (M.W. 610.5)
2. Myricetin (50 μg/mL) (M.W. 318.2)
3. Quercetin (50 μg/mL) (M.W. 302.2)
4. Luteolin (50 μg/mL) (M.W. 286.2)
5. Kaempferol (40 μg/mL) (M.W. 286.2)



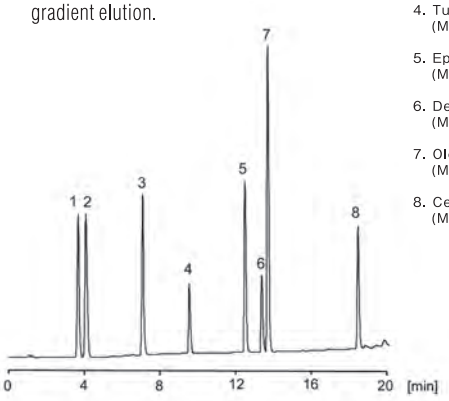
HPLC Conditions

Column : CAPCELL PAK C_{18} MGⅡ S3 ; 2.0 mm i.d.× 50 mm
Mobile phase : 0.1 vol% HCOOH / CH_3OH = 60 / 40
Flow rate : 200 μL/min
Temperature : 40 ℃
Detection : PDA 380 nm
Inj. vol. : 1 μL
Sample dissolved in : Mobile phase

Simultaneous analysis of drugs

An example of simultaneous analysis of various components such as antipyretic analgesics, antitussive and expectorant combination, antihistamines and antibiotics is shown. Using CAPCELL PAK C18 MGⅡ S3, 8 components could be separated by gradient elution.

1. Acetaminophen (50 μg/mL) (M.W. 151.1)
2. Procaterol (50 μg/mL) (M.W. 290.4)
3. Cefdinir (50 μg/mL) (M.W. 395.4)
4. Tulobuterol (50 μg/mL) (M.W. 227.7)
5. Epinastine (50 μg/mL) (M.W. 249.3)
6. Dextromethorphan (50 μg/mL) (M.W. 271.4)
7. Olopatadine (50 μg/mL) (M.W. 337.4)
8. Cefditoren Pivoxil (50 μg/mL) (M.W. 620.7)



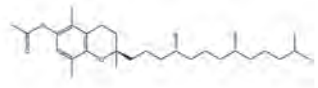
HPLC Conditions

Column : CAPCELL PAK C_{18} MGⅡ S3 ; 2.0 mm i.d.× 100 mm
Mobile phase : A) 0.1 vol% H_3PO_4 B) 0.1 vol% H_3PO_4, CH_3CN
B 8 %(0 min)-> 55 %(20 min)-> 8 %(20.1 min) Gradient
Flow rate : 200 μL/min
Temperature : 40 ℃
Detection : PDA 220 nm
Inj. vol. : 1 μL
Sample dissolved in : Epinastine was dissolved in the solution (CH_3OH / 1 vol% H_3PO_4 = 4 / 1) at 1000 μg /mL. Cefdinir was dissolved in 0.1 mol/L Phosphate buffer (pH 7). Cefditoren Pivoxil was dissolved in solution (CH_3CN / H_2O / H_3PO_4 = 600 / 400 / 0.1). The other compounds were dissolved in 50 vol% CH_3OH. Those compounds mixed together, diluted with 20 vol% CH_3CN at 50 μg/mL.

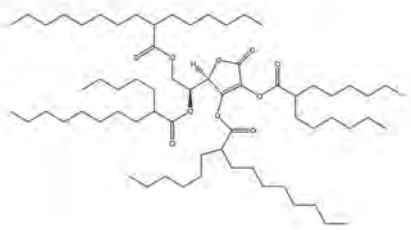
CAPCELL PAK C18 MG Ⅱ

■ Fat-soluble vitamins C and E

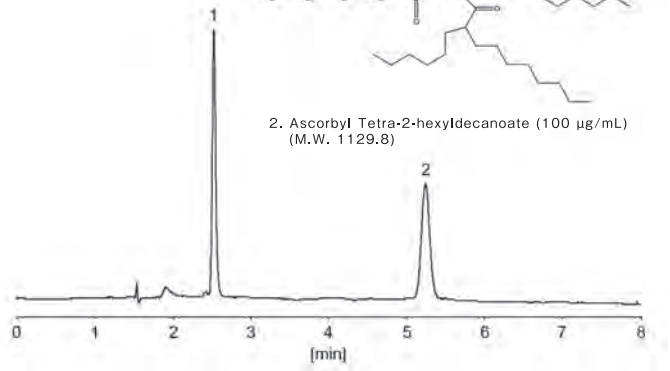
Fat-soluble vitamins C and E have strong antioxidant effect, and are often used together in cosmetics. An example of simultaneous analysis using CAPCELL PAK C18 MG Ⅱ S3 is shown. A good peak shape and separation were obtained with a simple analysis system.



1. Tocopherol acetate (100 μg/mL)
(M.W. 472.7)



2. Ascorbyl Tetra-2-hexyldecanoate (100 μg/mL)
(M.W. 1129.8)

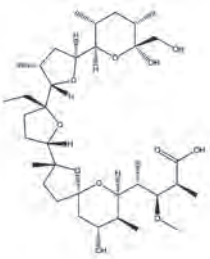


HPLC Conditions

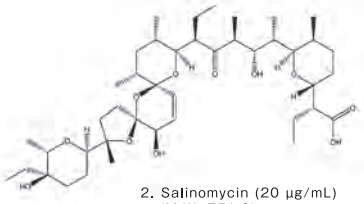
Column	: CAPCELL PAK C18 MG Ⅱ S3 ; 4.6 mm i.d.× 150 mm
Mobile phase	: C_2H_5OH
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 236 nm
Inj. vol.	: 5 μL
Sample dissolved in	: C_2H_5OH

■ Monensin, salinomycin

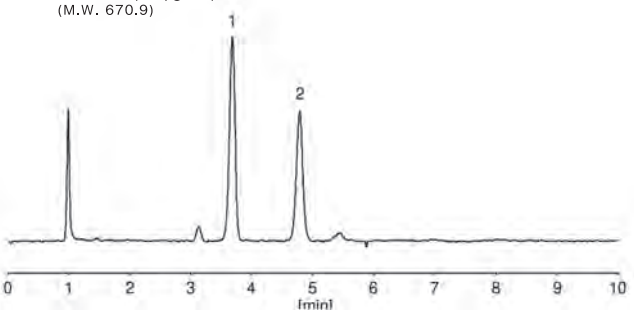
Monensin and salinomycin are polyether antibiotics used in livestock feed. An example of analysis using CAPCELL PAK C18 MG Ⅱ S5 is shown.



1. Monensin (20 μg/mL)
(M.W. 670.9)



2. Salinomycin (20 μg/mL)
(M.W. 751.0)



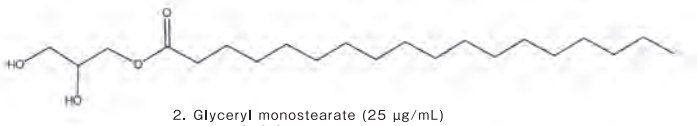
HPLC Conditions

Column	: CAPCELL PAK C18 MG Ⅱ S5 ; 4.6 mm i.d.× 150 mm
Mobile phase	: H_2O / CH_3OH / CH_3COOH = 60 / 940 / 1
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detector	: NQAD (Evaporation 35 ℃, Nebulizer 30 ℃)
Inj. vol.	: 10 μL
Sample dissolved in	: CH_3OH

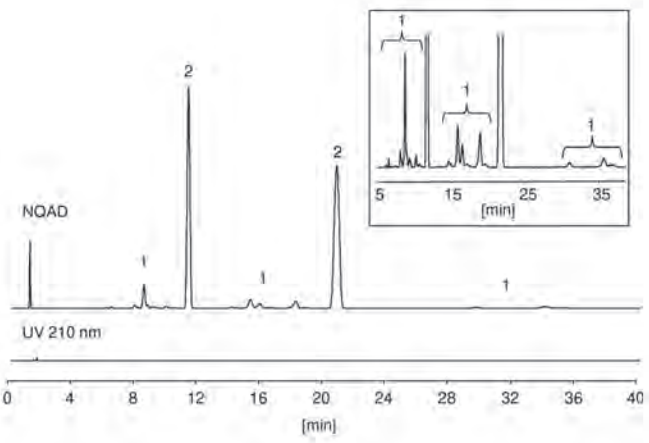
■ Non-ionic surfactant

Generally, in surfactant analysis, gas chromatography or size-exclusion chromatography using polymer based packing materials, is commonly used. In addition, RI and ELSD are often used for detection due to weak UV absorption, and the amount of sample introduced into the detector tends to be more. Given here is an example of analysis of non-ionic surfactants, sorbitan monostearate and glyceryl monostearate, using CAPCELL PAK C18 MG Ⅱ S3.
In this example, NQAD is selected as the detector, and it was confirmed that sorbitan monostearate eluted in 3 peak groups, while glyceryl monostearate eluted in 2 peaks, thus indicating that non-ionic surfactants can be analyzed in the general reversed-phase mode.

1. Sorbitan monostearate (25 μg/mL)
(M.W. 430.6)



2. Glyceryl monostearate (25 μg/mL)
(M.W. 358.6)



HPLC Conditions

Column	: CAPCELL PAK C18 MG Ⅱ S3 ; 4.6 mm i.d.× 150 mm
Mobile phase	: H_2O / CH_3CN / THF = 63 / 27 / 10
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detector	: NQAD (Evaporation 60 ℃, Nebulizer 30 ℃)
Inj. vol.	: 7 μL
Sample dissolved in	: THF / CH_3CN = 55 / 45

CAPCELL PAK C18 MG II Lineup

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
92450	CAPCELL PAK C18 MGⅡ(S3)0.3X50	3	0.3	50	Validation support column
92451	CAPCELL PAK C18 MGⅡ(S3)0.3X150	3	0.3	150	Validation support column
92452	CAPCELL PAK C18 MGⅡ(S3)0.5X150	3	0.5	150	Validation support column
92443	CAPCELL PAK C18 MGⅡ(S3)1.0X10	3	1.0	10	Validation support column
92453	CAPCELL PAK C18 MGⅡ(S3)1.0X35	3	1.0	35	Validation support column
92454	CAPCELL PAK C18 MGⅡ(S3)1.0X50	3	1.0	50	Validation support column
92455	CAPCELL PAK C18 MGⅡ(S3)1.0X75	3	1.0	75	Validation support column
92456	CAPCELL PAK C18 MGⅡ(S3)1.0X100	3	1.0	100	Validation support column
92457	CAPCELL PAK C18 MGⅡ(S3)1.0X150	3	1.0	150	Validation support column
92444	CAPCELL PAK C18 MGⅡ(S3)1.5X10	3	1.5	10	Validation support column
92459	CAPCELL PAK C18 MGⅡ(S3)1.5X35	3	1.5	35	Validation support column
92460	CAPCELL PAK C18 MGⅡ(S3)1.5X50	3	1.5	50	Validation support column
92461	CAPCELL PAK C18 MGⅡ(S3)1.5X75	3	1.5	75	Validation support column
92462	CAPCELL PAK C18 MGⅡ(S3)1.5X100	3	1.5	100	Validation support column
92463	CAPCELL PAK C18 MGⅡ(S3)1.5X150	3	1.5	150	Validation support column
92445	CAPCELL PAK C18 MGⅡ(S3)2.0X10	3	2.0	10	Validation support column
92465	CAPCELL PAK C18 MGⅡ(S3)2.0X20	3	2.0	20	Validation support column
92466	CAPCELL PAK C18 MGⅡ(S3)2.0X35	3	2.0	35	Validation support column
92467	CAPCELL PAK C18 MGⅡ(S3)2.0X50	3	2.0	50	Validation support column
92468	CAPCELL PAK C18 MGⅡ(S3)2.0X75	3	2.0	75	Validation support column
92469	CAPCELL PAK C18 MGⅡ(S3)2.0X100	3	2.0	100	Validation support column
92470	CAPCELL PAK C18 MGⅡ(S3)2.0X150	3	2.0	150	Validation support column
92472	CAPCELL PAK C18 MGⅡ(S3)3.0X35	3	3.0	35	Validation support column
92473	CAPCELL PAK C18 MGⅡ(S3)3.0X50	3	3.0	50	Validation support column
92474	CAPCELL PAK C18 MGⅡ(S3)3.0X75	3	3.0	75	Validation support column
92475	CAPCELL PAK C18 MGⅡ(S3)3.0X100	3	3.0	100	Validation support column
92476	CAPCELL PAK C18 MGⅡ(S3)3.0X150	3	3.0	150	Validation support column
92478	CAPCELL PAK C18 MGⅡ(S3)4.6X35	3	4.6	35	Validation support column
92479	CAPCELL PAK C18 MGⅡ(S3)4.6X50	3	4.6	50	Validation support column
92480	CAPCELL PAK C18 MGⅡ(S3)4.6X75	3	4.6	75	Validation support column
92481	CAPCELL PAK C18 MGⅡ(S3)4.6X100	3	4.6	100	Validation support column
92482	CAPCELL PAK C18 MGⅡ(S3)4.6X150	3	4.6	150	Validation support column
12197	GUARD CARTRIDGE CAPCELL PAK C18 MGⅡ(S3)2.0X10(2PCS)	3	2.0	10	Guard Cartridge Column
12198	GUARD CARTRIDGE CAPCELL PAK C18 MGⅡ(S3)4.0X10(2PCS)	3	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
92501	CAPCELL PAK C18 MGⅡ(S5)0.3X150	5	0.3	150	Validation support column
92502	CAPCELL PAK C18 MGⅡ(S5)0.5X150	5	0.5	150	Validation support column
92503	CAPCELL PAK C18 MGⅡ(S5)1.0X35	5	1.0	35	Validation support column
92504	CAPCELL PAK C18 MGⅡ(S5)1.0X50	5	1.0	50	Validation support column
92505	CAPCELL PAK C18 MGⅡ(S5)1.0X75	5	1.0	75	Validation support column
92506	CAPCELL PAK C18 MGⅡ(S5)1.0X100	5	1.0	100	Validation support column
92507	CAPCELL PAK C18 MGⅡ(S5)1.0X150	5	1.0	150	Validation support column
92508	CAPCELL PAK C18 MGⅡ(S5)1.0X250	5	1.0	250	Validation support column
92509	CAPCELL PAK C18 MGⅡ(S5)1.5X35	5	1.5	35	Validation support column
92510	CAPCELL PAK C18 MGⅡ(S5)1.5X50	5	1.5	50	Validation support column
92511	CAPCELL PAK C18 MGⅡ(S5)1.5X75	5	1.5	75	Validation support column
92512	CAPCELL PAK C18 MGⅡ(S5)1.5X100	5	1.5	100	Validation support column
92513	CAPCELL PAK C18 MGⅡ(S5)1.5X150	5	1.5	150	Validation support column
92514	CAPCELL PAK C18 MGⅡ(S5)1.5X250	5	1.5	250	Validation support column
92500	CAPCELL PAK C18 MGⅡ(S5)2.0X10	5	2.0	10	Validation support column
92515	CAPCELL PAK C18 MGⅡ(S5)2.0X20	5	2.0	20	Validation support column
92516	CAPCELL PAK C18 MGⅡ(S5)2.0X35	5	2.0	35	Validation support column
92517	CAPCELL PAK C18 MGⅡ(S5)2.0X50	5	2.0	50	Validation support column
92518	CAPCELL PAK C18 MGⅡ(S5)2.0X75	5	2.0	75	Validation support column
92519	CAPCELL PAK C18 MGⅡ(S5)2.0X100	5	2.0	100	Validation support column
92520	CAPCELL PAK C18 MGⅡ(S5)2.0X150	5	2.0	150	Validation support column
92544	CAPCELL PAK C18 MGⅡ(S5)2.0X200	5	2.0	200	Validation support column
92521	CAPCELL PAK C18 MGⅡ(S5)2.0X250	5	2.0	250	Validation support column
92522	CAPCELL PAK C18 MGⅡ(S5)3.0X35	5	3.0	35	Validation support column
92523	CAPCELL PAK C18 MGⅡ(S5)3.0X50	5	3.0	50	Validation support column
92524	CAPCELL PAK C18 MGⅡ(S5)3.0X75	5	3.0	75	Validation support column
92525	CAPCELL PAK C18 MGⅡ(S5)3.0X100	5	3.0	100	Validation support column
92526	CAPCELL PAK C18 MGⅡ(S5)3.0X150	5	3.0	150	Validation support column
92527	CAPCELL PAK C18 MGⅡ(S5)3.0X250	5	3.0	250	Validation support column
92528	CAPCELL PAK C18 MGⅡ(S5)4.6X35	5	4.6	35	Validation support column
92529	CAPCELL PAK C18 MGⅡ(S5)4.6X50	5	4.6	50	Validation support column
92530	CAPCELL PAK C18 MGⅡ(S5)4.6X75	5	4.6	75	Validation support column
92531	CAPCELL PAK C18 MGⅡ(S5)4.6X100	5	4.6	100	Validation support column
92532	CAPCELL PAK C18 MGⅡ(S5)4.6X150	5	4.6	150	Validation support column
92545	CAPCELL PAK C18 MGⅡ(S5)4.6X200	5	4.6	200	Validation support column
92533	CAPCELL PAK C18 MGⅡ(S5)4.6X250	5	4.6	250	Validation support column
92534	CAPCELL PAK C18 MGⅡ(S5)10X20	5	10	20	
92535	CAPCELL PAK C18 MGⅡ(S5)10X150	5	10	150	
92536	CAPCELL PAK C18 MGⅡ(S5)10X250	5	10	250	
92537	CAPCELL PAK C18 MGⅡ(S5)20X35	5	20	35	
92538	CAPCELL PAK C18 MGⅡ(S5)20X150	5	20	150	
92539	CAPCELL PAK C18 MGⅡ(S5)20X250	5	20	250	
92555	CAPCELL PAK C18 MGⅡ(S5)30X150	5	30	150	
92553	CAPCELL PAK C18 MGⅡ(S5)30X250	5	30	250	
12199	GUARD CARTRIDGE CAPCELL PAK C18 MGⅡ(S5)2.0X10(2PCS)	5	2.0	10	Guard Cartridge Column
12200	GUARD CARTRIDGE CAPCELL PAK C18 MGⅡ(S5)4.0X10(2PCS)	5	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder

CAPCELL PAK C18 MG Ⅲ / MG Ⅲ-H

1st Choice C18 column of LC-MS analysis

The focus is on use of CAPCELL PAK C18 MG Ⅲ in LC-MS to achieve low bleeding. This column is suitable for analysis of basic compounds under acidic conditions. In addition, CAPCELL PAK C18 MG Ⅲ has the highest surface polarity parameters in the MG Series, and is suitable for simultaneous analysis of a wide range of compounds with high to low polarity, such as metabolite analysis.
MG Ⅲ-H with high pressure resistance (50 MPa pressure resistance) specification is also available, and can be used in high-speed analysis.

■ Physical properties

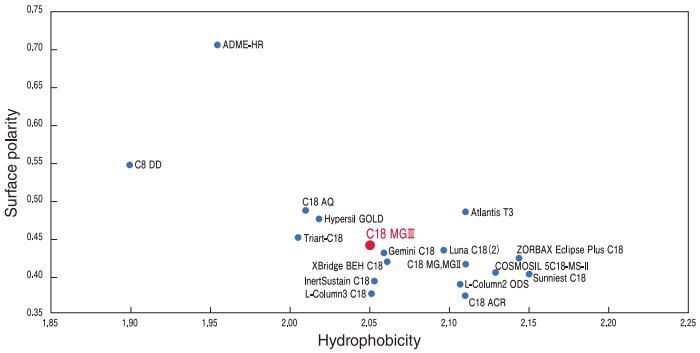
CAPCELL PAK C18 MG Ⅲ

Functional group	Pore Size (Å)	Particle Size (μm)	Surface Area (m^2/g)	% of Carbon	Density (μmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
C18 (octadecyl groups)	100	3	300	15	2.4	20	2~10	L1
C18 (octadecyl groups)	100	5	300	15	2.4	20	2~10	L1

CAPCELL PAK C18 MG Ⅲ-H

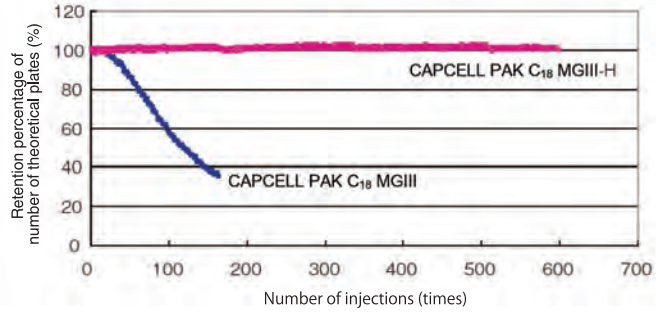
Functional group	Pore Size (Å)	Particle Size (μm)	Surface Area (m^2/g)	% of Carbon	Density (μmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
C18 (octadecyl groups)	100	3	300	15	2.4	50	2~10	L1

■ Hydrophobicity and surface polarity



■ MG Ⅲ-H 50 MPa durability check

Set the column pressure to 50 MPa by adjusting the flow velocity, and confirmed the durability. CAPCELL PAK C18 MG Ⅲ-H can maintain the theoretical plate even after 600 injections.



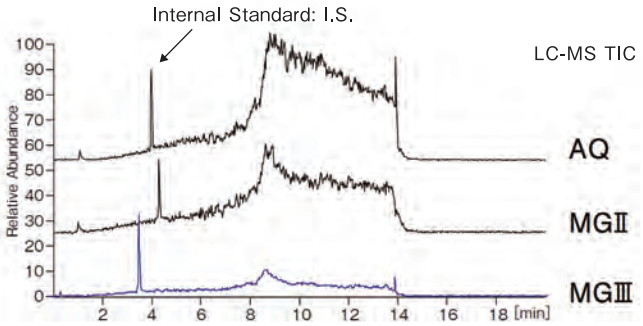
HPLC Conditions

Column size : 2.0 mm i.d.× 50 mm
Mobile phase : H_2O / CH_3CN = 40 / 60
Flow rate : Set the column pressure to 50 MPa.
Temperature : 40 ℃
Detection : UV 254 nm
Inj. vol. : 1 μL
Sample : 1. Uracil 2. Methyl Benzoate 3. Naphthalene 4. Butyl Benzoate

■ Low bleed column

Special preconditioning is applied to achieve a significant reduction in background (bleeding phenomenon) in the high sensitivity detection range.

Bleed phenomenon comparison (conditions specified in-house)



■ Elution behavior of strong basic compounds under acidic conditions

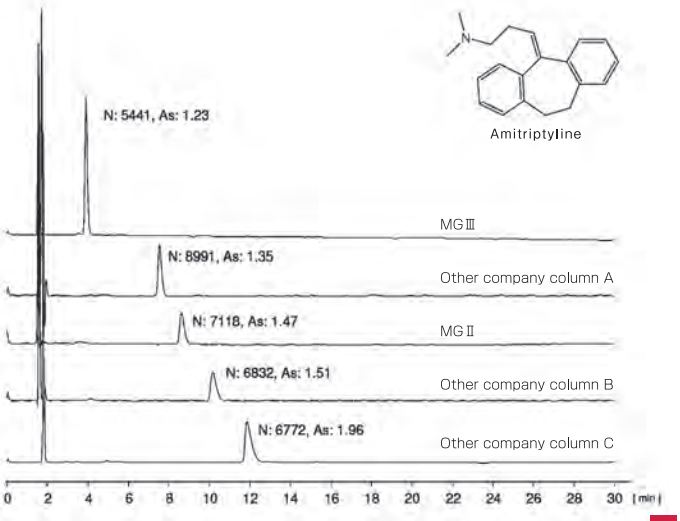
Generally, when setting LC-MS conditions, a mobile phase in which about 0.1 vol% formic acid is added, is widely used. However, if strong basic substances are analyzed using this acidic mobile phase, tailing of peaks and changes in retention time may be observed.
To avoid this phenomena, all impurities that might affect are eliminated in the CAPCELL PAK C18 MG Ⅲ column.

The chromatogram shown below is obtained by measuring with 0.1 vol% formic acid/CH_3OH = 50/50, using CAPCELL PAK C18 MG Ⅱ, MG Ⅲ and columns of other manufacturers with Amitriptyline (pKa 9.4), a strong basic substance, as the indicator substance.

An adequate peak shape is obtained with CAPCELL PAK C18 MG Ⅲ.

HPLC Conditions

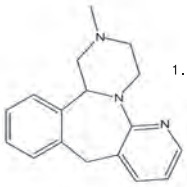
Column size : S5, 2.0 or 2.1 mm i.d.× 150 mm
Mobile phase : 0.1 vol% HCOOH / CH_3OH = 50 / 50
Flow rate : 200 μL/min
Temperature : 40 ℃
Detection : UV 254 nm
Inj. vol. : 1 μL
Sample : Amitriptyline 10 μg /mL



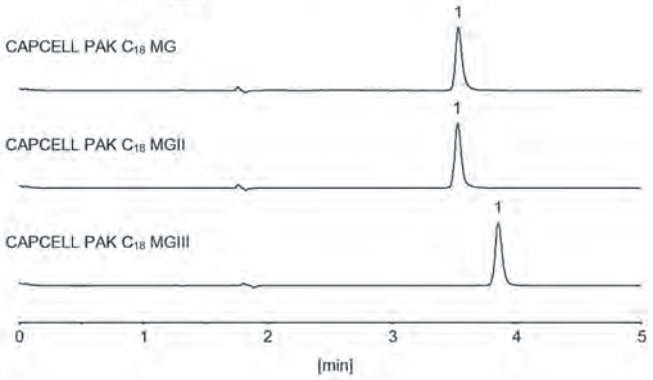
CAPCELL PAK C18 MG Ⅲ / MG Ⅲ-H

■ Higher surface polarity compared to MG/MG Ⅱ

CAPCELL PAK C18 MG Ⅲ has a higher surface polarity than MG and MG Ⅱ. MG, MG Ⅱ and MG Ⅲ were compared by conducting analysis of mirtazapine, a tetracyclic antidepressant.
A large retention capacity is obtained with MG Ⅲ, which has a high surface polarity, when compared to MG and MG Ⅱ.



1. Mirtazapine (100 µg/mL)
(M.W. 265.4)



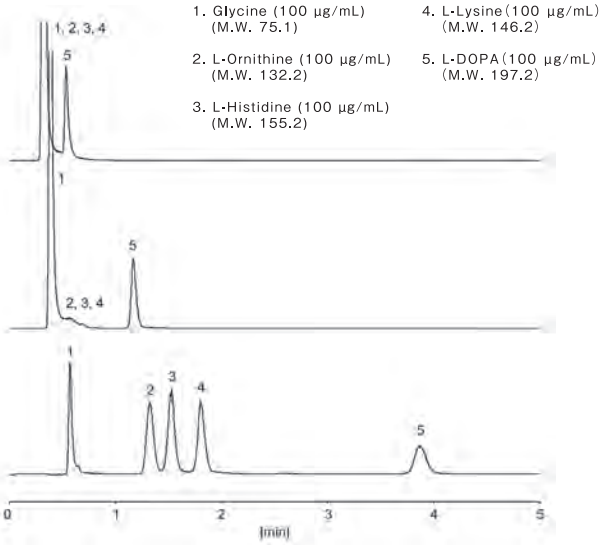
HPLC Conditions

Column size	: S3 ; 4.6 mm i.d.× 150 mm
Mobile phase	: 10 mmol/L TEAA* / CH_3OH = 30 / 70 *Triethylamine Acetate (pH 7.0)
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 290 nm
Inj. vol.	: 2 µL
Sample dissolved in	: CH_3OH

■ L-dopa, amino acids

Glycine, which has the simplest form among the amino acids that constitute proteins, ornithine, histidine and lysin, which are basic amino acids, and L-dopa, which is synthesized in the body from L-tyrosine, are highly polar compounds. Here, an example of analysis using CAPCELL PAK C18 MG Ⅲ is shown. Comparing the elution behavior of various acids, the retention increases in the order: Formic acid < Trifluoroacetic acid < Heptafluorobutyric acid.

