CAPCELL PAK C_{18} KG

CAPCELL PAK: Our Most Durable Grade

OSAKA SODA

Product Introduction

CAPCELL PAK C_{18} KG

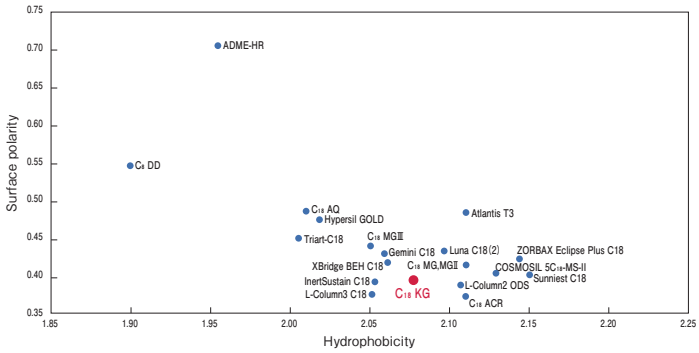
■ Product Features

- Enhanced durability achieved through improvements in silica and the development of a new polymer coating technology
- Wide pH compatibility (usable pH range of 1 to 12)
- Designed to meet rigorous demands modern analytical condition

■ Physical properties

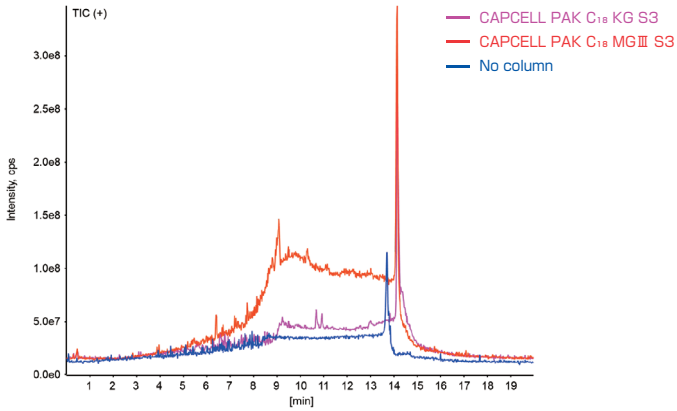
Functional group	Pore Size (Å)	Particle Size (μm)	Surface Area (m^2/g)	% of Carbon	Density (μmol/m^2)	Pressure resistance (MPa)	pH range	USP class No.
C18	100	2	320	17	2.7	100	1~12	L1
C18	100	3	320	17	2.7	20 / 50	1~12	L1
C18	100	5	320	17	2.7	20	1~12	L1

■ Hydrophobicity and surface polarity



■ Low bleed column

Compared to the conventional LC-MS/MS C_{18} column, CAPCELL PAK C_{18} MGⅢ, this CAPCELL PAK C_{18} KG achieves a significant reduction in column bleeding, making it an ideal choice for LC-MS/MS analysis.



HPLC Conditions

Column size : 2.0 or 2.1 mm i.d. × 100 mm
Mobile phase : A) 0.1 vol% HCOOH B) 0.1 vol% HCOOH, CH_3CN
B 5 %(0 min)-> 95 %(8 min)-> 95 %(13 min)->
5 %(13.1 min) Gradient
Flow rate : 0.4 mL/min
Temperature : 40 ℃
Detection : TIC (Mass Range : 50 - 1000)
Ionization : ESI positive

■ Relationship between flow rate and theoretical plates: Basic compound analysis

The CAPCELL PAK C_{18} KG S2 demonstrates superior performance compared to the hybrid-type C_{18} columns from Company A and Company B. It minimizes performance degradation under high flow rate conditions while enabling low-pressure operation.

