Shim-pack UC Series

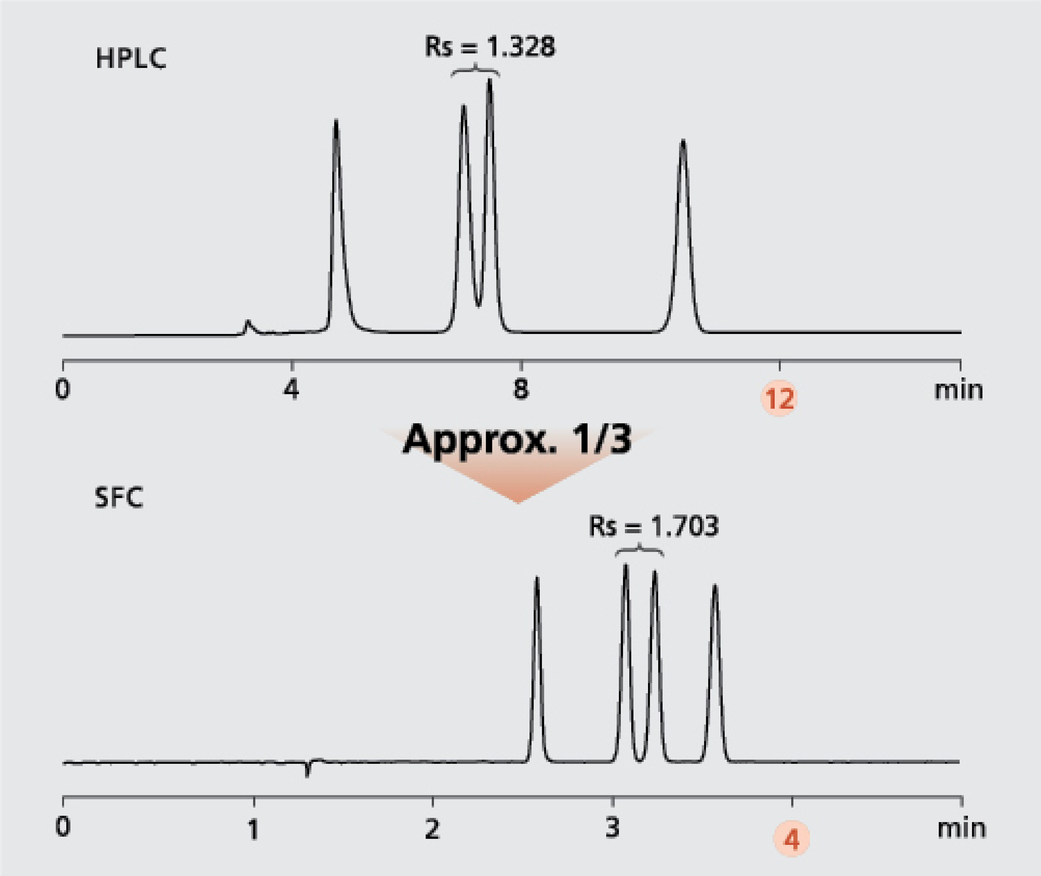
Analytical Columns

Column	Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	4.6
Shim-pack UC RP	3	150	227-30400-03	227-30401-03
		250	227-30400-04	227-30401-04
	5	150	227-30402-03	227-30403-03
		250	227-30402-04	227-30403-04
Shim-pack UC GIS II	3	150	227-30404-03	227-30405-03
		250	227-30404-04	227-30405-04
	5	150	227-30406-03	227-30407-03
		250	227-30406-04	227-30407-04
Shim-pack UC Phenyl	3	150	227-30424-03	227-30425-03
		250	227-30424-04	227-30425-04
	5	150	227-30426-03	227-30427-03
		250	227-30426-04	227-30427-04
Shim-pack UC CN	3	150	227-30428-03	227-30429-03
		250	227-30428-04	227-30429-04
	5	150	227-30430-03	227-30431-03
		250	227-30430-04	227-30431-04
Shim-pack UC Diol	3	150	227-30408-03	227-30409-03
		250	227-30408-04	227-30409-04
	5	150	227-30410-03	227-30411-03
		250	227-30410-04	227-30411-04
Shim-pack UC Sil	3	150	227-30412-03	227-30413-03
		250	227-30412-04	227-30413-04
	5	150	227-30414-03	227-30415-03
		250	227-30414-04	227-30415-04
Shim-pack UC Amide	3	150	227-30416-03	227-30417-03
		250	227-30416-04	227-30417-04
	5	150	227-30418-03	227-30419-03
		250	227-30418-04	227-30419-04
Shim-pack UC NH2	3	150	227-30420-03	227-30421-03
		250	227-30420-04	227-30421-04
	5	150	227-30422-03	227-30423-03
		250	227-30422-04	227-30423-04
Shim-pack UC-HyP	3	150	227-32600-01	-
	5	250	-	227-32600-02
Shim-pack UC-Py	3	150	227-32601-01	-
	5	250	-	227-32601-02
Shim-pack UC-PBr	3	150	227-32602-01	-
	5	250	-	227-32602-02
Shim-pack UC-Choles	3	150	227-32603-01	-
	5	250	-	227-32603-02
Shim-pack UC-PyE	3	150	227-32604-01	-
	5	250	-	227-32604-02
Shim-pack UC-Triazole	3	150	227-32605-01	-
	5	250	-	227-32605-02
Shim-pack UC-Sil II	3	150	227-32607-01	-
	5	250	-	227-32607-02
Shim-pack UC-Diol II	3	150	227-32606-01	-
	5	250	-	227-32606-02

Analysis Examples

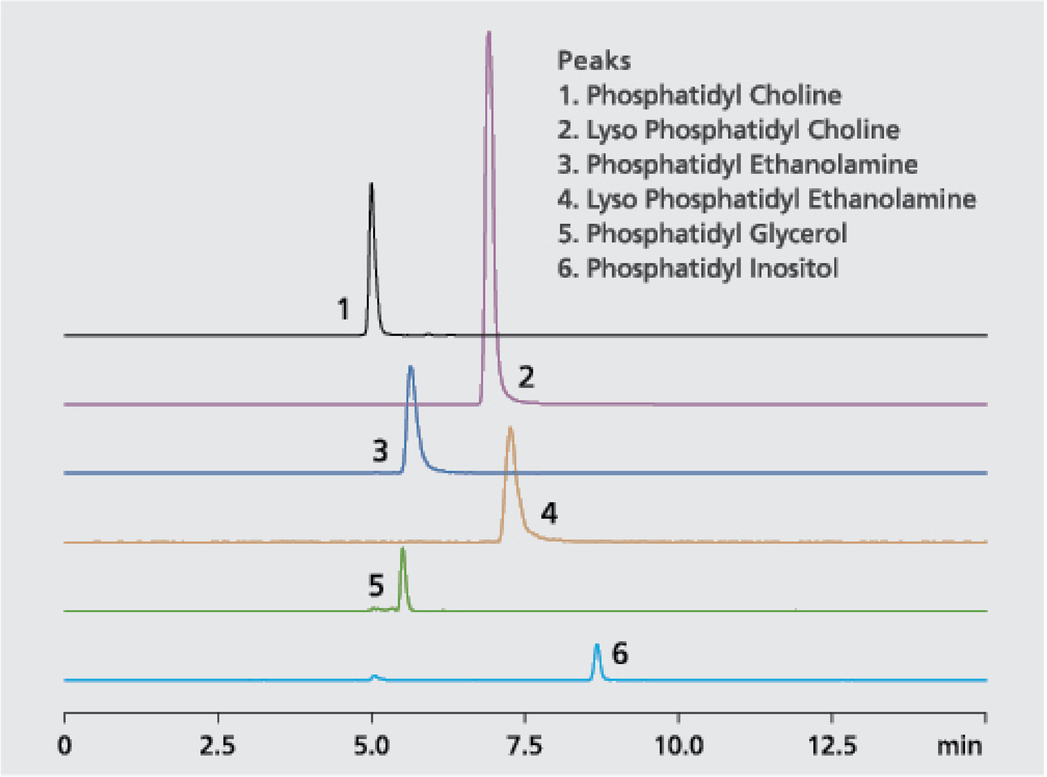
Tocopherol Isomers

Isomers and structurally similar compounds that are difficult to separate can be analyzed by Nexera UC and Shim-pack UC series at a high speed. In the example below, four kinds of tocopherol isomers were analyzed by Nexera UC and Shim-pack UC Sil. As shown below, analysis time was reduced to one-third the time analysis takes with a conventional HPLC method while resolution was improved.



Comparison of retention and resolution of tocopherol isomers between LC conditions and SFC ones

Phospholipid Classes



The example above shows the result of the analysis of phospholipid classes using Shim-pack UC Diol with Nexera UC. The ODS-based Shim-pack UC GIS II can also be used to analyze molecular species of phospholipids with the same modifiers. Nexera UC and Shim-pack UC series are ideal for analyzing complex samples.

Preparative Columns

Column	Particle Size (µm)	I.D. (mm) / Length (mm)	10	20	28
Shim-pack UC-HyP	5	250	227-32600-03	227-32600-04	227-32600-05
└ Guard Column	5	20	227-32600-06	-	-
Shim-pack UC-Py	5	250	227-32601-03	227-32601-04	227-32601-05
└ Guard Column	5	20	227-32601-06	-	-
Shim-pack UC-PBr	5	250	227-32602-03	227-32602-04	227-32602-05
└ Guard Column	5	20	227-32602-06	-	-
Shim-pack UC-Choles	5	250	227-32603-03	227-32603-04	227-32603-05
└ Guard Column	5	20	227-32603-06	-	-
Shim-pack UC-PyE	5	250	227-32604-03	227-32604-04	227-32604-05
└ Guard Column	5	20	227-32604-06	-	-
Shim-pack UC-Triazole	5	250	227-32605-03	227-32605-04	227-32605-05
└ Guard Column	5	20	227-32605-06	-	-
Shim-pack UC-Sil II	5	250	227-32607-03	227-32607-04	227-32607-05
└ Guard Column	5	20	227-32607-06	-	-
Shim-pack UC-Diol II	5	250	227-32606-03	227-32606-04	227-32606-05

Cannabis Analysis Columns

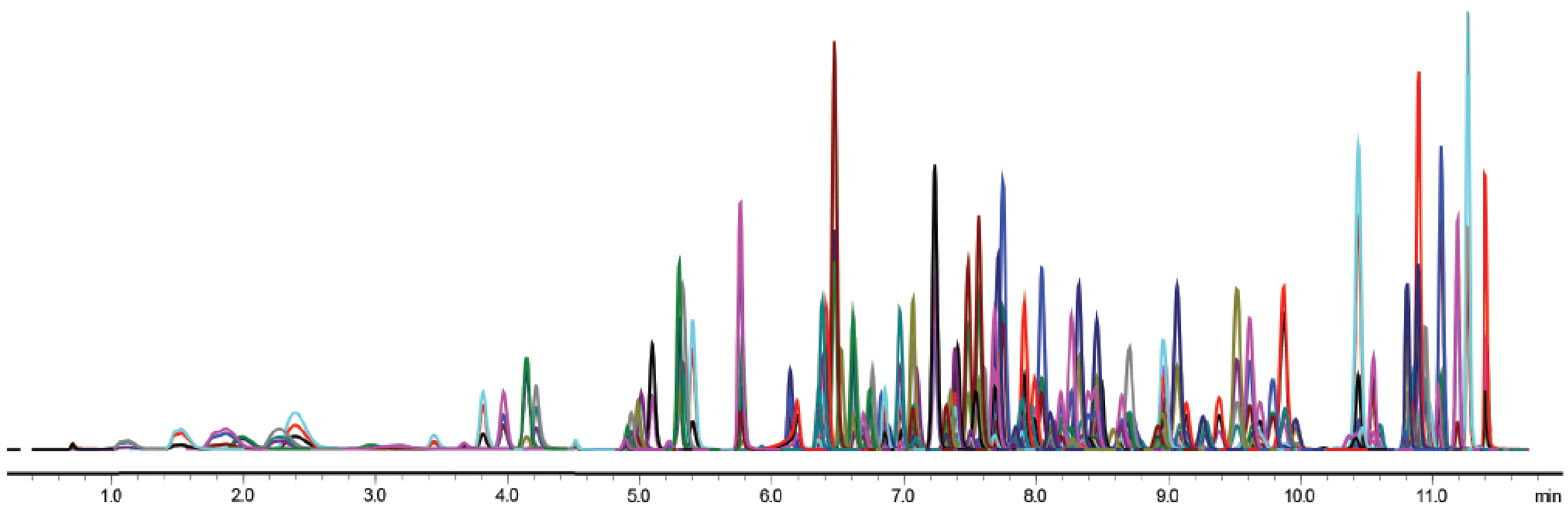
NexLeaf® Columns

Separating the Impossible

NexLeaf®, a superficially porous series of HPLC columns engineered to achieve the ultimate in resolution and sensitivity in the most challenging cannabis matrix. Each NexLeaf® column has both analytical and guard columns available.