1. Glycine (100 µg/mL)
(M.W. 75.1)
2. L-Ornithine (100 µg/mL)
(M.W. 132.2)
3. L-Histidine (100 µg/mL)
(M.W. 155.2)
4. L-Lysine (100 µg/mL)
(M.W. 146.2)
5. L-DOPA (100 µg/mL)
(M.W. 197.2)

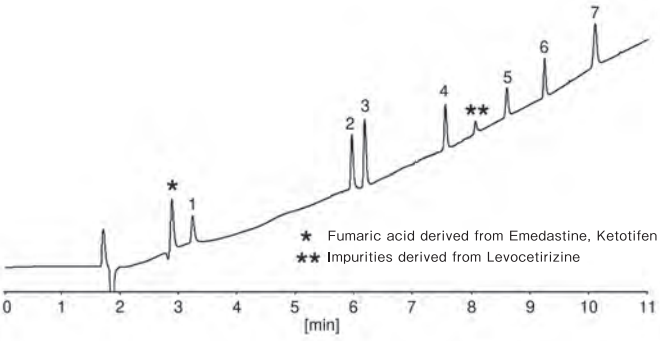


HPLC Conditions

Column	: CAPCELL PAK C_{18} MGⅢ S3 ; 2.0 mm i.d.× 50 mm
Mobile phase	: 0.1 vol% HCOOH / CH_3CN = 99 / 1 (upper) 0.1 vol% TFA / CH_3CN = 99 / 1 (middle) 0.1 vol% C_3F_7COOH / CH_3CN = 99 / 1 (lower)
Flow rate	: 400 µL/min
Temperature	: 40 ℃
Detector	: NQAD (Evaporation 60 ℃, Nebulizer 30 ℃)
Inj. vol.	: 1 µL
Sample dissolved in	: Each amino acid was separately dissolved in H_2O at 1 mg/mL. L-DOPA was dissolved in 0.1 vol% formic acid at 500 µg/mL. 100 µL of each amino acid solution and 200 µL of L-DOPA solution were mixed together. The mixture was diluted to 1 mL by adding H_2O.

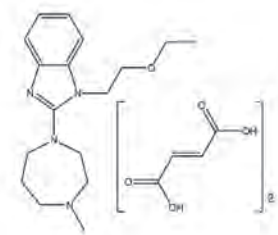
■ Second-generation antihistamines

Among antihistamines, second-generation antihistamines are those that were marketed after 1983, in which side effects, such as inhibitory effects on the central nervous system like drowsiness, and anticholinergic effects such as dry mouth and heartburn, were minimized compared to first-generation antihistamines. These drugs are prescribed and sold because of its low incidence of the side effect, drowsiness. Here, an example of simultaneously analysis of 7 types of drugs using CAPCELL PAK C18 MG Ⅲ S5 is shown. Adequate retention and separation is obtained.

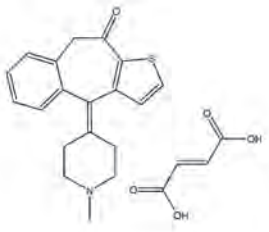


HPLC Conditions

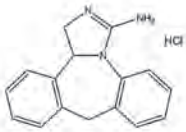
Column	: CAPCELL PAK C_{18} MGⅢ S5 ; 4.6 mm i.d.× 150 mm
Mobile phase	: A) 0.1 vol% HCOOH, H_2O B) 0.1 vol% HCOOH, CH_3OH B 15 %(0 min) -> 100 %(10 min) -> 15 %(10.1 min) Gradient
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 220 nm
Inj. vol.	: 10 µL
Sample dissolved in	: H_2O / CH_3OH = 80 / 20



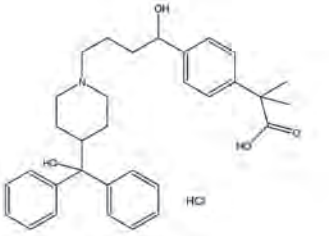
1. Emedastine Difumarate (20 µg/mL)
(M.W. 534.6)



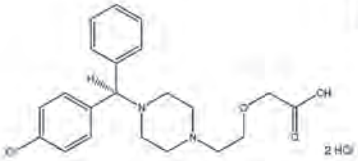
2. Ketotifen Fumarate (30 µg/mL)
(M.W. 425.5)



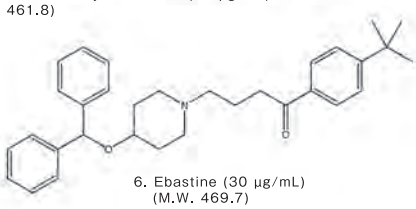
3. Epinastine Hydrochloride (30 µg/mL)
(M.W. 285.8)



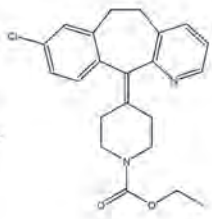
4. Fexofenadine Hydrochloride (30 µg/mL)
(M.W. 538.1)



5. Levocetirizine Dihydrochloride (30 µg/mL)
(M.W. 461.8)



6. Ebastine (30 µg/mL)
(M.W. 469.7)



7. Loratadine (30 µg/mL)
(M.W. 382.9)

CAPCELL PAK C18 MG Ⅲ / MG Ⅲ-H Lineup

CAPCELL PAK MGⅢ

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
92712	CAPCELL PAK C18 MGⅢ(S3)0.3X100(1/32)	3	0.3	100	Validation support column
92713	CAPCELL PAK C18 MGⅢ(S3)0.3X150(1/32)	3	0.3	150	Validation support column
92723	CAPCELL PAK C18 MGⅢ(S3)1.0X35	3	1.0	35	Validation support column
92724	CAPCELL PAK C18 MGⅢ(S3)1.0X50	3	1.0	50	Validation support column
92725	CAPCELL PAK C18 MGⅢ(S3)1.0X75	3	1.0	75	Validation support column
92726	CAPCELL PAK C18 MGⅢ(S3)1.0X100	3	1.0	100	Validation support column
92727	CAPCELL PAK C18 MGⅢ(S3)1.0X150	3	1.0	150	Validation support column
92733	CAPCELL PAK C18 MGⅢ(S3)1.5X35	3	1.5	35	Validation support column
92734	CAPCELL PAK C18 MGⅢ(S3)1.5X50	3	1.5	50	Validation support column
92735	CAPCELL PAK C18 MGⅢ(S3)1.5X75	3	1.5	75	Validation support column
92736	CAPCELL PAK C18 MGⅢ(S3)1.5X100	3	1.5	100	Validation support column
92737	CAPCELL PAK C18 MGⅢ(S3)1.5X150	3	1.5	150	Validation support column
92741	CAPCELL PAK C18 MGⅢ(S3)2.0X10	3	2.0	10	Validation support column
92742	CAPCELL PAK C18 MGⅢ(S3)2.0X20	3	2.0	20	Validation support column
92743	CAPCELL PAK C18 MGⅢ(S3)2.0X35	3	2.0	35	Validation support column
92744	CAPCELL PAK C18 MGⅢ(S3)2.0X50	3	2.0	50	Validation support column
92745	CAPCELL PAK C18 MGⅢ(S3)2.0X75	3	2.0	75	Validation support column
92746	CAPCELL PAK C18 MGⅢ(S3)2.0X100	3	2.0	100	Validation support column
92747	CAPCELL PAK C18 MGⅢ(S3)2.0X150	3	2.0	150	Validation support column
92748	CAPCELL PAK C18 MGⅢ(S3)2.0X250	3	2.0	250	Validation support column
92753	CAPCELL PAK C18 MGⅢ(S3)3.0X35	3	3.0	35	Validation support column
92754	CAPCELL PAK C18 MGⅢ(S3)3.0X50	3	3.0	50	Validation support column
92755	CAPCELL PAK C18 MGⅢ(S3)3.0X75	3	3.0	75	Validation support column
92756	CAPCELL PAK C18 MGⅢ(S3)3.0X100	3	3.0	100	Validation support column
92757	CAPCELL PAK C18 MGⅢ(S3)3.0X150	3	3.0	150	Validation support column
92763	CAPCELL PAK C18 MGⅢ(S3)4.6X35	3	4.6	35	Validation support column
92764	CAPCELL PAK C18 MGⅢ(S3)4.6X50	3	4.6	50	Validation support column
92765	CAPCELL PAK C18 MGⅢ(S3)4.6X75	3	4.6	75	Validation support column
92766	CAPCELL PAK C18 MGⅢ(S3)4.6X100	3	4.6	100	Validation support column
92767	CAPCELL PAK C18 MGⅢ(S3)4.6X150	3	4.6	150	Validation support column
12240	GUARD CARTRIDGE CAPCELL PAK C18 MGⅢ(S3)2.0X10(2PCS)	3	2.0	10	Guard Cartridge Column
12241	GUARD CARTRIDGE CAPCELL PAK C18 MGⅢ(S3)4.0X10(2PCS)	3	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
92602	CAPCELL PAK C18 MGⅢ(S5)1.0X35	5	1.0	35	Validation support column
92603	CAPCELL PAK C18 MGⅢ(S5)1.0X50	5	1.0	50	Validation support column
92604	CAPCELL PAK C18 MGⅢ(S5)1.0X75	5	1.0	75	Validation support column
92605	CAPCELL PAK C18 MGⅢ(S5)1.0X100	5	1.0	100	Validation support column
92606	CAPCELL PAK C18 MGⅢ(S5)1.0X150	5	1.0	150	Validation support column
92607	CAPCELL PAK C18 MGⅢ(S5)1.0X250	5	1.0	250	Validation support column
92609	CAPCELL PAK C18 MGⅢ(S5)1.5X35	5	1.5	35	Validation support column
92610	CAPCELL PAK C18 MGⅢ(S5)1.5X50	5	1.5	50	Validation support column
92611	CAPCELL PAK C18 MGⅢ(S5)1.5X75	5	1.5	75	Validation support column
92612	CAPCELL PAK C18 MGⅢ(S5)1.5X100	5	1.5	100	Validation support column
92613	CAPCELL PAK C18 MGⅢ(S5)1.5X150	5	1.5	150	Validation support column
92614	CAPCELL PAK C18 MGⅢ(S5)1.5X250	5	1.5	250	Validation support column
92638	CAPCELL PAK C18 MGⅢ(S5)2.0X10	5	2.0	10	Validation support column
92615	CAPCELL PAK C18 MGⅢ(S5)2.0X20	5	2.0	20	Validation support column
92616	CAPCELL PAK C18 MGⅢ(S5)2.0X35	5	2.0	35	Validation support column
92617	CAPCELL PAK C18 MGⅢ(S5)2.0X50	5	2.0	50	Validation support column
92618	CAPCELL PAK C18 MGⅢ(S5)2.0X75	5	2.0	75	Validation support column
92619	CAPCELL PAK C18 MGⅢ(S5)2.0X100	5	2.0	100	Validation support column
92620	CAPCELL PAK C18 MGⅢ(S5)2.0X150	5	2.0	150	Validation support column
92621	CAPCELL PAK C18 MGⅢ(S5)2.0X250	5	2.0	250	Validation support column
92623	CAPCELL PAK C18 MGⅢ(S5)3.0X35	5	3.0	35	Validation support column
92624	CAPCELL PAK C18 MGⅢ(S5)3.0X50	5	3.0	50	Validation support column
92625	CAPCELL PAK C18 MGⅢ(S5)3.0X75	5	3.0	75	Validation support column
92626	CAPCELL PAK C18 MGⅢ(S5)3.0X100	5	3.0	100	Validation support column
92627	CAPCELL PAK C18 MGⅢ(S5)3.0X150	5	3.0	150	Validation support column
92628	CAPCELL PAK C18 MGⅢ(S5)3.0X250	5	3.0	250	Validation support column
92630	CAPCELL PAK C18 MGⅢ(S5)4.6X35	5	4.6	35	Validation support column
92631	CAPCELL PAK C18 MGⅢ(S5)4.6X50	5	4.6	50	Validation support column
92632	CAPCELL PAK C18 MGⅢ(S5)4.6X75	5	4.6	75	Validation support column
92633	CAPCELL PAK C18 MGⅢ(S5)4.6X100	5	4.6	100	Validation support column
92634	CAPCELL PAK C18 MGⅢ(S5)4.6X150	5	4.6	150	Validation support column
92635	CAPCELL PAK C18 MGⅢ(S5)4.6X250	5	4.6	250	Validation support column
92639	CAPCELL PAK C18 MGⅢ(S5)10X20	5	10	20	
92636	CAPCELL PAK C18 MGⅢ(S5)10X150	5	10	150	
92640	CAPCELL PAK C18 MGⅢ(S5)10X250	5	10	250	
92641	CAPCELL PAK C18 MGⅢ(S5)20X35	5	20	35	
92643	CAPCELL PAK C18 MGⅢ(S5)20X50	5	20	50	
92647	CAPCELL PAK C18 MGⅢ(S5)20X100	5	20	100	
92637	CAPCELL PAK C18 MGⅢ(S5)20X150	5	20	150	
92642	CAPCELL PAK C18 MGⅢ(S5)20X250	5	20	250	
92649	CAPCELL PAK C18 MGⅢ(S5)30X50	5	30	50	
92644	CAPCELL PAK C18 MGⅢ(S5)30X150	5	30	150	
92645	CAPCELL PAK C18 MGⅢ(S5)30X250	5	30	250	
12223	GUARD CARTRIDGE CAPCELL PAK C18 MGⅢ(S5)2.0X10(2PCS)	5	2.0	10	Guard Cartridge Column
12225	GUARD CARTRIDGE CAPCELL PAK C18 MGⅢ(S5)2.0X20(2PCS)	5	2.0	20	Guard Cartridge Column
12224	GUARD CARTRIDGE CAPCELL PAK C18 MGⅢ(S5)4.0X10(2PCS)	5	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder
12414	For CARTRIDGE HOLDER 20L	-	-	20	Cartridge holder

CAPCELL PAK C18 MGⅢ-H

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
92782	CAPCELL PAK C18 MGⅢ-H(S3)2.0X20	3	2.0	20	
92784	CAPCELL PAK C18 MGⅢ-H(S3)2.0X50	3	2.0	50	
92786	CAPCELL PAK C18 MGⅢ-H(S3)2.0X100	3	2.0	100	
3654	EXP® GUARD CARTRIDGE CAPCELL PAK C18 MGⅢ-H(S3)2.1X5	3	2.1	5	EXP® Guard cartridge column, high pressure resistance (50 MPa) specification.
3640	EXP® DIRECT CONNECT HOLDER	-	-	5	EXP® Cartridge holder

EXP® is a registered trademark of Optimize Technologies, Inc.

CAPCELL PAK C18 AQ

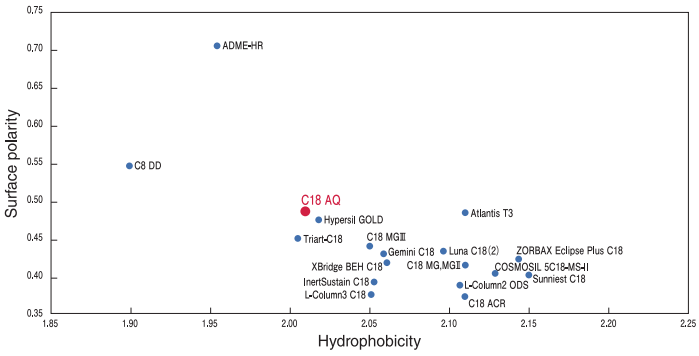
High-polarity C18 column with durability

Durability, which was a problem with the high polarity C18 column, has been improved in CAPCELL PAK C18 AQ column using the original polymer coating technology of our company. In addition to the stability in 100% aqueous mobile phase, the polymer coating minimizes the influence of residual silanol groups and provides good peak shape for basic compounds. Together with CAPCELL PAK ADME-HR, this column is the most suited for highly polar compounds.

Physical properties

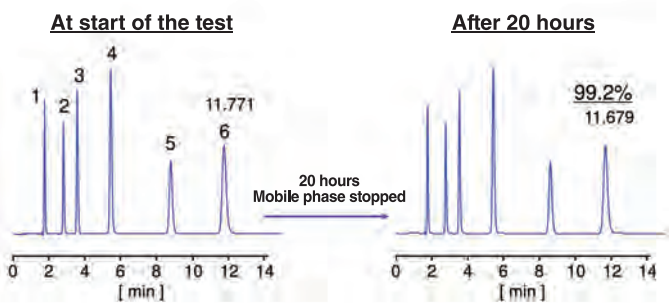
Functional group	Pore Size (Å)	Particle Size (μm)	Surface Area (m^2/g)	% of Carbon	Density (μmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
C18 (octadecyl groups)	80	3	330	12	1.7	20	2~9	L1
C18 (octadecyl groups)	80	5	300	11	1.7	20	2~9	L1

Hydrophobicity and surface polarity



Can be used for stable analysis with 100% aqueous mobile phase

CAPCELL PAK C18 AQ is coated with a polymer having low hydrophobicity. As a result, high surface polarity and uniform surface structure are achieved, and reproducibility of retention after stopping the liquid flow is extremely good even in a 100% aqueous mobile phase.



HPLC Conditions

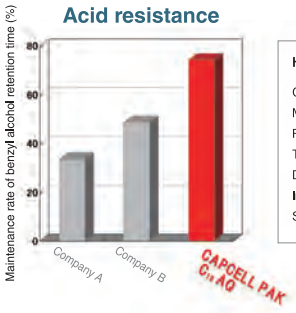
Column size : 4.6 mm i.d.× 150 mm
Mobile phase : 20 mmol/L KH_2PO_4-K_2HPO_4
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 254 nm
Sample : 1. Sodium Nitrite 2. Cytosine 3. Uracil 4. Guanine 5. Thymine 6. Adenine

High polarity ODS column High level durability

Durability in acidic and alkaline mobile phases, which was a problem of conventional high-polarity columns, has been improved using an original polymer coating technology.

* Residual rate of benzyl alcohol retention coefficient (k) when the liquid has passed for 20 hours (%)

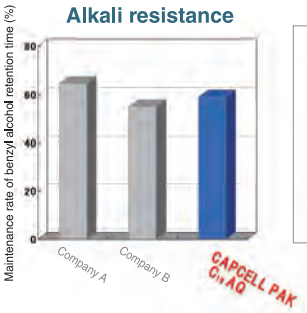
Acid resistance



HPLC Conditions

Column size : S5 ; 4.6 mm i.d.× 150 mm
Mobile phase : CH_3OH : TFA : H_2O = 10 : 1 : 89 (pH 1.2)
Flow rate : 1.0 mL/min
Temperature : 60 ℃
Detection : UV 254 nm
Inj. vol. : 7 μL
Sample : Benzyl alcohol in CH_3OH (1 mg/mL)

Alkali resistance



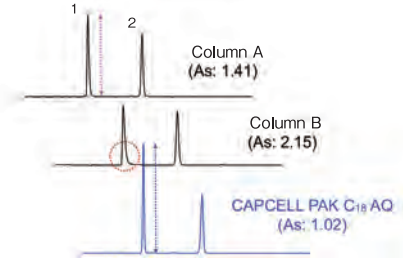
HPLC Conditions

Column size : S5 ; 4.6 mm i.d.× 150 mm
Mobile phase : 4 mmol/L $Na_2B_4O_7 \cdot 10H_2O$,
6 mmol/L NaOH / CH_3OH = 90 / 10 (pH 10)
Flow rate : 1.0 mL/min
Temperature : 50 ℃
Detection : UV 254 nm
Inj. vol. : 7 μL
Sample : Benzyl alcohol in CH_3OH (1 mg/mL)

Suppresses the secondary effect of residual silanol groups to the minimum

Some common high-polarity columns do not have packing material with end caps to increase surface polarity. Therefore, tailing of peaks may occur for basic compounds due to the influence of residual silanol groups and metal impurities in the silica gel substrate.
CAPCELL PAK C18 AQ has good a peak shape for basic compounds as it is coated with a fine polymer layer.

Good peak shape for basic compounds such as pyridine

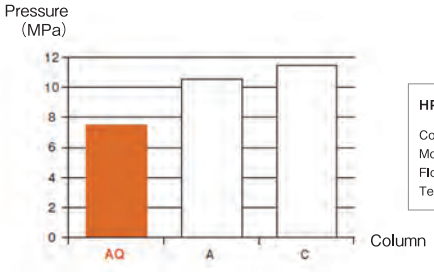


HPLC Conditions

Column size : 4.6 mm i.d.× 150 mm
Mobile phase : H_2O / CH_3CN = 70 / 30
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 254 nm
Sample : 1. Pyridine 2. Phenol
As : Tailing factor

Low column pressure used

Extremely low pressure columns due to the characteristics of silica gel substrate and precise classification of particles. Since the burden on the system is reduced, long-term stable analysis with good reproducibility is possible.



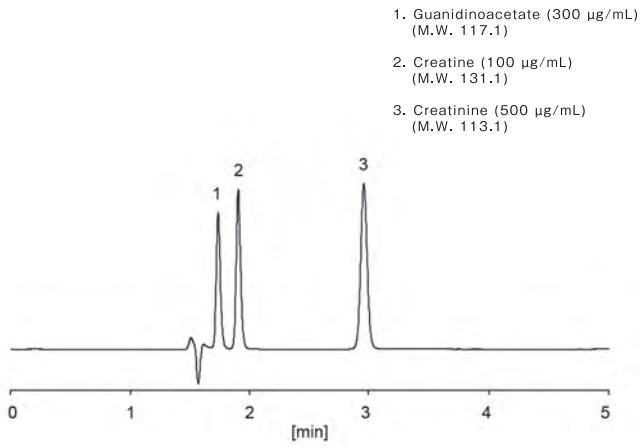
HPLC Conditions

Column size : 4.6 mm i.d.× 150 mm
Mobile phase : H_2O / CH_3OH = 50 / 50
Flow rate : 1.0 mL/min
Temperature : 40 ℃

CAPCELL PAK C18 AQ

■ Creatinine, creatine

Creatinine is a metabolite of creatine and is known as a typical compound used for the assessment of renal function. Here, an example of analysis of creatinine, creatine and guanidinoacetate using CAPCELL PAK C18 AQ S5 is shown.

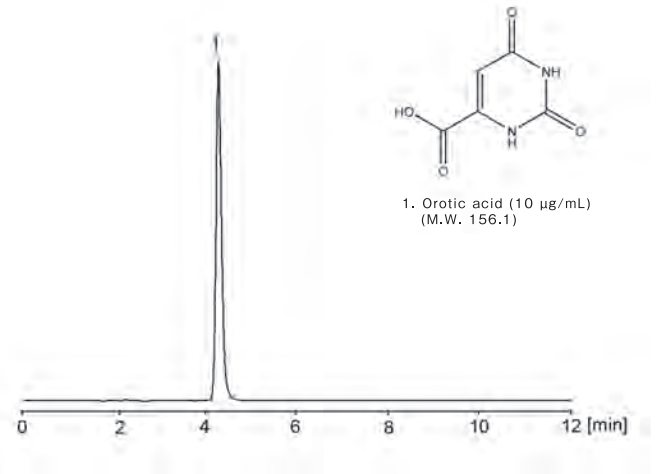


HPLC Conditions

Column	: CAPCELL PAK C_{18} AQ S5 ; 4.6 mm i.d.× 150 mm
Mobile phase	: 10 mmol/L $HCOONH_4$
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 210 nm
Inj. vol.	: 5 µL
Sample dissolved in	: H_2O

■ Orotic acid

Orotic acid is a heteroaromatic ring compound found in whey, and is one of the vitamin substances. Shown here is an example of analysis using CAPCELL PAK C18 AQ, which can use a 100% aqueous mobile phase, as its polarity is high.

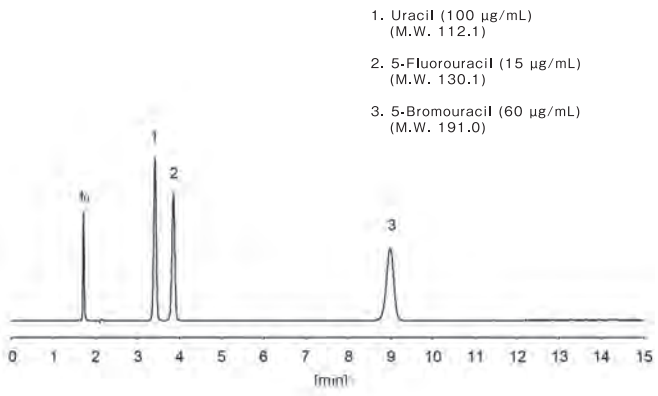


HPLC Conditions

Column	: CAPCELL PAK C_{18} AQ S3 ; 2.0 mm i.d.× 150 mm
Mobile phase	: 10 mmol/L NaH_2PO_4 (pH 2.6, H_3PO_4)
Flow rate	: 200 µL/min
Temperature	: 40 ℃
Detection	: PDA 280 nm
Inj. vol.	: 2 µL
Sample dissolved in	: Standard compound was dissolved in 10 vol% ammonia water at 1 mg/mL. and then, diluted with water.

■ 5-Fluorouracil

5-Fluorouracil, a pyrimidine antimetabolite, is a highly polar compound in which fluorine is introduced in the 5th position of uracil. Here, an example of analysis using CAPCELL PAK C18 AQ S5 is shown. Adequate retention and separation was obtained.

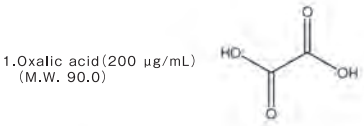


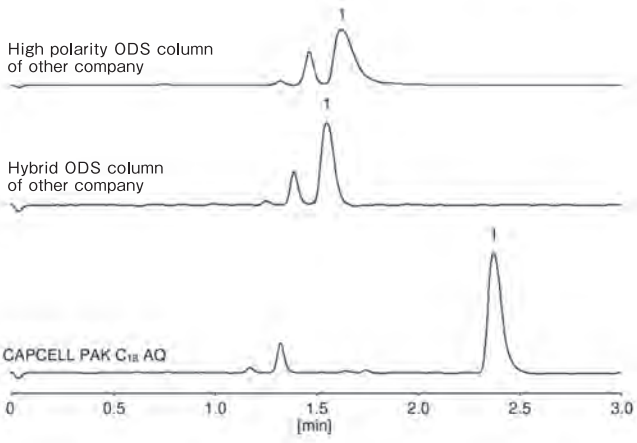
HPLC Conditions

Column	: CAPCELL PAK C_{18} AQ S5 ; 4.6 mm i.d.× 150 mm
Mobile phase	: 10 mmol/L $HCOONH_4$
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 254 nm
Inj. vol.	: 5 µL
Sample dissolved in	: H_2O

■ Oxalic acid

Oxalic acid, also known as a component of lye, is an organic acid found in bamboo shoots, konnyaku potatoes, and spinach, and is the simplest carboxylic acid. This acid is very polar and difficult to hold in a reversed-phase column. CAPCELL PAK C18 AQ, with its special polymer coating, provides greater retention compared to ODS columns of other companies.