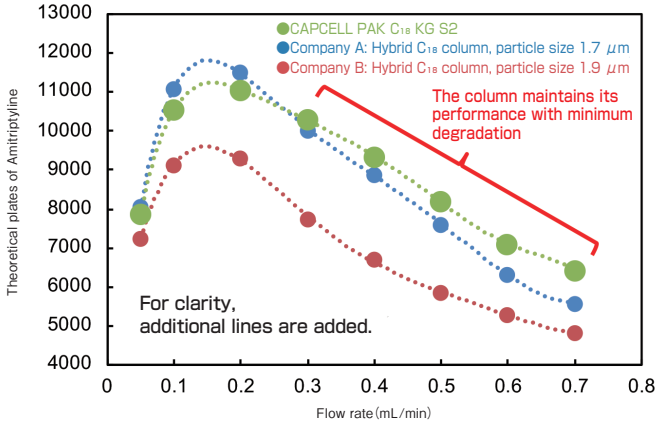


Figure 1: Relationship between flow rate and theoretical plates of amitriptyline

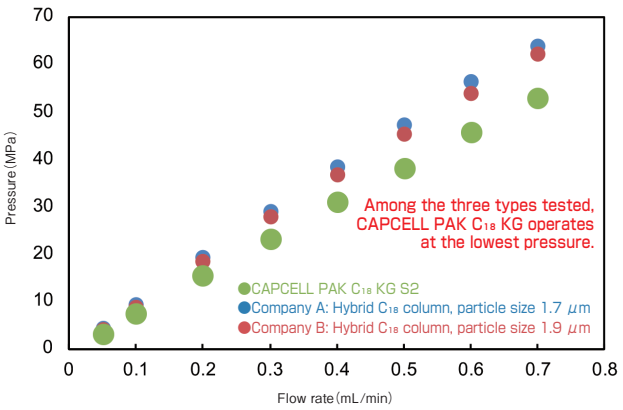


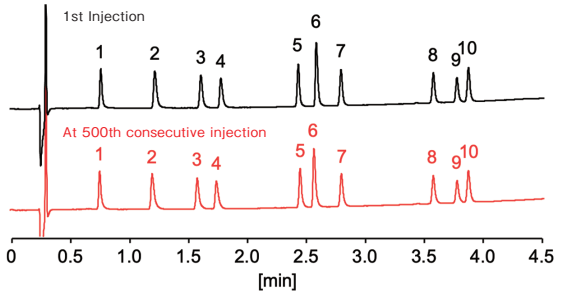
Figure 2: Relationship between flow rate and pressure

HPLC Conditions

Column size : 2.1 mm i.d.× 50 mm
Mobile phase : 20 mmol/L Phosphate buffer (KH_2PO_4 : K_2HPO_4 = 1 : 1 in molar ratio) / CH_3OH = 20 / 80
Temperature : 40 ℃
Detection : UV 220 nm
Inj. vol. : 1 μL
Sample : Amitriptyline (100 μg/mL)

Durability under acidic (TFA) mobile phase conditions

The CAPCELL PAK C_{18} KG demonstrates stable performance even under mobile phase conditions using the strong acid trifluoroacetic acid (TFA).

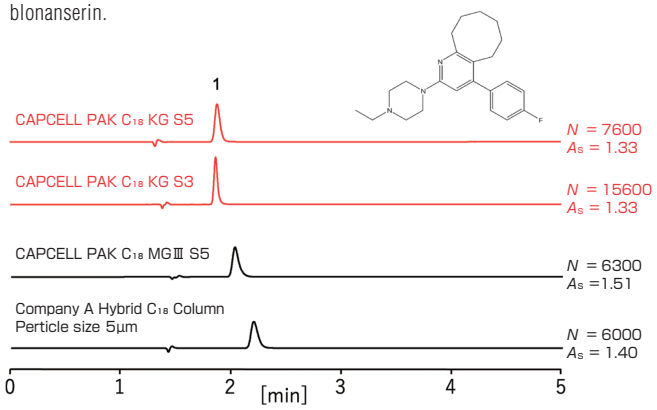


HPLC Conditions

Column : CAPCELL PAK C_{18} KG S2 ; 2.1 mm i.d.× 50 mm
Mobile phase : A) 0.1 vol% TFA B) 0.1 vol% TFA, CH_3CN
B 25 %(0 min)-> 70 %(4 min)-> 25 %(4.1 min) Gradient
Flow rate : 600 µL/min
Temperature : 40 ℃
Detection : UV 220 nm
Inj. vol. : 2 µL
Sample : 1. Ambroxol(20 µg/mL) 2. Epinastine(20 µg/mL) 3. Olopatadine(10 µg/mL)
4. Diphenhydramine(20 µg/mL) 5. Sulindac(15 µg/mL) 6. Fexofenadine(40 µg/mL)
7. Ketoprofen(20 µg/mL) 8. Flurbiprofen(20 µg/mL)
9. Diclofenac(10 µg/mL) 10. Ibuprofen(20 µg/mL)

Example of blonanserin analysis

Under the acidic conditions commonly used in LC-MS/MS, the CAPCELL PAK C_{18} KG achieves excellent peak shapes for the analysis of the basic compound blonanserin.

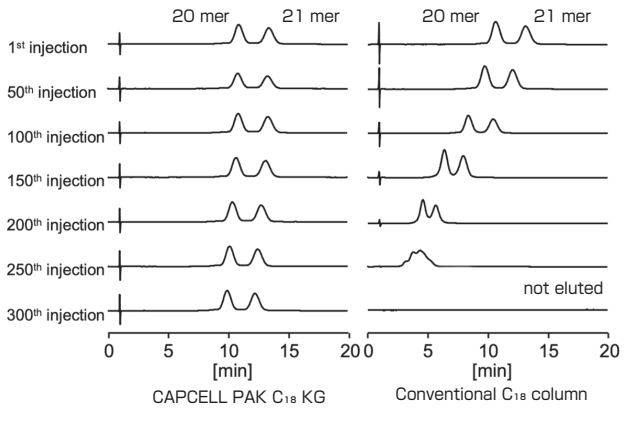


HPLC Conditions

Column size : 4.6 mm i.d.× 150 mm
Mobile phase : 0.1 vol% HCOOH / CH_3OH = 30 / 70
Flow rate : 1.0 mL/min
Temperature : 40 ℃
Detection : UV 254 nm
Sample : 1. Blonanserin(50 µg/mL)

