Liquid Chromatography

COSMOSIL

UHPLC Column for Hydrophilic Compound Separation

COSMOSIL 1.8PBr

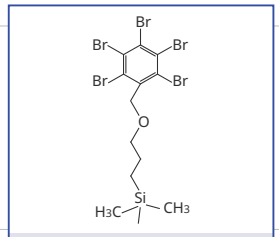
COSMOSIL PBr features a pentabromobenzyl functional group, which is suited to the retention of hydrophilic compounds in reversed-phase mode. This product is an ultra-high-performance liquid chromatography (UHPLC) with a particle size of 1.8 µm, enabling rapid separation of hydrophilic compounds under familiar reversed-phase analytical conditions.

POINT

01 **Retain hydrophilic compounds with reversed-phase chromatography**

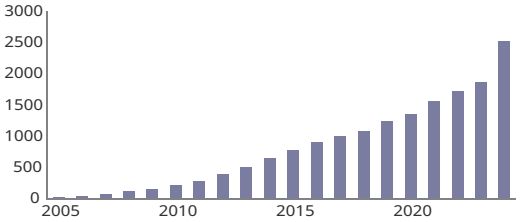
02 **Significantly improved separation compared to ODS columns**

03 **High-speed separation with UHPLC (1.8 µm particles)**



Stationary Phase Structure

Ultra-high performance liquid chromatography (UHPLC) is a technology for speeding up analysis by using columns packed with smaller silica gel particles than standard HPLC and flowing mobile phase at a high rate. Analyses by UHPLC are increasing in number every year, and it is sure to continue to be an important technology in years to come.



Number of Publications Using UHPLC (2005-2024)

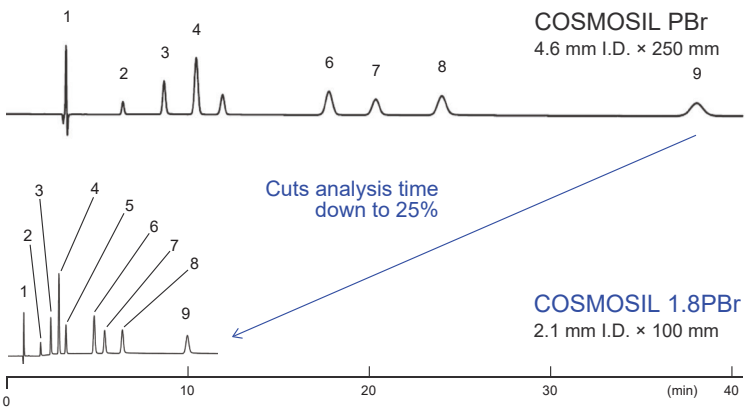
Number of publications with 'UPLC' or 'UHPLC' in the title, abstract, or keywords (searched via https://www.sciencedirect.com/)

Product description

Rapid separation of hydrophilic compounds using UHPLC

● Rapid separation of purine metabolites

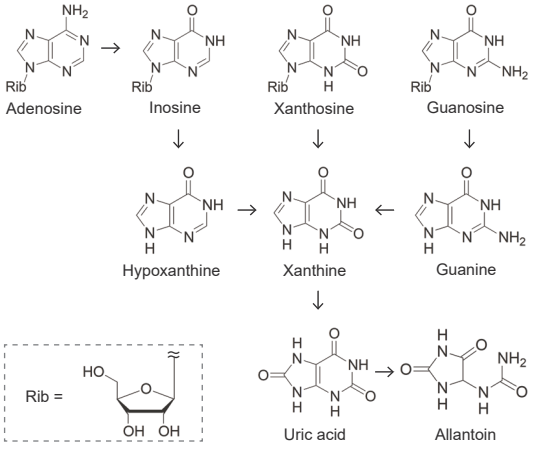
Using COSMOSIL PBr, the analysis of 9 purine nucleoside metabolites, including uric acid and allantoin, required approximately 40 minutes. Changing to COSMOSIL 1.8PBr, packed with smaller particles, allowed the analysis to be completed in approximately 10 minutes with equivalent separation.