HPLC Conditions

Column size	: S5 ; 4.6 mm i.d.× 150 mm
Mobile phase	: 0.5 vol% HCOOH / CH_3CN = 98 / 2
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detector	: NQAD (Evaporation 35 ℃, Nebulizer 30 ℃)
Inj. vol.	: 5 µL
Sample dissolved in	: H_2O

CAPCELL PAK C18 AQ Lineup

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
92111	CAPCELL PAK C18 AQ(S3)1.0X35	3	1.0	35	
92112	CAPCELL PAK C18 AQ(S3)1.0X50	3	1.0	50	
92113	CAPCELL PAK C18 AQ(S3)1.0X75	3	1.0	75	
92114	CAPCELL PAK C18 AQ(S3)1.0X100	3	1.0	100	
92115	CAPCELL PAK C18 AQ(S3)1.0X150	3	1.0	150	
92116	CAPCELL PAK C18 AQ(S3)1.0X250	3	1.0	250	
92119	CAPCELL PAK C18 AQ(S3)1.5X10	3	1.5	10	
92121	CAPCELL PAK C18 AQ(S3)1.5X35	3	1.5	35	
92122	CAPCELL PAK C18 AQ(S3)1.5X50	3	1.5	50	
92123	CAPCELL PAK C18 AQ(S3)1.5X75	3	1.5	75	
92124	CAPCELL PAK C18 AQ(S3)1.5X100	3	1.5	100	
92125	CAPCELL PAK C18 AQ(S3)1.5X150	3	1.5	150	
92126	CAPCELL PAK C18 AQ(S3)1.5X250	3	1.5	250	
92129	CAPCELL PAK C18 AQ(S3)2.0X10	3	2.0	10	
92130	CAPCELL PAK C18 AQ(S3)2.0X20	3	2.0	20	
92131	CAPCELL PAK C18 AQ(S3)2.0X35	3	2.0	35	
92132	CAPCELL PAK C18 AQ(S3)2.0X50	3	2.0	50	
92133	CAPCELL PAK C18 AQ(S3)2.0X75	3	2.0	75	
92134	CAPCELL PAK C18 AQ(S3)2.0X100	3	2.0	100	
92135	CAPCELL PAK C18 AQ(S3)2.0X150	3	2.0	150	
92136	CAPCELL PAK C18 AQ(S3)2.0X250	3	2.0	250	
92141	CAPCELL PAK C18 AQ(S3)3.0X35	3	3.0	35	
92142	CAPCELL PAK C18 AQ(S3)3.0X50	3	3.0	50	
92143	CAPCELL PAK C18 AQ(S3)3.0X75	3	3.0	75	
92144	CAPCELL PAK C18 AQ(S3)3.0X100	3	3.0	100	
92145	CAPCELL PAK C18 AQ(S3)3.0X150	3	3.0	150	
92146	CAPCELL PAK C18 AQ(S3)3.0X250	3	3.0	250	
92151	CAPCELL PAK C18 AQ(S3)4.6X35	3	4.6	35	
92152	CAPCELL PAK C18 AQ(S3)4.6X50	3	4.6	50	
92153	CAPCELL PAK C18 AQ(S3)4.6X75	3	4.6	75	
92154	CAPCELL PAK C18 AQ(S3)4.6X100	3	4.6	100	
92155	CAPCELL PAK C18 AQ(S3)4.6X150	3	4.6	150	
92156	CAPCELL PAK C18 AQ(S3)4.6X250	3	4.6	250	
92161	CAPCELL PAK C18 AQ(S3)10X20	3	10	20	
92162	CAPCELL PAK C18 AQ(S3)10X50	3	10	50	
92166	CAPCELL PAK C18 AQ(S3)10X250	3	10	250	
92172	CAPCELL PAK C18 AQ(S3)20X50	3	20	50	
12145	GUARD CARTRIDGE CAPCELL PAK C18 AQ(S3)2.0X10(2PCS)	3	2.0	10	Guard Cartridge Column
12135	GUARD CARTRIDGE CAPCELL PAK C18 AQ(S3)2.0X20(2PCS)	3	2.0	20	Guard Cartridge Column
12140	GUARD CARTRIDGE CAPCELL PAK C18 AQ(S3)4.0X10(2PCS)	3	4.0	10	Guard Cartridge Column
12130	GUARD CARTRIDGE CAPCELL PAK C18 AQ(S3)4.0X20(2PCS)	3	4.0	20	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder
12414	For CARTRIDGE HOLDER 20L	-	-	20	Cartridge holder

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
92054	CAPCELL PAK C18 AQ(S5)0.3X150	5	0.3	150	
92064	CAPCELL PAK C18 AQ(S5)0.5X150	5	0.5	150	
92000	CAPCELL PAK C18 AQ(S5)1.0X35	5	1.0	35	
92001	CAPCELL PAK C18 AQ(S5)1.0X50	5	1.0	50	
92002	CAPCELL PAK C18 AQ(S5)1.0X75	5	1.0	75	
92003	CAPCELL PAK C18 AQ(S5)1.0X100	5	1.0	100	
92004	CAPCELL PAK C18 AQ(S5)1.0X150	5	1.0	150	
92005	CAPCELL PAK C18 AQ(S5)1.0X250	5	1.0	250	
92020	CAPCELL PAK C18 AQ(S5)1.5X35	5	1.5	35	
92021	CAPCELL PAK C18 AQ(S5)1.5X50	5	1.5	50	
92022	CAPCELL PAK C18 AQ(S5)1.5X75	5	1.5	75	
92023	CAPCELL PAK C18 AQ(S5)1.5X100	5	1.5	100	
92024	CAPCELL PAK C18 AQ(S5)1.5X150	5	1.5	150	
92025	CAPCELL PAK C18 AQ(S5)1.5X250	5	1.5	250	
92009	CAPCELL PAK C18 AQ(S5)2.0X20	5	2.0	20	
92010	CAPCELL PAK C18 AQ(S5)2.0X35	5	2.0	35	
92011	CAPCELL PAK C18 AQ(S5)2.0X50	5	2.0	50	
92012	CAPCELL PAK C18 AQ(S5)2.0X75	5	2.0	75	
92013	CAPCELL PAK C18 AQ(S5)2.0X100	5	2.0	100	
92014	CAPCELL PAK C18 AQ(S5)2.0X150	5	2.0	150	
92015	CAPCELL PAK C18 AQ(S5)2.0X250	5	2.0	250	
92030	CAPCELL PAK C18 AQ(S5)3.0X35	5	3.0	35	
92031	CAPCELL PAK C18 AQ(S5)3.0X50	5	3.0	50	
92032	CAPCELL PAK C18 AQ(S5)3.0X75	5	3.0	75	
92033	CAPCELL PAK C18 AQ(S5)3.0X100	5	3.0	100	
92034	CAPCELL PAK C18 AQ(S5)3.0X150	5	3.0	150	
92035	CAPCELL PAK C18 AQ(S5)3.0X250	5	3.0	250	
92040	CAPCELL PAK C18 AQ(S5)4.6X35	5	4.6	35	
92041	CAPCELL PAK C18 AQ(S5)4.6X50	5	4.6	50	
92042	CAPCELL PAK C18 AQ(S5)4.6X75	5	4.6	75	
92043	CAPCELL PAK C18 AQ(S5)4.6X100	5	4.6	100	
92044	CAPCELL PAK C18 AQ(S5)4.6X150	5	4.6	150	
92045	CAPCELL PAK C18 AQ(S5)4.6X250	5	4.6	250	
92102	CAPCELL PAK C18 AQ(S5)6.0X35	5	6.0	35	
92104	CAPCELL PAK C18 AQ(S5)6.0X150	5	6.0	150	
92105	CAPCELL PAK C18 AQ(S5)6.0X250	5	6.0	250	
92069	CAPCELL PAK C18 AQ(S5)10X20	5	10	20	
92071	CAPCELL PAK C18 AQ(S5)10X50	5	10	50	
92074	CAPCELL PAK C18 AQ(S5)10X150	5	10	150	
92075	CAPCELL PAK C18 AQ(S5)10X250	5	10	250	
92076	CAPCELL PAK C18 AQ(S5)15X30	5	15	30	
92077	CAPCELL PAK C18 AQ(S5)15X50	5	15	50	
92079	CAPCELL PAK C18 AQ(S5)15X250	5	15	250	
92080	CAPCELL PAK C18 AQ(S5)20X35	5	20	35	
92081	CAPCELL PAK C18 AQ(S5)20X50	5	20	50	
92082	CAPCELL PAK C18 AQ(S5)20X75	5	20	75	
92083	CAPCELL PAK C18 AQ(S5)20X100	5	20	100	
92084	CAPCELL PAK C18 AQ(S5)20X150	5	20	150	
92085	CAPCELL PAK C18 AQ(S5)20X250	5	20	250	
92090	CAPCELL PAK C18 AQ(S5)30X30	5	30	30	
92091	CAPCELL PAK C18 AQ(S5)30X50	5	30	50	
92092	CAPCELL PAK C18 AQ(S5)30X75	5	30	75	
92093	CAPCELL PAK C18 AQ(S5)30X100	5	30	100	
92094	CAPCELL PAK C18 AQ(S5)30X150	5	30	150	
92095	CAPCELL PAK C18 AQ(S5)30X250	5	30	250	
92096	CAPCELL PAK C18 AQ(S5)50X50	5	50	50	
92097	CAPCELL PAK C18 AQ(S5)50X250	5	50	250	
12170	GUARD CARTRIDGE CAPCELL PAK C18 AQ(S5)2.0X10(2PCS)	5	2.0	10	Guard Cartridge Column
12173	GUARD CARTRIDGE CAPCELL PAK C18 AQ(S5)2.0X20(2PCS)	5	2.0	20	Guard Cartridge Column
12180	GUARD CARTRIDGE CAPCELL PAK C18 AQ(S5)4.0X10(2PCS)	5	4.0	10	Guard Cartridge Column
12185	GUARD CARTRIDGE CAPCELL PAK C18 AQ(S5)4.0X20(2PCS)	5	4.0	20	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder
12414	For CARTRIDGE HOLDER 20L	-	-	20	Cartridge holder

CAPCELL PAK C18 ACR

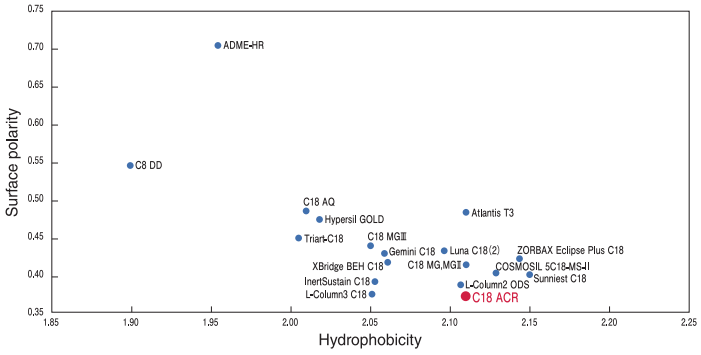
High level of acid resistance and high stereoselectivity

CAPCELL PAK C18 ACR has the highest level of acid resistance in the lineup of columns offered by Osaka Soda. This column has high selectivity for planar structure compounds and polymeric separation characteristics. It is suitable for continuous use in the low pH range and analysis of structural isomers.

Physical properties

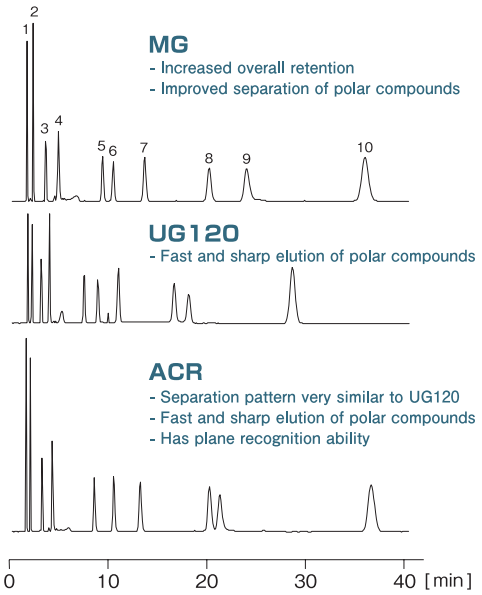
Functional group	Pore Size (Å)	Particle Size (μm)	Surface Area (m^2/g)	% of Carbon	Density (μmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
C18 (octadecyl groups)	80	3	300	17	2.6	20	1~10	L1
C18 (octadecyl groups)	80	5	300	17	2.6	20	1~10	L1

Hydrophobicity and surface polarity



High plane recognition capability

CAPCELL PAK C18 ACR exhibits a separation pattern of low surface polarity similar to UG. Also, since the bonding pattern of octadecyl groups is different, CAPCELL PAK C18 AQ has the separation characteristics of the so-called polymeric C18 columns that strongly retain compounds with planar structure.



HPLC Conditions

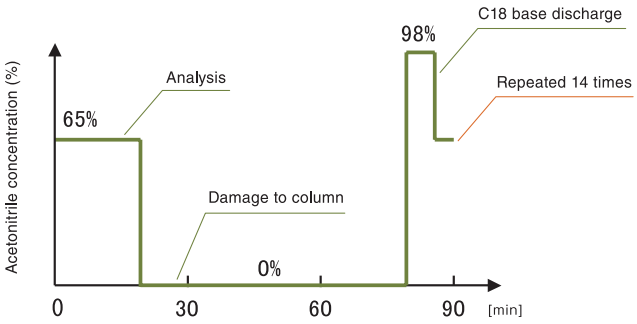
Column size : 4.6 mm i.d.× 150 mm
Mobile phase : H_2O / CH_3OH = 50 / 50
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 254 nm
Sample : 1. Uracil 2. Caffeine 3. Phenol 4. 2-Ethylpyridine 5. Methyl Benzoate 6. Benzene 7. N,N-Dimethylaniline 8. Toluene 9. Phenylacetylacetone 10. Naphthalene

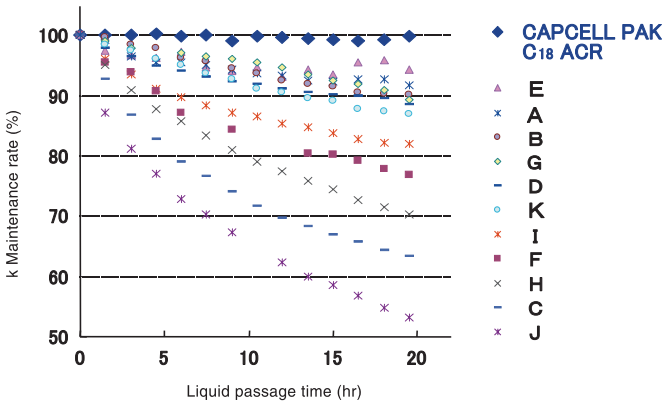
Can be used up to pH 1

Si-C bonds are known to break when octadecyl columns are used with acidic mobile phase. The durability of ACR and ODS column of each company was simultaneously compared with the extremely harsh acid resistance test using 2 vol% TFA aqueous solution.

HPLC Conditions

Column : CAPCELL PAK C_{18} ACR ; 4.6 mm i.d.× 150 mm
Mobile phase : A) 2 vol% TFA, H_2O (pH=1) B) 2 vol% TFA, CH_3CN
B 65 % (0 min) -> 65 % (20 min) -> 0 % (20.1 min) -> 0 % (80 min) -> 98 % (80.1 min) -> 98 % (85 min) -> 65 % (85.1 min) -> 65 % (90 min)
Flow rate : 1.0 mL/min
Temperature : 60 ℃
Detection : UV 254 nm
Inj. vol. : 7 μL
Sample : 1. Uracil 2. Amylbenzene
* Remaining retention coefficient of amylbenzene after 14 iterations (%)

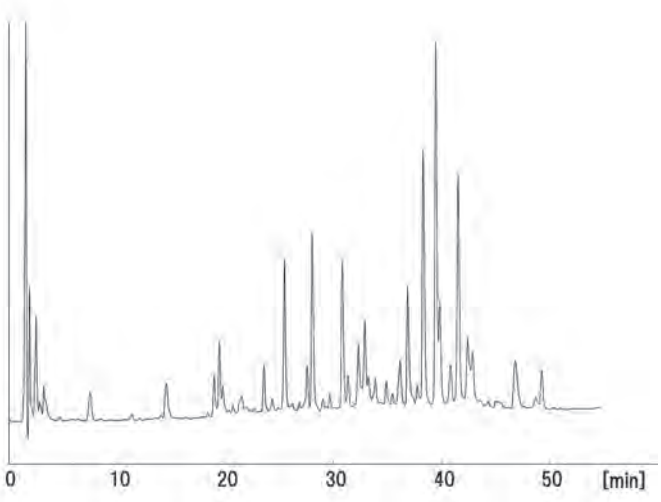




CAPCELL PAK C18 ACR

Trypsin digest

An example of analysis of trypsin degradation products of casein with CAPCELL PAK C18 ACR is shown. Peptide analysis in a reversed-phase system is generally performed by gradient analysis under acidic conditions. C18 ACR shows excellent durability even under such conditions, and excellent separation performance can also be confirmed as shown in the following chromatogram.



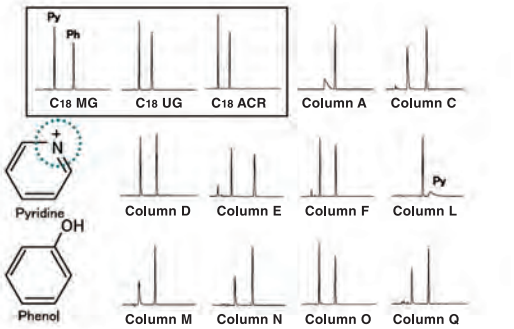
HPLC Conditions

Column : CAPCELL PAK C_{18} ACR S5 ; 1.0 mm i.d.× 150 mm
Mobile phase : A) 0.05 vol% TFA, H_2O B) 0.05 vol% TFA, CH_3CN
Gradient B:10 %(0 min)-> 50 %(60 min)
Flow rate : 50 µL/min
Temperature : 40 ℃
Detection : UV 210 nm
Inj. vol. : 1 µL

Basic compound

Since the secondary effect of residual silanol groups is reduced to the minimum with the polymer coating in CAPCELL PAK C18 ACR, peak shape for basic compounds is also good.

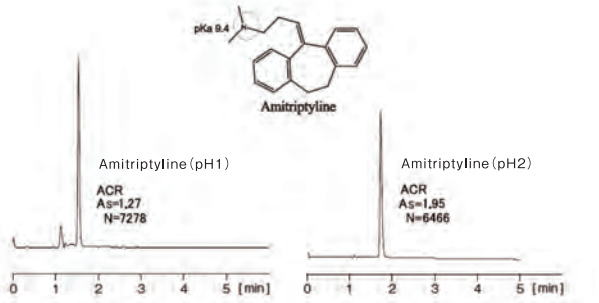
Comparison of the peak shapes of pyridine



HPLC Conditions

Column : CAPCELL PAK C_{18} ACR ; 4.6 mm i.d.× 150 mm
Mobile phase : H_2O / CH_3CN = 70 / 30
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 254 nm
sample : 1. Pyridine 2. Phenol

Peak shape of amitriptyline



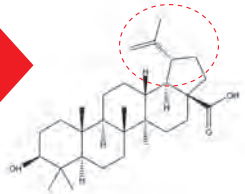
HPLC Conditions

Column : CAPCELL PAK C_{18} ACR S5 ; 4.6 mm i.d.× 150 mm
Mobile phase : (pH 1) 20 mmol/L Phosphate buffer / CH_3CN = 40 / 60
(pH 2) 20 mmol/L Phosphate buffer / CH_3CN = 40 / 60
Flow rate : 1.0 mL/min
Temperature : 30 ℃
Detection : UV 254 nm
Inj. vol. : 5 µL
Sample : Amitriptyline

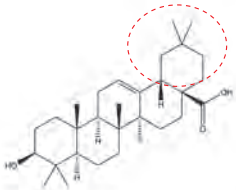
Triterpenes

Betulinic, oleanolic and ursolic acids, which are “3 main functional triterpenes” in plants, have been particularly receiving attention in recent years due to their bioactivities, such as anti-inflammatory and antioxidant effect.
The characteristic of these 3 compounds is that they are structural isomers with partially different ring structures.
CAPCELL PAK C18 ACR, which has a high plane recognition ability, could adequately separate these 3 compounds.

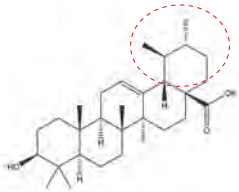
Three types of triterpenes that are structural isomers



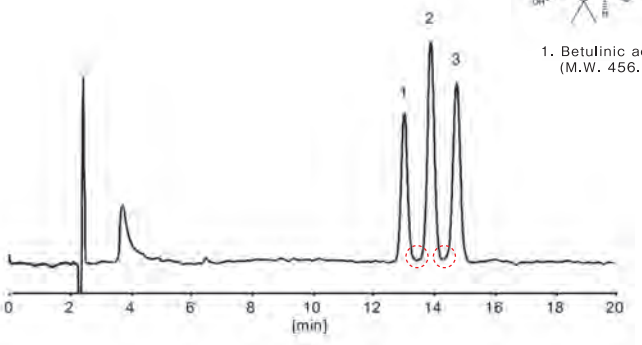
1. Betulinic acid (100 µg/mL) (M.W. 456.7)



2. Oleanolic acid (100 µg/mL) (M.W. 456.7)



3. Ursolic acid (100 µg/mL) (M.W. 456.7)



HPLC Conditions

Column : CAPCELL PAK C_{18} ACR S3 ; 4.6 mm i.d.× 250 mm
Mobile phase : 30 mmol/L CH_3COONH_4 / CH_3OH = 15 / 85
Flow rate : 1.0 mL/min
Temperature : 30 ℃
Detection : UV 210 nm
Inj. vol. : 10 µL
Sample dissolved in : CH_3OH

CAPCELL PAK C18 ACR Lineup

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
92200	CAPCELL PAK C18 ACR(S3)0.3X150	3	0.3	150	
92205	CAPCELL PAK C18 ACR(S3)0.5X150	3	0.5	150	
92210	CAPCELL PAK C18 ACR(S3)1.0X35	3	1.0	35	
92211	CAPCELL PAK C18 ACR(S3)1.0X50	3	1.0	50	
92212	CAPCELL PAK C18 ACR(S3)1.0X75	3	1.0	75	
92213	CAPCELL PAK C18 ACR(S3)1.0X100	3	1.0	100	
92214	CAPCELL PAK C18 ACR(S3)1.0X150	3	1.0	150	
92215	CAPCELL PAK C18 ACR(S3)1.0X250	3	1.0	250	
92220	CAPCELL PAK C18 ACR(S3)1.5X35	3	1.5	35	
92221	CAPCELL PAK C18 ACR(S3)1.5X50	3	1.5	50	
92222	CAPCELL PAK C18 ACR(S3)1.5X75	3	1.5	75	
92223	CAPCELL PAK C18 ACR(S3)1.5X100	3	1.5	100	
92224	CAPCELL PAK C18 ACR(S3)1.5X150	3	1.5	150	
92225	CAPCELL PAK C18 ACR(S3)1.5X250	3	1.5	250	
92230	CAPCELL PAK C18 ACR(S3)2.0X20	3	2.0	20	
92231	CAPCELL PAK C18 ACR(S3)2.0X35	3	2.0	35	
92232	CAPCELL PAK C18 ACR(S3)2.0X50	3	2.0	50	
92233	CAPCELL PAK C18 ACR(S3)2.0X75	3	2.0	75	
92234	CAPCELL PAK C18 ACR(S3)2.0X100	3	2.0	100	
92235	CAPCELL PAK C18 ACR(S3)2.0X150	3	2.0	150	
92236	CAPCELL PAK C18 ACR(S3)2.0X250	3	2.0	250	
92240	CAPCELL PAK C18 ACR(S3)3.0X35	3	3.0	35	
92241	CAPCELL PAK C18 ACR(S3)3.0X50	3	3.0	50	
92242	CAPCELL PAK C18 ACR(S3)3.0X75	3	3.0	75	
92243	CAPCELL PAK C18 ACR(S3)3.0X100	3	3.0	100	
92244	CAPCELL PAK C18 ACR(S3)3.0X150	3	3.0	150	
92245	CAPCELL PAK C18 ACR(S3)3.0X250	3	3.0	250	
92250	CAPCELL PAK C18 ACR(S3)4.6X35	3	4.6	35	
92251	CAPCELL PAK C18 ACR(S3)4.6X50	3	4.6	50	
92252	CAPCELL PAK C18 ACR(S3)4.6X75	3	4.6	75	
92253	CAPCELL PAK C18 ACR(S3)4.6X100	3	4.6	100	
92254	CAPCELL PAK C18 ACR(S3)4.6X150	3	4.6	150	
92255	CAPCELL PAK C18 ACR(S3)4.6X250	3	4.6	250	
12050	GUARD CARTRIDGE CAPCELL PAK C18 ACR(S3)2.0X10(2PCS)	3	2.0	10	Guard Cartridge Column
12055	GUARD CARTRIDGE CAPCELL PAK C18 ACR(S3)2.0X20(2PCS)	3	2.0	20	Guard Cartridge Column
12060	GUARD CARTRIDGE CAPCELL PAK C18 ACR(S3)4.0X10(2PCS)	3	4.0	10	Guard Cartridge Column
12065	GUARD CARTRIDGE CAPCELL PAK C18 ACR(S3)4.0X20(2PCS)	3	4.0	20	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder
12414	For CARTRIDGE HOLDER 20L	-	-	20	Cartridge holder

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
91913	CAPCELL PAK C18 ACR(S5)0.3X150	5	0.3	150	
91933	CAPCELL PAK C18 ACR(S5)0.5X150	5	0.5	150	
91501	CAPCELL PAK C18 ACR(S5)1.0X35	5	1.0	35	
91505	CAPCELL PAK C18 ACR(S5)1.0X50	5	1.0	50	
91502	CAPCELL PAK C18 ACR(S5)1.0X75	5	1.0	75	
91506	CAPCELL PAK C18 ACR(S5)1.0X100	5	1.0	100	
91503	CAPCELL PAK C18 ACR(S5)1.0X150	5	1.0	150	
91504	CAPCELL PAK C18 ACR(S5)1.0X250	5	1.0	250	
91401	CAPCELL PAK C18 ACR(S5)1.5X35	5	1.5	35	
91405	CAPCELL PAK C18 ACR(S5)1.5X50	5	1.5	50	
91402	CAPCELL PAK C18 ACR(S5)1.5X75	5	1.5	75	
91400	CAPCELL PAK C18 ACR(S5)1.5X100	5	1.5	100	
91403	CAPCELL PAK C18 ACR(S5)1.5X150	5	1.5	150	
91404	CAPCELL PAK C18 ACR(S5)1.5X250	5	1.5	250	
91306	CAPCELL PAK C18 ACR(S5)2.0X20	5	2.0	20	
91301	CAPCELL PAK C18 ACR(S5)2.0X35	5	2.0	35	
91305	CAPCELL PAK C18 ACR(S5)2.0X50	5	2.0	50	
91308	CAPCELL PAK C18 ACR(S5)2.0X75	5	2.0	75	
91307	CAPCELL PAK C18 ACR(S5)2.0X100	5	2.0	100	
91303	CAPCELL PAK C18 ACR(S5)2.0X150	5	2.0	150	
91304	CAPCELL PAK C18 ACR(S5)2.0X250	5	2.0	250	
91201	CAPCELL PAK C18 ACR(S5)3.0X35	5	3.0	35	
91205	CAPCELL PAK C18 ACR(S5)3.0X50	5	3.0	50	
91206	CAPCELL PAK C18 ACR(S5)3.0X75	5	3.0	75	
91207	CAPCELL PAK C18 ACR(S5)3.0X100	5	3.0	100	
91203	CAPCELL PAK C18 ACR(S5)3.0X150	5	3.0	150	
91204	CAPCELL PAK C18 ACR(S5)3.0X250	5	3.0	250	
91101	CAPCELL PAK C18 ACR(S5)4.6X35	5	4.6	35	
91105	CAPCELL PAK C18 ACR(S5)4.6X50	5	4.6	50	
91106	CAPCELL PAK C18 ACR(S5)4.6X75	5	4.6	75	
91107	CAPCELL PAK C18 ACR(S5)4.6X100	5	4.6	100	
91103	CAPCELL PAK C18 ACR(S5)4.6X150	5	4.6	150	
91104	CAPCELL PAK C18 ACR(S5)4.6X250	5	4.6	250	
91110	CAPCELL PAK C18 ACR(S5)6.0X35	5	6.0	35	
91213	CAPCELL PAK C18 ACR(S5)6.0X150	5	6.0	150	
91115	CAPCELL PAK C18 ACR(S5)6.0X250	5	6.0	250	
91601	CAPCELL PAK C18 ACR(S5)10X20	5	10	20	
91602	CAPCELL PAK C18 ACR(S5)10X50	5	10	50	
91603	CAPCELL PAK C18 ACR(S5)10X150	5	10	150	
91604	CAPCELL PAK C18 ACR(S5)10X250	5	10	250	
91610	CAPCELL PAK C18 ACR(S5)15X30	5	15	30	
91611	CAPCELL PAK C18 ACR(S5)15X50	5	15	50	
91615	CAPCELL PAK C18 ACR(S5)15X250	5	15	250	
91701	CAPCELL PAK C18 ACR(S5)20X35	5	20	35	
91702	CAPCELL PAK C18 ACR(S5)20X50	5	20	50	
91705	CAPCELL PAK C18 ACR(S5)20X75	5	20	75	
91706	CAPCELL PAK C18 ACR(S5)20X100	5	20	100	
91703	CAPCELL PAK C18 ACR(S5)20X150	5	20	150	
91704	CAPCELL PAK C18 ACR(S5)20X250	5	20	250	
91801	CAPCELL PAK C18 ACR(S5)30X30	5	30	30	
91802	CAPCELL PAK C18 ACR(S5)30X50	5	30	50	
91803	CAPCELL PAK C18 ACR(S5)30X75	5	30	75	
91805	CAPCELL PAK C18 ACR(S5)30X100	5	30	100	
91806	CAPCELL PAK C18 ACR(S5)30X150	5	30	150	
91804	CAPCELL PAK C18 ACR(S5)30X250	5	30	250	
91810	CAPCELL PAK C18 ACR(S5)50X50	5	50	50	
91814	CAPCELL PAK C18 ACR(S5)50X250	5	50	250	
12152	GUARD CARTRIDGE CAPCELL PAK C18 ACR(S5)2.0X10(2PCS)	5	2.0	10	Guard Cartridge Column
12153	GUARD CARTRIDGE CAPCELL PAK C18 ACR(S5)2.0X20(2PCS)	5	2.0	20	Guard Cartridge Column
12155	GUARD CARTRIDGE CAPCELL PAK C18 ACR(S5)4.0X10(2PCS)	5	4.0	10	Guard Cartridge Column
12156	GUARD CARTRIDGE CAPCELL PAK C18 ACR(S5)4.0X20(2PCS)	5	4.0	20	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder
12414	For CARTRIDGE HOLDER 20L	-	-	20	Cartridge holder

CAPCELL PAK C8 DD

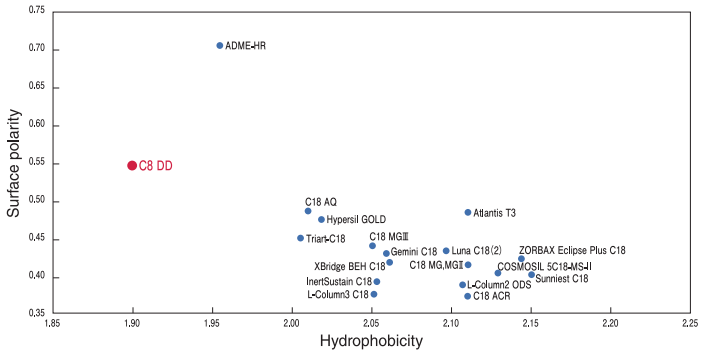
High durability C8 columns

CAPCELL PAK C8 DD is a polymer-coated C8 column with improved acid and alkali resistance by alkyl group introduction technology, which is used for ACR. A C8 column that can be used in a wide range of pH from 1.5 to 10. Since the column has high surface polarity, it is characterized by high retention of polar compounds.