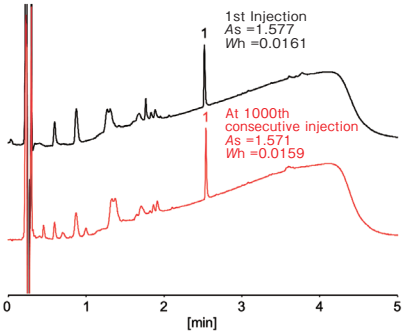
Improved durability under alkaline mobile phase conditions

Compared to conventional C_{18} columns, C_{18} KG demonstrates superior durability with high reproducibility in separation performance and retention times even after 300 consecutive injections.



Durability in continuous injections of pharmaceutical additive plasma samples

In bioanalytical sample analysis, a primary cause of column degradation is the adsorption of matrix-derived components onto the packing material surface. The CAPCELL PAK C_{18} KG maintains excellent performance even under such Demanding conditions, ensuring stable operation during continuous injections.

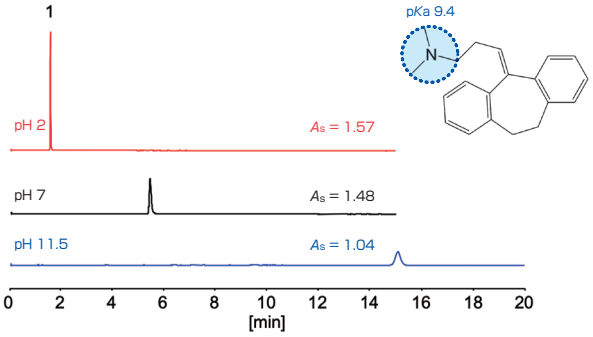


HPLC Conditions

Column : CAPCELL PAK C_{18} KG S2 ; 2.1 mm i.d.× 50 mm
Mobile phase : A) 0.1vol% HCOOH B) 0.1 vol% HCOOH, CH_3CN
B 30 %(0 min)-> 90 %(2 min)-> 90 %(3 min)-> 30 %(3.1 min) Gradient
Flow rate : 600 µL/min
Temperature : 40 ℃
Detection : UV 220 nm
Inj. vol. : 2 µL
Sample : 1. Febuxostat(10 µg/mL in human plasma supernatant)

Analysis of basic compounds under acidic, neutral, and basic conditions

Excellent peak shapes are achieved under acidic, neutral, and basic conditions.



HPLC Conditions

Column : CAPCELL PAK C_{18} KG S3 ; 4.6 mm i.d.× 150 mm
Mobile phase : (pH 2) 20 mmol/L Phosphate buffer / CH_3CN = 40 / 60
(pH 7) 20 mmol/L Phosphate buffer / CH_3CN = 40 / 60
(pH 11.5) 20 mmol/L $Na_2B_4O_7 \cdot 10H_2O$ / CH_3CN = 40 /60
Flow rate : 1.0 mL/min
Temperature : 30 ℃
Detection : UV 254 nm
Inj. vol. : 5 µL
Sample : Amitriptyline(100 µg/mL)

Enhanced durability under high-temperature and high-pH conditions

Sequence	
5'-U^C^A^U^C^A^C^A^C^U^G^A^A^U^A^C^C^A^A^U-3'	RNA 20 mer, All PS
5'-G^U^C^A^U^C^A^C^A^C^U^G^A^A^U^A^C^C^A^A^U-3'	RNA 21 mer, All PS

