

Polymer-based Hydrophilic Interaction Chromatography (HILIC) Columns (Asahipak)

Features

- NH2P-50**
- Suitable for saccharides analysis using HILIC mode
 - Polymer-based packing material provides excellent chemical stability and minimum deterioration over extended time period
 - Easily regenerated by washing in an alkaline solution
 - Appropriate for evaporative light scattering detector, corona charged aerosol detector, and LC/MS
 - Fulfills USP-NF L82 requirements
- NH2P-40**
- Provides higher theoretical plate number than NH2P-50 series

Standard columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (μm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F7630005	Asahipak NH2P-50 4B	≥ 1,500	Amino	5	100	4.6 x 50	CH ₃ CN
F7630002	Asahipak NH2P-50 4D	≥ 5,500	Amino	5	100	4.6 x 150	CH ₃ CN
F7630001	Asahipak NH2P-50 4E	≥ 7,500	Amino	5	100	4.6 x 250	CH ₃ CN
F6710016	Asahipak NH2P-50G 4A	(guard column)	Amino	5	—	4.6 x 10	CH ₃ CN
F7630007	Asahipak NH2P-40 3E	≥ 8,500	Amino	4	100	3.0 x 250	CH ₃ CN
F6710030	Asahipak NH2P-50G 3A	(guard column)	Amino	5	—	3.0 x 10	CH ₃ CN

Base Material: Polyvinyl alcohol

Semi-micro columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (μm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F7630006	Asahipak NH2P-50 2D	≥ 3,500	Amino	5	100	2.0 x 150	CH ₃ CN
F6713000	Asahipak NH2P-50G 2A	(guard column)	Amino	5	—	2.0 x 10	CH ₃ CN
F7630010	Asahipak NH2P-40 2E	≥ 7,000	Amino	4	100	2.0 x 250	CH ₃ CN

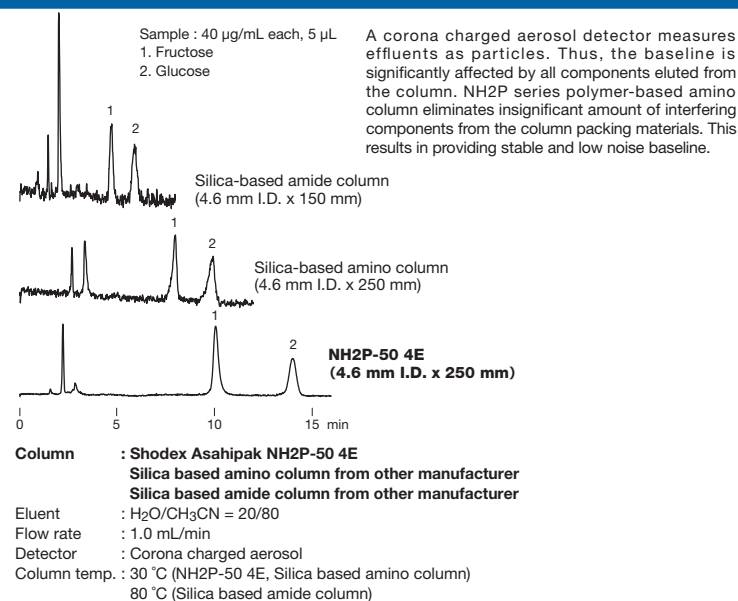
Base Material: Polyvinyl alcohol

Preparative columns [Preparative columns are made to order]