Physical properties

Functional group	Pore Size (Å)	Particle Size (µm)	Surface Area (m^2/g)	% of Carbon	Density (µmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
C8 (octyl group)	80	3	300	11	3.8	20	1.5~10	L7
C8 (octyl group)	80	5	300	11	3.8	20	1.5~10	L7

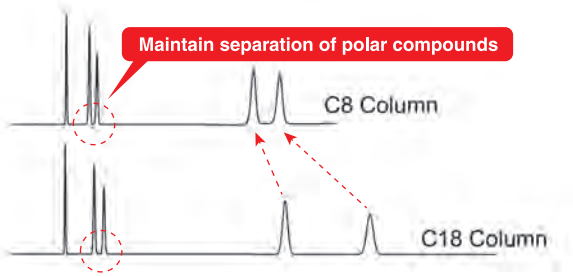
Hydrophobicity and surface polarity



Usage example of C8 column

C8 columns are the second most widely used columns in the world after C18 columns since C8 columns have the same selectivity as C18 columns, without strong retention, and good balance between hydrophobicity and retention. The following are the advantages of using C8 columns.

- **Reduces analysis time for compounds with significantly different polarities. Elution is sharp.**
- **Since gradient analysis is not required or the final organic solvent ratio can be reduced, reproducibility is improved and the time to return to initial conditions can be shortened.**
- **Reduce the use of hazardous and costly organic solvents.**



Rapid and sharp elution of compounds with high hydrophobicity while retaining polar compounds.

Excellent durability

In addition to alkali resistance, which is a feature of CAPCELL PAK, acid resistance has been significantly improved in this column with high durability, when compared to the previous C8 columns.

Acid resistance test conditions

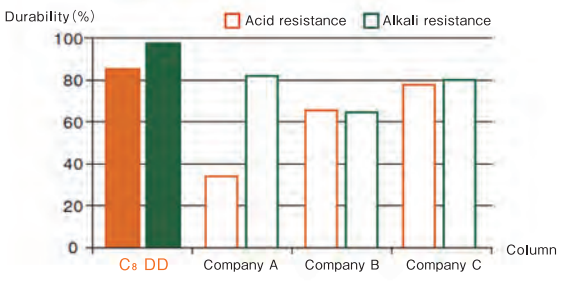
HPLC Conditions

Column size : 4.6 mm i.d.× 150 mm
Mobile phase : A) 2 vol% TFA, H_2O, pH 1
B) 2 vol% TFA, CH_3CN
B 65 % (20 min) -> 0 % (60 min) -> 98 % (5 min) -> 65 % (5 min)
Flow rate : 1.0 mL/min
Temperature : 60 ℃
Detection : UV 254 nm
Sample : Uracil, Amylbenzene * Retention of amylbenzene after 14 iterations

Alkali resistance test conditions

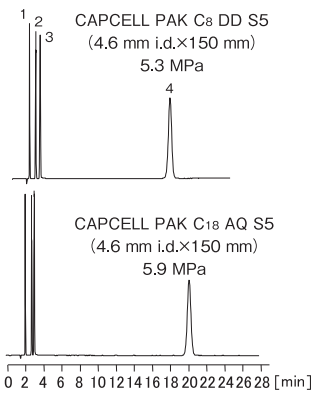
HPLC Conditions

Column size : 4.6 mm i.d.× 150 mm
Mobile phase : 4 mmol/L $Na_2B_4O_7$ / CH_3OH = 90 / 10 , pH 10
Flow rate : 1.0 mL/min
Temperature : 50 ℃
Detection : UV 254 nm
Sample : Benzyl alcohol * Residual rate of benzyl alcohol retention coefficient (k) when the liquid has passed for 20 hours (%)



Effective for simultaneous analysis of low-polarity to high-polarity compounds

High-polarity column CAPCELL PAK C18 AQ and CAPCELL PAK C8 DD were compared.
Since hydrophobicity in C18 AQ columns increases with the length of the functional group, it takes time to analyze ibuprofen which has a relatively high hydrophobicity. On the other hand, since hydrophobicity is small in C8 DD column, analysis is completed in a shorter time. Since a high surface polarity that is equivalent to C18 AQ, acts, the first half of the sample, which is highly polar, is also retained well.



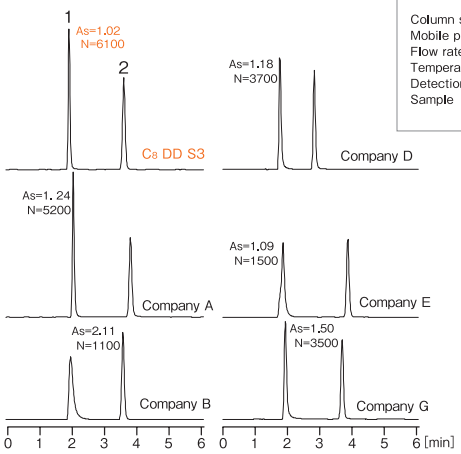
HPLC Conditions

Mobile phase : 0.1 vol% H_3PO_4, H_2O / CH_3OH = 40 / 60
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 220 nm
Sample : 1. Caffeine
2. Ethenzamide
3. Bromovalerylurea
4. Ibupurofen

CAPCELL PAK C8 DD

Good peak shape even for basic compounds

In CAPCELL PAK C8 DD, where the influence of silanol groups is reduced to a minimum by polymer coating, symmetrical peak shapes are observed with the pyridine/phenol test.

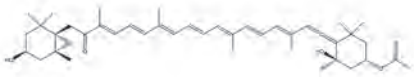


HPLC Conditions

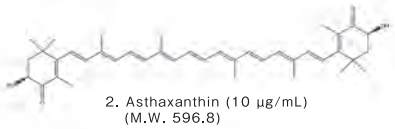
Column size	: 4.6 mm i.d.× 100 mm
Mobile phase	: H_2O / CH_3CN = 70 / 30
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 254 nm
Sample	: 1. Pyridine 2. Phenol

Carotenoid

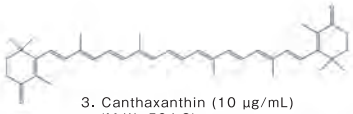
Carotenoids are yellow or red pigments widely found in plants and animals, and are broadly classified into carotenes and xanthophylls. The following are examples of analysis for fucoxanthin, asthaxanthin and canthaxanthin, which are xanthophylls, using CAPCELL PAK C8 DD S5 and CAPCELL PAK C18 MG Ⅱ S5.
When compared to C18 MG Ⅱ, the 3 components could be separated in a shorter period with CAPCELL PAK C8 DD.



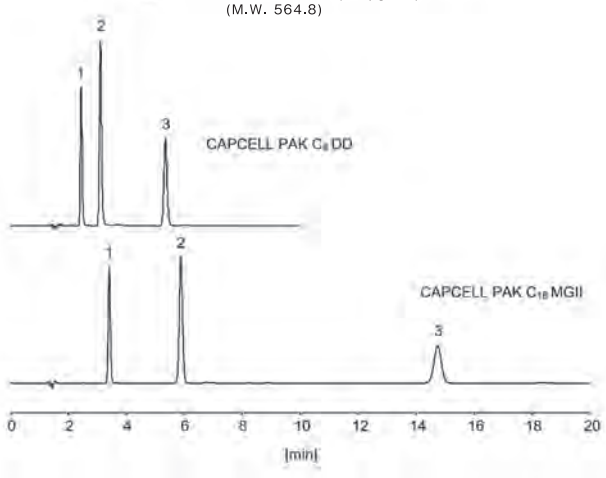
1. Fucoxanthin (10 μg/mL)
(M.W. 658.9)



2. Asthaxanthin (10 μg/mL)
(M.W. 596.8)



3. Canthaxanthin (10 μg/mL)
(M.W. 564.8)

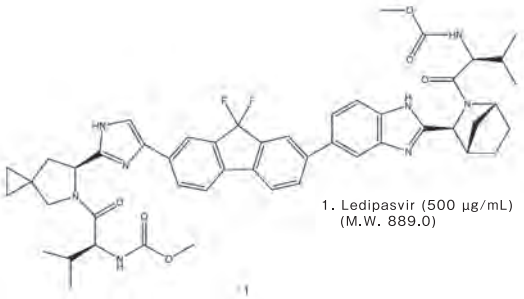


HPLC Conditions

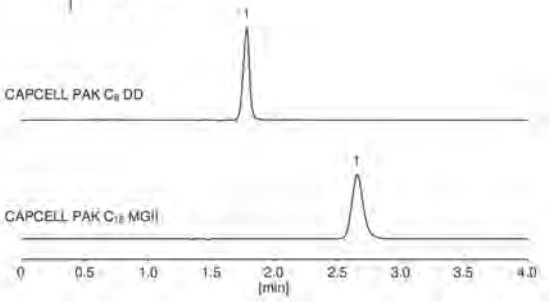
Column size	: S5 ; 4.6 mm i.d.×150 mm
Mobile phase	: H_2O / CH_3CN = 10 / 90
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 480 nm
Inj. vol.	: 10 μL
Sample dissolved in	: Each compound was separately dissolved in DMF at 200 μg/mL. The mixture was diluted to 10 μg/mL by adding methanol.

Ledipasvir

Ledipasvir is one of the key components in “Harvoni”, a treatment drug that is highly effective for hepatitis C. The data comparing CAPCELL PAK C8 DD S5 and CAPCELL PAK C18 MG Ⅱ S5, which is the 1st Choice C18 column of OSAKA SODA, is shown.



1. Ledipasvir (500 μg/mL)
(M.W. 889.0)

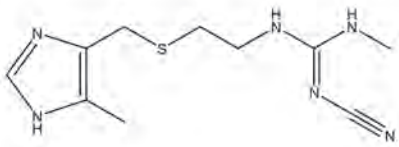


HPLC Conditions

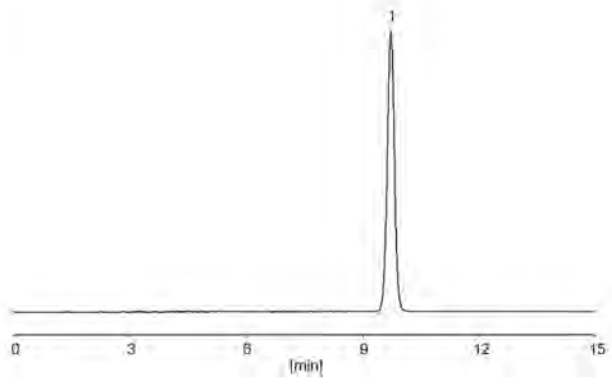
Column	: S5 ; 4.6 mm i.d.× 150 mm
Mobile phase	: 0.1 vol% HCOOH / CH_3CN = 55 / 45
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 254 nm
Inj. vol.	: 10 μL
Sample dissolved in	: 50 vol% CH_3CN

Cimetidine

Cimetidine is a type of H2 blocker used for gastric ulcers. It inhibits the secretion of gastric acid by preventing the bonding of histamine to histamine H2 receptors present on the gastric mucosal cell walls. An example of analysis using CAPCELL PAK C8 DD S5 is shown.



1. Cimetidine (300 μg/mL)
(M.W. 252.3)



HPLC Conditions

Column	: CAPCELL PAK C8 DD S5 ; 4.6 mm i.d.× 150 mm
Mobile phase	: 25 mmol/L Phosephate buffer (KH_2PO_4 : K_2HPO_4 = 1 : 1 in molar ratio) / CH_3CN = 90 / 10
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 230 nm
Inj. vol.	: 1 μL

CAPCELL PAK C8 DD Lineup

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
92350	CAPCELL PAK C8 DD(S3)0.3X150	3	0.3	150	
92351	CAPCELL PAK C8 DD(S3)0.5X150	3	0.5	150	
92352	CAPCELL PAK C8 DD(S3)1.0X35	3	1.0	35	
92353	CAPCELL PAK C8 DD(S3)1.0X50	3	1.0	50	
92354	CAPCELL PAK C8 DD(S3)1.0X75	3	1.0	75	
92355	CAPCELL PAK C8 DD(S3)1.0X100	3	1.0	100	
92356	CAPCELL PAK C8 DD(S3)1.0X150	3	1.0	150	
92357	CAPCELL PAK C8 DD(S3)1.0X250	3	1.0	250	
92358	CAPCELL PAK C8 DD(S3)1.5X35	3	1.5	35	
92359	CAPCELL PAK C8 DD(S3)1.5X50	3	1.5	50	
92360	CAPCELL PAK C8 DD(S3)1.5X75	3	1.5	75	
92361	CAPCELL PAK C8 DD(S3)1.5X100	3	1.5	100	
92362	CAPCELL PAK C8 DD(S3)1.5X150	3	1.5	150	
92363	CAPCELL PAK C8 DD(S3)1.5X250	3	1.5	250	
92364	CAPCELL PAK C8 DD(S3)2.0X20	3	2.0	20	
92365	CAPCELL PAK C8 DD(S3)2.0X35	3	2.0	35	
92366	CAPCELL PAK C8 DD(S3)2.0X50	3	2.0	50	
92367	CAPCELL PAK C8 DD(S3)2.0X75	3	2.0	75	
92368	CAPCELL PAK C8 DD(S3)2.0X100	3	2.0	100	
92369	CAPCELL PAK C8 DD(S3)2.0X150	3	2.0	150	
92370	CAPCELL PAK C8 DD(S3)2.0X250	3	2.0	250	
92371	CAPCELL PAK C8 DD(S3)3.0X35	3	3.0	35	
92372	CAPCELL PAK C8 DD(S3)3.0X50	3	3.0	50	
92373	CAPCELL PAK C8 DD(S3)3.0X75	3	3.0	75	
92374	CAPCELL PAK C8 DD(S3)3.0X100	3	3.0	100	
92375	CAPCELL PAK C8 DD(S3)3.0X150	3	3.0	150	
92376	CAPCELL PAK C8 DD(S3)3.0X250	3	3.0	250	
92377	CAPCELL PAK C8 DD(S3)4.6X35	3	4.6	35	
92378	CAPCELL PAK C8 DD(S3)4.6X50	3	4.6	50	
92379	CAPCELL PAK C8 DD(S3)4.6X75	3	4.6	75	
92380	CAPCELL PAK C8 DD(S3)4.6X100	3	4.6	100	
92381	CAPCELL PAK C8 DD(S3)4.6X150	3	4.6	150	
92382	CAPCELL PAK C8 DD(S3)4.6X250	3	4.6	250	
92383	CAPCELL PAK C8 DD(S3)10X20	3	10	20	
92385	CAPCELL PAK C8 DD(S3)10X150	3	10	150	
92386	CAPCELL PAK C8 DD(S3)10X250	3	10	250	
92390	CAPCELL PAK C8 DD(S3)20X35	3	20	35	
92394	CAPCELL PAK C8 DD(S3)20X150	3	20	150	
92395	CAPCELL PAK C8 DD(S3)20X250	3	20	250	
12106	GUARD CARTRIDGE CAPCELL PAK C8 DD(S3)2.0X10(2PCS)	3	2.0	10	Guard Cartridge Column
12104	GUARD CARTRIDGE CAPCELL PAK C8 DD(S3)4.0X10(2PCS)	3	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
90935	CAPCELL PAK C8 DD(S5)0.3X150	5	0.3	150	
90937	CAPCELL PAK C8 DD(S5)0.5X150	5	0.5	150	
90940	CAPCELL PAK C8 DD(S5)1.0X35	5	1.0	35	
90941	CAPCELL PAK C8 DD(S5)1.0X50	5	1.0	50	
90942	CAPCELL PAK C8 DD(S5)1.0X75	5	1.0	75	
90943	CAPCELL PAK C8 DD(S5)1.0X100	5	1.0	100	
90944	CAPCELL PAK C8 DD(S5)1.0X150	5	1.0	150	
90945	CAPCELL PAK C8 DD(S5)1.0X250	5	1.0	250	
90950	CAPCELL PAK C8 DD(S5)1.5X35	5	1.5	35	
90951	CAPCELL PAK C8 DD(S5)1.5X50	5	1.5	50	
90952	CAPCELL PAK C8 DD(S5)1.5X75	5	1.5	75	
90953	CAPCELL PAK C8 DD(S5)1.5X100	5	1.5	100	
90954	CAPCELL PAK C8 DD(S5)1.5X150	5	1.5	150	
90955	CAPCELL PAK C8 DD(S5)1.5X250	5	1.5	250	
90959	CAPCELL PAK C8 DD(S5)2.0X20	5	2.0	20	
90960	CAPCELL PAK C8 DD(S5)2.0X35	5	2.0	35	
90961	CAPCELL PAK C8 DD(S5)2.0X50	5	2.0	50	
90962	CAPCELL PAK C8 DD(S5)2.0X75	5	2.0	75	
90963	CAPCELL PAK C8 DD(S5)2.0X100	5	2.0	100	
90964	CAPCELL PAK C8 DD(S5)2.0X150	5	2.0	150	
90965	CAPCELL PAK C8 DD(S5)2.0X250	5	2.0	250	
90970	CAPCELL PAK C8 DD(S5)3.0X35	5	3.0	35	
90971	CAPCELL PAK C8 DD(S5)3.0X50	5	3.0	50	
90972	CAPCELL PAK C8 DD(S5)3.0X75	5	3.0	75	
90973	CAPCELL PAK C8 DD(S5)3.0X100	5	3.0	100	
90974	CAPCELL PAK C8 DD(S5)3.0X150	5	3.0	150	
90975	CAPCELL PAK C8 DD(S5)3.0X250	5	3.0	250	
90980	CAPCELL PAK C8 DD(S5)4.6X35	5	4.6	35	
90981	CAPCELL PAK C8 DD(S5)4.6X50	5	4.6	50	
90982	CAPCELL PAK C8 DD(S5)4.6X75	5	4.6	75	
90983	CAPCELL PAK C8 DD(S5)4.6X100	5	4.6	100	
90984	CAPCELL PAK C8 DD(S5)4.6X150	5	4.6	150	
90985	CAPCELL PAK C8 DD(S5)4.6X250	5	4.6	250	
91000	CAPCELL PAK C8 DD(S5)10X20	5	10	20	
91001	CAPCELL PAK C8 DD(S5)10X50	5	10	50	
91004	CAPCELL PAK C8 DD(S5)10X150	5	10	150	
91005	CAPCELL PAK C8 DD(S5)10X250	5	10	250	
91010	CAPCELL PAK C8 DD(S5)15X30	5	15	30	
91012	CAPCELL PAK C8 DD(S5)15X50	5	15	50	
91013	CAPCELL PAK C8 DD(S5)15X250	5	15	250	
91020	CAPCELL PAK C8 DD(S5)20X35	5	20	35	
91021	CAPCELL PAK C8 DD(S5)20X50	5	20	50	
91022	CAPCELL PAK C8 DD(S5)20X75	5	20	75	
91023	CAPCELL PAK C8 DD(S5)20X100	5	20	100	
91024	CAPCELL PAK C8 DD(S5)20X150	5	20	150	
91025	CAPCELL PAK C8 DD(S5)20X250	5	20	250	
91030	CAPCELL PAK C8 DD(S5)30X30	5	30	30	
91031	CAPCELL PAK C8 DD(S5)30X50	5	30	50	
91032	CAPCELL PAK C8 DD(S5)30X75	5	30	75	
91033	CAPCELL PAK C8 DD(S5)30X100	5	30	100	
91034	CAPCELL PAK C8 DD(S5)30X150	5	30	150	
91035	CAPCELL PAK C8 DD(S5)30X250	5	30	250	
91040	CAPCELL PAK C8 DD(S5)50X50	5	50	50	
91042	CAPCELL PAK C8 DD(S5)50X250	5	50	250	
12095	GUARD CARTRIDGE CAPCELL PAK C8 DD(S5)2.0X10(2PCS)	5	2.0	10	Guard Cartridge Column
12096	GUARD CARTRIDGE CAPCELL PAK C8 DD(S5)2.0X20(2PCS)	5	2.0	20	Guard Cartridge Column
12090	GUARD CARTRIDGE CAPCELL PAK C8 DD(S5)4.0X10(2PCS)	5	4.0	10	Guard Cartridge Column
12091	GUARD CARTRIDGE CAPCELL PAK C8 DD(S5)4.0X20(2PCS)	5	4.0	20	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder
12414	For CARTRIDGE HOLDER 20L	-	-	20	Cartridge holder

CAPCELL PAK ADME-HR / INERT ADME-HR

New 1st Choice of Osaka Soda

CAPCELL PAK ADME-HR is a reversed-phase system column in which an innovative cage-shaped functional group called adamantyl group is introduced. This column has moderate hydrophobicity with high surface polarity, and exhibits high retention for high-polarity compounds. These columns also have specific selectivity, and are effective to change the selectivity and separation pattern of commonly used columns such as the C18 column. This is the new 1st Choice column of OSAKA SODA that we want you to try along with CAPCELL PAK C18 MG Ⅱ for the first screening.

■ Physical properties

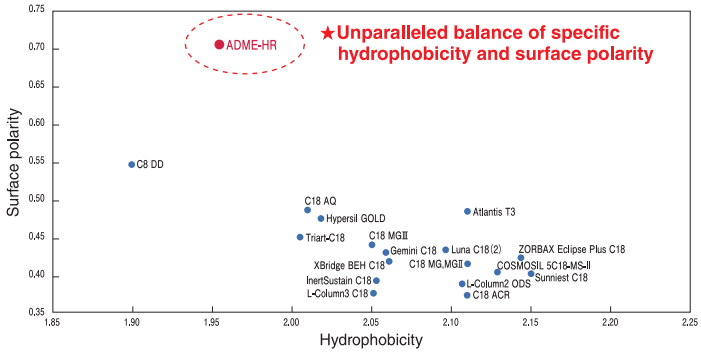
CAPCELL PAK ADME-HR

Functional group	Pore Size (A)	Particle Size (μm)	Surface Area (m^2/g)	% of Carbon	Density (μmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
Adamantyl group	100	2	310	12	2.7	100	2~9	–
Adamantyl group	100	3	310	12	2.7	20	2~9	–
Adamantyl group	100	5	310	12	2.7	20	2~9	–

CAPCELL PAK INERT ADME-HR

Functional group	Pore Size (A)	Particle Size (μm)	Surface Area (m^2/g)	% of Carbon	Density (μmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
Adamantyl group	100	3	310	12	2.7	50	2~9	–

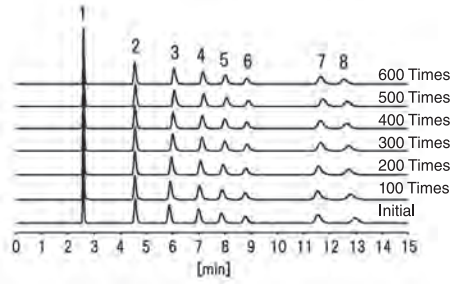
■ Hydrophobicity and surface polarity



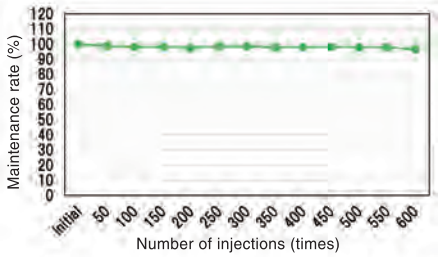
■ Stable in 100% aqueous mobile phase

The maintenance rate of the number of theoretical plates is almost constant during continuous analysis under acidic conditions, which enables stable use.

Chromatogram of 600 consecutive analyses



Change in the number of theoretical plates for thymine (peak 8)



HPLC Conditions

Column size	: S5 ; 2.1 mm i.d.× 150 mm
Mobile phase	: 10 mmol/L $HCOONH_4$ (adjusted with formic acid at pH 3)
Flow rate	: 200 μL/min
Temperature	: 40 ℃
Detection	: UV 254 nm
Inj. vol.	: 1 μL
Sample	: 1. Cytosine 2. Uracil 3. Guanine 4. Hypoxanthine 5. Xanthine 6. Oxipurinol 7. Allopurinol 8. Thymine

■ What is ADME?

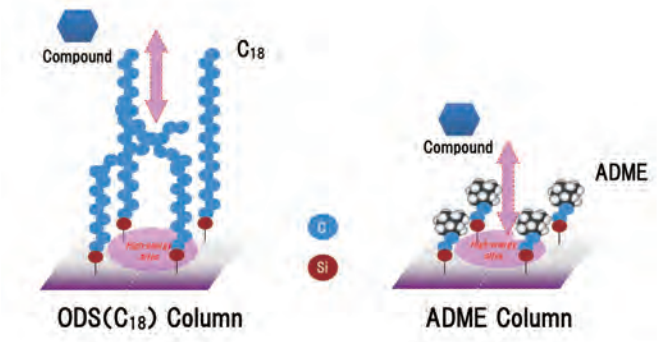
Adamantyl ethyl group (ADME group)

Adamantane is a cage-shaped molecule with 10 carbon atoms arranged in a diamond structure.

The packing material is made by bonding adamantane to a silica substrate using ethyl groups as spacers.

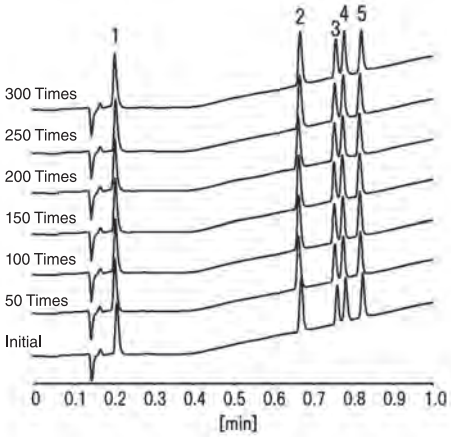
■ Illustration of the packing material surface in ADME and C18 columns

The ADME group has a cage-shaped structure, is more susceptible to the polarity of the substrate surface than the C18 group, and exhibits a unique separation.



■ Durability under high temperature and high pressure conditions

Data to confirm durability under high temperature and high pressure using a formic acid-based mobile phase, which is generally used in LC-MS. There is almost no change in the retention time or peak shape after 300 times continuous operation at a temperature of 70°C and a pressure of around 70 MPa.