NexLeaf® for Pesticides

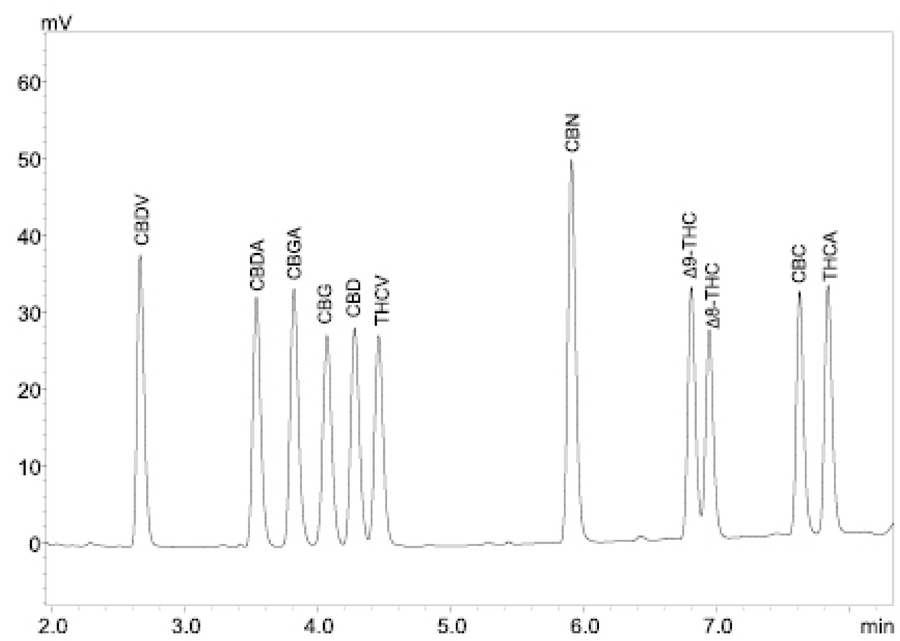
Provides the Ultimate separation for all your multi-residue pesticide analysis needs.



NexLeaf® CBX™ for Potency

Designed for the best separations of cannabinoids allowing for accurate potency determination of each analyte.

Part Number	Description
220-91525-70	NexLeaf CBX for Potency, 2.7µm, 4.6 X 150mm
220-91525-71	NexLeaf CBX for Potency, 2.7µm, 2.1 X 100mm
220-91525-72	NexLeaf CBX for Potency, 2.7µm, Guard Cartridge, 3/pk
220-91525-73	NexLeaf Guard Column Cartridge Holder
220-91525-74	NexLeaf for Pesticides, 2.7µm, 2.1 X 150mm

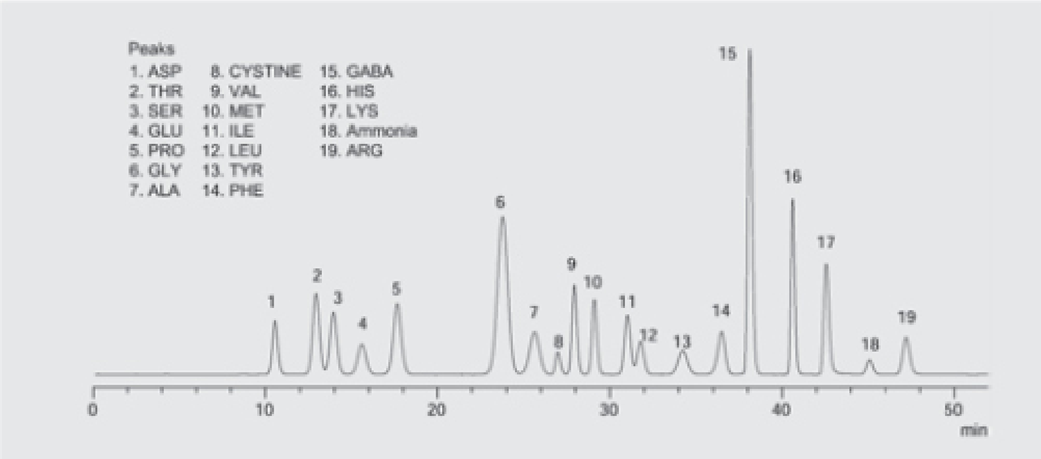


Analysis of Amino Acids

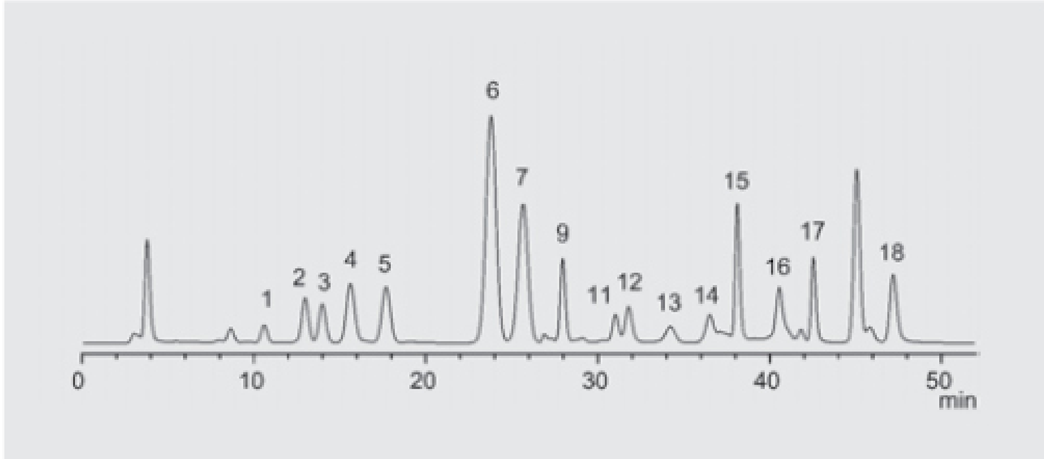
Shim-pack Amino Series

Examples of Cation Analysis

Shim-pack Amino series uses polystyrene gel as solid support, making it possible to utilize both electrostatic reaction and hydrophobic reaction. It is ideal for the analysis of amino acids.



Analysis of Amino Acid Standard



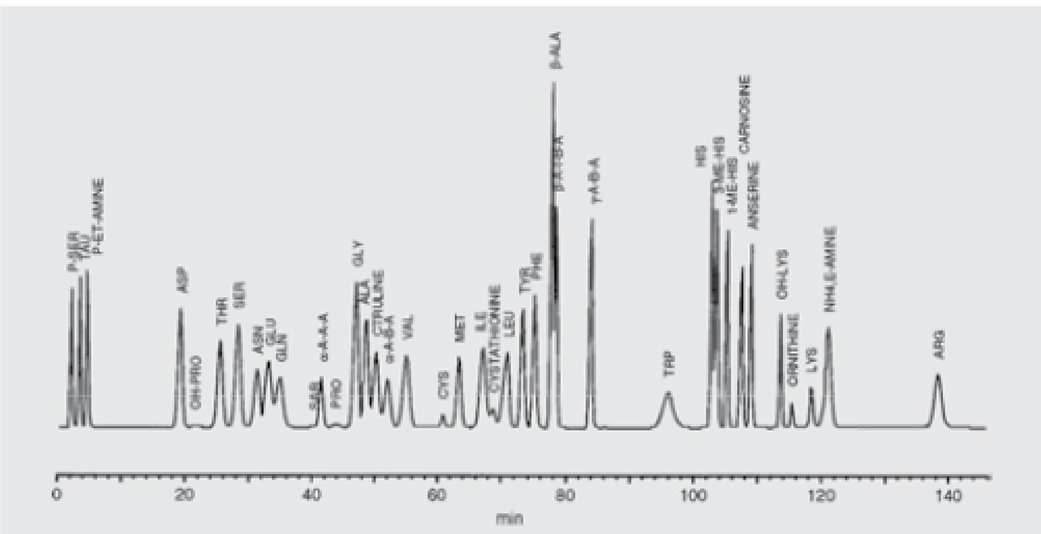
Analysis of Vinegar

Conditions

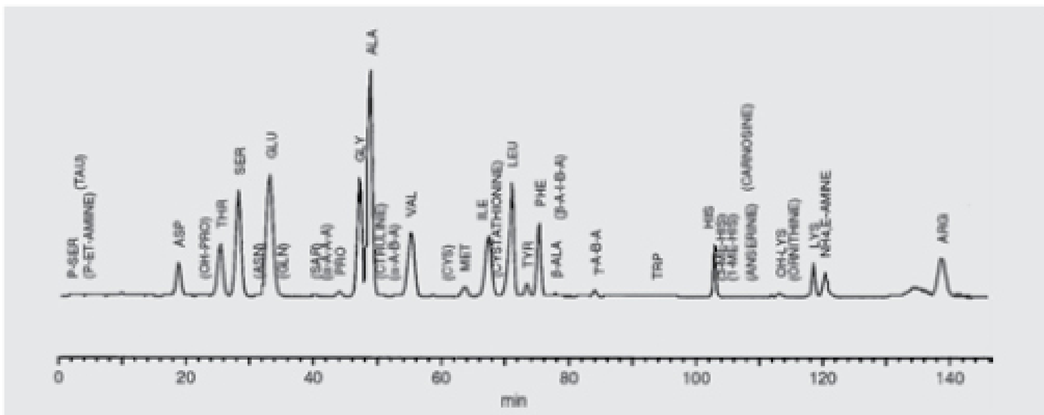
Column	: Shim-pack Amino-Na (100 mmL × 6.0 mmI.D., 5 µm) (P/N: 228-18837-91)
Mobile Phase	: Mobile phase kit for amino acid analysis (Na Type) (P/N: 228-21195-94)
Flow Rate	: 0.4 mL/min
Col. Temp.	: 60 °C
Detection	: RF (Post-column derivation)

Peaks

1. ASP	6. GLY	11. ILE	16. HIS
2. THR	7. ALA	12. LEU	17. LYS
3. SER	8. CYSTINE	13. TYR	18. ARG
4. GLU	9. VAL	14. PHE	
5. PRO	10. MET	15. GABA	



Simultaneous Analysis of 38 Amino Acids



Analysis of Soy Sauce

Conditions

Column	: Shim-pack Amino-Li (100 mmL × 6.0 mmI.D., 5 µm) (P/N: 228-18837-92)
Mobile Phase	: Mobile phase kit for amino acid analysis (Li Type) (P/N: 228-21195-95)
Flow Rate	: 0.6 mL/min
Col. Temp.	: 39 °C
Detection	: RF-10AXL Ex. 350 nm, Em. 450 nm

Product Information

Column	Stationary Phase	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N	Guard Column
Shim-pack AMINO-NA	Na type sulfone group	5	100 × 6.0	228-18837-91	228-18837-93 *
Shim-pack AMINO-LI	Li type sulfone group	5	100 × 6.0	228-18837-92	-

* Dedicated for the analysis of cyanide. Please do not use it in the analysis of amino acids.

In the analysis of amino acids, the following trap columns are required.