^ = Phosphorothioated

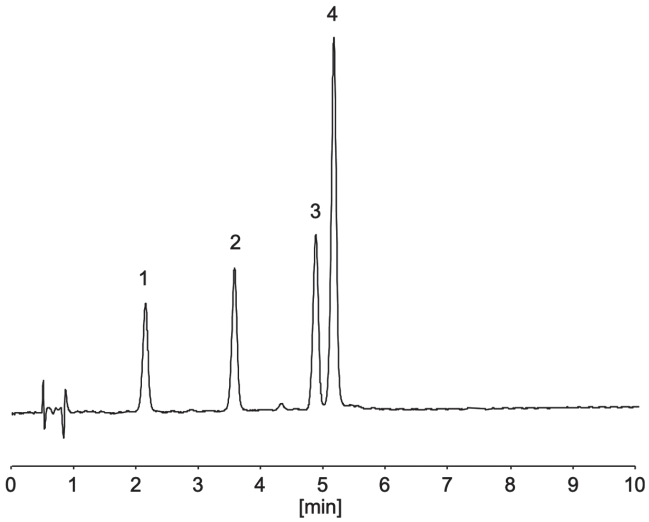
HPLC Conditions

Column : CAPCELL PAK C_{18} KG S3 ; 2.1 mm i.d.× 100 mm
Mobile phase : A) 15 mmol/L DBA, 50 mmol/L HFIP
B) 15 mmol/L DBA, 50 mmol/L HFIP, 50 vol% CH_3OH
B 73 %(0 min)-> 78 %(20 min)-> 73 %(20.1 min) Gradient
Flow rate : 200 µL/min
Temperature : 60 ℃
Detection : UV 270 nm
Inj. vol. : 2 µL
Sample : 100 µg/mL each in 10 mmol/L Tris-HCl buffer(pH 8)

Application

■ Oligonucleotide Resolution Standard

This example demonstrates the analysis of the Oligonucleotide Resolution Standard (manufactured by Agilent), which is commonly used as a benchmark for column separation performance in oligonucleotide analysis, using the metal-free C_{18} column, CAPCELL PAK INERT C_{18} KG S3 (2.0 mm i.d. x 100 mm).



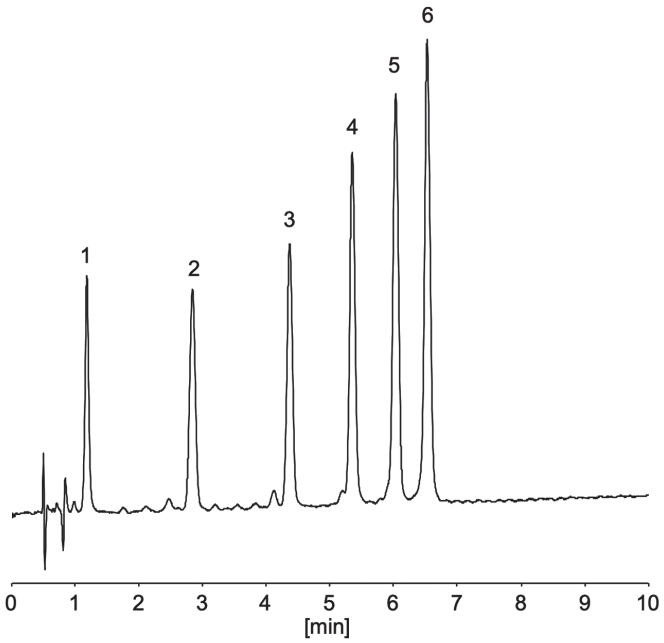
1. RNA 14 mer
2. RNA 17 mer
3. RNA 20 mer
4. RNA 21 mer

HPLC Conditions

Column	: CAPCELL PAK INERT C_{18} KG S3 ; 2.0 mm i.d.× 100 mm
Mobile phase	: A) H_2O / HFIP* / TEA** = 1000 / 30 / 0.4
	B) CH_3OH / HFIP* / TEA** = 1000 / 30 / 2
	B 15 %(0 min)-> 25 %(10 min) Gradient
Flow rate	: 0.4 mL/min
Temperature	: 60 ℃
Detection	: UV 260 nm
Inj. vol.	: 2 µL
Sample dissolved in	: H_2O
	HFIP* : 1,1,1,3,3,3-Hexafluoroisopropanol
	TEA** : Triethylamine
	※ 1 µg/mL = 1 ppm

■ Oligonucleotide Ladder Standard

This example demonstrates the analysis of the Oligonucleotide Ladder Standard (manufactured by Agilent), which is commonly used as a benchmark for evaluating column selectivity and reproducibility in oligonucleotide analysis, using the metal-free C_{18} column, CAPCELL PAK INERT C_{18} KG S3 (2.0 mm i.d. x 100 mm).



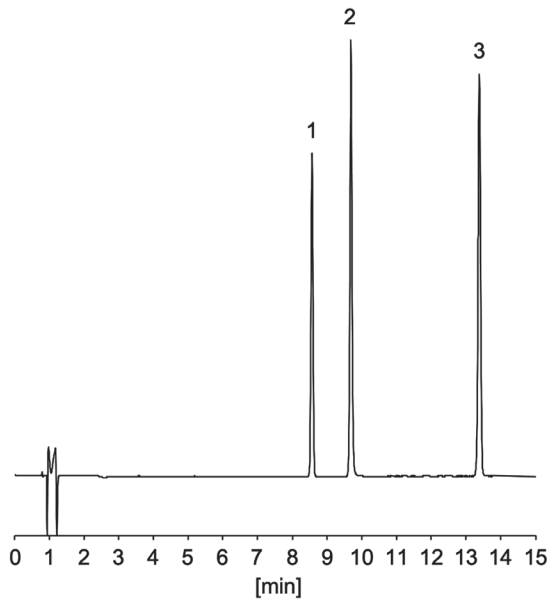
1. Oligodeoxythymidine 15 mer
2. Oligodeoxythymidine 20 mer
3. Oligodeoxythymidine 25 mer
4. Oligodeoxythymidine 30 mer
5. Oligodeoxythymidine 35 mer
6. Oligodeoxythymidine 40 mer