HPLC Conditions

Column	: CAPCELL PAK ADME-HR S2 ; 2.1 mm i.d.× 50 mm
Mobile phase	: A) 0.1 vol% HCOOH B) 0.1 vol% HCOOH in CH_3CN B 0 %(0 min)-> 100 %(1.0 min)-> 0 %(1.1 min) Gradient
Flow rate	: 1.5 mL/min
Temperature	: 70 ℃
Detection	: UV 210 nm
Inj. vol.	: 1 μL
Sample	: 1. Gly-Tyr 2. Val-Tyr-Val 3. Angiotensin Ⅱ 4. Met-Enkephalin 5. Leu-Enkephalin (50 ppm each) *Sigma aldrich H2016 (peptide standard)
Sample dissolved in	: H_2O

CAPCELL PAK ADME-HR / INERT ADME-HR

Has high selectivity for polar groups

~ Elution behavior in organic acid analysis ~

The elution behavior of 10 organic acids was compared between the hybrid-type ODS and ADME-HR columns. The ADME-HR column due to its high surface polarity, exhibited an overall trend of increased retention compared to the hybrid-type ODS.

In addition, the separation coefficient of tartaric acid (peak #1) and malic acid (peak #3), and malic acid (peak #3) and succinic acid (peak #9) are larger in the case of ADME-HR, indicating its excellent capability to recognize hydroxyl groups.

Similarly, the separation coefficient of formic acid (peak #2) and acetic acid (peak #6) indicates a high capability to recognize methyl groups, while the separation coefficient of maleic acid (peak #7) and fumaric acid (peak #10) indicates a high capability to separate cis-trans isomer.

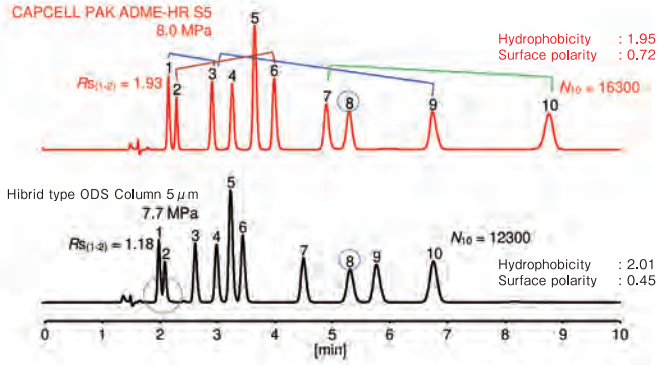


Fig. 2 Chromatogram obtained with each column

Parameters of each column

Evaluation items	Hydroxyl group selectivity		Methyl group selectivity	Spatial arrangement selectivity	Apparent retention	
	α (1-3)	α (3-9)	α (2-6)	α (7-10)	RT(8)	RT(10)
CAPCELL PAK ADME-HR S5	2.44	3.98	3.55	2.18	5.30	8.76
Hibrid type ODS Column 5 μm	2.28	3.80	3.26	1.75	5.31	6.75

- High retention of polar compounds
- Excellent capability to recognize hydroxy and methyl groups
- High capability to separate cis-trans isomer

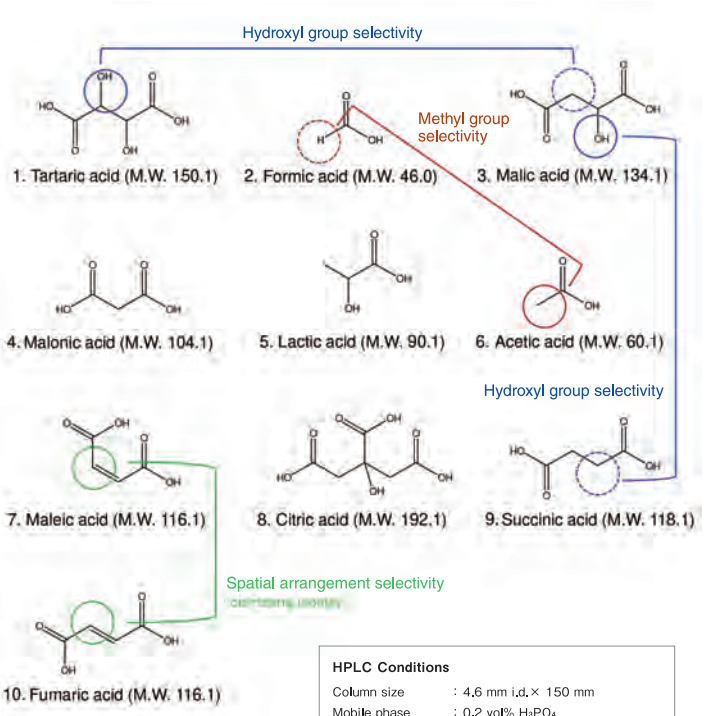
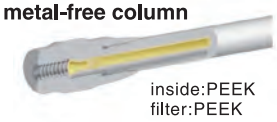


Fig. 1 Sample used for measurement

HPLC Conditions

Column size	: 4.6 mm i.d.× 150 mm
Mobile phase	: 0.2 vol% H_3PO_4
Temperature	: 35 ℃
Detection	: UV 215 nm
Inj. vol.	: 20 μL
Sample dissolved in	: H_2O

Inert type effective for chelating compounds (metal-free column) lineup



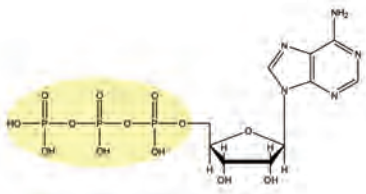
Line-up of CAPCELL PAK INERT ADME-HR, in which ADME-HR 3 μm is packed in metal-free columns. Influence of stainless steel is reduced to the minimum by coating the inside of the empty column with PEEK, and chelating compounds can be analyzed with good peaks without adsorption.

* Since frit is also made of PEEK, the specification for all wetted surfaces is PEEK.

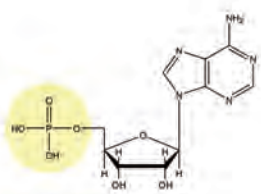
Usefulness of inert type

~ Improvement of peak shape of chelating compounds ~

Application example: Nucleic-acid related compounds



1. Adenosine triphosphate (ATP) (20 μg/mL) (M.W. 507.2)

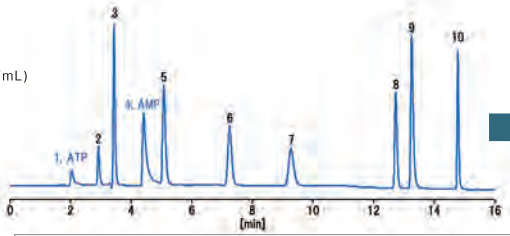


4. Adenosine monophosphate (ATP) (20 μg/mL) (M.W. 347.2)

1. Adenosine triphosphate (ATP) (20 μg/mL) (M.W. 507.2)
2. Cytosine (10 μg/mL) (M.W. 111.1)
3. Uracil (10 μg/mL) (M.W. 112.1)
4. Adenosine monophosphate AMP (20 μg/mL) (M.W. 347.2)
5. Guanine (10 μg/mL) (M.W. 151.1)
6. Tymine (10 μg/mL) (M.W. 126.1)
7. Guanosine (10 μg/mL) (M.W. 283.2)
8. 2'-Deoxyguanosine (10 μg/mL) (M.W. 267.2)
9. Adenine (10 μg/mL) (M.W. 135.1)
10. Adenosine (10 μg/mL) (M.W. 267.2)

ADME-HR, having high retention of polar compounds, is also very effective in analyzing highly polar nucleic-acid related compounds. However, nucleotides, having phosphate groups with very high chelating, are prone to peak tailing if ordinary columns (manufactured with SUS) are used. In such cases, using metal-free columns can improve the peak shape of nucleotides. (Although peak tailing can be reduced by using phosphate in the mobile phase, here, volatile salts, which can also be used in LC-MS, are used in the mobile phase.)

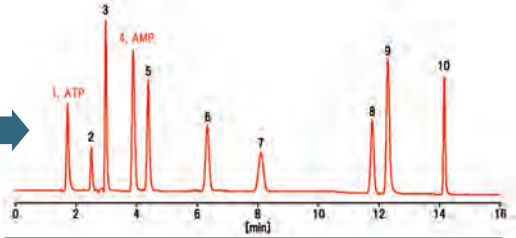
CAPCELL PAK ADME-HR (Stainless steel column)



HPLC Conditions

Column size	: 2.1 mm i.d.× 150 mm
Mobile phase	: A) 10 mmol/L $HCOONH_4$ B) CH_3CN B 1 %(0 min)-> 1 %(5 min)-> 40 %(20 min)-> 1 %(20.1 min) Gradient
Flow rate	: 200 μL/min
Temperature	: 40 ℃
Detection	: UV 254 nm
Inj. vol.	: 1 μL

CAPCELL PAK INERT ADME-HR (Metal-free column)



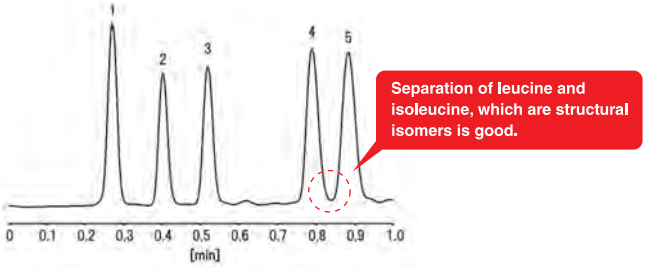
HPLC Conditions

Column size	: 2.0 mm i.d.× 150 mm
Mobile phase	: A) 10 mmol/L $HCOONH_4$ B) CH_3CN B 1 %(0 min)-> 1 %(5 min)-> 40 %(20 min)-> 1 %(20.1 min) Gradient
Flow rate	: 200 μL/min
Temperature	: 40 ℃
Detection	: UV 254 nm
Inj. vol.	: 1 μL

CAPCELL PAK ADME-HR / INERT ADME-HR

High-speed analysis of amino acids

Amino acids are the building blocks of proteins in the body. An example of ultra-high speed analysis of the 5 types, namely, valine, leucine and isoleucine, which are branched-chain amino acids (BCCA) associated with metabolism and synthesis of energy in the muscles, and glutamine and methionine associated with the regulation of nitrogen (ammonia) balance in the body, using CAPCELL PAK ADME-HR 2 µm, is shown. Baseline separation is achieved within one minute.
* Amino acids are compounds with low UV absorption and can be detected using NQAD without derivatization.

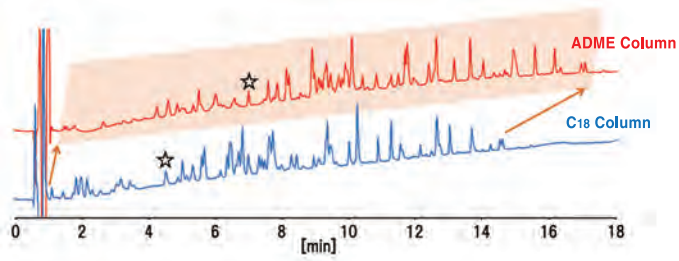


HPLC Conditions

Column	: CAPCELL PAK ADME-HR S2 ; 2.1 mm i.d. × 50 mm
Mobile phase	: 0.5 vol% HCOOH
Flow rate	: 800 µL/min
Temperature	: 40 ℃
Detector	: NQAD (Evaporation 60 ℃, Nebulizer 30 ℃)
Inj. vol.	: 1 µL
Sample	: 1. Glutamine 2. Valine 3. Methionine 4. Isoleucine 5. Leucine (50 ppm each)
Sample dissolved in	: H_2O

Analysis example of BSA trypsin digested product

An example of analysis of BSA trypsin digested product is shown.
The separation behavior was compared with that of a typical C18 column with sub 2 µm.
A relatively increased retention of all the peptides is observed in ADME column compared to C18 columns, which makes the analytical window broader.



HPLC Conditions

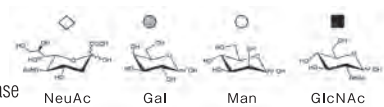
Column size	: S2 ; 2.1 mm i.d.× 50 mm (upper)
	: S2 ; 2.0 mm i.d.× 50 mm (lower)
Mobile phase	: A) 0.1 vol% TFA
	B) 0.1 vol% TFA, CH_3CN
	B 10 % (0 min) -> 50 % (20 min) -> 10 % (20.1 min) Gradient
Flow rate	: 200 µL/min
Temperature	: 40 ℃
Detection	: UV 210 nm
Inj. vol.	: 2 µL
Sample	: Tryptic digest of BSA (STD) in H_2O

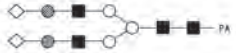
PA (pyridylamino) glycans

An example of the analysis of PA converted N-glycans in reversed-phase mode is shown.
Compared to ODS columns of other companies, CAPCELL PAK ADME-HR not only shows higher retention but has also achieved complete separation at all peaks.

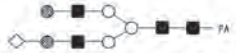
HPLC Conditions

Column size	: S3 ; 2.1 mm i.d.× 150 mm
Mobile phase	: 20 mmol/L CH_3COONH_4 / CH_3CN = 95 / 5
Flow rate	: 200 µL/min
Temperature	: 40 ℃
Detection	: FL Ex. 310 nm, Em. 380 nm
Inj. vol.	: 2 µL
Sample dissolved in	: H_2O



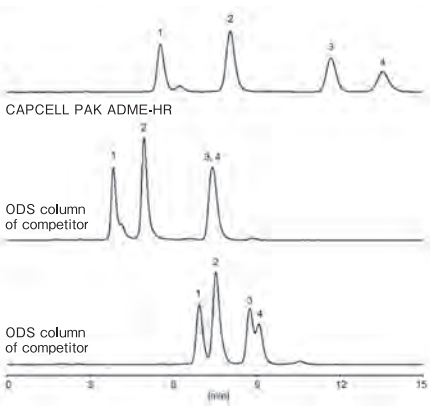


1.PA-11N (100 µmol/L)



2.PA-10NC (100 µmol/L)

3.PA-5NC (100 µmol/L) 4.PA-7NC (100 µmol/L)



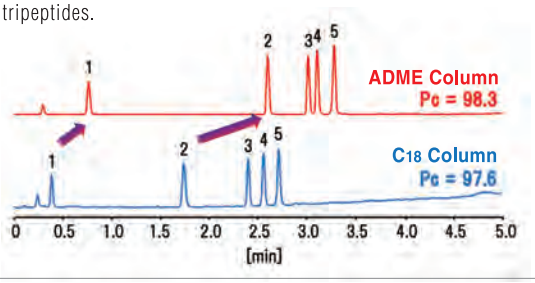
High-speed analysis of standard peptides

The separation behavior of an ADME column for standard peptides was compared with that of a typical C18 column with sub 2µm. Pc (peak capacity) was calculated using the formula on the right.

$$Pc = 1 + \left[\left(\frac{2.35}{4}\right)\left(\frac{t_{gradient}}{W_{h\ avg}}\right)\right]$$

tgradient = Gradient time
Wh = Half width

Pc of the ADME column was equivalent to the C18 column and showed an overall increase in retention. Improvement can be expected in the separation of polar compounds with weak retention in C18 columns such as dipeptides and tripeptides.

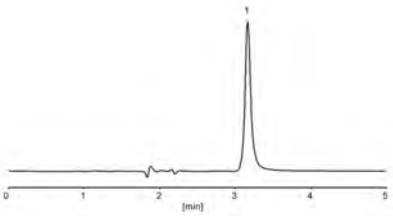


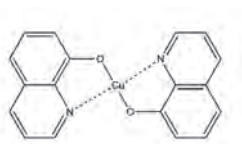
HPLC Conditions

Column size	: S2 ; 2.1 mm i.d.× 50 mm (upper)
	: S2 ; 2.0 mm i.d.× 50 mm (lower)
Mobile phase	: A) 0.1 vol% HCOOH
	B) 0.1 vol% HCOOH, CH_3CN
	B 5 % (0 min) -> 90 % (5 min) -> 5 % (5.1 min) Gradient
Flow rate	: 600 µL/min
Temperature	: 40 ℃
Detector	: NQAD (Evaporation 60 ℃, Nebulizer 30 ℃)
Inj. vol.	: 1 µL
Sample	: 1. Gly-Tyr 2. Val-Tyr-Val 3. Angiotensin II
	4. Met-Enkephalin 5. Leu-Enkephalin (50 µg/mL each)
	*Sigma aldrich H2016 (peptide standard)
Sample dissolved in	: H_2O

Oxine-copper

Oxine copper is a compound that is sprayed as a fungicide and structurally shows a strong chelating. An example of analysis using CAPCELL PAK INERT ADME-HR S3 in which the influence of stainless steel reduced to the minimum, by coating the inside of the column with PEEK, is shown. A good peak shape was obtained under simple conditions using only formic acid, which can be applied to MS without using a chelating agent.





1. Oxine-copper (10 µg/mL) (M.W. 351.8)

HPLC Conditions

Column	: CAPCELL PAK INERT ADME-HR S3 ; 2.1 mm i.d.× 150 mm
Mobile phase	: 0.1 vol% HCOOH / CH_3CN = 90 / 10
Flow rate	: 200 µL/min
Temperature	: 40 ℃
Detection	: UV 254 nm
Inj. vol.	: 2 µL
Sample dissolved in	: Mobile phase

CAPCELL PAK ADME-HR / INERT ADME-HR Lineup

CAPCELL PAK ADME-HR

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
93300	CAPCELL PAK ADME-HR(S2)2.1X20	2	2.1	20	
93301	CAPCELL PAK ADME-HR(S2)2.1X50	2	2.1	50	
93302	CAPCELL PAK ADME-HR(S2)2.1X100	2	2.1	100	
93303	CAPCELL PAK ADME-HR(S2)2.1X150	2	2.1	150	
3655	EXP® GUARD CARTRIDGE CAPCELL PAK ADME-HR(S2)2.1X5	2	2.1	5	EXP® Guard cartridge column, high pressure resistance (100 MPa) specification.
3640	EXP® DIRECT CONNECT HOLDER	-	-	5	EXP® Cartridge holder

EXP® is a registered trademark of Optimize Technologies, Inc.

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
93310	CAPCELL PAK ADME-HR(S3)0.3X100 (1/32)	3	0.3	100	
93311	CAPCELL PAK ADME-HR(S3)0.3X150 (1/32)	3	0.3	150	
93312	CAPCELL PAK ADME-HR(S3)1.0X100	3	1.0	100	
93320	CAPCELL PAK ADME-HR(S3)2.1X20	3	2.1	20	
93321	CAPCELL PAK ADME-HR(S3)2.1X35	3	2.1	35	
93322	CAPCELL PAK ADME-HR(S3)2.1X50	3	2.1	50	
93323	CAPCELL PAK ADME-HR(S3)2.1X75	3	2.1	75	
93324	CAPCELL PAK ADME-HR(S3)2.1X100	3	2.1	100	
93325	CAPCELL PAK ADME-HR(S3)2.1X150	3	2.1	150	
93326	CAPCELL PAK ADME-HR(S3)2.1X250	3	2.1	250	
93330	CAPCELL PAK ADME-HR(S3)3.0X50	3	3.0	50	
93331	CAPCELL PAK ADME-HR(S3)3.0X100	3	3.0	100	
93332	CAPCELL PAK ADME-HR(S3)3.0X150	3	3.0	150	
93340	CAPCELL PAK ADME-HR(S3)4.6X35	3	4.6	35	
93341	CAPCELL PAK ADME-HR(S3)4.6X50	3	4.6	50	
93342	CAPCELL PAK ADME-HR(S3)4.6X75	3	4.6	75	
93343	CAPCELL PAK ADME-HR(S3)4.6X100	3	4.6	100	
93344	CAPCELL PAK ADME-HR(S3)4.6X150	3	4.6	150	
93345	CAPCELL PAK ADME-HR(S3)4.6X250	3	4.6	250	
12600	GUARD CARTRIDGE CAPCELL PAK ADME-HR(S3)2.0X10(2PCS)	3	2.0	10	Guard Cartridge Column
12601	GUARD CARTRIDGE CAPCELL PAK ADME-HR(S3)4.0X10(2PCS)	3	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
93350	CAPCELL PAK ADME-HR(S5)2.1X20	5	2.1	20	
93351	CAPCELL PAK ADME-HR(S5)2.1X35	5	2.1	35	
93352	CAPCELL PAK ADME-HR(S5)2.1X50	5	2.1	50	
93353	CAPCELL PAK ADME-HR(S5)2.1X75	5	2.1	75	
93354	CAPCELL PAK ADME-HR(S5)2.1X100	5	2.1	100	
93355	CAPCELL PAK ADME-HR(S5)2.1X150	5	2.1	150	
93356	CAPCELL PAK ADME-HR(S5)2.1X250	5	2.1	250	
93360	CAPCELL PAK ADME-HR(S5)3.0X150	5	3.0	150	
93361	CAPCELL PAK ADME-HR(S5)3.0X250	5	3.0	250	
93370	CAPCELL PAK ADME-HR(S5)4.6X35	5	4.6	35	
93371	CAPCELL PAK ADME-HR(S5)4.6X50	5	4.6	50	
93372	CAPCELL PAK ADME-HR(S5)4.6X75	5	4.6	75	
93373	CAPCELL PAK ADME-HR(S5)4.6X100	5	4.6	100	
93374	CAPCELL PAK ADME-HR(S5)4.6X150	5	4.6	150	
93375	CAPCELL PAK ADME-HR(S5)4.6X250	5	4.6	250	
93380	CAPCELL PAK ADME-HR(S5)10X35	5	10	35	
93381	CAPCELL PAK ADME-HR(S5)10X150	5	10	150	
93382	CAPCELL PAK ADME-HR(S5)10X250	5	10	250	
93390	CAPCELL PAK ADME-HR(S5)20X35	5	20	35	
93391	CAPCELL PAK ADME-HR(S5)20X50	5	20	50	
93392	CAPCELL PAK ADME-HR(S5)20X100	5	20	100	
93393	CAPCELL PAK ADME-HR(S5)20X150	5	20	150	
93394	CAPCELL PAK ADME-HR(S5)20X250	5	20	250	
12610	GUARD CARTRIDGE CAPCELL PAK ADME-HR(S5)2.0X10(2PCS)	5	2.0	10	Guard Cartridge Column
12611	GUARD CARTRIDGE CAPCELL PAK ADME-HR(S5)4.0X10(2PCS)	5	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder

CAPCELL PAK INERT ADME-HR

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
95001	CAPCELL PAK INERT ADME-HR(S3)2.0X50	3	2.0	50	INERT(PEEK)Type
95002	CAPCELL PAK INERT ADME-HR(S3)2.0X100	3	2.0	100	INERT(PEEK)Type
95003	CAPCELL PAK INERT ADME-HR(S3)2.0X150	3	2.0	150	INERT(PEEK)Type

Proteonavi

Column for protein/peptide analysis

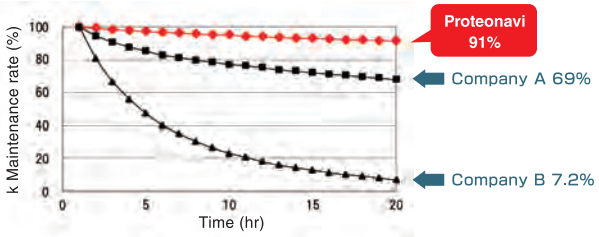
Proteonavi is a 300Å C4 column developed for protein and peptide analysis.
In general, shortening of the alkyl chain causes issues such as acid resistance, retention and differences between lots. Proteonavi is a C4 column that uses a special chemical modification technology to achieve excellent acid resistance, retention and lot reproducibility.
Since a special surface treatment is used, there is little protein adsorption on the packing material surface and a high recovery rate can be obtained.Different preparative sizes are available, which enables scaling up to preparative.

Physical properties

Functional group	Pore Size (A)	Particle Size (μm)	Surface Area (m^2/g)	% of Carbon	Density (μmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
C4 (butyl group)	300	5	105	3.3	3.2	20	2~10	L26

Excellent durability (1) (acid resistance)

Protein and peptide analysis is commonly performed under acidic conditions by adding TFA or formic acid to the mobile phase. Proteonavi has excellent acid resistance and can be used safely under acidic conditions.

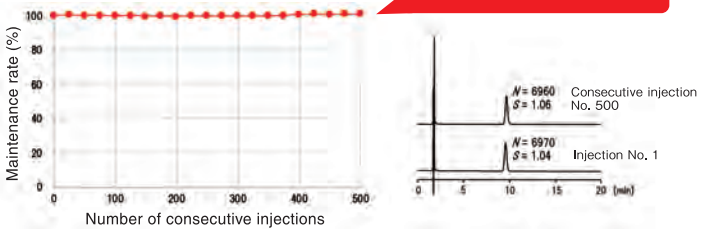


HPLC Conditions

Column size : 4.6 mm i.d.× 150 mm
Mobile phase : 1 vol% TFA, H_2O / CH_3OH = 90 / 10
Flow rate : 1.0 mL/min
Temperature : 60 ℃
Detection : UV 254 nm
Inj. vol. : 7 μL
Sample : Uracil (50 μg/mL), Benzylalcohol (1000 μg/mL)

Excellent durability (2) (temperature resistance)

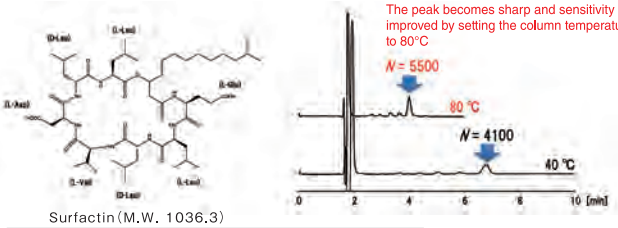
Almost no change was observed in the peak shape and Proteonavi was stable at 80°C.



HPLC Conditions

Column : 2.0 mm i.d.× 150 mm
Mobile phase : 0.1 vol% HCOOH, H_2O / CH_3CN = 45 / 55
Flow rate : 200 μL/min
Temperature : 80 ℃
Detection : UV 210 nm
Inj. vol. : 1 μL
Sample dissolved in : H_2O / CH_3CN = 50 / 50 (100 μg/mL)

Example of analysis with column temperature 80°C



HPLC Conditions

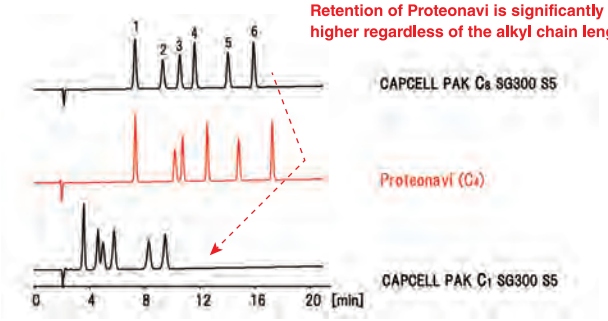
Column : 2.0 mm i.d.× 150 mm
Mobile phase : 0.1 vol% HCOOH, H_2O / CH_3CN = 30 / 70
Flow rate : 200 μL/min
Temperature : 40 ℃ and 80 ℃
Detection : UV 220 nm
Inj. vol. : 2 μL
Sample dissolved in : CH_3OH (100 μg/mL)

Excellent retention

Retention was compared between Proteonavi, C8 and C1 columns using standard peptides and proteins. Proteonavi showed high retention regardless of the alkyl chain length.

Comparison of retention using 6 types of peptides

Retention of Proteonavi is significantly higher regardless of the alkyl chain length



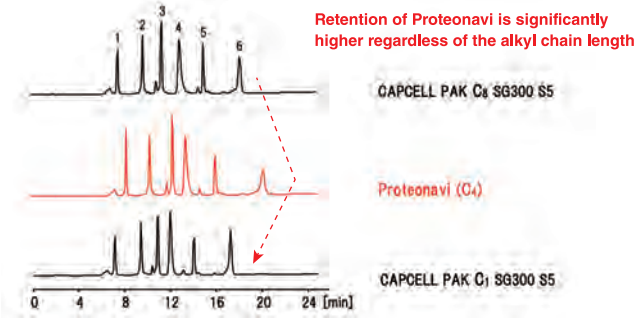
HPLC Conditions

Column : 2.0 mm i.d.× 150 mm
Mobile phase : A) 0.1 vol% TFA, H_2O
B) 0.1 vol% TFA, CH_3CN
B 15 % (0 min) -> 30 % (20 min) Gra.
Flow rate : 200 μL/min
Temperature : 40 ℃
Detection : UV 220 nm
Inj. vol. : 2 μL

1. Methionine-Enkephalin (M.W. 574)
2. Bradykinin (M.W. 1060)
3. Leucine-Enkephalin (M.W. 556)
4. Angiotensin II (M.W. 1046)
5. Neurotensin (M.W. 1673)
6. Angiotensin I (M.W. 1296)

Comparison of retention using 6 types of proteins

Retention of Proteonavi is significantly higher regardless of the alkyl chain length



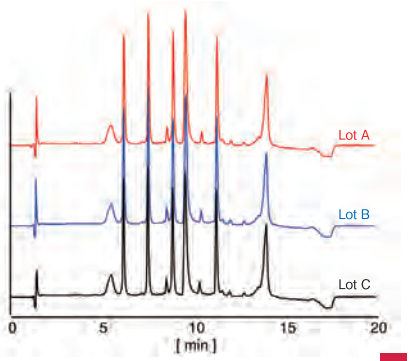
HPLC Conditions

Column : 2.0 mm i.d.× 150 mm
Mobile phase : A) 0.1 vol% TFA, H_2O
B) 0.1 vol% TFA, CH_3CN
B 20 % (0 min) -> 70 % (20 min) Gra.
Flow rate : 200 μL/min
Temperature : 40 ℃
Detection : UV 220 nm
Inj. vol. : 2 μL

1. Ribonuclease A (M.W. 13.7 kDa)
2. Cytochrome C (M.W. 12.4 kDa)
3. Lyzozyme (M.W. 14.3 kDa)
4. B.S. albumin (M.W. 69.0 kDa)
5. Myoglobin (M.W. 17.0 kDa)
6. Ovalbumin (M.W. 45.0 kDa)

Excellent lot reproducibility

Generally, when the alkyl chain is shortened, the influence of the silica gel substrate is likely and lot-to-lot variation tends to increase. Since Proteonavi is manufactured under strict quality control, the reproducibility of peak shape and retention time between lots is good.