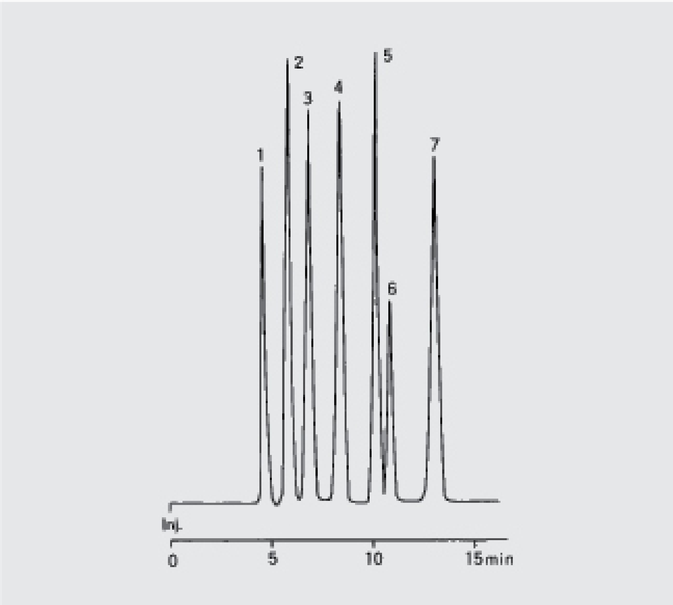
Description	Dimensions (Length × I.D., mm)	P/N
ISC-30/S 0504 NA (For trapping Na type ammonia)	50 × 4.0	228-14206-91
ISC-30/S 0504 LI (For trapping Li type ammonia)	50 × 4.0	228-00821-91

Analysis of Sugar and Organic Acid

Shim-pack SCR Series

Shim-pack SCR-101N/C/P are suitable for the analysis of monosaccharides. Since the samples are separated under a mixed mode of gel filtration and ligand exchange, the selectivity differs depending on the type of cation.

Shim-pack SCR-101H and SCR-102H are ion exclusion chromatography columns, using H type sulfonated styrene polymer as stationary phase. They are ideal for analysis of organic acids using an acid aqueous solution (e.g. aqueous solution of perchloric acid) as mobile phase.



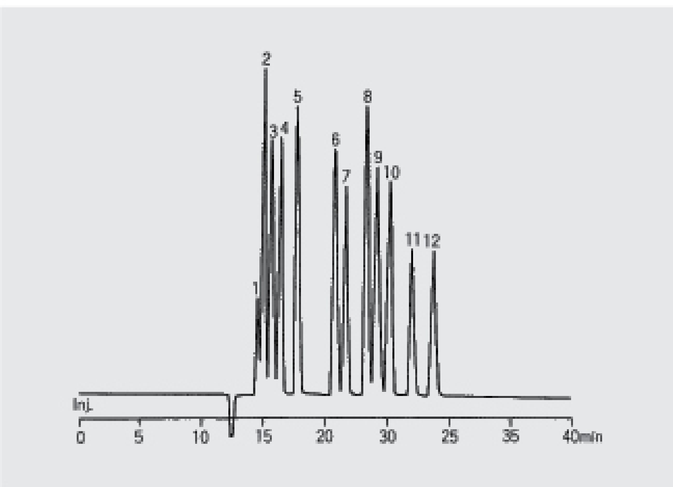
Analysis of Saccharide Standard

Peaks

1. PEG 4000
2. Maltose
3. Glucose
4. Fructose
5. Glycerol
6. Ethanol
7. Sorbitol

Conditions

Column	: Shim-pack SCR-101C (300 mmL × 7.9 mmI.D., 10 µm) (P/N: 228-17889-91)
Mobile Phase	: Water
Flow Rate	: 1.0 mL/min
Col. Temp.	: 80 °C
Detection	: RID



Analysis of Organic Acids

Peaks

1. Phosphoric acid
2. α-Ketoglutaric acid
3. Citric acid
4. Pyruvic acid
5. Malic acid
6. Succinio acid
7. Lactic acid
8. Formic acid
9. Fumaric acid
10. Acetic acid
11. Levulinic acid
12. Pyroglutamic acid

Conditions

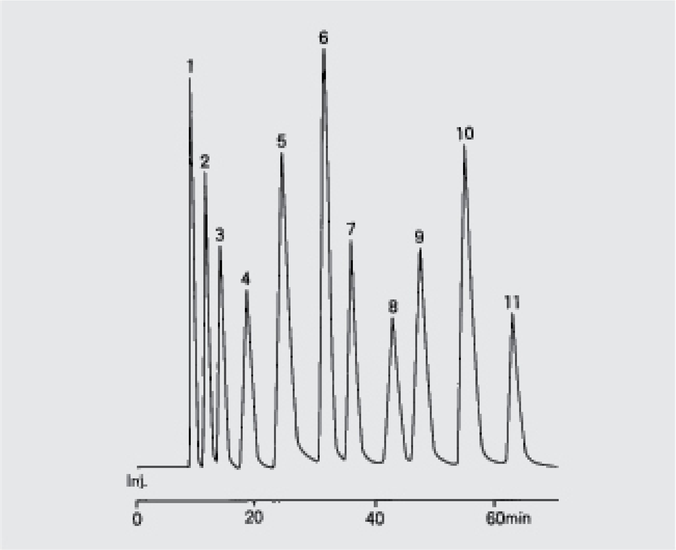
Column	: Shim-pack SCR-102H (2 columns in series) (P/N: 228-17893-91)
Mobile Phase	: 5 mM p-Toluene sulfonic acids aqueous solution
Flow Rate	: 0.8 mL/min
Col. Temp.	: 40 °C
Detection	: CDD (pH buffer organic acids analysis system)

Product Information

Column	Stationary Phase	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N	Guard Column
Shim-pack SCR-101N	Na type sulfone group	10	300 × 7.9	228-07730-92	228-09619-92
Shim-pack SCR-101C	Ca type sulfone group	10	300 × 7.9	228-17889-91	228-17891-91
Shim-pack SCR-101P	Pb type sulfone group	10	300 × 7.9	228-17890-91	228-17892-91
Shim-pack SCR-101H	H type sulfone group	10	300 × 7.9	228-07730-93	228-09619-93
Shim-pack SCR-102H	H type sulfone group	7	300 × 8.0	228-17893-91	228-17924-91

Shim-pack ISA/ISC Series

Shim-pack ISA/ISC series uses polystyrene gel as solid support, making it possible to utilize both electrostatic reaction and hydrophobic reaction. They are suitable for the analysis of sugars (ISA) and guanidiono compounds (ISC-05).



Analysis of Saccharides Standards

Peaks

1. Sucrose
2. Cellobiose
3. Maltose
4. Lactose
5. Rhamnose
6. Ribose
7. Mannose
8. Fructose
9. Galactose
10. Xylose
11. Giucose

Conditions

Column : Shim-pack ISA-07/S2504 (250 mmL × 4.0 mmI.D., 7 µm) (P/N: 228-09699-91)
Mobile Phase : Potassium borate buffer solution
gradient elution
Flow Rate : 0.6 mL/min
Col. Temp. : 65 °C
Detection : RF EX. 348 nm, Em. 430 nm
(Post-column derivatization with arginine)

Product Information

Column	Stationary Phase	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N	Guard Column
Shim-pack ISA-07/S 2504	Quaternery ammonium group	7	250 × 4.0	228-09699-91	228-00823-91
Shim-pack ISC-05/S 0504	Na type sulfone group	5	38 × 4.6	228-09700-91	228-00802-91
Shim-pack ISC-07/S 1504	Na type sulfone group	7	150 × 4.0	228-09328-91	
Shim-pack ISC-07/S 1504 Li	Li type sulfone group	7	150 × 4.0	228-00796-91	228-00797-91

Check out more Application Systems at
www.shimadzu.com/an/hplc

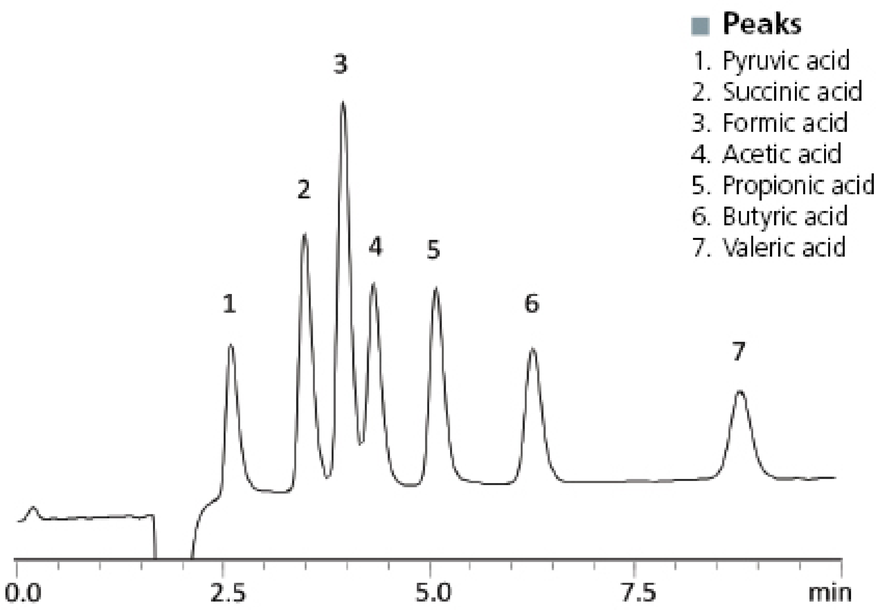
Shim-pack Fast-OA

High-speed analysis of organic acids

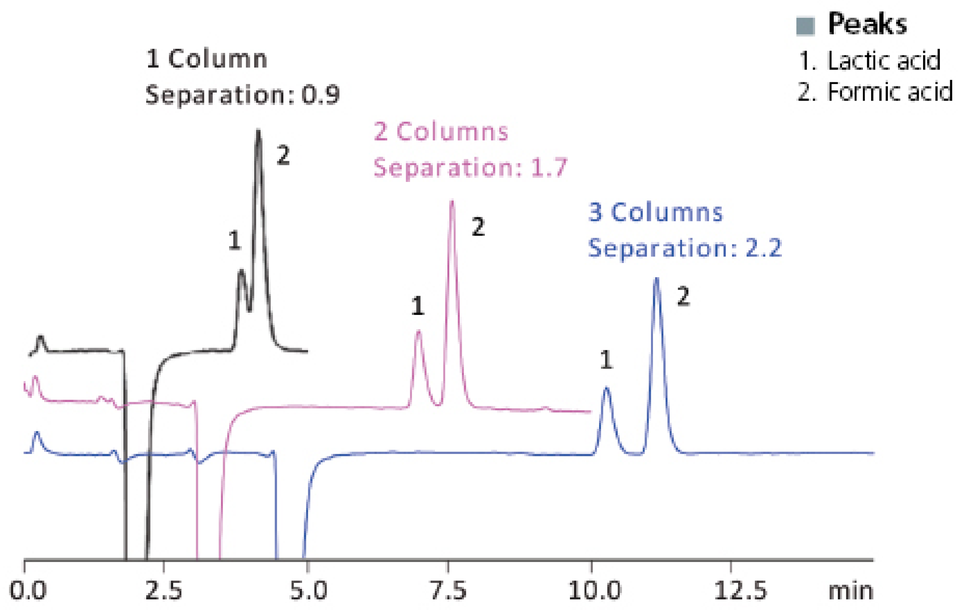
Shim-pack Fast-OA columns are packed with an ion-exclusion polymer, and utilizing an acidic mobile phase, can separate mixture solutions based on the pKa value of each sample component. The Shim-pack Fast-OA is a column for the high speed analysis of organic acids. It can separate multiple organic acids in a short time and supports real-time monitoring of their concentration levels.