Column	: COSMOSIL PBr ; 4.6 mm I.D. × 250 mm, COSMOSIL 1.8PBr ; 2.1 mm I.D. × 100 mm
Mobile phase	: Methanol / 0.1% Formic acid aq. = 10 / 90
Flow rate	: PBr ; 1.0 mL/min, 1.8PBr ; 0.4 mL/min
Temperature	: 30°C
Detection	: UV 240 nm
Inj. vol	: 1.0 µL

*The flow rate is optimized for each column according to the particle size and inner diameter

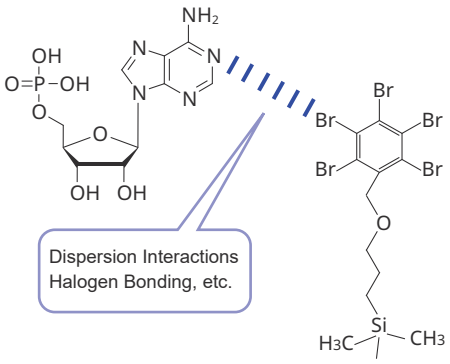
Sample : 1. Allantoin, 2. Guanine, 3. Hypoxanthine, 4. Uric acid, 5. Xanthine, 6. Adenosine, 7. Inosine, 8. Guanosine, 9. Xanthosine



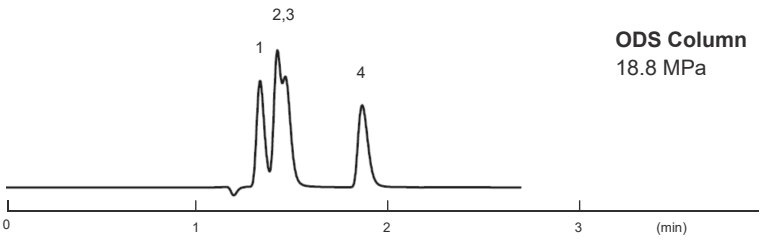
Product description (cont.)

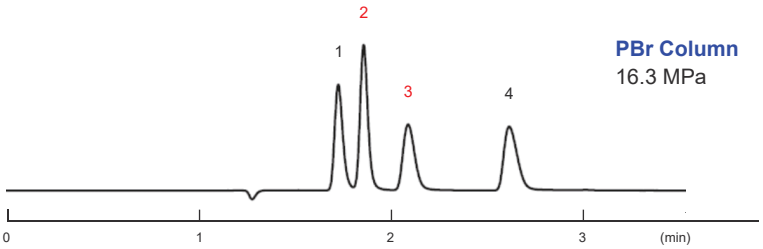
Hydrophilic compound retention by interaction with bromine

COSMOSIL PBr columns can be used in the same reversed-phase mode as ODS columns; however, due to the high polarizability of bromine atoms, it exhibits unique retention and separation behavior. This is attributed to dispersion interactions and the recently recognized halogen bonding, which differ from conventional ODS columns. These interactions occur between highly polarizable atoms and π-electrons, as well as oxygen or nitrogen atoms possessing lone electron pairs. As a result, PBr columns can retain hydrophilic compounds that are difficult to retain on ODS columns, and enable the analysis of difficult compounds.