Proteonavi

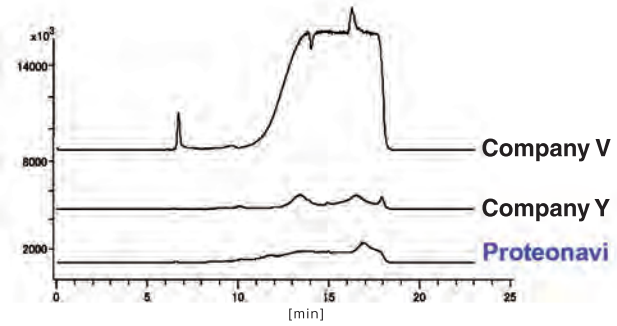
Low column bleeding

Column bleeding is the signal of the compound derived from the stationary phase detected under the analysis conditions used. There is concern that quantitative reproducibility will be reduced in LC-MS as bleeding affects ionization efficiency. Bleeding direct impacts the reduction of purity in preparative processes.
Proteonavi was developed as a preparative column that can be used in the future, after a research and development stage for proteins and peptides. Column bleeding is controlled to a minimum to ensure high purity during preparative.

HPLC Conditions

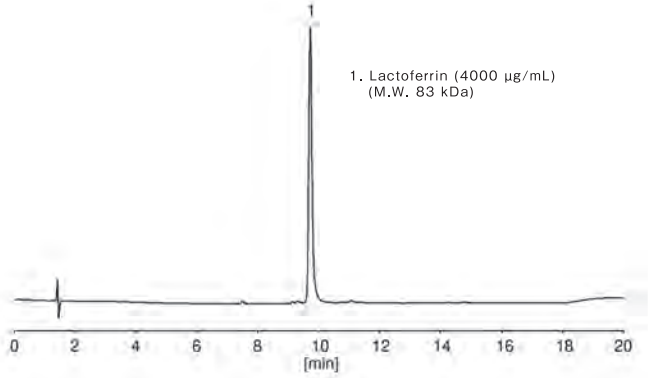
Column size : 2.0 mm i.d. × 150 mm
Mobile phase : A) 0.1 vol% TFA, H_2O
B) 0.1 vol% TFA, CH_3CN
B 5 %(0 min)-> 95 %(10 min)-> 95 %(12 min)-> 5 %(12.1 min) Gradient
Flow rate : 200 µL/min
Detection : LC-MS (AccuTOF)

Total Ion Chromatogram (TIC)



Lactoferrin

Lactoferrin is a glycoprotein with diverse physiological functions, such as, promotion of bifidobacteria growth, iron absorption regulation, anti-inflammatory action and immunoregulation. Good peak shapes were obtained using Proteonavi S5.



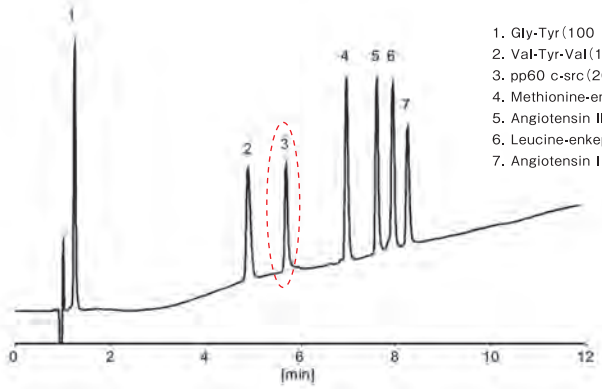
1. Lactoferrin (4000 µg/mL)
(M.W. 83 kDa)

HPLC Conditions

Column : Proteonavi S5 ; 2.0 mm i.d. × 100 mm
Mobile phase : A) 0.05 vol% TFA B) 0.05 vol% TFA, CH_3CN
B 10 %(0 min)-> 60 %(10 min)-> 60 %(15 min)-> 10 %(15.1 min) Gradient
Flow rate : 200 µL/min
Temperature : 40 ℃
Detection : UV 280 nm
Inj. vol. : 2 µL
Sample dissolved in : H_2O

Standard peptides

An example of analysis of 7 types of peptides contained in standard peptide products using a formic acid-based mobile phase is shown. The peak shape of pp60 c-src contained in phosphate groups was also good, and an adequate overall retention and separation was obtained.



1. Gly-Tyr (100 µg/mL)
2. Val-Tyr-Val (100 µg/mL)
3. pp60 c-src (200 µg/mL)
4. Methionine-enkephalin (100 µg/mL)
5. Angiotensin II (100 µg/mL)
6. Leucine-enkephalin (100 µg/mL)
7. Angiotensin I (100 µg/mL)

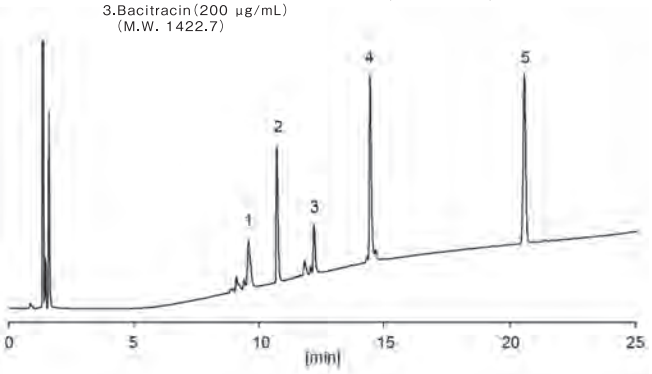
HPLC Conditions

Column : Proteonavi S5 ; 2.0 mm i.d.× 100 mm
Mobile phase : A) 0.1 vol% HCOOH B) 0.1 vol% HCOOH, CH_3CN
B 5 %(0 min)-> 65 %(15 min)-> 5 %(15.1 min) Gradient
Flow rate : 300 µL/min
Temperature : 40 ℃
Detection : UV 210 nm
Inj. vol. : 1 µL
Sample dissolved in : H_2O

Cyclic peptides

An example of analysis of 5 types of polypeptides with cyclic structures, polymyxin B, octreotide, bacitracin, daptomycin, and cyclosporin A, using Proteonavi S5, with a formic acid-based mobile phase, is shown. Proteonavi, which boasts of a high recovery rate, also has a good peak shape for cyclosporin A.

1. Polymyxin B (300 µg/mL)
2. Octreotide (300 µg/mL)
(M.W. 1019.2)
3. Bacitracin (200 µg/mL)
(M.W. 1422.7)
4. Daptomycin (200 µg/mL)
(M.W. 1619.7)
5. Cyclosporine A (300 µg/mL)
(M.W. 1202.6)



HPLC Conditions

Column : Proteonavi S5 ; 2.0 mm i.d.× 100 mm
Mobile phase : A) 0.1 vol% HCOOH B) 0.1 vol% HCOOH, CH_3CN
B 5 %(0 min)-> 5 %(1 min)-> 90 %(20 min)-> 90 %(25 min)-> 5 %(25.1 min) Gradient
Flow rate : 200 µL/min
Temperature : 70 ℃
Detection : UV 214 nm
Inj. vol. : 2 µL
Sample dissolved in : Polymixin B, Octreotide, Bacitracin and Cyclosporin were dissolved in water. Daptomycin was dissolved in CH_3OH, and then mixed together with 50 vol% CH_3CN.

Proteonavi Lineup

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
80253	Proteonavi (S5) 0.3X100 (1/32)	5	0.3	100	
80255	Proteonavi (S5) 0.3X150 (1/32)	5	0.3	150	
80263	Proteonavi (S5) 1.0X75	5	1.0	75	
80208	Proteonavi (S5) 2.0X20	5	2.0	20	
80209	Proteonavi (S5) 2.0X35	5	2.0	35	
80200	Proteonavi (S5) 2.0X50	5	2.0	50	
80206	Proteonavi (S5) 2.0X100	5	2.0	100	
80201	Proteonavi (S5) 2.0X150	5	2.0	150	
80202	Proteonavi (S5) 2.0X250	5	2.0	250	
80207	Proteonavi (S5) 3.0X150	5	3.0	150	
80203	Proteonavi (S5) 4.6X50	5	4.6	50	
80204	Proteonavi (S5) 4.6X150	5	4.6	150	
80205	Proteonavi (S5) 4.6X250	5	4.6	250	
80210	Proteonavi (S5) 10X20	5	10	20	
80213	Proteonavi (S5) 10X100	5	10	100	
80214	Proteonavi (S5) 10X150	5	10	150	
80215	Proteonavi (S5) 10X250	5	10	250	
80221	Proteonavi (S5) 20X35	5	20	35	
80223	Proteonavi (S5) 20X100	5	20	100	
80224	Proteonavi (S5) 20X150	5	20	150	
80225	Proteonavi (S5) 20X250	5	20	250	
80231	Proteonavi (S5) 30X30	5	30	30	
80234	Proteonavi (S5) 30X150	5	30	150	
80235	Proteonavi (S5) 30X250	5	30	250	
11530	GUARD CARTRIDGE Proteonavi (S5) 2.0X10 (2PCS)	5	2.0	10	Guard Cartridge Column
11531	GUARD CARTRIDGE Proteonavi (S5) 4.0X10 (2PCS)	5	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder

CAPCELL PAK NH2 UG80

HILIC, weak anion exchange column

CAPCELL PAK NH2 UG80 is an amino column, with a structure consisting of a polymer coating, followed by a polyamine coating, on which primary amino groups are arranged. When water/acetonitrile * is used for the mobile phase, HILIC mode is enabled, and it can be used for analysis of sugar. This column can be used to analyze water-soluble vitamins, nucleic acids, etc., as a weak anion exchange column since the amino groups are positively charged when an acidic mobile phase is used. High durability and lot reproducibility has been achieved as polymer coating has been used.

* For organic solvent ratio of 50% or more

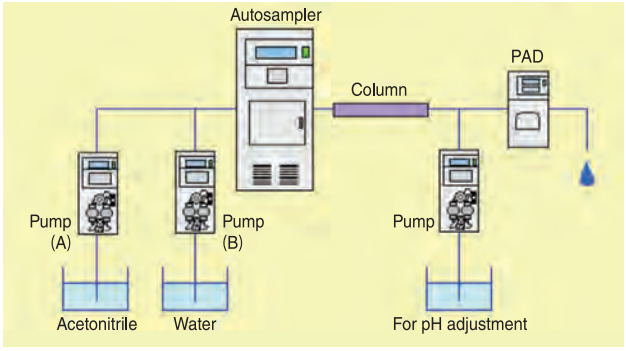
Physical properties

Functional group	Pore Size (Å)	Particle Size (µm)	Surface Area (m^2/g)	% of Carbon	Density (µmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
NH2 (amino group)	80	5	540	14	1.2	20	2~8	L8

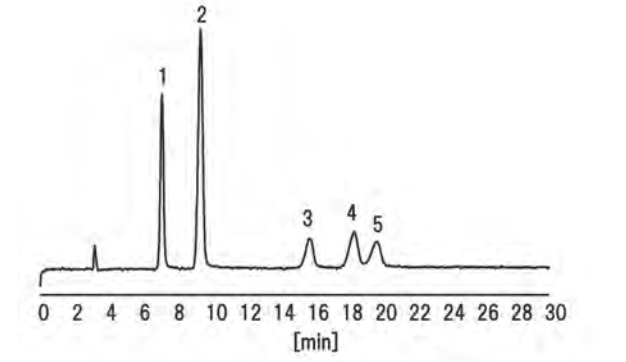
Analysis of sugar

An example for analysis of sugar that combines a Pulsed Amperometric Detector (PAD) and CAPCELL PAK NH2 UG80 is introduced.
Using this method, pH of the mobile phase can be adjusted in the post column even in the case of columns where an alkaline solution cannot be used in the mobile phase, and sugars can be analyzed.

System configuration example



Analysis of sugars

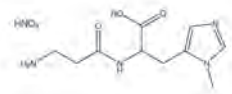


HPLC Conditions

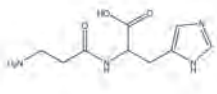
Column	: CAPCELL PAK NH_2 UG80 S5 ; 2.0 mm i.d.× 250 mm
Mobile phase	: H_2O / CH_3CN = 15 / 85
Flow rate	: 200 µL/min
Reagent	: 500 mmol/L LiOH
Flow rate of reagent	: 400 µL/min
Temperature	: 40 ℃
Detection	: PAD
Inj. vol.	: 10 µL
Sample	: 1. Fructose (500 µg/mL) 2. Glucose (500 µg/mL) 3. Sucrose (500 µg/mL) 4. Lactose (500 µg/mL) 5. Maltose (500 µg/mL)
Sample dissolved in	: 80 vol% CH_3CN

Imidazole dipeptide

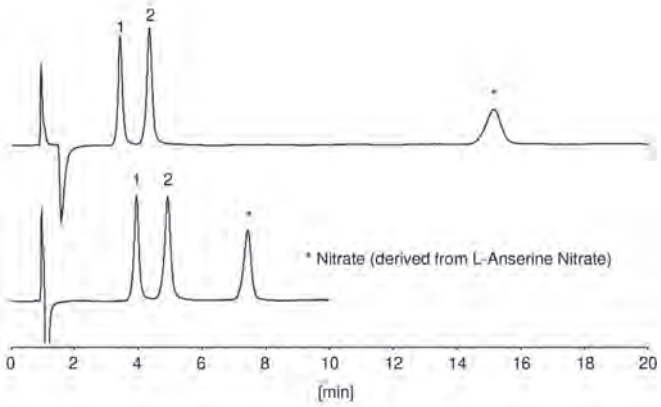
Carnosine and anserine, representative compounds of imidazole dipeptide, are abundant in chicken and said to have antioxidant effect and fatigue recovery effect. The polarity of these compounds is very high and retaining in a standard ODS column is difficult. An example of analysis in HILIC mode using CAPCELL PAK NH2 UG80 is shown. Two mobile phases that are applicable to LC-MS were also used.



1. L-Anserine Nitrate (100 µg/mL) (M.W. 240.3)



2. L-Carnosine (100 µg/mL) (M.W. 226.2)

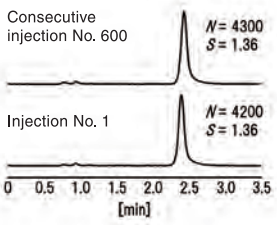


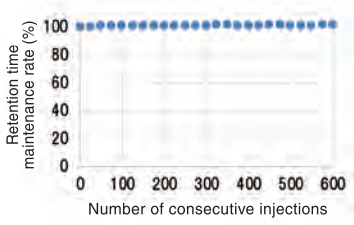
HPLC Conditions

Column	: CAPCELL PAK NH_2 UG80 S5 ; 2.0 mm i.d.× 100 mm
Mobile phas	: 50 mmol/L $HCOONH_4$ / CH_3CN = 30 / 70 (upper)
	50 mmol/L TEAA* / CH_3CN = 30 / 70 (lower)
	*Triethylamine Acetate (pH 7.0)
Flow rate	: 200 µL/min
Temperature	: 40 ℃
Detection	: UV 210 nm
Inj. vol.	: 1 µL
Sample dissolved in	: 70 vol% CH_3CN

High durability

Allantoin was used to evaluate the durability of CAPCELL PAK NH2 UG80 S5. Almost the same retention time is maintained for 600 consecutive injections, and almost no change was observed in the peak shape (number of theoretical plates N and symmetry coefficient S).
The test was started after passing the mobile phase for 12 hours. Analysis time is set to 10 minutes. (600 Times ≒ 6000 minutes = 100 hours)





HPLC Conditions

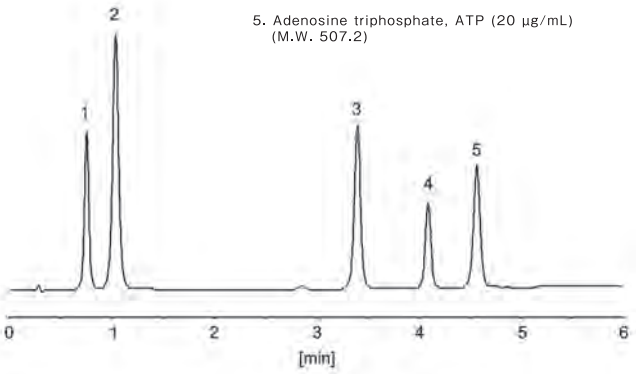
Column	: CAPCELL PAK NH_2 UG80 S5 ; 2.0 mm i.d.× 100 mm
Mobile phase	: 15 mmol/L KH_2PO_4 (adjusted at pH 2 with phosphoric acid) / CH_3CN = 20 / 80
Flow rate	: 200 µL/min
Temperature	: 40 ℃
Detection	: UV 210 nm
Inj. vol.	: 2 µL
Sample	: Allantoin (100 µg/mL in 80 vol% CH_3CN)

CAPCELL PAK NH2 UG80

Nucleotide

An example of analysis of 5 types of nucleotides under aqueous phase 100% using CAPCELL PAK NH2 UG80 S5 in the ion exchange mode is shown. The column can also be used for MS with ammonium bicarbonate, a volatile salt.

1. Uridine monophosphate, UMP (20 µg/mL) (M.W. 324.2)
2. Adenosine monophosphate, AMP (20 µg/mL) (M.W. 347.2)
3. Adenosine diphosphate, ADP (20 µg/mL) (M.W. 427.2)
4. Uridine triphosphate, UTP 20 (µg/mL) (M.W. 484.1)
5. Adenosine triphosphate, ATP (20 µg/mL) (M.W. 507.2)

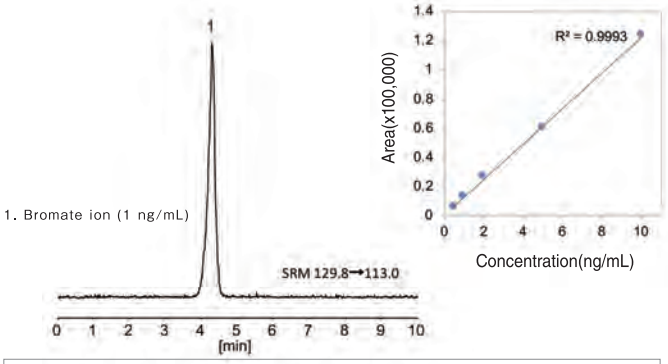


HPLC Conditions

Column	: CAPCELL PAK NH_2 UG80 S5 ; 2.0 mm i.d.× 35 mm
Mobile phase	: A) 5 mmol/L NH_4HCO_3, B) 200 mmol/L NH_4HCO_3
	B 5 %(0 min)-> 90 %(10 min)-> 5 %(10.1 min) Gradient
Flow rate	: 200 µL/min
Temperature	: 40 ℃
Detection	: UV 260 nm
Inj. vol.	: 2 µL
Sample dissolved in	: H_2O

Bromate ion

Bromic acid in tap water is produced by advanced ozone treatment, etc. during the water purification process. However, bromic acid is considered to have carcinogenic potential, and is set as an item in the water quality standards by the voluntary standards of the Japan Water Works Association (JWWA standards).
The Ion Chromatography-Post Column Absorption Spectrophotometry is defined as the test method for bromic acid.
A part of the JWWA standards were revised in April 2018, and Liquid Chromatography-Mass Spectrometry method using an anion exchange column, was added to the test method of bromic acid. An example of analysis using CAPCELL PAK NH2 UG80 S5 under the conditions complying with the test method is shown. Good retention and peak shapes were obtained. When a 5-point calibration curve in the concentration range of 0.5 – 10 ng/mL was plotted, good linearity with a correlation coefficient R = 0.999 and a determination coefficient of R2 = 0.999 was obtained.

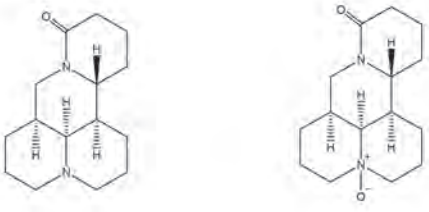


HPLC Conditions

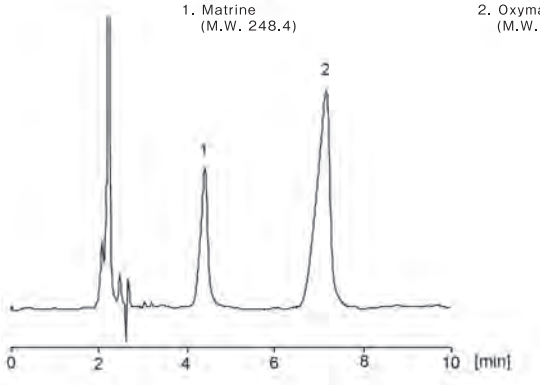
Column	: CAPCELL PAK NH_2 UG80 S5 ; 2.0 mm i.d.×35 mm
Mobile phase	: 50 mmol/L CH_3COONH_4 / CH_3CN = 70 / 30
Flow rate	: 200 µL/min
Temperature	: 40 ℃
Detection	: MS/MS
Ionization	: ESI negative
Inj. vol.	: 10 µL
Sample dissolved in	: H_2O

Matrine, oxymatrine

Matrine and oxymatrine are components contained in the legume clara and are a type of alkaloid.
An example of measurement by hydrophilic interaction (HILIC) using CAPCELL PAK HN2 UG80 S5 is shown.



1. Matrine (M.W. 248.4)
2. Oxymatrine (M.W. 264.4)

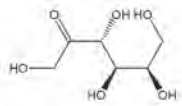


HPLC Conditions

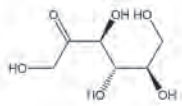
Column	: CAPCELL PAK NH_2 UG80 S5 ; 4.6 mm i.d.× 250 mm
Mobile phase	: 3 vol% H_3PO_4 / C_2H_5OH / CH_3CN = 9 / 9 / 82
Flow rate	: 1.0 mL/min
Temperature	: 35 ℃
Detection	: UV 220 nm
Inj. vol.	: 5 µL

Rare sugars

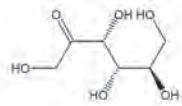
Rare sugars are defined as monosaccharides, and their derivatives that are present in extremely small quantities in nature, and more than 50 types exist in nature. Although RI detectors are generally used as sugars do not absorb UV rays, a Pulsed Amperometric Detector (PAD) is used in the example of analysis shown.



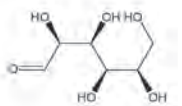
1. Psicose (200 µg/mL) (M.W. 180.2)



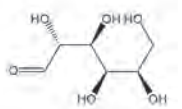
2. Tagatose (200 µg/mL) (M.W. 180.2)



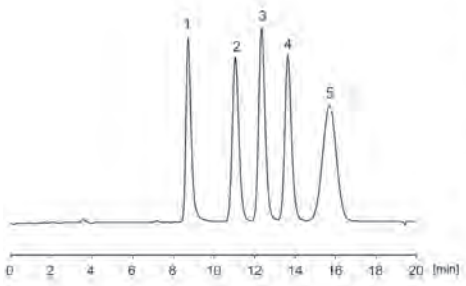
3. Sorbose 200 µg/mL (M.W. 180.2)



4. Mannose (200 µg/mL) (M.W. 180.2)



5. Glucose (200 µg/mL) (M.W. 180.2)



HPLC Conditions

Column	: CAPCELL PAK NH_2 UG80 S5 ; 2.0 mm i.d.× 250 mm
Mobile phase	: H_2O / CH_3OH = 15 / 85
Flow rate	: 200 µL/min
Reagent	: 500 mmol/L LiOH
Flow rate of reagent	: 400 µL/min
Temperature	: 20 ℃
Detection	: PAD
Inj. vol.	: 2 µL
Sample dissolved in	: Each standard was dissolved in H_2O at 2 mg/mL. An equivolume mixture of all the solutions was diluted with 80 vol% CH_3CN, so that concentration of each compound was 200 µg/mL.

CAPCELL PAK NH2 UG80 ラインナップ

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
76007	CAPCELL PAK NH2 UG80(S5)1.0X35	5	1.0	35	
76008	CAPCELL PAK NH2 UG80(S5)1.0X150	5	1.0	150	
76009	CAPCELL PAK NH2 UG80(S5)1.0X250	5	1.0	250	
76001	CAPCELL PAK NH2 UG80(S5)1.5X35	5	1.5	35	
76003	CAPCELL PAK NH2 UG80(S5)1.5X150	5	1.5	150	
76004	CAPCELL PAK NH2 UG80(S5)1.5X250	5	1.5	250	
75001	CAPCELL PAK NH2 UG80(S5)2.0X35	5	2.0	35	
75003	CAPCELL PAK NH2 UG80(S5)2.0X150	5	2.0	150	
75004	CAPCELL PAK NH2 UG80(S5)2.0X250	5	2.0	250	
62539	CAPCELL PAK NH2 UG80(S5)3.0X35	5	3.0	35	
62543	CAPCELL PAK NH2 UG80(S5)3.0X150	5	3.0	150	
62544	CAPCELL PAK NH2 UG80(S5)3.0X250	5	3.0	250	
62501	CAPCELL PAK NH2 UG80(S5)4.6X35	5	4.6	35	
62505	CAPCELL PAK NH2 UG80(S5)4.6X50	5	4.6	50	
62502	CAPCELL PAK NH2 UG80(S5)4.6X100	5	4.6	100	
62503	CAPCELL PAK NH2 UG80(S5)4.6X150	5	4.6	150	
62504	CAPCELL PAK NH2 UG80(S5)4.6X250	5	4.6	250	
12100	GUARD CARTRIDGE CAPCELL PAK NH2 UG80(S5)2.0X10(2PCS)	5	2.0	10	Guard Cartridge Column
12429	GUARD CARTRIDGE CAPCELL PAK NH2 UG80(S5)4.0X10(2PCS)	5	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder

CAPCELL PAK SCX UG80

Polymer-coated strong cation exchange column

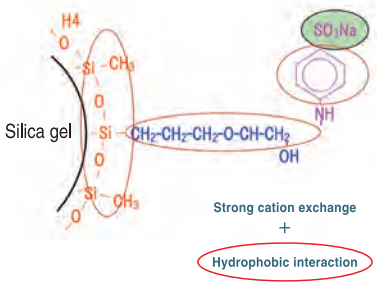
CAPCELL PAK SCX UG80 is a polymer-coated strong cation exchange column in which sulfonic acid groups are introduced after applying a polymer coat. High durability and lot reproducibility have been achieved by using the polymer coating.
Since the hydrophobic part is used as an anchor when introducing the sulfonic acid group, the column shows characteristic retention behavior as hydrophobic interactions also come into play.

Physical properties

Functional group	Pore Size (Å)	Particle Size (µm)	Surface Area (m^2/g)	% of Carbon	Density (µmol/m^2)	Ion exchange capacity (meq/g)	Pressure resistance (MPa)	pH range	USP class No.
SCX (sulfonic acid group)	80	5	450	9	0.9	0.23	20	2~7	L9

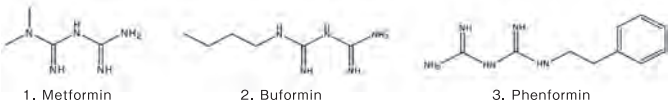
Features

Since CAPCELL PAK SCX is a polymer-coated strong cation exchange column, it has excellent durability and lot-to-lot difference.
Since the hydrophobic part is used as an anchor when introducing the sulfone group, the column shows retention behavior due to strong cation exchange and hydrophobic interaction.