Analysis Examples

Analysis of Short-Chain Fatty Acids



Improved Separation: Columns in Series



Because the column design is optimized for the high-speed analysis of organic acids, even short-chain fatty acids such as valeric acid are eluted within 10 minutes. If separation with one column is not enough, up to three Shim-pack Fast-OA columns can be connected in series to improve the separation

Conditions

Column	:	Shim-pack Fast-OA (P/N: 228-59942-41) + Shim-pack Fast-OA (G) (P/N: 228-59942-42)
Mobile Phase	:	5 mmol/L p-Toluenesulfonic acid
pH buffering solution	:	5 mmol/L p-Toluenesulfonic acid, 20 mmol/L Bis- Tris, 0.1 mmol/L EDTA
Flow Rate	:	0.8 mL/min
Detection	:	Conductivity Detector (CDD-10AVP)

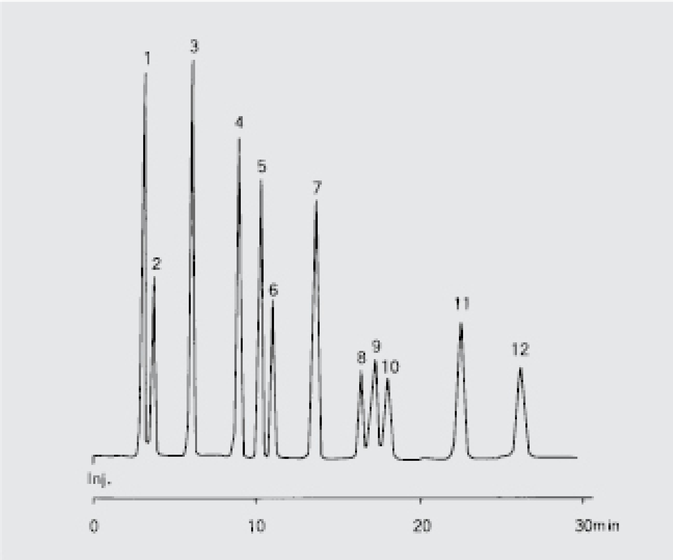
Product Information

Product Name	Length x I.D.	Part Number
Shim-pack Fast OA	100 mm x 7.8 mm	228-59942-41
Guard column + Holder	10 mm x 4.0 mm	228-59942-42
Guard column (4 pcs)	10 mm x 4.0 mm	228-59942-43

Analysis of Nucleotides, Oligonucleotides and Protein

Shim-pack WAX/WCX Series

Shim-pack WAX/WCX series columns are chemically-bonded hydrophilic silica gel based ion exchange columns. Shim-pack WAX-1 is ideal for analysis of nucleotides and oligonucleotides while Shim-pack WAX-2 and WCX-1 is ideal for analysis of proteins.



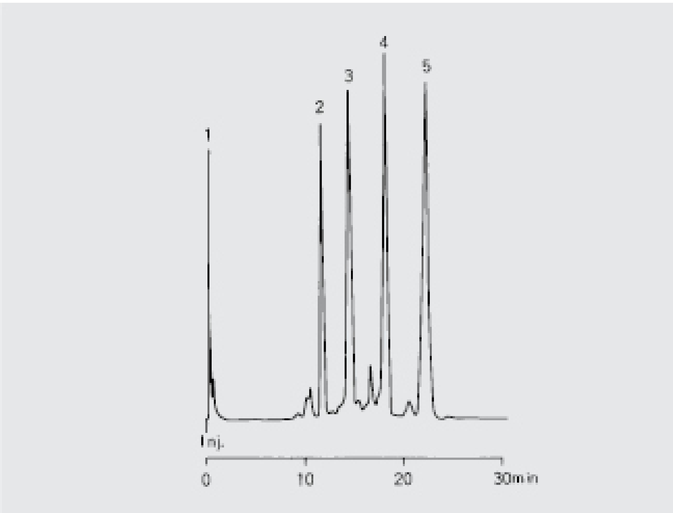
Analysis of Mononucleotides

Peaks

1. UMP
2. CMP
3. AMP
4. GMP
5. UDP
6. CDP
7. ADP
8. UTP
9. GDP
10. CTP
11. ATP
12. GTP

Conditions

Column : Shim-pack WAX-1 (50 mmL × 4.0 mmI.D., 3 µm) (P/N: 228-16225-91)
Mobile Phase : A) 20mM phosphate buffer solution (pH 7)
B) 480mM phosphoric acid buffer solution (pH 6.85)
gradient elution
Flow Rate : 1.0 mL/min
Col. Temp. : 45 °C
Detection : UV 260 nm



Analysis of Protein Standard

Peaks

1. Ovalbumin
2. Myoglobin
3. α-Chymotrypsinogen A
4. Ribonuclease A
5. Lysozyme

Conditions

Column : Shim-pack WCX-1 (50 mmL × 4.0 mmI.D., 5 µm) (P/N: 228-16366-91)
Mobile Phase : A) 20mM phosphate buffer solution (pH 6.0)
B) Sodium sulfate
gradient elution
Flow Rate : 1.0 mL/min
Col. Temp. : Ambient
Detection : UV 415 nm

Product Information

Column	Stationary Phase	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N
Shim-pack WAX-1	Tertiary amino group	3	50 × 4.0	228-16225-91
Shim-pack WAX-1	Tertiary amino group	3	150 × 4.6	228-16225-92
Shim-pack WAX-1T	Tertiary amino group	3	50 × 4.6	228-18257-91
Shim-pack WAX-2	Tertiary amino group	5	50 × 4.0	228-16365-91
Shim-pack WCX-1	Carboxyl group	5	50 × 4.0	228-16366-91
Pre-column Diol *	Diol group	10	50 × 4.0	228-16367-91

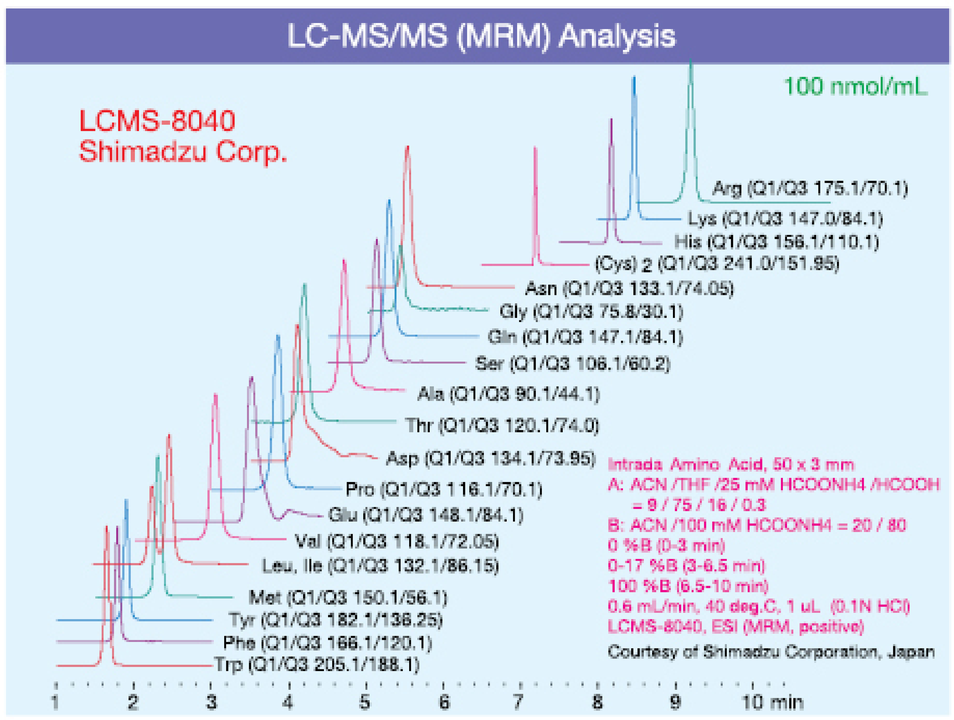
* Installed between the liquid pump and the sample injector to protect the column.

Intrada Amino Acid column

The world's first specialty column for intact amino acid analysis via LC-MS Compatible with conventional LC-MS, providing fast and easy amino acid analysis without sample derivatization. Ability to separate isobaric amino acids such as Leu and Ile. High-throughput (<1 minute) analysis for selected amino acids, 5-10 minutes for standard amino acids analysis.

Features

- For analysis of amino acids that couples well with MS detection and does not require use of an amino acid analysis system:
- When coupled to LCMS the Intrada Amino Acid column achieves high-throughput analysis without requiring tedious pre- or post-labeling methods
- Use of various column dimensions can aid in optimizing analytical time and resolution for different amino acid samples
- Separation of leucine and isoleucine isomers, GABA isomers and dipeptides analysis is now possible
- Separation free amino acids in mixtures
- Study protein amino acid composition
- Isolate amino acid bio-markers



Particle Size (µm)	Length/ mm	ID		
		1 mm	2 mm	3 mm
3	10	-	APAIMT-WAA20	APAIMT-WAA30
	20	-	APAIMT-WAA29	APAIMT-WAA39
	30	APAIMT-WAA11	APAIMT-WAA21	APAIMT-WAA31
	50	APAIMT-WAA12	APAIMT-WAA22	APAIMT-WAA32
	75	APAIMT-WAA13	APAIMT-WAA23	APAIMT-WAA33
	100	APAIMT-WAA14	APAIMT-WAA24	APAIMT-WAA34
	150	APAIMT-WAA15	APAIMT-WAA25	APAIMT-WAA35
	250	APAIMT-WAA16	APAIMT-WAA26	APAIMT-WAA36

Ion Chromatography Columns

Shim-pack IC Series

Ion chromatography (IC) is used for analysis of inorganic and organic ions. It is categorized as suppressor IC and non-suppressor IC. Non-suppressor IC is composed of a conventional HPLC system combined with a conductivity detector, while suppressor IC requires an extra suppressor.

Non-Suppressor Type	Anion Analysis	Shim-pack IC-A1	Capable of analyzing inorganic anions. Compatible with acid or basic mobile phases of wide pH range.
		Shim-pack IC-A3	Provides outstanding separation efficiency in the analysis of inorganic anions and acid ions, especially when weakly acid mobile phase is used.
	Cation Analysis	Shim-pack IC-C1	Capable of analyzing cations such as alkaline metal ions, alkali earth metal ions, transition metal ions, rare earth metal ions, and alkyl amines.
		Shim-pack IC-C4	Capable of simultaneous analysis of alkali metal ions and alkaline earth metal ions. Enhances the separation of sodium and ammonium ions.
Suppressor Type	Anion Analysis	Shim-pack IC-SA2	Capable of determining fluoride ions, chloride ions, nitrite ions, bromide ions, nitrate ions, phosphate ions and sulfuric acid ions.
		Shim-pack IC-SA3	Provides high-resolution performance when analyzing fluoride ions, chloride ions, nitrous acid ions, bromide ions, nitric acid ions, phosphate ions and sulfuric acid ions as well as chlorous acid ions, chloric acid ions and bromic acid ions.
	Cation Analysis	Shim-pack IC-SC1	Also can be used in non-suppressor IC. Suitable for the analysis of water quality.

Shim-pack IC Series

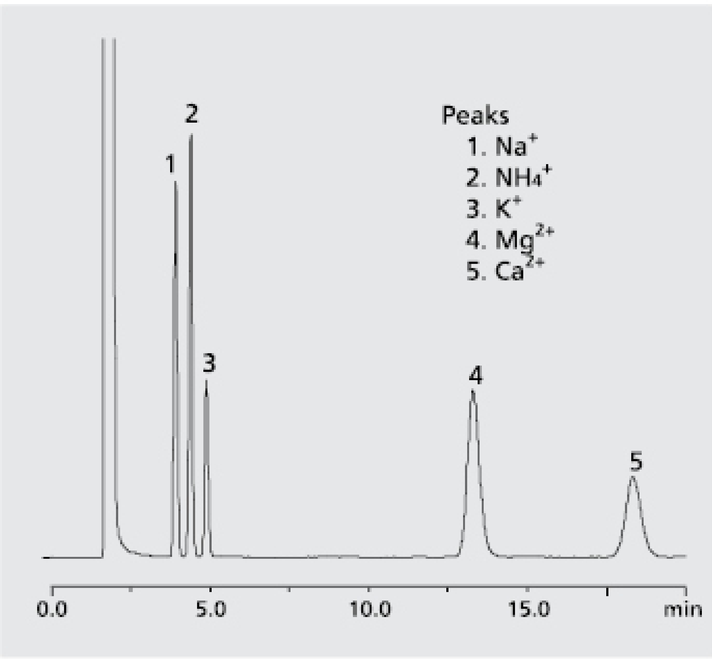
Analysis Examples

Examples of Cation Analysis

Shim-pack IC-C4 is a cation analysis column for non-suppressor IC. Because the pH of the mobile phase can be changed by selecting a different combination of acid and base in eluent, non-suppressor IC enables various kinds of analysis.