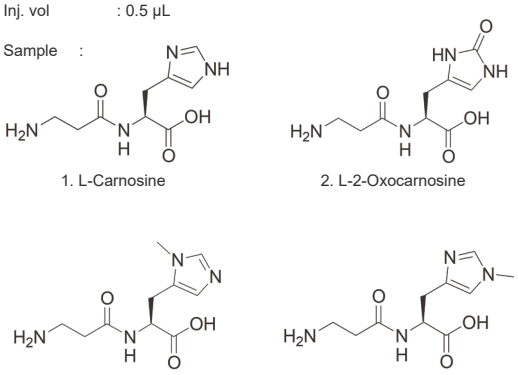
Imidazole dipeptide analysis



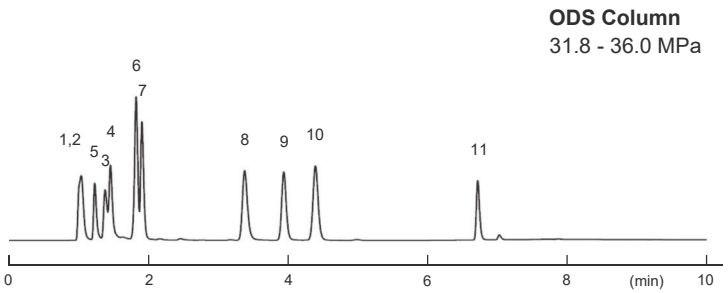


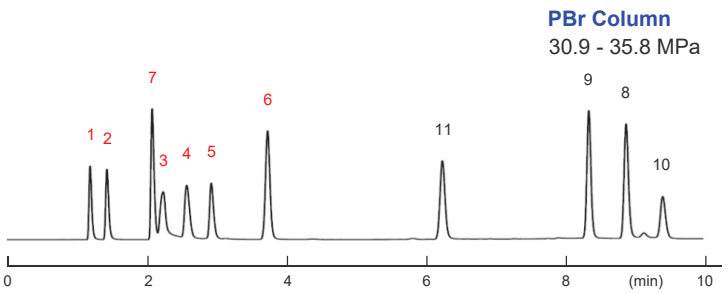
Column : COSMOSIL 1.8C18-MS-II ; 2.1 mm I.D.×100 mm
COSMOSIL 1.8PBr ; 2.1 mm I.D.×100 mm
Mobile phase : 20 mM Ammonium formate aq.
Flow rate : 0.2 mL/min
Temperature : 40°C
Detection : UV 220 nm
Inj. vol : 0.5 µL

Sample :



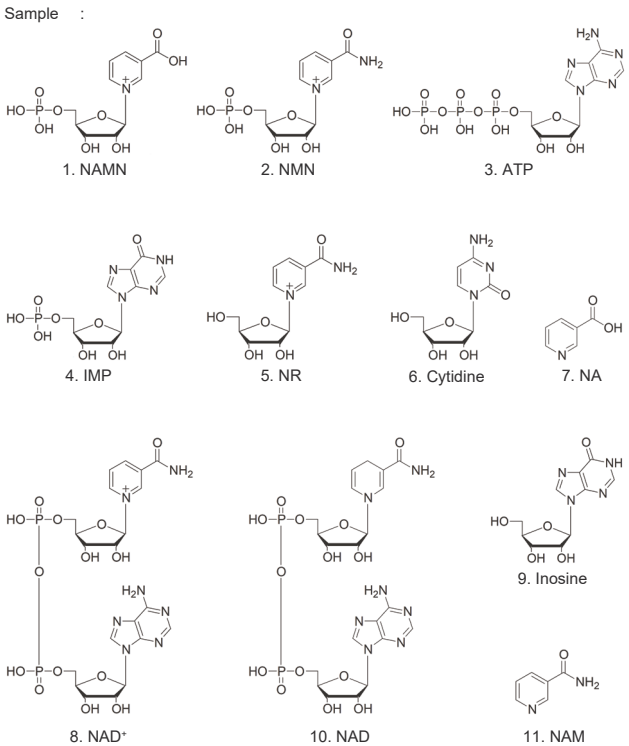
Nicotinamide metabolite analysis





Column : COSMOSIL 1.8C18-MS-II ; 2.1 mm I.D.×100 mm
COSMOSIL 1.8PBr ; 2.1 mm I.D.×100 mm
Mobile phase : A ; Methanol / 20 mM Ammonium formate aq. = 5 / 95
B ; Methanol / 20 mM Ammonium formate aq. = 20 / 80
B conc. gradient ; 0% (0 → 3 min), 100% (3 → 6 min), 100% (6 → 10 min)
Flow rate : 0.3 mL/min
Temperature : 30°C
Detection : UV 260 nm
Inj. vol : 1.0 µL

Sample :



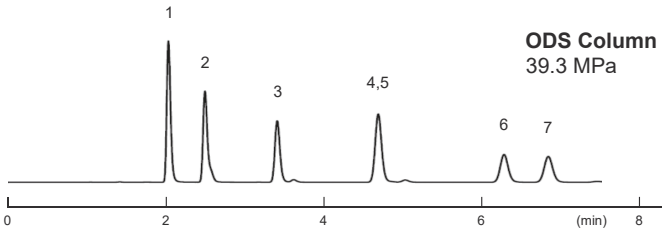
Differences in separation characteristics due to stereoselectivity compared to ODS columns

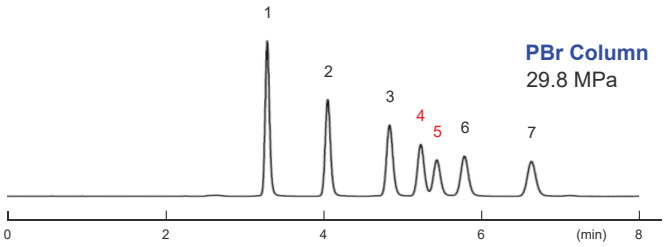
With COSMOSIL PBr columns, selectivity derives not only from π-interactions of aromatic rings and dispersion interactions with bromine, but also structural configuration of the analytes. These effects can lead to improved separation on PBr columns, even when retention on ODS columns is sufficient.