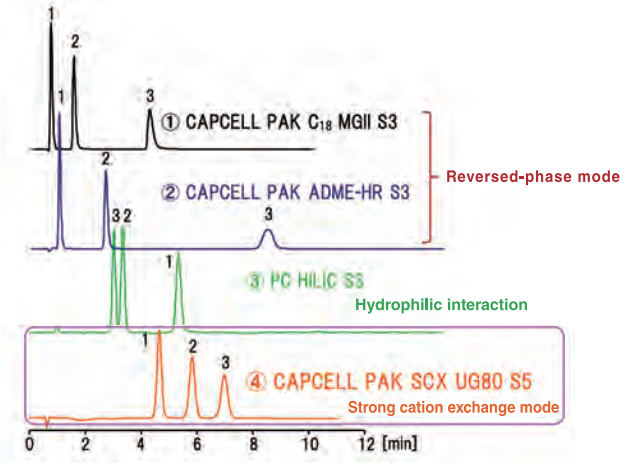


Analysis of biguanide-based compounds (drugs for diabetes)

The biguanide-based compounds, metformin and buformin, used as drugs for diabetes, and phenformin, which was once used for the same purpose, are highly polar ionic compounds that show strong basicity.
An example of analysis using a column of the same size in different separation modes is shown.
In the reversed-phase mode, although CAPCELL PAK ADME-HR (ADME column) provided overall higher retention compared to CAPCELL PAK C18 MG II (C18 column), metformin at peak 1 eluted near t_0.
Retention of metformin significantly increased in HILIC mode (hydrophilic interaction). However, the separation of peaks 2 and 3 is not good.
In the strong cation exchange mode using CAPCELL PAK SCX, the three components are retained moderately, and good separation is achieved. Since the organic solvent ratio differs depending on the separation mode, select the optimum separation mode according to the analysis target.



1. Metformin　2. Buformin　3. Phenformin

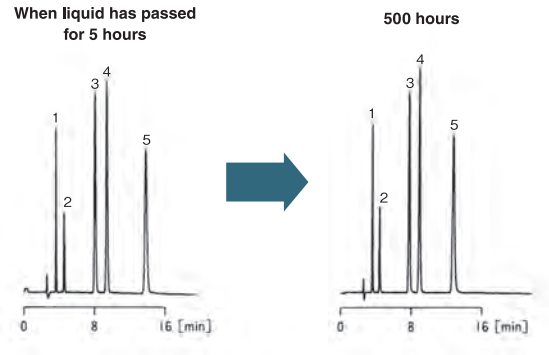


HPLC Conditions

Column size : 2.0 or 2.1 mm i.d.× 50 mm
Mobile phase : ①, ②10 mmol/L $HCOONH_4$ / CH_3CN = 90 / 10
③ 50 mmol/L $HCOONH_4$ / CH_3CN = 10 / 90
④ 50 mmol/L $HCOONH_4$ / CH_3CN = 60 / 40
Flow rate : 200 µL/min
Temperature : 40 ℃
Detection : PDA 225 nm
Inj. vol. : 1 µL
Sample : 1. Metformin (100 µg/mL) 2. Buformin (100 µg/mL) 3. Phenformin (100 µg/mL)

Good durability

Si-C bonds of polymer-coated type are more stable than the Si-O-Si bonds of standard chemically bonded silica gel-based SCX.



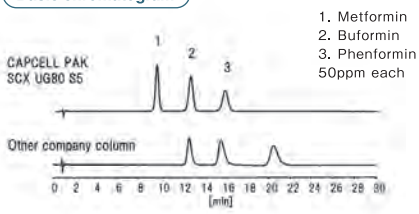
HPLC Conditions

Column : CAPCELL PAK SCX UG80 S5 ; 4.6 mm i.d.× 250 mm
Mobile phase : 200 mmol/L $NH_4H_2PO_4$, pH 3.5
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 254 nm
Inj. vol. : 1 µL
Sample : 1. Uracil 2. Thymine 3. Guanine 4. Cytosine 5. Adenine

High load capacity

The data comparing the load capacity of CAPCELL PAK SCX and cation exchange columns of other companies, when biguanide-based compounds (anti-diabetic drugs) are injected, is shown.

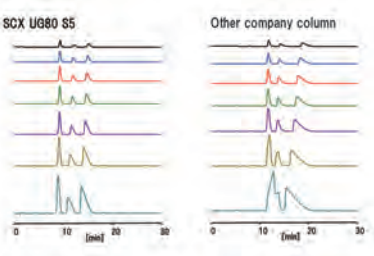
Basic chromatogram



HPLC Conditions

Column size : S3 ; 4.6 mm i.d.× 50 mm
Mobile phase : 50 mmol/L $HCOONH_4$ / CH_3CN = 60 / 40
Flow rate : 600 µL/min
Temperature : 40 ℃
Detection : UV 225 nm
Inj. vol. : 20 µL
Sample dissolved in : Mobile phase

Increased injection volume



For columns of other companies, the peak shape began to distort when the injection volume exceeded 50 µL. However, for CAPCELL PAK SCX UG80, the peak shape did not distort even after the load capacity was increased.
CAPCELL PAK SCX UG80 is observed to have a high load capacity.

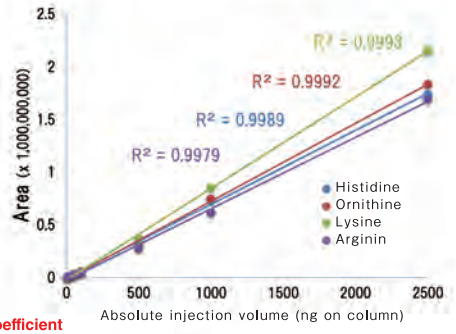
Inj. vol. : 5, 10, 15, 20, 30, 50, 100 µL
Sample dissolved in : Mobile phase (300 ppm each)

CAPCELL PAK SCX UG80

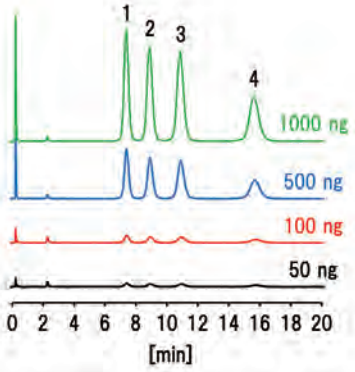
Basic amino acids

CAPCELL PAK SCX UG80 was used to obtain quantitative results for 4 types of basic amino acids.
Since CAPCELL PAK SCX UG80 has a high load capacity, a correlation coefficient of 0.997 or above could be obtained over a wide range of concentrations (10 – 2500 ng).
The column is effective for quantitative analysis over a wide range of concentrations and preparative applications.

*** The universal detector "NQAD" of Osaka Soda is used for detection.**
If NQAD is used, amino acids can be detected without derivatization



Correlation coefficient 0.997 or more

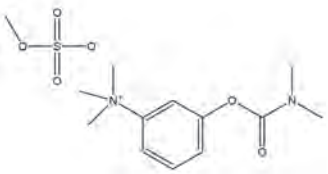


HPLC Conditions

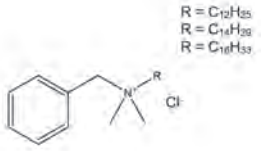
Column	: CAPCELL PAK SCX UG80 S5 ; 4.6 mm i.d.× 35 mm
Mobile phase	: 50 mmol/L $HCOONH_4$ (adjusted at pH 3.0 with formic acid) / CH_3CN = 70 / 30
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detector	: NQAD (Evaporation 60 ℃, Nebulizer 30 ℃)
Inj. vol.	: 10 µL
Sample	: H_2O (10 – 2500 ng) 1. Histidine 2. Ornithine 3. Lysine 4. Arginin

Quaternary ammonium salt

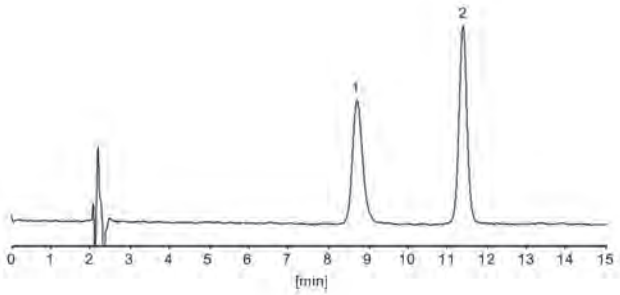
An example of analysis of neostigmine methylsulfate and benzalkonium chloride, which are quaternary ammonium salts, using the strong cation exchange column CAPCELL PAK SCX UG80 S5 is shown. Although benzalkonium chloride used has 3 components with different alkyl chains, it was possible to detect them as a single peak under these analysis conditions. Adequate retention and separation is obtained for both compounds.



1. Neostigmine methylsulfate (50 µg/mL))
(M.W. 334.4)



2. Benzalkonium hydrochloride

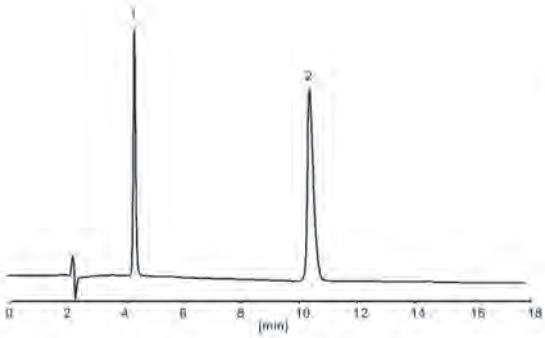


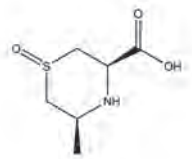
HPLC Conditions

Column	: CAPCELL PAK SCX UG80 S5 ; 4.6 mm i.d.× 250 mm
Mobile phase	: 30 mmol/L $NaClO_4$, H_2O / CH_3CN = 45 / 55
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 260 nm
Inj. vol.	: 20 µL
Sample dissolved in	: H_2O

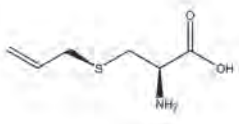
Cycloalliin, S-Allyl-L-cysteine

Cycloalliin and S-Allyl-L-cysteine, which are present in large quantities in aged garlic, are compounds that have attracted attention in recent years due to their anti-carcinogenic and brain function-protective action. An example of analysis using CAPCELL PAK SCX UG80 S5 is shown. Under these analysis conditions, both compounds, which are water-soluble sulfur-containing amino acids, are sufficiently retained.





1. Cycloalliin (500 µg/mL)
(M.W. 177.2)



2. S-Allyl-L-cysteine (500 µg/mL)
(M.W. 161.2)

HPLC Conditions

Column	: CAPCELL PAK SCX UG80 S5 ; 4.6 mm i.d.× 250 mm
Mobile phase	: 20 mmol/L KH_2PO_4 (adjusted at pH 2.5 with phosphoric acid)
Flow rate	: 1.0 mL/min
Temperature	: 45 ℃
Detection	: UV 210 nm
Inj. vol.	: 5 µL
Sample	: H_2O

CAPCELL PAK SCX UG80 Lineup

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
77053	CAPCELL PAK SCX UG80(S5)1.0X150	5	1.0	150	
77054	CAPCELL PAK SCX UG80(S5)1.0X250	5	1.0	250	
77061	CAPCELL PAK SCX UG80(S5)1.5X35	5	1.5	35	
77062	CAPCELL PAK SCX UG80(S5)1.5X50	5	1.5	50	
77063	CAPCELL PAK SCX UG80(S5)1.5X75	5	1.5	75	
77064	CAPCELL PAK SCX UG80(S5)1.5X150	5	1.5	150	
77065	CAPCELL PAK SCX UG80(S5)1.5X250	5	1.5	250	
77070	CAPCELL PAK SCX UG80(S5)2.0X20	5	2.0	20	
77071	CAPCELL PAK SCX UG80(S5)2.0X35	5	2.0	35	
77072	CAPCELL PAK SCX UG80(S5)2.0X50	5	2.0	50	
77073	CAPCELL PAK SCX UG80(S5)2.0X150	5	2.0	150	
77075	CAPCELL PAK SCX UG80(S5)2.0X250	5	2.0	250	
77042	CAPCELL PAK SCX UG80(S5)3.0X100	5	3.0	100	
77043	CAPCELL PAK SCX UG80(S5)3.0X150	5	3.0	150	
77044	CAPCELL PAK SCX UG80(S5)3.0X250	5	3.0	250	
77001	CAPCELL PAK SCX UG80(S5)4.6X35	5	4.6	35	
77002	CAPCELL PAK SCX UG80(S5)4.6X50	5	4.6	50	
77006	CAPCELL PAK SCX UG80(S5)4.6X75	5	4.6	75	
77005	CAPCELL PAK SCX UG80(S5)4.6X100	5	4.6	100	
77003	CAPCELL PAK SCX UG80(S5)4.6X150	5	4.6	150	
77004	CAPCELL PAK SCX UG80(S5)4.6X250	5	4.6	250	
77011	CAPCELL PAK SCX UG80(S5)10X20	5	10	20	
77014	CAPCELL PAK SCX UG80(S5)10X250	5	10	250	
77021	CAPCELL PAK SCX UG80(S5)20X35	5	20	35	
77023	CAPCELL PAK SCX UG80(S5)20X150	5	20	150	
77024	CAPCELL PAK SCX UG80(S5)20X250	5	20	250	
12192	GUARD CARTRIDGE CAPCELL PAK SCX UG80(S5)2.0X10(2PCS)	5	2.0	10	Guard Cartridge Column
12195	GUARD CARTRIDGE CAPCELL PAK SCX UG80(S5)4.0X10(2PCS)	5	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder

PC HILIC

HILC column

A PC HILIC column in which a component (phosphorylcholine group) of the cell membrane is introduced as the functional group.
Introduction of the phosphorylcholine group improves hydrophilicity and shows high retention of polar compounds.

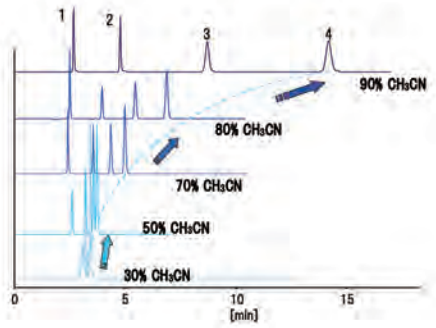
Physical properties

Functional group	Pore Size (Å)	Particle Size (μm)	Surface Area (m^2/g)	% of Carbon	Density (μmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
PC (phosphorylcholine group)	100	3	450	–	–	20	3~7.5	–
PC (phosphorylcholine group)	100	5	450	–	–	20	3~7.5	–

What is HILIC mode?

In HILIC mode, a hydrated phase is formed on the surface of the hydrophilic stationary phase, and sample distribution occurs between the mobile and hydrated phases. Therefore, polar compounds with high hydrophilicity are retained in the hydrated phase. While low polarity compounds are barely retained and elute quickly. Since it shows a separation pattern opposite to that of the reversed-phase mode, it is useful for analyzing polar compounds that are difficult to retain in the reversed-phase mode.

	Reversed-phase mode	HILIC mode
Stationary phase	Hydrophobic groups such as C18	Hydrophilic group or silica
Mobile phase	Organic solvents such as CH_3CN and CH_3OH/H_2O	CH_3CN/H_2O
Mechanism of retention	Hydrophobic interaction	Hydrophilic interaction

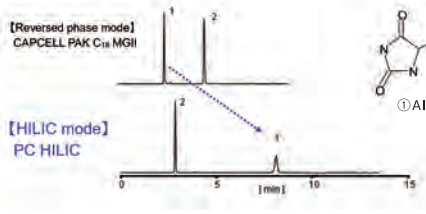


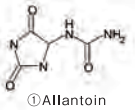
In HILIC mode, retention tends to increase as the organic solvent ratio in the mobile phase increases.
➡ This mode is also very effective as a separation method for polar substances.

HPLC Conditions
Column : PC HILIC S5, 4.6 mm i.d.× 250 mm
Mobile phase : 10 mmol/L $HCOONH_4$, x % CH_3CN
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 254 nm
Sample : 1. Naphthalene (100 μg/mL)
2. Thymine (50 μg/mL)
3. Adenine (50 μg/mL)
4. Cytosine (100 μg/mL)

Comparison of separation pattern with C18 column

When compared to the C18 column, the sequence of elution is reversed in the PC HILIC column and is found to be useful in the analysis of compounds that are difficult to retain with the C18 column.



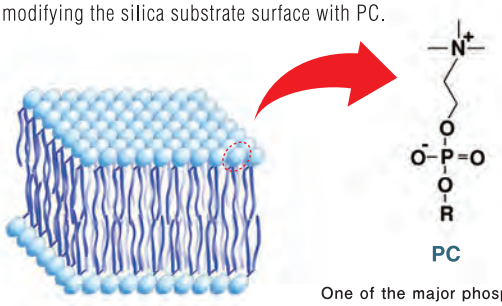

①Allantoin


②Naphthalene

HPLC Conditions
Column size : S5 ; 4.6 mm i.d.× 250 mm
Mobile phase : H_2O / CH_3CN = 10 / 90
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 210 nm
Sample : 1. Allantoin, 2. Naphthalene

What is PC?

Phosphorylcholine (PC) is a component of cell membranes. PC has a betaine structure and exhibits high hydrophilicity, biocompatibility and inhibitory effect of protein adhesion.
A superhydrophilic packing material suitable for HILIC column was realized by modifying the silica substrate surface with PC.

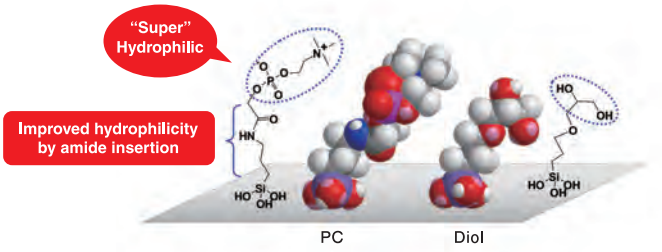


Cell membrane

One of the major phospholipids that make up cell membranes, and hydrophilic part of lecithin

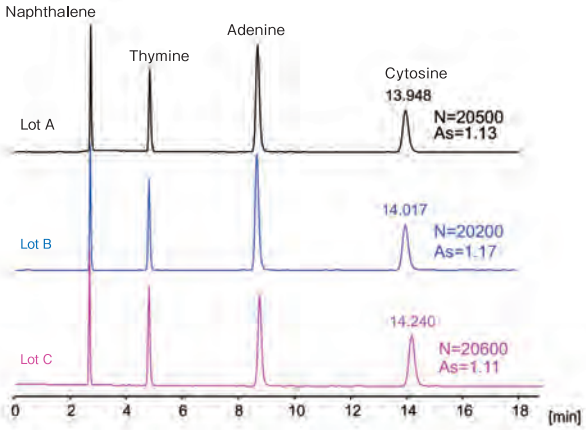
Differences between PC modification and diol modification

(1) "Superhydrophilic" surface covered with a substantial quantity of free water by means of phosphorylcholine groups
(2) Pursuit of hydrophilicity of the entire modified chain through the use of amide as a spacer



Lot reproducibility is good

Three columns with different packing material lots were used to measure nucleic acid base. Good reproducibility is shown in both retention time and peak shape.

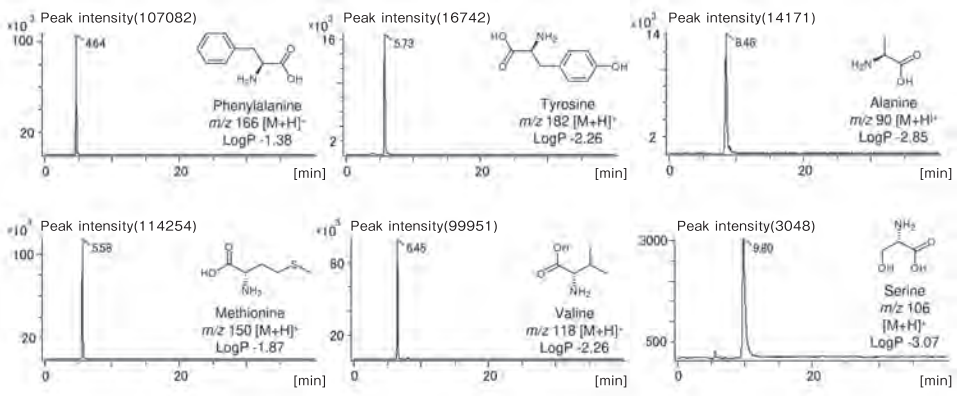


HPLC Conditions
Column : PC HILIC S5, 4.6 mm i.d.× 250 mm
Temperature : 40 ℃
Mobile phase : 10 mmol/L $HCOONH_4$, CH_3CN / H_2O = 90 / 10
Flow rate : 1.0 mL/min
Detection : UV 254 nm
Inj. vol. : 1 μL
Sample : 1. Naphthalene 100 μg/mL
2. Thymine 50 μg/mL
3. Adenine 50 μg/mL
4. Cytosine 100 μg/mL

PC HILIC

Suitable for LC-MS

In HILIC mode, the mobile phase contains more volatile organic solvents such as acetonitrile. Since this increases the ionization efficiency when connected to the MS detector, sensitivity is expected to improve compared to the reversed-phase system with high water content in the mobile phase.
On the other hand, the use of highly concentrated buffers is generally not preferred as it reduces the MS detection sensitivity. PC in PC HILIC has an amphoteric ionic structure, which balances the electrostatic forces of the respective electric charges and is electrically neutral. Therefore, the buffer concentration of the mobile phase can be kept low as it shows only weak electrostatic interaction.
An example of the analysis of free amino acids with LC-MS is shown.

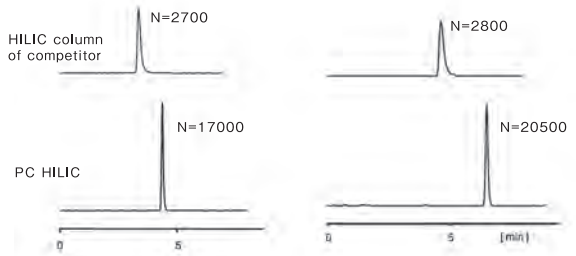


HPLC Conditions

Column	: PC HILIC S3 ; 2.0 mm i.d.× 150 mm
Mobile phase	: 10 mmol/L $HCOONH_4$, 0.1 vol% HCOOH / CH_3CN = 20 / 80
Flow rate	: 200 µL/min
Temperature	: 40 ℃
Inj. vol.	: 2 µL
Detection	: TOF-MS (AccuTOF, JEOL)、ESI positive
Sample dissolved in	: Amino acid mixed standard solution H type (Wako Pure Chemical Industries, Ltd.), 0.25 mmol/mL (diluted preparation with 80% CH_3CN)

Sharp peak of basic compounds

When basic compounds represented by amitriptyline, a tricyclic antidepressant, are analyzed in the reversed-phase system, problems may occur due to tailing of peaks. Since the silica gel surface is modified uniformly with PC groups in PC HILIC, the hydrated and mobile phases are smoothly distributed, and symmetrical peaks can be obtained. A high number of theoretical plates can be obtained.
Results of measurements using phosphate and formate buffers. With both the buffers, a sharp and high number of theoretical plates is obtained with PC HILIC.



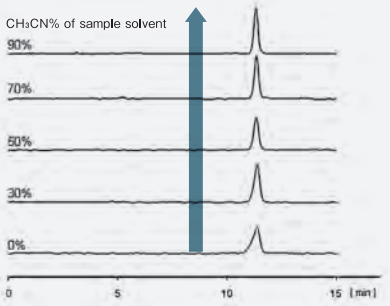
HPLC Conditions

Column size	: S5 ; 4.6 mm i.d.× 250 mm
Mobile phase	: Left: CH_3CN / 20 mmol/L phosphate buffer = 60 / 40 Right: 10 mmol/L $HCOONH_4$, CH_3CN / H_2O = 90 / 10
Flow rate	: 1.0 mL/min
Temperature	: 30 ℃
Detection	: UV 254 nm
Sample	: Amitriptyline

One point for condition examination!

Influence of sample solvent

The data to check the effect of the sample solvent using vitamin B2 (riboflavin) is shown.
Dissolve the sample in the mobile phase or a mixture of organic solvent and water with the same ratio as the mobile phase. As shown in the figure on the right, if the sample is dissolved in a solvent with a higher water content than the mobile phase, the solubility in the column decreases, and the number of theoretical plates for a peak decreases, affecting the peak shape.
When pretreating the sample with alcohol, such as methanol, it is recommended to dilute the sample with mobile phase before injection, instead of using the sample solution directly.

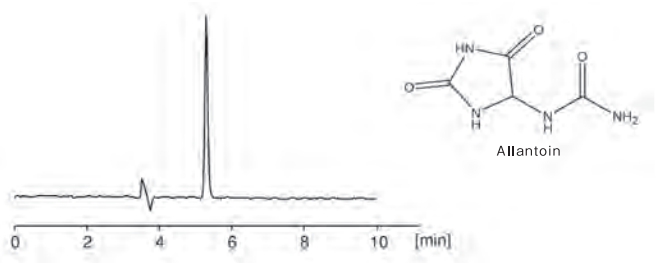


HPLC Conditions

Column size	: S5 ; 4.6 mm i.d.× 250 mm
Mobile phase	: 10 mmol/L CH_3COONH_4, CH_3CN/H_2O = 90 / 10
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 265 nm
Sample	: Riboflavin

Analysis of allantoin

An example of analysis of allantoin, a neutral compound, is shown.
Although allantoin is a neutral compound, analysis of allantoin is difficult as it is not retained in a reversed-phase system column due to its high polarity.
PC HILIC, which is suitable for the analysis of polar compounds, can sufficiently retain and separate the compounds.

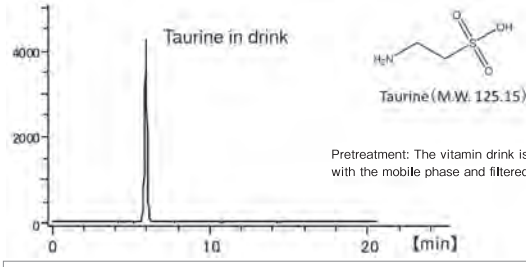


HPLC Conditions

Column	: PC HILIC S5 ; 4.6 mm i.d.× 250 mm
Mobile phase	: H_2O / CH_3CN = 20 / 80
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 210 nm
Sample	: Allantoin

Analysis of low molecular weight amphoteric substance analysis

It is generally difficult to set up simple mobile phase conditions on reversed-phase system columns for substances with low molecular weight and having properties of amphoteric ions. PC HILIC is an effective tool for such substances as it utilizes the hydrophilicity of the substance.
Analysis examples of sulfur-containing amino acids and taurine are introduced. Since taurine does not absorb UV rays, either pre-column or post column derivatization methods have been used in the conventional HPLC. An example of direct analysis of taurine in an energy drink using LC-MS in the HILIC mode is introduced.



Pretreatment: The vitamin drink is diluted 1000 times with the mobile phase and filtered with a 0.45 µm filter

HPLC Conditions

Column	: PC HILIC 2.0 mm i.d.× 150 mm
Mobile phase	: 10 mmol/L $HCOONH_4$ / CH_3CN = 20 / 80
Flow rate	: 200 µL/min
Temperature	: 40 ℃
Detection	: MS ESI negative (AccuTOF, JEOL)
Inj. vol.	: 1 µL
Sample dissolved in	: Mobile phase

PC HILIC Lineup

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
93152	PC HILIC(S3)2.0X50	3	2.0	50	
93154	PC HILIC(S3)2.0X100	3	2.0	100	
93155	PC HILIC(S3)2.0X150	3	2.0	150	
93162	PC HILIC(S3)4.6X50	3	4.6	50	
93164	PC HILIC(S3)4.6X100	3	4.6	100	
93165	PC HILIC(S3)4.6X150	3	4.6	150	
93145	GUARD CARTRIDGE PC HILIC(S3)2.0X10(2PCS)	3	2.0	10	Guard Cartridge Column
93146	GUARD CARTRIDGE PC HILIC(S3)4.0X10(2PCS)	3	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
93102	PC HILIC(S5)2.0X50	5	2.0	50	
93104	PC HILIC(S5)2.0X100	5	2.0	100	
93105	PC HILIC(S5)2.0X150	5	2.0	150	
93106	PC HILIC(S5)2.0X250	5	2.0	250	
93112	PC HILIC(S5)4.6X50	5	4.6	50	
93114	PC HILIC(S5)4.6X100	5	4.6	100	
93115	PC HILIC(S5)4.6X150	5	4.6	150	
93116	PC HILIC(S5)4.6X250	5	4.6	250	
93120	PC HILIC(S5)10X20	5	10	20	
93125	PC HILIC(S5)10X150	5	10	150	
93126	PC HILIC(S5)10X250	5	10	250	
93140	GUARD CARTRIDGE PC HILIC(S5)2.0X10(2PCS)	5	2.0	10	Guard Cartridge Column
93141	GUARD CARTRIDGE PC HILIC(S5)4.0X10(2PCS)	5	4.0	10	Guard Cartridge Column
12415	For CARTRIDGE HOLDER 10L	-	-	10	Cartridge holder

CAPCELL PAK CR / CR-H

Mixed-mode column

CAPCELL PAK CR is a column filled with a mixture of ion exchange (SCX) and C18 packing materials.
These columns enable the analysis of mixtures of basic compounds achieving both retention and detection sensitivity in MS.