High Resolution of Na+ and NH4+

High resolution of Na+ and NH4+ has been achieved by improving the peak shape of Na+. The influence on the peak shape of NH4+ from a high concentration of Na+ has been reduced, making it possible to analyze tap water of normal concentration under standard mobile phase conditions. The resolution can be further improved by using a mobile phase treated with 18-crown-6 additive.



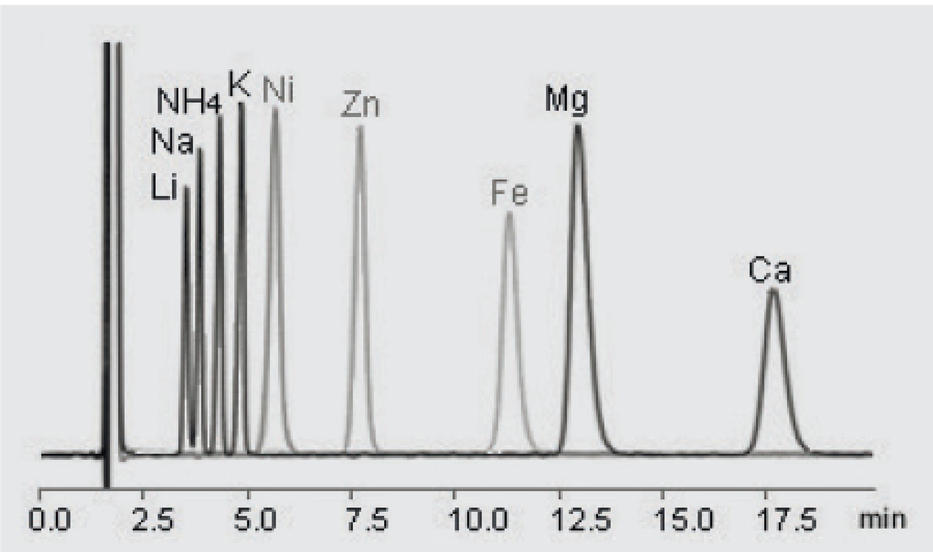
Analyses of a Standard Mixture of 5 Cations

Conditions

Column	: Shim-pack IC-C4 (150 mmL × 4.6 mmI.D., 7 µm) (P/N: 228-41616-91)
Mobile Phase	: 2.5 mmol/L oxalic acid
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: CDD
Injection Vol.	: 50 µL

Flexible Mobile Phase Selection

Due to the features of non-suppressor IC, flexible mobile phase composition can be used. Besides normal inorganic cations, Shim-pack IC-C4 is capable of analyzing transition metals by using a mixed mobile phase.



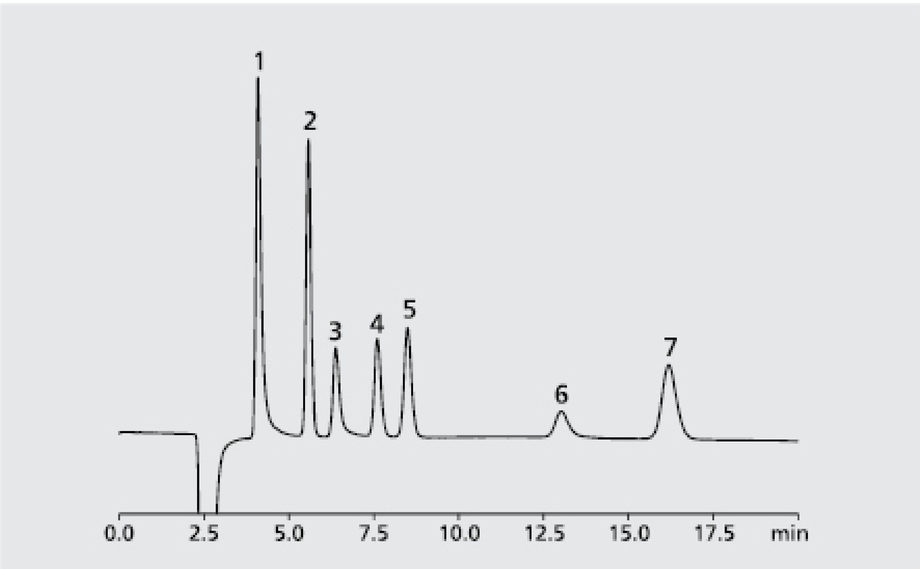
Conditions

Column	: Shim-pack IC-C4 (150 mmL × 4.6 mmI.D., 7 µm) (P/N: 228-41616-91)
Mobile Phase	: A) 2.5 mmol/L oxalic acid B) 2.5 mmol/L methanesulfonic acid A/B = 60/40 (v/v)
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: CDD
Injection Vol.	: 50 µL

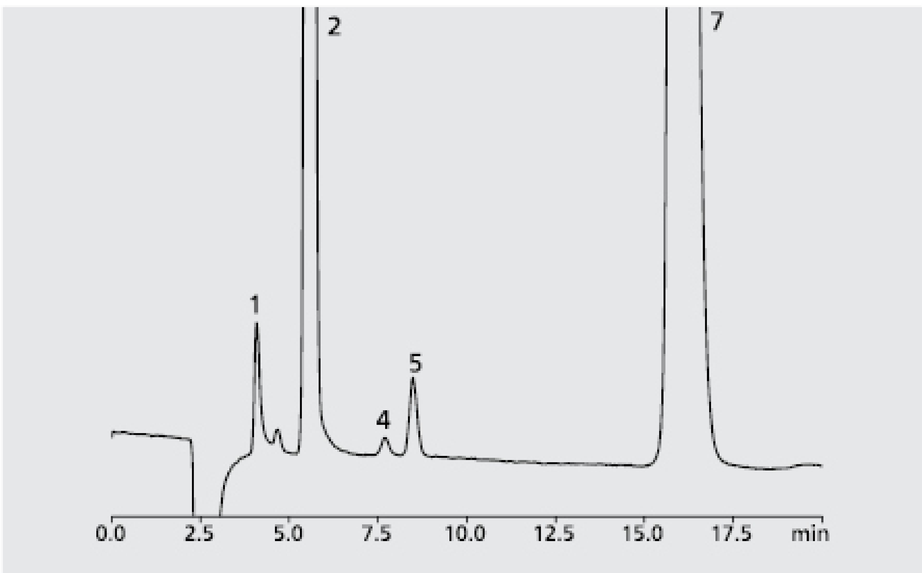
Analysis of Anions in Water

Shim-pack IC-SA2 was developed for anion analysis with a Shimadzu Ion Chromatograph HIC-SP (suppressor type). It is capable of analyzing fluoride ions, chloride ions, nitrite ions, bromide ions, nitrate ions, phosphate ions, sulfate ions, etc., making it possible to be used in both tap water and environmental water analysis.

Analysis Examples



Analysis of Standard Anion Samples



Analysis of Tap Water

Conditions

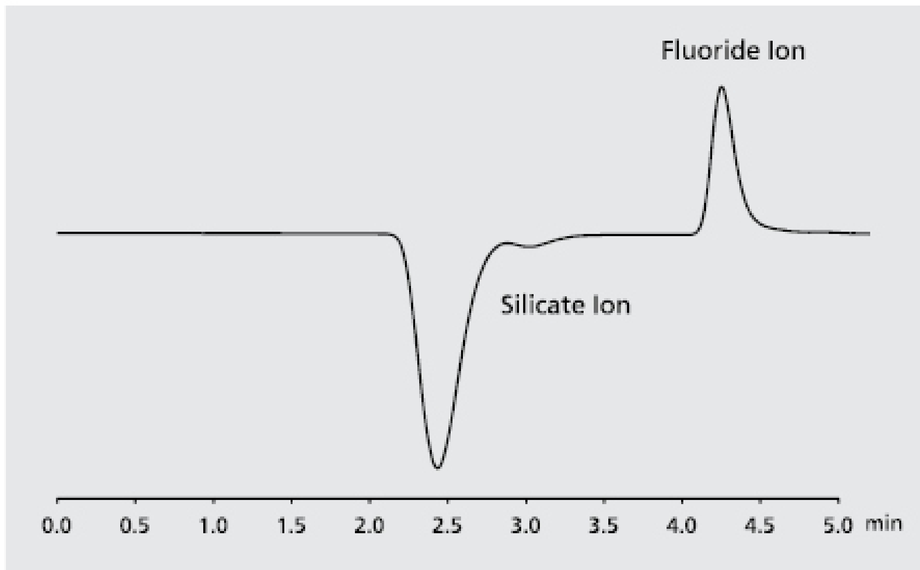
Column	: Shim-pack IC-SA2 (250 mmL. × 4.0 mmI.D.) (P/N: 228-38983-91)
Mobile Phase	: A) 12 mmol/L sodium hydrogen carbonate B) 0.6 mmol/L sodium carbonate A/B = 60/40 (v/v)
Flow Rate	: 1.0 mL/min
Col. Temp.	: 30 °C
Detection	: CDD
Injection Vol.	: 50 µL

Peaks (1 mg/L each)

1. F
2. Cl
3. NO_2
4. Br
5. NO_3
6. PO_4
7. SO_4

High-Resolution Determination of the Components in Water-Quality Analysis

Environmental water and mineral water usually contain silicate. In this kind of analysis, although the water sample contains a large amount of silicic acid, fluoride ions can still be separated and determined with high resolution (same mobile phase as above was used).



Product Information

Column	Stationary Phase	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N	Guard Column
Shim-pack IC-A1	Quaternary ammonium group	12.5	100 × 4.6	228-17733-91	228-17734-91
Shim-pack IC-A3	Quaternary ammonium group	5	150 × 4.6	228-31076-91	228-31076-92
Shim-pack IC-A3 (S) *1	Quaternary ammonium group	5	150 × 2.0	228-33366-91	
Shim-pack IC-C1 *2	Sulfone group	10	150 × 5.0	228-17737-91	228-17738-91
Shim-pack IC-C1 PEEK	Sulfone group	10	100 × 4.6	228-33497-91	228-33497-92
Shim-pack IC-C4	Carboxyl group	7	150 × 4.6	228-41616-91	228-59900-91 (Cartridge + Holder)
					228-59900-92 (Cartridge only)
Shim-pack IC-SA2	Quaternary ammonium group	9	250 × 4.0	228-38983-91	228-38983-92
Shim-pack IC-SA3	Quaternary ammonium group	5	250 × 4.0	228-41600-91	228-41600-92
Shim-pack IC-SC1	Carboxylic group	6	150 × 4.6	228-36605-91	228-36605-92

*1 Shim-pack IC(S) series are for semi-micro LC. PIA-1000 is required.
*2 During the analysis of alkali metal ions with the Shim-pack IC-C1, it is recommended to use a pre-column Shim-pack IC-PC1 (P/N:228-17744-91) installed between the liquid pump and the sample injector.

More Free Literature at www.shimadzu.com/an

Shim-pack Ultron PS-Series

Shim-pack ULTRON PS-80H

Shim-pack ULTRON PS-80H columns are HPLC columns packed with a sulfonic acid type polystyrene cation exchange resin designed for organic acid analyses.