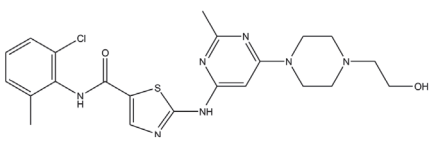
HPLC Conditions

Column	: CAPCELL PAK INERT C_{18} KG S3 ; 2.0 mm i.d.× 100 mm
Mobile phase	: A) H_2O / HFIP* / TEA** = 1000 / 30 / 0.4
	B) CH_3OH / HFIP* / TEA** = 1000 / 30 / 2
	B 20 %(0 min)-> 30 %(10 min) Gradient
Flow rate	: 0.4 mL/min
Temperature	: 60 ℃
Detection	: UV 260 nm
Inj. vol.	: 2 µL
Sample dissolved in	: H_2O
	HFIP* : 1,1,1,3,3,3-Hexafluoroisopropanol
	TEA** : Triethylamine
	※ 1 µg/mL = 1 ppm

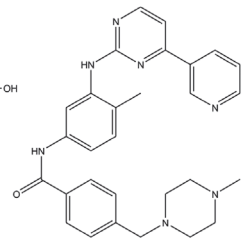
■ Tyrosine kinase inhibitor

In reversed-phase mode analysis of basic compounds, peak distortion such as tailing can be a concern when the mobile phase is neutral or acidic. Here, this example demonstrates the analysis of three tyrosine kinase inhibitors under strongly alkaline conditions using the CAPCELL PAK C_{18} KG S3 (4.6 mm i.d. x 100 mm), which has a useable wide pH range from 1 to 12.

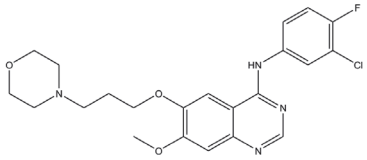




1. Dasatinib
(50 µg/mL) (M.W. 488.0)



2. Imatinib
(50 µg/mL) (M.W. 488.0)



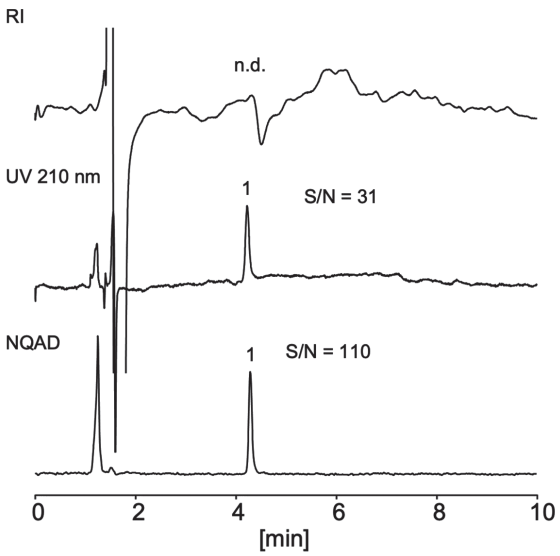
3. Gefitinib
(50 µg/mL) (M.W. 446.9)

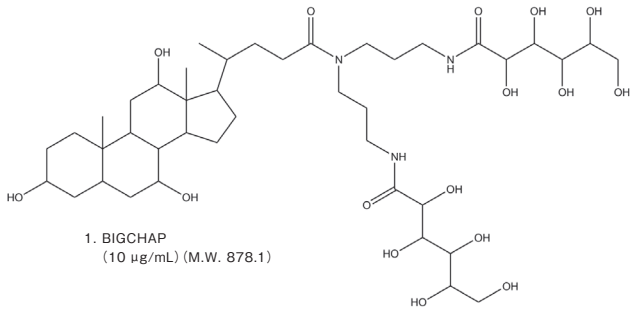
HPLC Conditions

Column	: CAPCELL PAK C_{18} KG S3 ; 4.6 mm i.d.× 100 mm
Mobile phase	: A) 10 mmol/L K_2HPO_4 (adjusted at pH 11.0 with potassium hydroxide)
	B) CH_3CN
	B 0 %(0 min)-> 40 %(15 min) Gradient
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 254 nm
Inj. vol.	: 5 µL
Sample dissolved in	: 50 vol% CH_3OH
	※ 1 µg/mL = 1 ppm

■ Membrane protein solubilizer

The CAPCELL PAK C_{18} KG, which achieves a significant reduction in column bleeding, is highly suitable for analysis in combination with the universal detector NQAD. Here, this example demonstrates the analysis of the challenging-t-detect compound BIGCHAP using the CAPCELL PAK C_{18} KG S3 (4.6 mm i.d. x 150 mm) together with the NQAD detector.