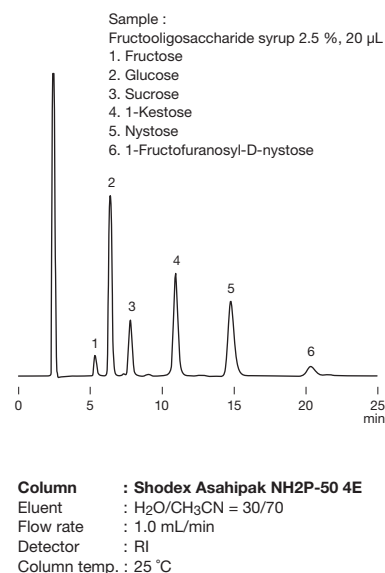
Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (μm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6830001	Asahipak NH2P-50 10E	≥ 10,000	Amino	5	10.0 x 250	CH ₃ CN
F6710016	Asahipak NH2P-50G 4A	(guard column)	Amino	5	4.6 x 10	CH ₃ CN
F6830031	Asahipak NH2P-90 20F	≥ 10,000	Amino	9	20.0 x 300	CH ₃ CN
F6710017	Asahipak NH2P-130G 7B	(guard column)	Amino	13	7.5 x 50	CH ₃ CN

Base Material: Polyvinyl alcohol

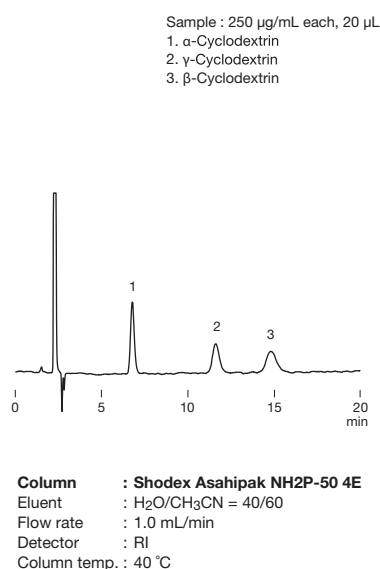
Comparison of saccharide analysis using corona charged aerosol detector