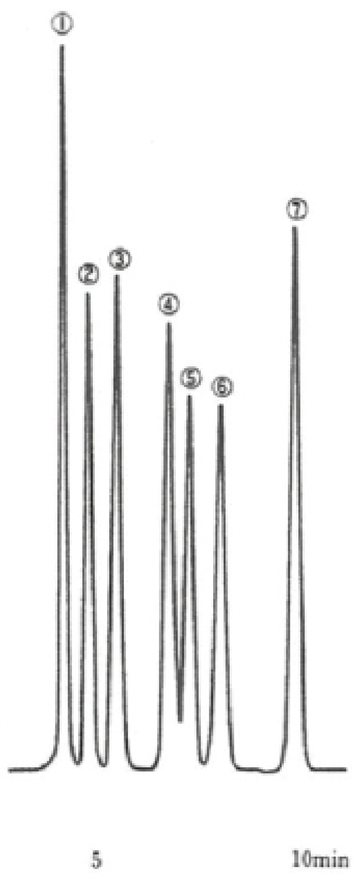
- Utilize electrostatic repulsion interactions.
- Display excellent retention reproducibility.
- Durable due to the use of a mechanically strong polymer gel.
- ph range pH 2-6
- USP L17

Applications: Aliphatic, aromatic organic acids / Alcohols, aldehydes, diols / Monitoring of fermentation processes

Fittings: Waters compatible

Maximum operating pressure: 40 kgf/cm²

Maximum operating temperature: 90°C



Elution Position of Sugar and Sugar Alcohol for PS-80N

1. Dextran T-10
2. Lactose
3. Galactose
4. Ethanol
5. Raffinose
6. Glucose
7. Arabinose

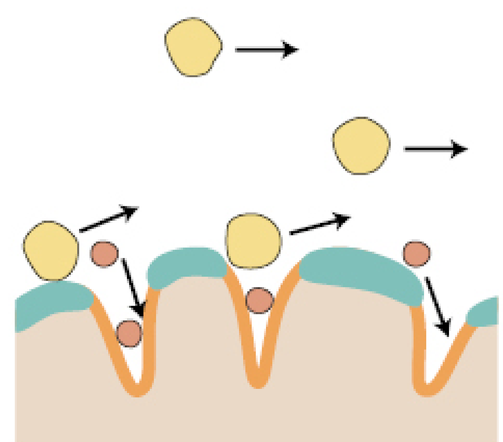
Column : ULTRON PS-80N, 300 mm x 8.0 mm I.D. (P/N: 226-80001-01)
Mobile Phase : H_2O
Flow Rate : 1.0 mL/min
Col. Temp. : 60 °C
Detection : RI, 16x10-5 RIUFS

Column	Particle Size (µm)	I.D (mm)	Length (mm)			Guard column (50 x 8.0)
			250	300	500	
PS-80H	10	8.0	-	226-80001-01	-	226-80003-91
		2.0	226-80002-01	-	-	-

Shim-pack MAYI Series

Due to optimized particle size and a newly developed coating technology, the MAYI series online pretreatment column is highly effective in deproteinization and offers long-term stability. It provides excellent reproducibility even for continuous analysis of multiple analytes.

How the Shim-pack MAYI Series Works



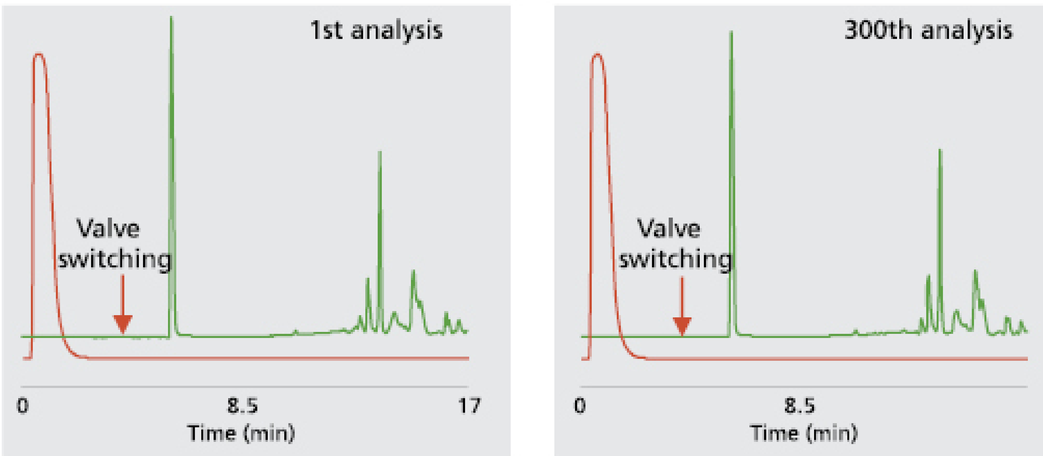
The outer surfaces of silica gel (50 µm) are coated with a hydrophilic polymer, so that only the interior of pores are chemically modified by octadecyl radicals (ODS). Since proteins and other macromolecules cannot enter the pores and are blocked by the hydrophilic polymer on the outer surfaces, they are quickly eluted without being retained by the ODS solid phase. In contrast, pharmaceuticals and other induced low molecular weight compounds penetrate the pores and are retained by the inner surfaces of the stationary phase.

Quick and Reliable Protein Removal

The newly developed hydrophilic polymer coating technology quickly and reliably removes macromolecules, such as protein, from injected biological samples to achieve high recovery rates for target components. In addition to securely protecting analytical columns and LC/MS interfaces, this also helps reduce the time required for finishing the analysis.

Outstanding Durability

Due to the polymer coating technology and particle size optimization, stable data can be obtained for long periods. The figure below shows results from 300 consecutive injections of 100 µL of blood plasma. No decrease in the deproteinization rate or degradation of peak shape was observed.



Comparison of 1st and 300th Analyses

Conditions

Samples	:	Isopropylantipyrine added Blood plasma Sample solution: 0.1% phosphoric acid and acetonitrile mixture (95:5) Dilution: 8 times
Detection	:	Analysis: 275 nm, Blood plasma matrix: 280 nm
Injection Vol.	:	100 µL

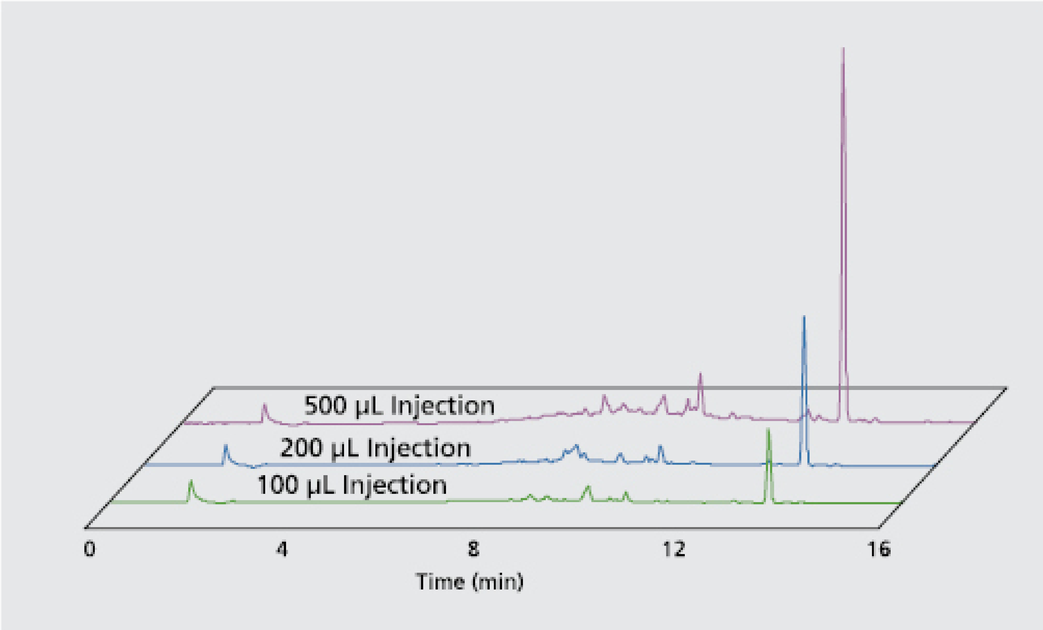
Stable Trap Even for Large Injection Volumes

The Shim-pack MAYI-ODS column provides stable component recovery rates and protein removal, even when injecting large volumes. Even when 500 µL of blood plasma was directly injected, a high recovery rate was obtained and no peak distortion was observed.

Conditions

Samples : Indomethacin added Blood plasma
Sample solution: 0.1% phosphoric acid and acetonitrile mixture (95:5)
Dilution: 8 times

Detection : UV 315 nm



Comparison Data for Injecting 100, 200, and 500 µL

Product Information

Column	Stationary Phase	Separation Mode
Shim-pack MAYI-ODS(G)	Octadecyl group	Strongest retentivity in reversed phase mode
Shim-pack MAYI-C14(G)	Tetradecyl group	Retentivity next to ODS in reversed phase mode
Shim-pack MAYI-C8(G)	Octyl group	Retentivity next to C14 in reversed phase mode
Shim-pack MAYI-C4(G)	Butyl group	Retentivity next to C8 in reversed phase mode
Shim-pack MAYI-C1(G)	Methyl group	Weakest retentivity in reversed phase mode
Shim-pack MAYI-SCX(G)	Sulfonic acid group	Strong acid cation exchange mode
Shim-pack MAYI-SAX(G)	Trimethylammonium group	Weakly basic anion exchange mode

Cartridge

Column	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N
Shim-pack MAYI-ODS	50	5 × 2.0	228-40835-93
		10 × 2.0	228-40835-95
		10 × 4.6	228-40835-91
		30 × 4.6	228-40835-97
Shim-pack MAYI-C1	50	10 × 4.6	228-46185-91
Shim-pack MAYI-C4	50	10 × 4.6	228-46186-91
Shim-pack MAYI-C8	50	10 × 4.6	228-46187-91
Shim-pack MAYI-C14	50	10 × 4.6	228-46188-91
Shim-pack MAYI-SAX	50	10 × 4.6	228-45366-91
		30 × 4.6	228-45366-93
Shim-pack MAYI-SCX	50	10 × 4.6	228-45370-91
		30 × 4.6	228-45370-93

Column Holder

Dimensions (Length × I.D., mm)	P/N
5 × 2.0	228-34938-94
10 × 2.0	228-34938-98
10 × 4.6	228-34938-92
30 × 4.6	228-34938-96

Shim-pack SPC Series

Shim-pack SPC series is specifically developed for online sample preparation systems that utilize a column switching method.

Shim-pack SPC-RP column is packed with polymer particles and used for reversed phase LC.

Shim-pack SPC-AE1 column is packed with fully porous silica gel particles on which weakly basic anion exchange functions are chemically bonded.

Product Information

Column	Stationary Phase	Separation Mode	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N
Shim-pack SPC-RP3	Polymer	Reversed phase	9	30 × 4.0	228-33713-91
Shim-pack SPC-RP2	Polymer	Reversed phase	10	10 × 4.6	228-18838-91
Shim-pack SPC-AE1	Tertiary amino group	Anion exchange	10	10 × 4.0	228-17990-91

Check out Online Sample Preparation Co-Sense Series at
www.shimadzu.com/an/hplc

Ultron Series LC Columns

Separation Mode	Column	USP Code	Application
Chiral Separation Chromatography	ULTRON ES-OVM	L57	Optical Isomers of Medicines, Pesticides
	ULTRON ES-PEPSIN	-	
	ULTRON ES-BSA	-	
	ULTRON ES-CD	L45	
	ULTRON ES-PhCD	L45	
Ion Exclusion Chromatography	ULTRON PS-80H	L17	Organic Acids and Alcohols
Ligand Exchange Chromatography	ULTRON PS-80N	L58	Monosaccharides, Disaccharides, Alditol
	ULTRON PS-80C	L19	
	ULTRON PS-80P	L34	
	ULTRON CI	-	Inositol
	ULTRON CL	-	Glucuronic Acid
Normal-phase Chromatography	ULTRON VX-SIL	L3	Phosphorus Liquid
Reversed-phase Chromatography	ULTRON VX-ODS	L1	Pharmaceutical Compounds, General Organic Substances, Food Additives, Pesticides, Fatty Acids and Catecholamines
	ULTRON VX-Octyl	L7	
	STR ODS-II	L1	
	STR ODS-M	L1	

Ultron ES-Series

The ULTRON ES series are columns for enantiomer separation. Columns which are packed with protein immobilized silica (ULTRON ES-OVM, ULTRON ES-PEPSIN, ULTRON ES-BSA) and chemically bonded cyclodextrin (ULTRON ES-CD, ULTRON ES-PhCD).