* Taniguchi A, et al. Chromatography. 2025;46:55.

Malodorous aldehyde derivative analysis

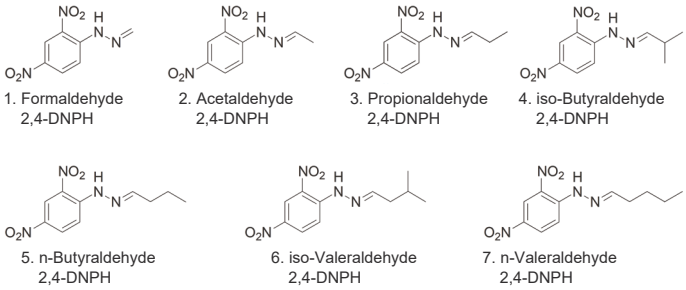
In the analysis of odorous aldehyde derivatives regulated under Japan's Offensive Odor Control Law, separation of certain isomers can be challenging. When using conventional reversed-phase columns, complex analytical conditions, such as a three-component mobile-phase gradient, have been used. In contrast, analysis can be performed using 1.8PBr under simpler isocratic conditions using a two-component mobile phase.





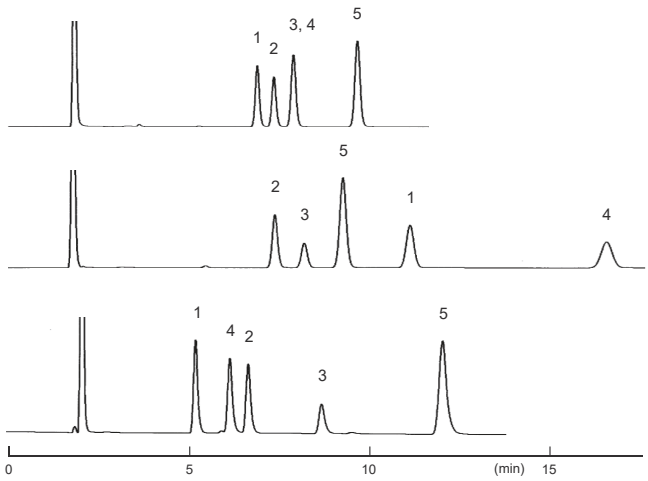
Column : COSMOSIL 1.8C18-MS-II ; 2.1 mm I.D.×100 mm
COSMOSIL 1.8PBr ; 2.1 mm I.D.×100 mm
Mobile phase : ODS ; Methanol / Water = 75 / 25
PBr ; Methanol / Water = 90 / 10
Flow rate : 0.3 mL/min
Temperature : 30°C
Detection : UV 360 nm
Inj. vol : 0.4 µL

Sample :



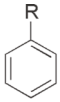
Differences in separation characteristics compared to PFP columns

PBr columns and pentafluorophenyl (PFP) columns both contain halogenated benzene. However, because PFP relies on dipole–dipole interactions, while PBr retains compounds primarily through dispersion interactions, their separation characteristics differ significantly. Both PFP and PBr columns showed improved separation compared to ODS columns, but the elution order was different. PFP exhibited strong retention of the fluorinated groups, -CF_3 and -SF_5, while PBr exhibited strong retention of the heavy halogen groups, -Br and -I, through dispersion interactions.



Column : COSMOSIL 3C18-MS-II ; 4.6 mm I.D.×150 mm
COSMOSIL PFP ; 4.6 mm I.D.×150 mm
COSMOSIL 3PBr ; 4.6 mm I.D.×150 mm
Mobile phase : Methanol / Water = ** / **
ODS = 70 / 30, PFP = 60 / 40, PBr = 70 / 30
Flow rate : 1.0 mL/min
Temperature : 30°C
Detection : UV 254 nm
Inj. vol : 1.0 µL

Sample :



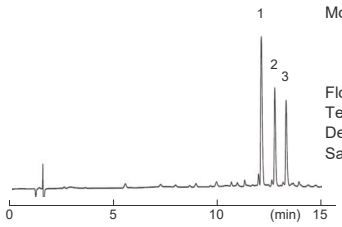
1. Trifluorotoluene (R = CF_3)
2. Toluene (R = CH_3)
3. Bromobenzene (R = Br)
4. Phenylsulfur pentafluoride (R = SF_5)
5. Iodobenzene (R = I)