1. BIGCHAP
(10 µg/mL) (M.W. 878.1)

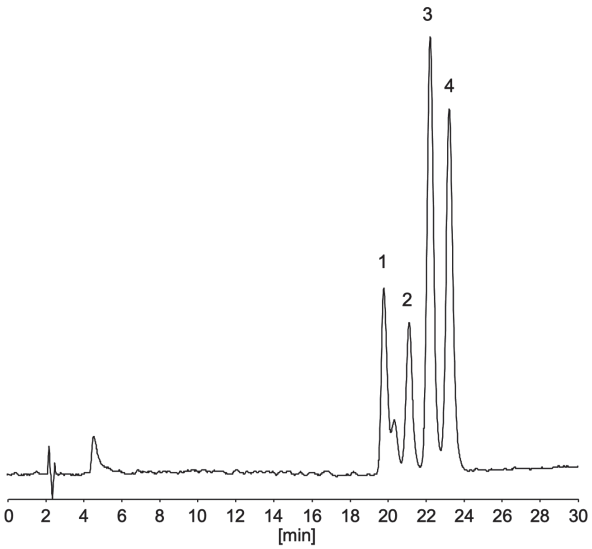
HPLC Conditions

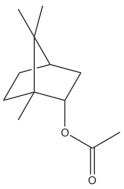
Column	: CAPCELL PAK C_{18} KG S3 ; 4.6 mm i.d.× 150 mm
Mobile phase	: H_2O / CH_3CN = 70 / 30
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: RI, UV 210 nm
Detector	: NQAD (Evaporation 35 ℃, Nebulizer 30 ℃)
Inj. vol.	: 5 µL
Sample dissolved in	: BIGCHAP was dissolved in 50 vol% methanol at 1 mg/mL.
	To 10 µL of this solution water was added to make 1 mL.
	※ 1 µg/mL = 1 ppm

Application

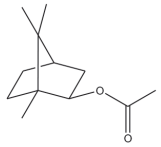
■ Monoterpene compounds

Here is an example of HPLC analysis of four monoterpene acetate esters, which are structural isomers. The peak observed between Peak 1 and Peak 2 is presumed to be isobornyls acetate, which is present at approximately 20% in the commercially available bornyl acetate reagent.

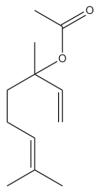




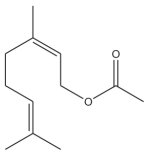
1. Bornyl acetate
(2500 µg/mL) (M.W. 196.3)



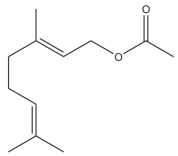
Isobornyl acetate (M.W. 196.3)



2. Linalyl acetate
(50 µg/mL) (M.W. 196.3)



3. Neryl acetate
(50 µg/mL) (M.W. 196.3)



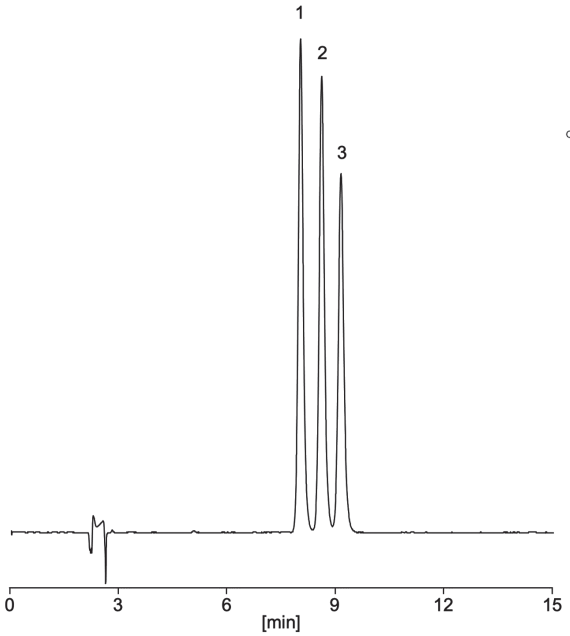
4. Geranyl acetate
(50 µg/mL) (M.W. 196.3)

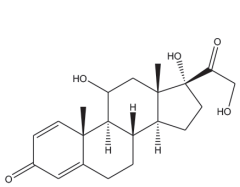
HPLC Conditions

Column	: CAPCELL PAK C_{18} KG S5 ; 4.6 mm i.d.× 250 mm
Mobile phase	: H_2O / CH_3CN = 30 / 70
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 210 nm
Inj. vol.	: 10 µL
Sample dissolved in	: 80 vol% CH_3CN
	※ 1 µg/mL = 1 ppm

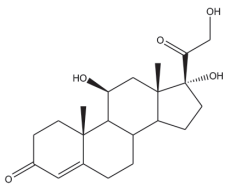
■ Steroids

Additionally, this example demonstrates the analysis of three steroids: prednisolone, hydrocortisone, and cortisone.