ULTRON ES-OVM, ULTRON ES-OVM-C

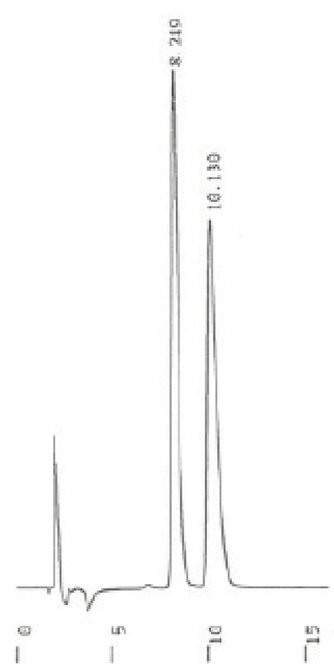
- A chiral separation column immobilized with ovomucoid which is a strong protein for denaturation
- Display a wide range of chiral recognition.
- No sample pretreatment required for chiral separations.
- Can be used for reversed-phase analyses.
- Trace analyses possible (several nanograms).
- [ULTRON ES-OVM-C]
  Clopidogrel bisulfate evaluation conditions based on USP standards employed for shipping inspections.
- [ULTRON ES-OVM-C]
  Low viscosity 30% acetonitrile aqueous solution used as column storage solvent.
- USP L57

Applications: Pharmaceuticals/Pesticides/Organic synthetic compounds

ULTRON ES-OVM-3

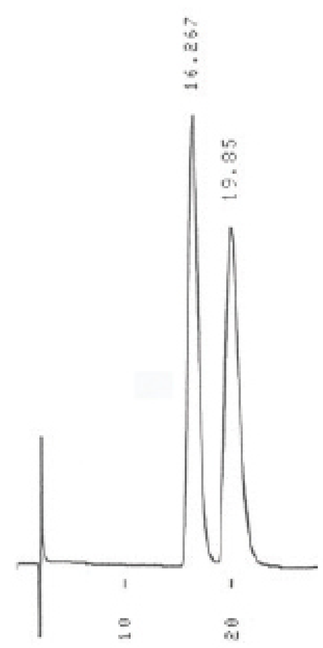
- Maximum operating pressure of 30 MPa.
- Can be used in LC/MS systems as well.
- Employs a 3 μm packing material for higher peak resolution and theoretical plate numbers.
- Enables significant reductions in analysis times while maintaining high theoretical plate numbers.
- Enables further improvements in performance with optimization of LC system tubing and flow cells.
- 9 column length and inner diameter combinations available.
- USP L57

Applications: Pharmaceuticals/Pesticides/Organic synthetic compounds



Skeletal Muscle Relaxants: Chlorphenesin

Column	: ULTRON ES-OVM 150 mm x 4.6 mm I.D.
Mobile Phase	: 20 mM KH2PO4 (pH 5.5)
Flow Rate	: 1.0 mL/min
Col. Temp.	: 25 °C
Detection	: UV-220 nm



Drugs in Peptic Ulcer: Proglumide

Column	: ULTRON ES-OVM 150 mm x 4.6 mm I.D.
Mobile Phase	: 20 mM KH2PO4 (pH 4.6) / C2H5OH = 100 / 20
Flow Rate	: 1.0 mL/min
Col. Temp.	: 25 °C
Detection	: UV-220 nm

ULTRON ES-PEPSIN

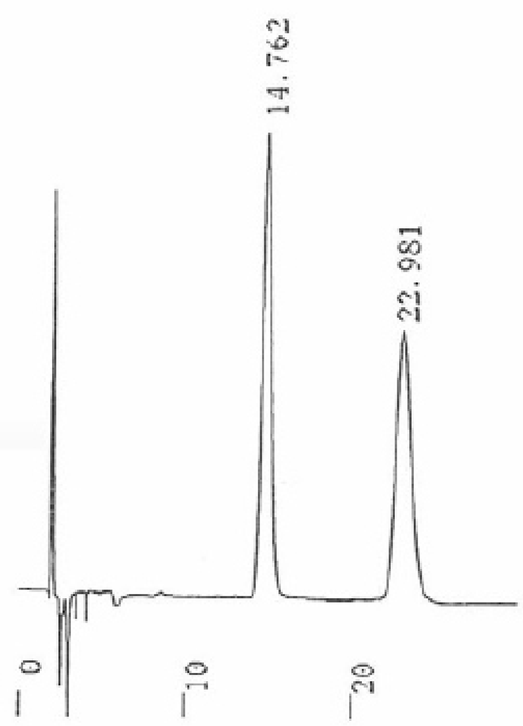
- An enantiomer separation column immobilized with pepsin which is the polypeptide dialytic enzyme of the pig stomach mucous membrane origin.
- Displays superior performance with respect to chiral separations of aminoalcohol pharmaceuticals such as beta blockers.
- No sample pretreatment required for chiral separations.
- Can be used for reversed-phase analyses.
- Trace analyses possible (several nanograms).

Applications: Pharmaceuticals/Pesticides/Organic synthetic compound

ULTRON ES-BSA

- Employs bovine serum albumin, which is chemically bonded to the base material in an extremely stable manner.
- Provides superior chiral separations of acidic compounds such as arylpropionic acid pharmaceuticals.
- No sample pretreatment required for chiral separations.
- Can be used for reversed-phase analyses.
- Trace analyses possible (several nanograms).

Applications: Pharmaceuticals/Pesticides/Organic synthetic compound



Antiinflammatories : Ibuprofen

Column	:	ULTRON ES-BSA, 150 mm x 4.6 mm I.D
Mobile Phase	:	20 mM KH2PO4 (pH 7.0) / 1-Propanol / Caprylic Acid = 98 / 2 / 0.08
Flow Rate	:	1.0 mL/min
Col. Temp.	:	25 °C
Detection	:	UV-220 nm

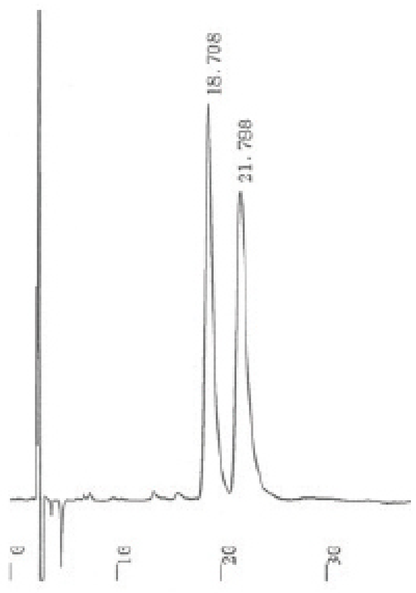
Chiral Separation Columns

ULTRON ES-CD, ULTRON ES-PhCD

ULTRON ES-CD and ULTRON ES-PhCD are enantiomeric separation columns chemically bonded with β-cyclodextrin (CD) and phenylcarbamated⊠-cyclodextrin (PhCD), respectively.

- Capable of chiral separations of hydrophobic cyclic compounds.
- Both reverse and normal phase eluents can be used.
- Chiral separations of a wide range of compounds are possible using these two types of columns.
- Display superior stability and durability.
- USP L45

Applications: Pharmaceuticals/Pesticides/Organic synthetic compounds



■ ⊠-Blockers: Arotinolol

Column	: ULTRON ES-PhCD 150 mm x 6.0 mm I.D.
Mobile Phase	: 20 mM KH2PO4 (pH 4.6) / CH3CN = 75 / 25
Flow Rate	: 1.2 mL/min
Col. Temp.	: 25 °C
Detection	: UV-220 nm

■ ⊠-Blockers: Alprenolol

Column	: ULTRON ES-PhCD 150 mm x 6.0 mm I.D.
Mobile Phase	: 20 mM KH2PO4 (pH 4.6) / CH3CN = 80 / 20
Flow Rate	: 1.2 mL/min
Col. Temp.	: 25 °C
Detection	: UV-220 nm

Column	Particle Size (µm)	I.D (mm)	Length (mm)				Guard Column
			50	100	150	250	
ES-OVM	3	2.1	APASHI-0013	APASHI-0016	APASHI-0019	-	-
		3.0	APASHI-0014	APASHI-0017	APASHI-0020	-	-
		4.6	APASHI-0015	APASHI-0018	APASHI-0021	-	-
	5	2.0	-	-	APASHI-0001	-	APASHI-0005 (5um 10x4.0)
		4.6	-	-	APASHI-0002	-	
ES-OVM-C	5	4.6	-	-	APASHI-0003	-	
		6.0	-	-	APASHI-0004	-	
	10	4.6	-	-	APASHI-0006	-	APASHI-0008 (10um 15x8.0)
ES-OVM-C (prep)	10	20.0	-	-	-	APASHI-0007	
ES-PEPSIN	5	4.6	-	-	APASHI-0022	-	APASHI-0023 (5um 10x4.0)
ES-BSA	5	4.6	-	-	APASHI-0024	-	APASHI-0025 (5um 10x4.0)
ES-CD	5	2.0	-	-	APASHI-0026		-
		6.0	-	-	APASHI-0027	-	APASHI-0028 (5um 10×4.0)
ES-PhCD	5	2.0	-	-	APASHI-0033	-	APASHI-0035 (5um 10×4.0)
ES-PhCD-T	5	6.0	-	-	APASHI-0034	-	

Guard Cartridges (2 pcs)	Particle Size (µm)	I.D (mm)	Length (mm)		Holder (With Adaptor)
			5	10	
ES-OVM	5	2.0	APASHI-0009	-	APASHI-0011
		4.6	-	APASHI-0010	APASHI-0012
ES-CD	5	2.0	APASHI-0029	-	APASHI-0031
		4.6	-	APASHI-0030	APASHI-0032
ES-PhCD	5	2.0	APASHI-0036	-	APASHI-0038
		4.6	-	APASHI-0037	APASHI-0039

Shim-pack Ultron PS-Series

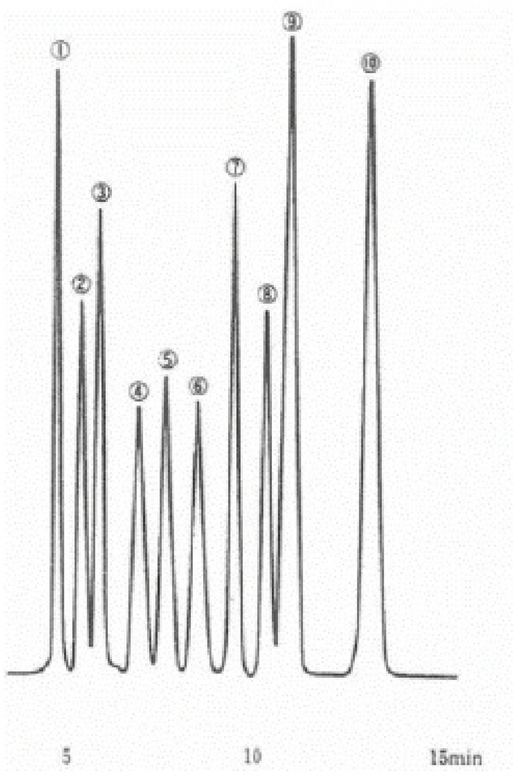
Shim-pack ULTRON PS-80N, ULTRON PS-80C, ULTRON PS-80P

The Shim-pack ULTRON PS series are HPLC columns packed with sulfonic acid type polystyrene cation exchange resin for sugar and sugar alcohol analysis.

Column	PS-80N	PS-80C	PS-80P
Type	Na type	Ca type	Pb type
USP Code	L58	L19	L34
Max. Operation Pressure	4.0 MPa	4.0 MPa	4.0 MPa
Max. Operation Temperature	80 °C	90 °C	90 °C
pH Range	pH 6 - 12	pH 6 - 7.5	pH 6 - 7.5

- PS series columns are effective for quantitative analyses because saccharides are not adsorbed on matrices.
- PS series columns use aqueous mobile phases.
- Durable due to the use of a mechanically strong polymer gel.