Material properties

Packing Material	1.8PBr		
Silica Gel	Fully Porous Spherical High-Purity Silica	Surface Area (m^2/g)	340
Particle Size (µm)	1.8	Bonded Phase	Pentabromobenzyl group
Pore Size (nm)	12	Bonding Type	Monomeric

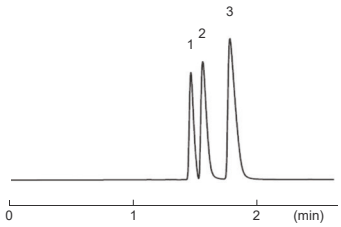
Applications

Purity of synthetic peptides



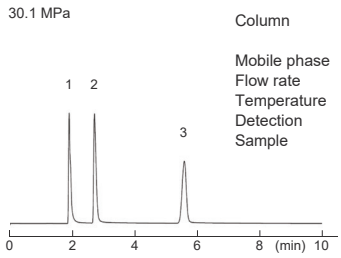
Column : COSMOSIL 1.8PBr
2.1 mm I.D.×100 mm
Mobile phase : A ; 0.1% TFA in water
B ; 0.08% TFA in acetonitrile
B conc. gradient ;
0 - 15% (0 - 15 min)
Flow rate : 0.2 mL/min
Temperature : 40°C
Detection : UV 220 nm
Sample : H-(D-Arg)n-NH2
1. n = 6
2. n = 7
3. n = 8

Separation of isomers of highly hydrophilic compounds



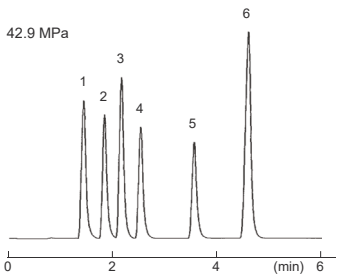
Column : COSMOSIL 1.8PBr
2.1 mm I.D.×150 mm
Mobile phase : 0.1% Formic acid aq.
Flow rate : 0.4 mL/min
Temperature : 40°C
Detection : UV 220 nm
Sample : 1. 1-Methyl imidazole
2. 2-Methyl imidazole
3. 4-Methyl imidazole

Separation of adenosine phosphates



Column : COSMOSIL 1.8PBr
2.1 mm I.D.×100 mm
Mobile phase : 20 mM Ammonium formate aq.
Flow rate : 0.4 mL/min
Temperature : 40°C
Detection : UV 260 nm
Sample : 1. Adenosine-5'-triphosphate (ATP)
2. Adenosine-5'-diphosphate (ADP)
3. Adenosine-5'-monophosphate (AMP)

Separation of sugars



Column : COSMOSIL 1.8PBr
2.1 mm I.D.×150 mm
Mobile phase : Water
Flow rate : 0.4 mL/min
Temperature : 40°C
Detection : ELSD
Sample : 1. Glucose
2. Trehalose
3. Sucrose
4. Melezitose
5. Raffinose
6. Stachyose

Related resources

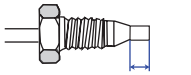
For additional product information, please visit our website. You can access it using the QR codes below.

COSMOSIL PBr Series

Information on other UHPLC series

COSMOSIL Application (Search for analysis examples)

Note on connector type:
Our UHPLC columns use the same connectors as Waters UPLC (UHPLC) columns. This is different from our conventional COSMOSIL columns, which use the conventional Waters HPLC-compatible connectors. Attempting to connect an unsuitable fitting may result in it becoming stuck in the column.



Ordering information

COSMOSIL 1.8PBr Packed Column

Column Size I.D. x Length (mm)	Product Number	Column Size I.D. x Length (mm)	Product Number	Column Size I.D. x Length (mm)	Product Number
2.1 x 30	22739-41	2.1 x 100	22742-81	3.0 x 50	22744-61
2.1 x 50	22740-01	2.1 x 150	22743-71	3.0 x 100	22745-51
2.1 x 75	22741-91			3.0 x 150	22746-41

nacalai tesque
The quality for certainty.

NACALAI TESQUE, INC.
Nijo Karasuma, Nakagyo-ku, Kyoto 604-0855 JAPAN
TEL : +81-(0)75-251-1730
Website : www.nacalai.com
E-mail : info.intl@nacalai.com