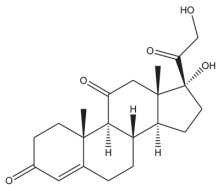




1. Prednisolone
(100 µg/mL) (M.W. 360.4)



2. Hydrocortisone
(100 µg/mL) (M.W. 362.5)



3. Cortisone
(100 µg/mL) (M.W. 360.4)

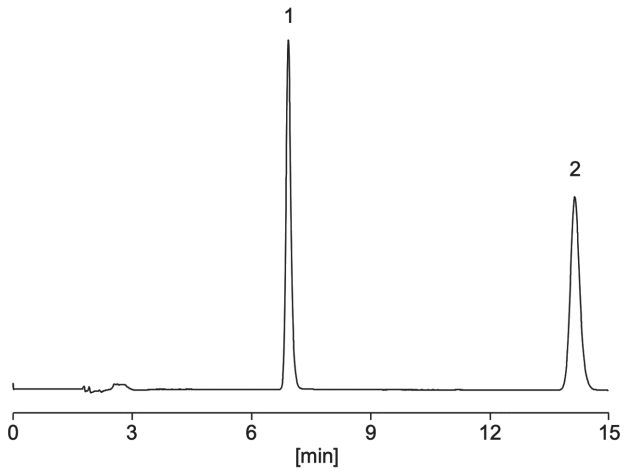
HPLC Conditions

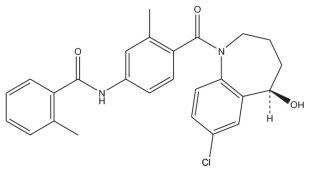
Column	: CAPCELL PAK C_{18} KG S5 ; 4.6 mm i.d.× 250 mm
Mobile phase	: H_2O / CH_3CN = 70 / 30
Flow rate	: 1.0 mL/min
Temperature	: 40 ℃
Detection	: UV 254 nm
Inj. vol.	: 5 µL
Sample dissolved in	: Prednisolone was dissolved in methanol at 2 mg/mL.
	Hydrocortisone and cortisone were separately dissolved in methanol at 1 mg/mL.
	50 µL of prednisolone solution and 100 µL of other solutions were mixed together and water was added to the mixture to make 1 mL.
	※ 1 µg/mL = 1 ppm

Column selection criteria for the 18th Edition of the Japanese Pharmacopoeia, Second Supplement

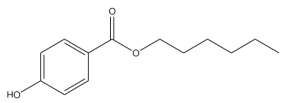
■ Column selection criteria for the quantitative determination of tolvaptan

Tolvaptan, a diuretic listed in the 18th Edition of the Japanese Pharmacopoeia, Second Supplement, has specific column selection criteria defined in the pharmacopoeia. The criteria state that a column must elute tolvaptan and hexyl para-hydroxybenzoate in that order, with a resolution of at least 15 between the two compounds.
With the introduction of the General Chapter on Chromatography in the 18th Edition of the Japanese Pharmacopoeia, First Supplement, parameters such as column dimensions and flow rates can now be adjusted, providing greater flexibility in column selection for quantitative analysis. Although the pharmacopoeia specifies a C_{18} column with dimensions of 6.0 mm i.d. x 150 mm and a particle size of 5 µm for the quantitative determination of tolvaptan, the CAPCELL PAK C_{18} KG S5 (4.6 mm i.d. x 150 mm) is also suitable. Using this column for the quantitative method achieved a resolution of 22.1, demonstrating excellent separation.





1. Tolvaptan
(100 µg/mL) (M.W. 448.9)



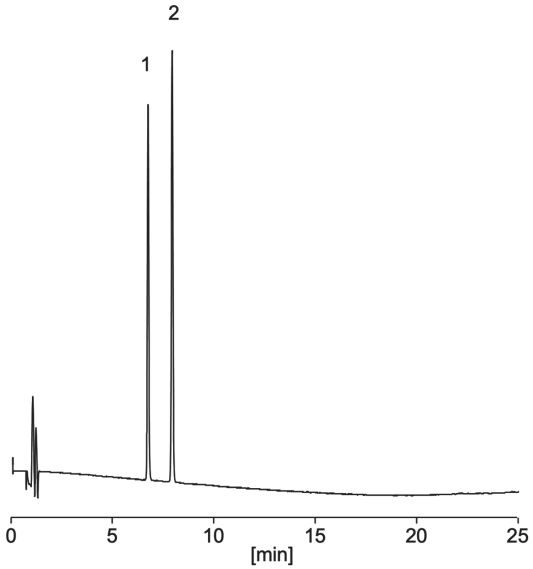
2. Hexyl 4-Hydroxybenzoate
(60 µg/mL) (M.W. 222.3)