Applications: Oligosaccharides, disaccharides, monosaccharides / Sugar alcohols / Monitoring of fermentation hydrolysis of polysaccharides



Elution Position of Sugar and Sugar Alcohol for PS-80C

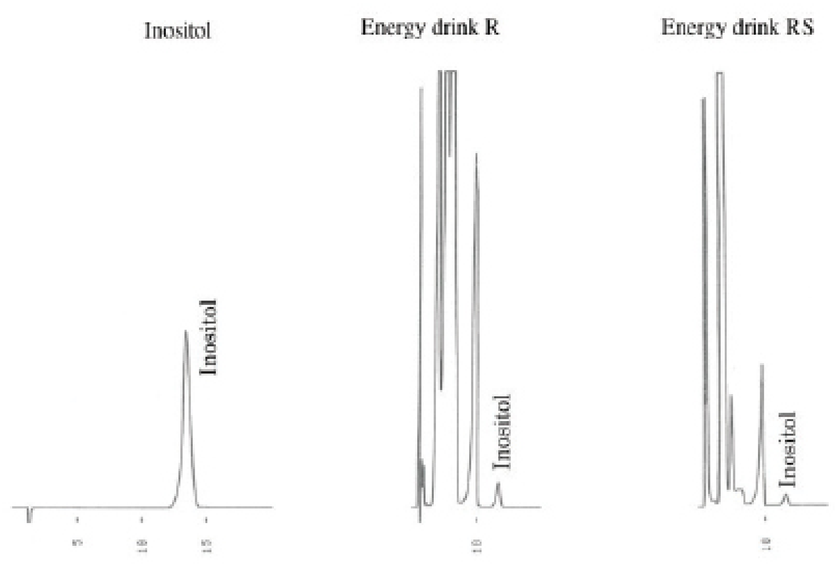
1. Dextran T-10
2. Raffinose
3. Sucrose
4. Glucose
5. Galactose
6. Fructose
7. Adonitol
8. Glycerol
9. Ethanol + Mannitol
10. Xylitol +Sorbitol

Column : ULTRON PS-80C, 300 mm x 8.0 mm I.D.
Mobile Phase : H_2O
Flow Rate : 1.0 mL/min
Col. Temp. : 80 °C
Detection : RI, 16x10-5 RIUFS
Sample : ea. 10 uL/mL

Column	Particle Size (µm)	I.D (mm)	Length (mm)			Guard column (50 x 8.0)
			250	300	500	
PS-80N	10	8.0	-	226-80004-01	226-80005-01	226-80006-91
PS-80C	10	8.0	-	226-80007-01	-	226-80008-91
PS-80P	10	8.0	-	226-80009-01	-	226-80010-91

Shim-pack ULTRON CI

- A strong cation exchange polymer packed HPLC column designed for analyses of inositol.
- Provides excellent quantitative analyses of inositol in energy drinks.
- Displays good retention reproducibility.
- Polymer beads possess good mechanical strength.
- Maximum operating pressure is 8.0 MPa.
- Maximum operating temperature is 90°C.



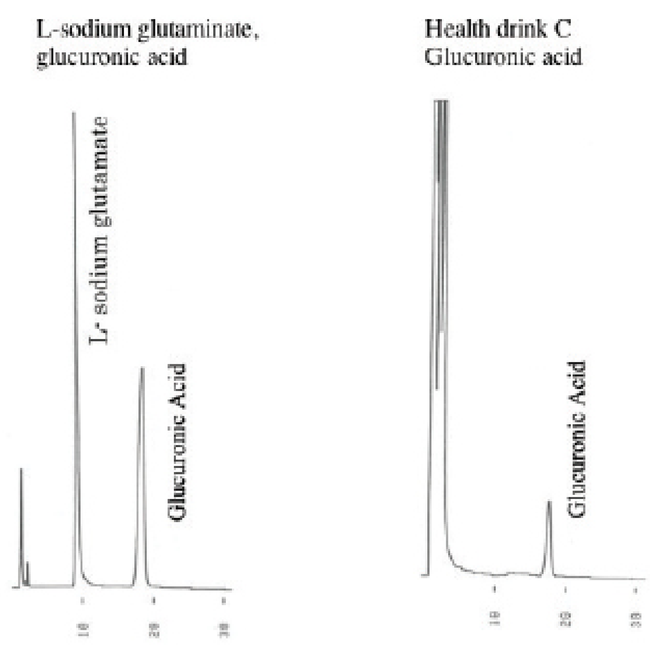
Inositol in Health Drink

Column	: ULTRON CI, 200mm x 4.6mm I.D
Mobile Phase	: CH3CN/H2O = 60/40
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: RI

Column	I.D (mm)	Length (mm)
		250
ULTRON CI	4.6	226-80011-01

Shim-pack ULTRON CL

- A strong anion exchange polymer packed HPLC column for glucuronic acid.
- Provides excellent quantitative analyses of glucuronic acid in energy drinks.
- Displays good retention reproducibility.
- Polymer beads possess good mechanical strength.
- Maximum operating pressure is 8.0 MPa.
- Maximum operating temperature is 70°C.



Glucuronic acid in Health Drink

Column	: ULTRON CL, 150mm x 4.6mm I.D
Mobile Phase	: 20 mM KH2PO4
Flow Rate	: 0.8 mL/min
Col. Temp.	: 70 °C
Detection	: UV-210 nm

Column	I.D (mm)	Length (mm)
		150
ULTRON CL	4.0	226-80012-01

Shim-pack Ultron VX Series

Shim-pack ULTRON VX-SIL

Shim-pack ULTRON VX-SIL columns use high purity silica gel (SiO2 99.99% or higher), thereby reducing sample absorption by metal oxides to the lowest possible levels.

The use of the spherical silica particles reduced column back pressure and prolong column life time.

Bonded Phase	-
Particle Size	5 µm
Pore Size	12 nm
Surface Area	300 m²/g
USP Code	L3

Column	Particle Size (µm)	I.D (mm)	Length (mm)		Guard column
			150	250	
VX-SIL (Analytical)	5	4.6	226-80013-01	226-80014-01	226-80031-01 (10 x 4.0 mm)
	5	6.0	226-80015-01	-	
	10	4.6	226-80021-01	226-80022-01	-
	10	6.0	226-80023-01	-	-
VX-SIL (Preparative)	5	20.0	-	226-80016-01	226-80032-01 (15 x 8.0 mm)
	10	20.0	-	226-80024-01	226-80033-01 (10 x 4.0 mm)
	10	30.0	-	226-80025-01	
	10	50.0	-	226-80026-01	226-80034-01 (15 x 8.0 mm)
	15	4.6	-	226-80027-01	226-80035-01 (10 x 4.0 mm)
	15	20.0	-	226-80028-01	
	15	30.0	-	226-80029-01	226-80036-01 (15 x 8.0 mm)
	15	50.0	-	226-80030-01	
VX-SIL (Narrow Bore)	5	2.0	226-80017-01	226-80018-01	-
	5	1.0	226-80019-01	226-80020-01	-

Guard cartridges (2 pcs)	Particle Size (µm)	I.D (mm)	Length (mm)		Holder (With adaptor)
			5	10	
VX-SIL	5	2.0	226-80037-91	-	226-80039-91
		4.6	-	226-80038-91	226-80040-91

Shim-pack Ultron VX Series

Shim-pack ULTRON VX-ODS

Shim-pack ULTRON VX-ODS is reversed-phase column having monomeric octadecyl group. The bare silica of ULTRON VX-ODS is the same of ULTRON VX-SIL. Our excellent end-capping technology (secondary silylation) lead to the reduction of the influence of the residual silanol groups.

Bonded Phase	Octadecyl Group
Particle Size	5 µm, 10 µm, 15 µm
Pore Size	12 nm
Specific Surface	300 m^2/g
Carbon content	16 %
End-cap	Yes
USP Code	L1

Reproducibility between column lots

ULTRON VX-ODS columns are checked using stringent quality control in each manufacturing process.
Only ULTRON VX-ODS columns that pass repeated testing during the manufacturing processes are shipped to customers. k' and α values obtained using ULTRON VX-ODS columns display only extremely small differences between lots. ULTRON VX-ODS columns also display excellent reproducibility and stability in other tests between column lots.

Stereoselectivity, distribution equilibria

ULTRON VX-ODS columns, which have monolayers of octadecyl groups, display excellent stereoselectivity with respect to sample molecules. Distribution equilibria are reached rapidly when performing gradient elutions and when mobile phases are changed.

Pressure resistance

Because ULTRON VX-ODS columns use spherical silica gel, they display excellent pressure resistance, and stable separations can be achieved even at fast mobile phase flow rates.

Column	Particle Size (µm)	I.D (mm)	Length (mm)		Guard column
			150	250	
VX-ODS (for Analytical)	5	4.6	226-80041-01	226-80042-01	226-80059-01 (10 x 4.0 mm)
		6.0	226-80043-01	-	
	10	4.6	226-80049-01	226-80050-01	226-80061-01 (10 x 4.0 mm)
		6.0	226-80051-01	-	-
VX-ODS (Narrow Bore)	5	2.0	226-80045-01	226-80046-01	-
		1.0	226-80047-01	226-80048-01	-
VX-ODS (for Preparative)	5	20.0	-	226-80044-01	226-80060-01 (15 x 8.0 mm)
	10	20.0	-	226-80052-01	226-80062-01 (15 x 8.0 mm)
		30.0	-	226-80053-01	
		50	-	226-80054-01	
	15	4.6	-	226-80055-01	226-80063-01 (10 x 4.0 mm)
		20.0	-	226-80056-01	
		30.0	-	226-80057-01	226-80064-01 (15 x 8.0 mm)
		50.0	-	226-80058-01	

Guard cartridges (2 pcs)	Particle Size (µm)	I.D (mm)	Length (mm)		Holder (With adaptor)
			5	10	
VX-ODS	5	2.0	226-80065-91	-	226-80067-91
		4.6	-	226-80066-91	226-80068-91

Shim-pack ULTRON VX-Octyl

We have utilized the highly refined synthesizing technology used to manufacture ULTRON VX-ODS columns to produce the ULTRON VX-Octyl column.

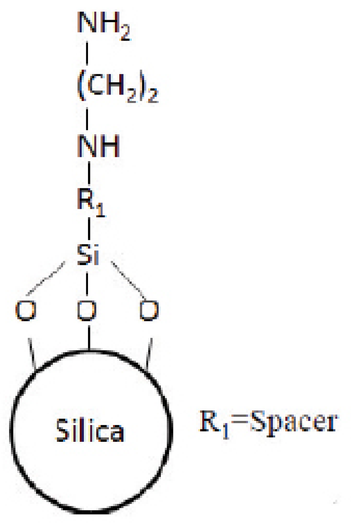
- Column lifetime is greatly improved.
- ULTRON VX-Octyl columns have very low variations between lots and display excellent reproducibility.
- ULTRON VX-Octyl columns provide shorter analysis times than ODS columns and can also maintain high separation capacities.
- Volumes of organic solvents can be reduced.
- Because distribution equilibriums can be achieved quickly and adsorbed materials can be eluted easily in comparison with ODS columns, these columns are perfect for gradient elutions.
- USP L07

Applications: Pharmaceutical compounds / pesticides / chemical compounds / food products / environmental compounds, etc.

Column	Particle Size (µm)	I.D (mm)	Length (mm)		Guard column
			150	250	
VX-Octyl (for Analytical)	5	4.6	226-80069-01	226-80070-01	226-80072-91 (10 x 4.0 mm)
VX-Octyl (for preparative)	5	20.0	-	226-80071-01	226-80073-91 (15 x 8.0 mm)

Shim-pack Ultron AF-HILIC-DA

Shim-pack ULTRON AF-HILIC-DA is the latest addition to the ULTRON series. By introducing a new amino group via a spacer, this column has greatly improved retention while maintaining the characteristics of an amino column. This column also shows selectivity for different separations



- Diamine (primary and secondary) is introduced in packing material that is based on silica gel.
- The retention of polar compounds is strong and have a variety of separation selectivities.
- Have anion exchange as same as amino column

Applications: Separation selectivity of nucleobase and nucleoside

Column	I.D (mm)	Length (mm)	
		100	150
ULTRON AF-HILIC-DA	4.6	226-80105-01	226-80106-01