Physical properties

CAPCELL PAK CR

Functional group	Mixing ratio	Particle Size (μm)	Pressure resistance (MPa)	pH range	USP class No.
SCX (sulfonic acid group) C18 (octadecyl groups)	1:4 1:20 1:50	3	20	2~7	–
SCX (sulfonic acid group) C18 (octadecyl groups)	1:4 1:20 1:50	5	20	2~7	–

CAPCELL PAK CR-H

Functional group	Mixing ratio	Particle Size (μm)	Pressure resistance (MPa)	pH range	USP class No.
SCX (sulfonic acid group) C18 (octadecyl groups)	1:4	3	50	2~7	–

Separation mechanism

The separation mechanism is easy to understand with a schematic diagram.
When C18 (ODS) column is used under neutral conditions, neutral compounds are retained by hydrophobic interaction, while ionized cations (basic compounds) and anions (acidic compounds) are not retained (Fig. 1. a). On the other hand, when SCX (strong cation exchange) column is used, basic compounds are retained by ion exchange interaction, while neutral and acidic compounds are not retained (Fig. 1. b). Therefore, if a CR column containing a mixture of C18 (ODS) and SCX packing materials is used, non-acidic compounds are retained (Fig. 1. c).
When a CR column is used under acidic conditions that is common in LC-MS, the ionized cations (basic compounds) are retained by ion exchange interaction. Since ionization of acidic compounds is also suppressed, the retention power is greater than under neutral conditions. Neutral compounds are retained by hydrophobic interactions (Fig. 2). Thus, all these mixtures are retained, increasing the possibility that they can be separated (can be applied for simultaneous analysis of neutral, acidic and basic compounds).

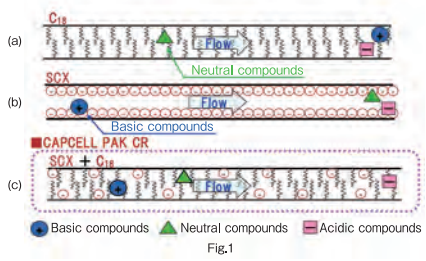


Fig.1

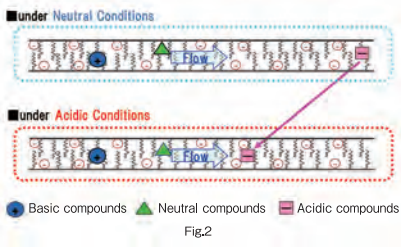
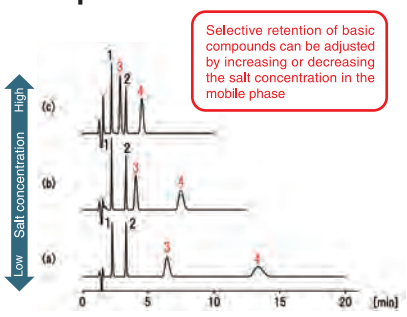


Fig.2

Simultaneous analysis of acidic, neutral and basic compounds

As described in the separation mechanism, CAPCELL PAK CR can be applied for the simultaneous analysis of acidic, neutral and basic compounds. An example of simultaneous analysis of acidic, neutral and basic compounds is shown. By changing the salt concentration of the mobile phase, it is possible to adjust retention of only the basic compounds to which the ion exchange action contributes, which also allows to change the separation pattern.



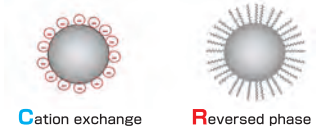
HPLC Conditions

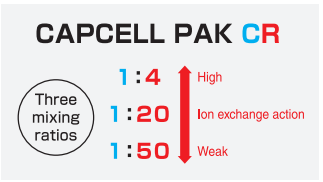
Column : CAPCELL PAK CR (1:4), 2.0 mm i.d.× 150 mm
Mobile phase : (a) CH_3CN / 5 mmol/L CH_3COONH_4 (CH_3COOH, pH 4.0) = 70 / 30
(b) CH_3CN / 10 mmol/L CH_3COONH_4 (CH_3COOH, pH 4.0) = 70 / 30
(c) CH_3CN / 20 mmol/L CH_3COONH_4 (CH_3COOH, pH 4.0) = 70 / 30
Flow rate : 200 μL/min
Temperature : 40 ℃
Detection : UV 220 nm
Inj. vol. : 1 μL
Sample : 1. Flurbiprofen (Acidic compound)
2. Toluene (Neutral compound)
3. Verapamil Hydrochloride (Basic compound)
4. Metoprolol (Basic compound)

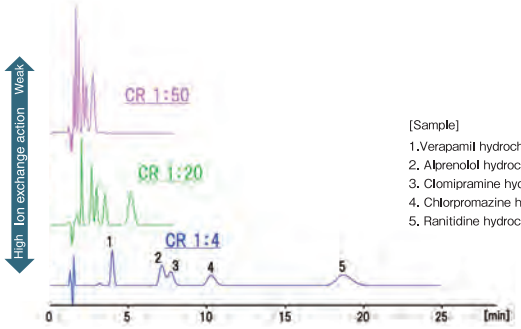
Three mixing ratios can be selected

In CAPCELL PAK CR, 3 mixing ratios, 1:4, 1:20 and 1:50 (* Ratio 1 is SCX packing material) are available for C18 and SCX packing materials. Strength of the ion exchange action can be selected according to the target compound.

An example of analysis of a basic compound with different mixing ratios is shown. The separation pattern can be changed and duration can be reduced by changing the mixing ratio without changing the mobile phase.







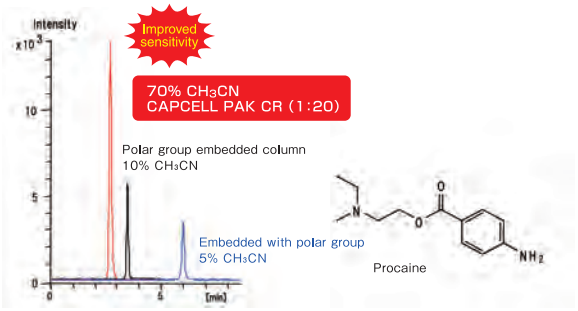
[Sample] [pKa]
1. Verapamil hydrochloride 8.9
2. Alprenolol hydrochloride 9.6
3. Clomipramine hydrochloride 7.8
4. Chlorpromazine hydrochloride 6.9
5. Ranitidine hydrochloride 8.4

HPLC Conditions

Column size : 2.0 mm i.d.×150 mm
Mobile phase : CH_3CN /10 mmol/L $HCOONH_4$ ($HCOOH$, pH 3.0) = 70 / 30
Flow rate : 200 μL/min
Temperature : 40 ℃
Detection : UV 220 nm
Inj. vol. : 1 μL

Analysis of higher sensitivity with LC-MS

Acidic conditions and high organic solvent composition are suitable ionization conditions for the analysis of basic compounds in LC-MS. In the C18 column, retention of basic compounds is less, and it is difficult to increase the organic solvent content in the mobile phase.
In CAPCELL PAK CR, due to the action of SCX, moderate retention is possible in the acidic mobile phase with high organic solvent composition, which enables analysis with high sensitivity of basic compounds by LC-MS.



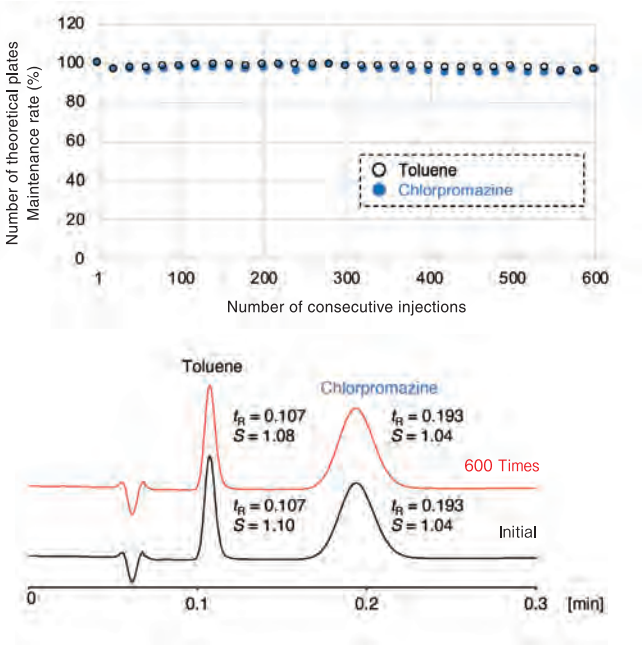
HPLC Conditions

Column : CAPCELL PAK CR 1: 20 (2.0 mm i.d.× 150 mm)
Polar group embedded column (2.1 mm i.d.× 150 mm)
Mobile phase : A) 10 mmol/L $HCOONH_4$ (adjusted at pH 3 with formic acid)
B) CH_3CN
A / B CR 30 / 70, Embedded with polar group 90 / 10, Blue 95 / 5
Flow rate : 200 μL/min
Temperature : 40 ℃
Detection : TOF-MS, Dual ESI, Positive mode
Inj. vol. : 2 μL
Sample : Procaine was dissolved at 1000 μg/mL in methanol, and diluted to 1 μg/mL with each mobile phase.

CAPCELL PAK CR / CR-H

CR-H with high pressure resistance specification (50 MPa)

To evaluate the pressure resistance of CAPCELL PAK CR-H S3 at 50 MPa, the samples were continuously injected with toluene, as the neutral compound, and chlorpromazine, as the basic compound, and the change in the number of theoretical plates was examined. Trends in maintenance rate and chromatograms for injections No. 1 and 600 are shown. For 600 consecutive injections, the number of theoretical plates was maintained almost the same, and there was almost no change in the retention time and symmetry coefficient, for both neutral and basic compounds.

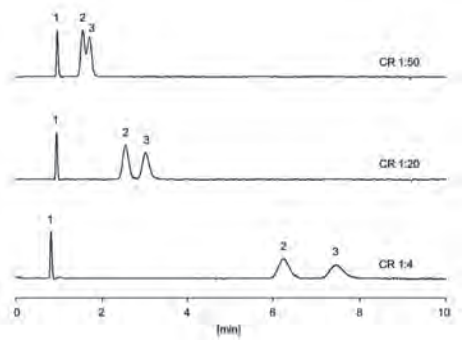


HPLC Conditions

Column	: CAPCELL PAK CR-H 1:4 S3 ; 2.0 mm i.d.× 50 mm
Mobile phase	: 20 mmol/L CH_3COONH_4 (adjusted at pH 4 with acetic acid) / CH_3CN = 30 / 70
Flow rate	: 2.5 mL/min
Pressure	: 50 MPa
Temperature	: 40 ℃
Detection	: UV 220 nm
Inj. vol.	: 1 µL
Sample	: 1. Toluene, 2. Chlorpromazine (p*Ka* = 9.3)

Inorganic ions

Since ion chromatography is used to measure inorganic ions in environmental water, a dedicated column is required. An example of analysis of sodium and potassium ions using CAPCELL PAK CR S3, a column with a mixture of SCX (strong cation exchange) and C18 packing materials that can be used in a mobile phase of a reversed-phase system, is shown.



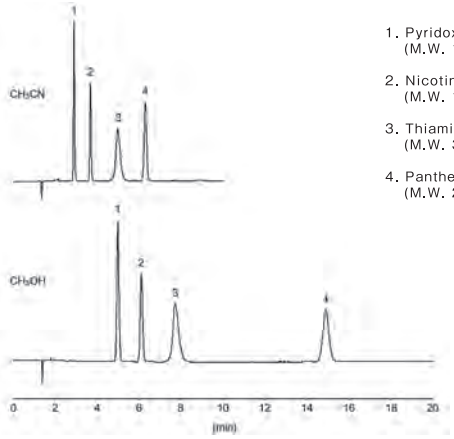
1. Chloride ion
2. Sodium ion
3. Potassium ion

HPLC Conditions

Column	: CAPCELL PAK CR S3 ; 2.0 mm i.d.× 150 mm
Mobile phase	: 10 mmol/L $HCOONH_4$ / CH_3OH = 60 / 40
Flow rate	: 300 µL/min
Temperature	: 40 ℃
Detector	: NQAD (Evaporation 60 ℃, Nebulizer 30 ℃)
Inj. vol.	: 1 µL
Sample	: Potassium chloride and Sodium chloride were dissolved in H_2O.(100 µg/mL each)

Vitamin B

Vitamin B, a water-soluble vitamin, is a highly polar compound, among which thiamine, known as vitamin B1, is difficult to retain under reversed-phase analysis conditions. An example of analysis, using CAPCELL PAK CR 1:50 S5, with a mixture of SCX (strong cation exchange) and C18 packing materials, and two common mobile phases, methanol and acetonitrile, is shown. Adequate retention and separation is obtained in both the mobile phases.



1. Pyridoxine (50 µg/mL) (M.W. 168.2)
2. Nicotinamide (20 µg/mL) (M.W. 122.1)
3. Thiamine (200 µg/mL) (M.W. 337.3)
4. Panthenol (200 µg/mL)) (M.W. 205.3)

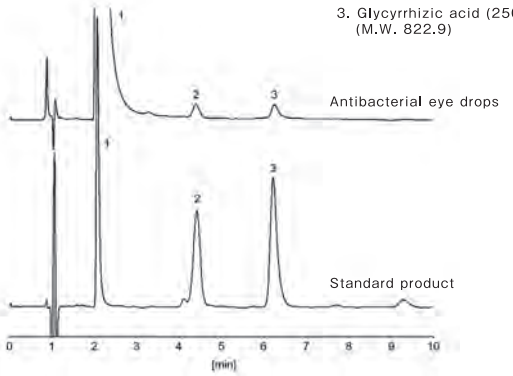
HPLC Conditions

Column	: CAPCELL PAK CR 1 : 50 S5 ; 4.6 mm i.d.× 150 mm
Mobile phase	: 100 mmol/L Phosphate buffer (KH_2PO_4 : K_2HPO_4 = 1 : 1 in molar ratio) / Organic solvent = 95 / 5
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 210 nm
Inj. vol.	: 5 µL
Sample dissolved in	: H_2O

Antibacterial eye drops

Commercially available antibacterial eye drops used for treating sty, etc., generally contain a combination of sulfamethoxazole, as an antimicrobial component, and glycyrrhizic acid dipotassium salt and ε-aminocaproic acid, as anti-inflammatory components. An example of simultaneous analysis of 3 components using CAPCELL PAK CR 1:4 S5 is shown. The actual samples were analyzed using this analysis condition.

1. Sulfamethoxazole (5 µg/mL) (M.W. 253.3)
2. ε-aminocaproic acid (1000 µg/mL) (M.W. 131.2)
3. Glycyrrhizic acid (250 µg/mL) (M.W. 822.9)



HPLC Conditions

Column	: CAPCELL PAK CR 1:4 S3 ; 2.0 mm i.d.× 150 mm
Mobile phase	: 10 mmol/L KH_2PO_4 (adjusted at pH 2.5 with phosphoric acid) / CH_3CN = 65 / 35
Flow rate	: 300 µL/min
Temperature	: 40 ℃
Detection	: UV 210 nm
Inj. vol.	: 3 µL
Sample	: 200 µL of Antibacterial eye drops was added 600 µL of 50 vol% CH_3CN. The mixture was sonicated for 20 min and centrifuged. The supernatant was filtered with a 0.45 µL filter. 50 µL of the solution was added 950 µL of 50 vol% CH_3CN. Each standard compound was dissolved in 50 vol% CH_3CN.

CAPCELL PAK CR / CR-H Lineup

CAPCELL PAK CR

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
93072	CAPCELL PAK CR 1:4(S3)2.0X50	3	2.0	50	
93074	CAPCELL PAK CR 1:4(S3)2.0X100	3	2.0	100	
93075	CAPCELL PAK CR 1:4(S3)2.0X150	3	2.0	150	
93082	CAPCELL PAK CR 1:20(S3)2.0X50	3	2.0	50	
93084	CAPCELL PAK CR 1:20(S3)2.0X100	3	2.0	100	
93085	CAPCELL PAK CR 1:20(S3)2.0X150	3	2.0	150	
93086	CAPCELL PAK CR 1:20(S3)2.0X250	3	2.0	250	
93092	CAPCELL PAK CR 1:50(S3)2.0X50	3	2.0	50	
93094	CAPCELL PAK CR 1:50(S3)2.0X100	3	2.0	100	
93095	CAPCELL PAK CR 1:50(S3)2.0X150	3	2.0	150	
93096	CAPCELL PAK CR 1:50(S3)2.0X250	3	2.0	250	

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
93001	CAPCELL PAK CR 1:4(S5)2.0X35	5	2.0	35	
93002	CAPCELL PAK CR 1:4(S5)2.0X50	5	2.0	50	
93003	CAPCELL PAK CR 1:4(S5)2.0X75	5	2.0	75	
93004	CAPCELL PAK CR 1:4(S5)2.0X100	5	2.0	100	
93005	CAPCELL PAK CR 1:4(S5)2.0X150	5	2.0	150	
93006	CAPCELL PAK CR 1:4(S5)2.0X250	5	2.0	250	
93007	CAPCELL PAK CR 1:4(S5)4.6X35	5	4.6	35	
93008	CAPCELL PAK CR 1:4(S5)4.6X50	5	4.6	50	
93009	CAPCELL PAK CR 1:4(S5)4.6X75	5	4.6	75	
93010	CAPCELL PAK CR 1:4(S5)4.6X100	5	4.6	100	
93011	CAPCELL PAK CR 1:4(S5)4.6X150	5	4.6	150	
93012	CAPCELL PAK CR 1:4(S5)4.6X250	5	4.6	250	
93013	CAPCELL PAK CR 1:20(S5)2.0X35	5	2.0	35	
93014	CAPCELL PAK CR 1:20(S5)2.0X50	5	2.0	50	
93015	CAPCELL PAK CR 1:20(S5)2.0X75	5	2.0	75	
93016	CAPCELL PAK CR 1:20(S5)2.0X100	5	2.0	100	
93017	CAPCELL PAK CR 1:20(S5)2.0X150	5	2.0	150	
93018	CAPCELL PAK CR 1:20(S5)2.0X250	5	2.0	250	
93019	CAPCELL PAK CR 1:20(S5)4.6X35	5	4.6	35	
93020	CAPCELL PAK CR 1:20(S5)4.6X50	5	4.6	50	
93021	CAPCELL PAK CR 1:20(S5)4.6X75	5	4.6	75	
93022	CAPCELL PAK CR 1:20(S5)4.6X100	5	4.6	100	
93023	CAPCELL PAK CR 1:20(S5)4.6X150	5	4.6	150	
93024	CAPCELL PAK CR 1:20(S5)4.6X250	5	4.6	250	
93025	CAPCELL PAK CR 1:50(S5)2.0X35	5	2.0	35	
93026	CAPCELL PAK CR 1:50(S5)2.0X50	5	2.0	50	
93027	CAPCELL PAK CR 1:50(S5)2.0X75	5	2.0	75	
93028	CAPCELL PAK CR 1:50(S5)2.0X100	5	2.0	100	
93029	CAPCELL PAK CR 1:50(S5)2.0X150	5	2.0	150	
93030	CAPCELL PAK CR 1:50(S5)2.0X250	5	2.0	250	
93031	CAPCELL PAK CR 1:50(S5)4.6X35	5	4.6	35	
93032	CAPCELL PAK CR 1:50(S5)4.6X50	5	4.6	50	
93033	CAPCELL PAK CR 1:50(S5)4.6X75	5	4.6	75	
93034	CAPCELL PAK CR 1:50(S5)4.6X100	5	4.6	100	
93035	CAPCELL PAK CR 1:50(S5)4.6X150	5	4.6	150	
93036	CAPCELL PAK CR 1:50(S5)4.6X250	5	4.6	250	
93037	CAPCELL PAK CR (S5) 2.0X50 3-number set	5	2.0	50	
93038	CAPCELL PAK CR (S5) 2.0X150 3-number set	5	2.0	150	
93039	CAPCELL PAK CR (S5) 4.6X150 3-number set	5	4.6	150	

CAPCELL PAK CR-H

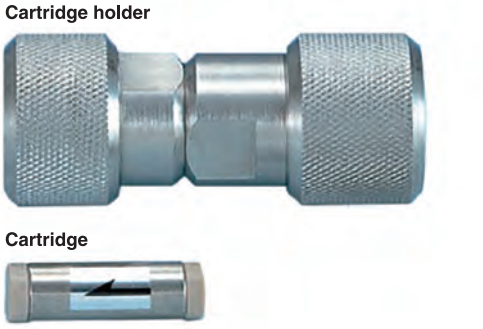
Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Remarks
93201	CAPCELL PAK CR-H 1:4(S3)2.0X50	3	2.0	50	

Guard Cartridge Column

Depending on the degree of clean-up in the sample, if many impurities are adsorbed into the column, a guard column is effective in preventing the contamination of the main column.
Osaka Soda has two types of cartridge-type guard columns, one for the general-purpose HPLC and the other for high pressure resistance UHPLC.
Select according to the analysis column.

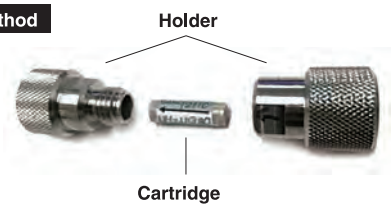
Guard cartridge column - For general HPLC -

- **Use with a holder and cartridge set**
- **The cartridge holder is the same for all cartridges with the same length even if the inner diameter is different**
- **The main column can be protected by simply replacing the cartridge, which is available at a lower unit price**
- **Can be connected easily by tightening with hand, without tools**



Cartridge size	Compatible holders
2.0 mm i.d. × 10 mm	12415 CARTRIDGE HOLDER 10L
4.0 mm i.d. × 10 mm	
2.0 mm i.d. × 20 mm	12414 CARTRIDGE HOLDER 20L
4.0 mm i.d. × 20 mm	

Installation method

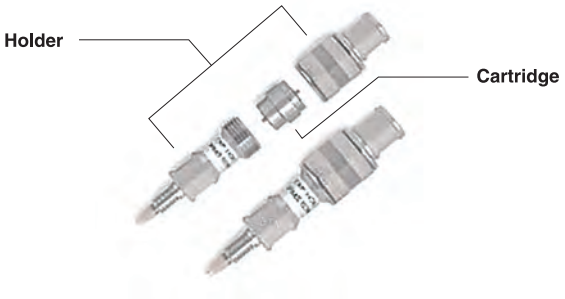


Precautions on usage

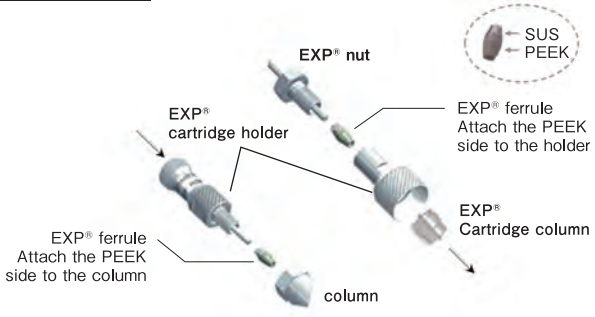
In principle, attach the cartridge to the holder by manual tightening. If leakage occurs with manual tightening, perform slight additional tightening with a tool. The cartridge may break if tightened excessively with a tool. Please pay attention to this point.

EXP® Guard cartridge column - UHPLC -

- **High pressure resistance specifications that supports UHPLC**
- **Use with holder and cartridge set**
- **The influence of dead volume can be reduced with the type where the column is connected directly**
- **Can be connected easily by tightening with hand, without tools**



Installation method <Cartridge column and holder installation diagram>



Guard Cartridge Column Lineup

[Guard cartridge column for General HPLC use] Cartridge holder

Product number	Product name	Length(mm)
12415	For CARTRIDGE HOLDER 10L	10
12414	For CARTRIDGE HOLDER 20L	20

[Guard cartridge column] line-up (supported product grade)

C18 (Type: MG/MGII/MGIII/ACR/AQ/BB/UG120/UG80/SG120/SG300/AG120)
C8 (Type: DD/UG120/SG300/AG120)
Others (ADME-HR/Proteonavi/C1 UG120/C1 SG300/Ph UG120/CN UG120/SCX UG80/NH2 UG80/PC HILIC)
Dedicated Columns (MF C8/MF SCX/MF Ph-1)

[EXP® Guard cartridge column for UHPLC] Cartridge holder

Product number	Product name	Length(mm)
3640	EXP® DIRECT CONNECT HOLDER (titanium hybrid ferrule: 2 Nos.; Stainless steel nut: 1 No.)	5
3624	Titanium hybrid ferrule (5 Nos.)	-
3625	Hand tightening nut (5 numbers)	-

[EXP® Guard cartridge column] line-up

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Pressure resistance(MPa)
3648	EXP® GUARD CARTRIDGE CAPCELL CORE ADME(S2.7)2.1×5	2.7	2.1	5	60
3645	EXP® GUARD CARTRIDGE CAPCELL CORE AQ(S2.7)2.1×5	2.7	2.1	5	60
3643	EXP® GUARD CARTRIDGE CAPCELL CORE C18(S2.7)2.1×5	2.7	2.1	5	60
3644	EXP® GUARD CARTRIDGE CAPCELL CORE C18(S2.7)4.6×5	2.7	4.6	5	60
3649	EXP® GUARD CARTRIDGE CAPCELL CORE MP(S2.7)2.1×5	2.7	2.1	5	60
3646	EXP® GUARD CARTRIDGE CAPCELL CORE PC(S2.7)2.1×5	2.7	2.1	5	60
3647	EXP® GUARD CARTRIDGE CAPCELL CORE PFP(S2.7)2.1×5	2.7	2.1	5	60

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Pressure resistance(MPa)
3655	EXP® GUARD CARTRIDGE CAPCELL PAK ADME-HR(S2)2.1×5	2	2.1	5	100
3641	EXP® GUARD CARTRIDGE CAPCELL PAK C18 IF2(S2)2.1×5	2	2.1	5	100

Product number	Product name	Particle Size(μm)	Inner diameter(mm)	Length(mm)	Pressure resistance(MPa)
3654	EXP® GUARD CARTRIDGE CAPCELL PAK C18 MGⅢ-H(S3)2.1×5	3	2.1	5	50

EXP® is a registered trademark of Optimize Technologies, Inc.

4 Contact information

Column: Application and technical consultation
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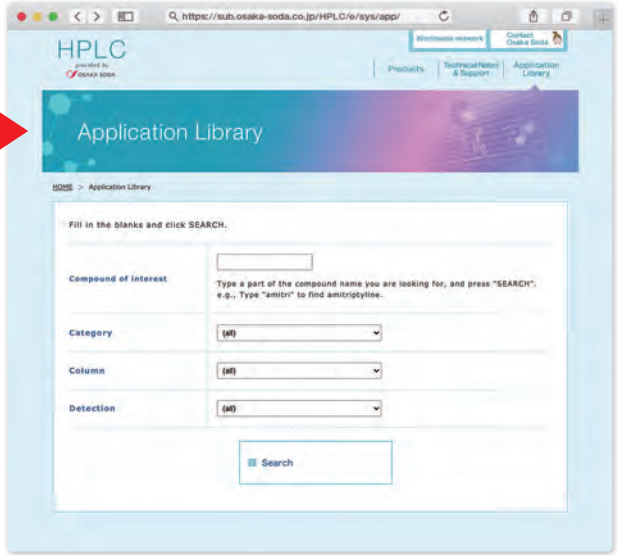
You can check the various application data on our website!

https://sub.osaka-soda.co.jp/HPLC/e/

Osaka Soda HPLC



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