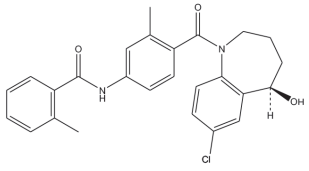
HPLC Conditions

Column	: CAPCELL PAK C_{18} S5 ; 4.6 mm i.d.× 150 mm
Mobile phase	: H_3PO_4 / H_2O / CH_3CN = 1 / 400 / 600
Flow rate	: 0.51 mL/min
Temperature	: 25 ℃
Detection	: UV 254 nm
Inj. vol.	: 6 µL
Sample dissolved in	: CH_3OH
	※ 1 µg/mL = 1 ppm

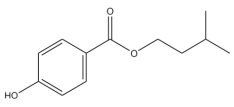
■ Column selection criteria for the purity test of tolvaptan

Tolvaptan, a diuretic listed in the 18th Edition of the Japanese Pharmacopoeia, Second Supplement, has specific column selection criteria defined in the pharmacopoeia. The criteria state that a column must elute tolvaptan and hexyl para-hydroxybenzoate in that order, with a resolution of at least 3 between the two compounds. Under these conditions, the CAPCELL PAK C_{18} KG S3 (4.6 mm i.d. x 100 mm) achieved a resolution of 9.2, demonstrating excellent separation performance.





1. Tolvaptan
(40 µg/mL) (M.W. 448.9)



2. Isoamyl 4-Hydroxybenzoate
(30 µg/mL) (M.W. 208.3)

HPLC Conditions

Column	: CAPCELL PAK C_{18} KG S3 ; 4.6 mm i.d.× 100 mm
Mobile phase	: A) 0.1 vol% H_3PO_4 B) 0.1 vol% H_3PO_4, CH_3CN
	B 40 %(0 min)-> 80 %(20 min)-> 80 %(25 min)-> 40 %(25.1 min) Gradient
Flow rate	: 1.0 mL/min
Temperature	: 25 ℃
Detection	: UV 254 nm
Inj. vol.	: 5 µL
Sample dissolved in	: CH_3OH
	※ 1 µg/mL = 1 ppm

Product Lineup

CAPCELL PAK C_{18} KG 2μm

Product number	Particle Size(μm)	Inner diameter(mm)	Length(mm)
85101	2	2.1	35
85102	2	2.1	50
85103	2	2.1	100
85104	2	2.1	150

CAPCELL PAK C_{18} KG 3μm

Product number	Particle Size(μm)	Inner diameter(mm)	Length(mm)
85201	3	2.1	35
85202	3	2.1	50
85203	3	2.1	75
85204	3	2.1	100
85205	3	2.1	150
85206	3	2.1	250
85207	3	3.0	35
85208	3	3.0	50
85209	3	3.0	75
85210	3	3.0	100
85211	3	3.0	150
85212	3	3.0	250
85213	3	4.6	35
85214	3	4.6	50
85215	3	4.6	75
85216	3	4.6	100
85217	3	4.6	150
85218	3	4.6	250

CAPCELL PAK INERT C_{18} KG

Product number	Particle Size(μm)	Inner diameter(mm)	Length(mm)
95093	2	2.0	50
95094	2	2.0	100
95095	2	2.0	150
95083	3	2.0	50
95084	3	2.0	100
95085	3	2.0	150

CAPCELL PAK C_{18} KG 5μm

Product number	Particle Size(μm)	Inner diameter(mm)	Length(mm)
85301	5	2.1	35
85302	5	2.1	50
85303	5	2.1	75
85304	5	2.1	100
85305	5	2.1	150
85306	5	2.1	250
85307	5	3.0	35
85308	5	3.0	50
85309	5	3.0	75
85310	5	3.0	100
85311	5	3.0	150
85312	5	3.0	250
85313	5	4.6	35
85314	5	4.6	50
85315	5	4.6	75
85316	5	4.6	100
85317	5	4.6	150
85318	5	4.6	250

CAPCELL PAK C_{18} KG Semi-Preparative Columns

Product number	Particle Size(μm)	Inner diameter(mm)	Length(mm)
85320	5	10	100
85321	5	10	150
85322	5	10	250
85324	5	20	100
85325	5	20	150
85326	5	20	250
85330	5	30	250

Inert Column Structure

Metal-Free Columns

Internal Surface : PEEK
Filter : PEEK

OSAKA SODA

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