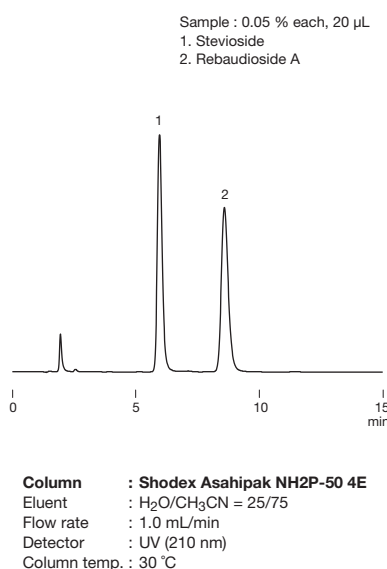
Fructooligosaccharide syrup



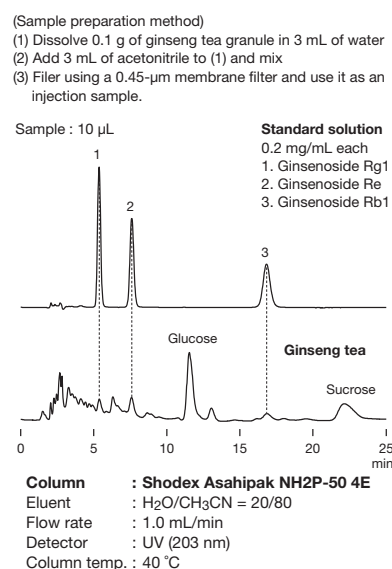
Cyclodextrins



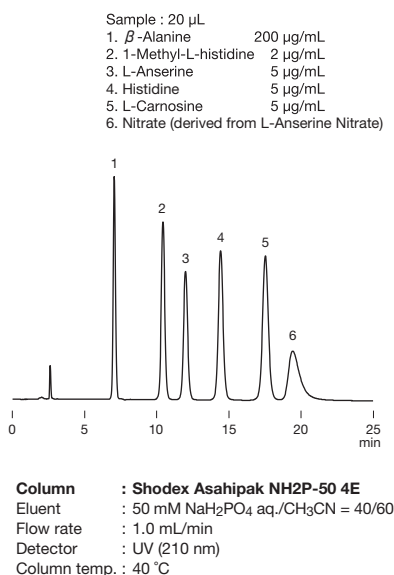
Stevioside and rebaudioside A



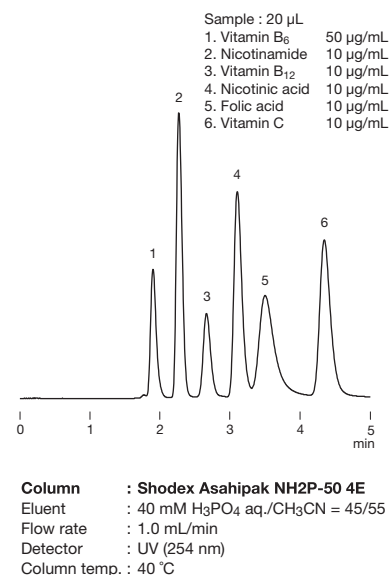
Ginsenosides in ginseng tea



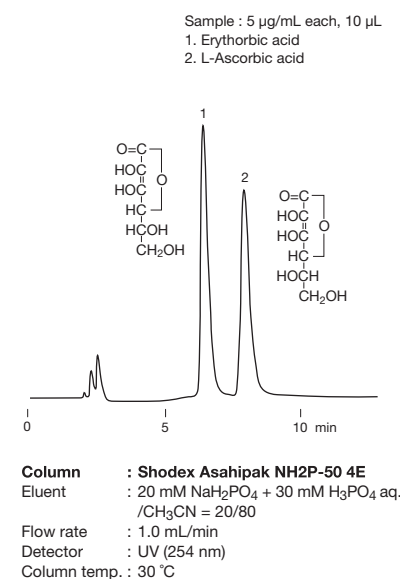
Imidazole dipeptides



Simultaneous analysis of water-soluble vitamins



Ascorbic acid and erythorbic acid



Ligand Exchange Chromatography Columns

* Please check our website for elution-volume summary lists of various saccharides using Shodex columns.

Features

SC1011
SP0810
KS-801
KS-802

- Separates saccharides by combination of ligand exchange and size exclusion modes
- Three types of counter ions are available: Ca^{2+} , Pb^{2+} and Na^{+}
- Only water is required for the analysis of neutral sugars
- SC1011 fulfills USP-NF L19 and L22 requirements
- SP0810 fulfills USP-NF L22 and L34 requirements
- KS-801 and KS-802 fulfill USP-NF L22 and L58 requirements

KS-803
KS-804

- Suitable for separation of polysaccharides by size exclusion mode
- Can be used in combination with other columns e.g., KS-801 and/or KS-802
- Only water is required for the analysis of neutral sugars
- Fulfill USP-NF L22 and L58 requirements

DC-613
SZ5532
SC1211

- Separates elements by combination of ligand exchange and HILIC modes
- DC-613 can analyze sugars without removing sodium salts in the sample
- SZ5532 is recommended for the separation of disaccharides or trisaccharides
- SC1211 is suitable for separating sugar alcohols
- DC-613 fulfills USP-NF L22 and L58 requirements
- SZ5532 fulfills USP-NF L22 requirements
- SC1211 fulfills USP-NF L19 and L22 requirements

SC1011-7F
MN-431

- Pharmacopoeia method relevant columns
- Ca^{2+} modified ligand exchange chromatography column
- Only water is required for the analysis of neutral sugars
- Fulfill USP-NF L19 and L22 requirements

Ligand exchange and size exclusion

• Standard columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group (Counter Ion)	Exclusion Limit (Pullulan)	Particle Size (μm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6378102	SUGAR SC1011	$\geq 13,000$	Sulfo (Ca^{2+})	1,000	6	8.0 x 300	H_2O
F6700090	SUGAR SC-G 6B	(guard column)	Sulfo (Ca^{2+})	—	10	6.0 x 50	H_2O
F6378105	SUGAR SP0810	$\geq 11,000$	Sulfo (Pb^{2+})	1,000	7	8.0 x 300	H_2O
F6700081	SUGAR SP-G 6B	(guard column)	Sulfo (Pb^{2+})	—	10	6.0 x 50	H_2O
F6378106	SUGAR SP0810 8C	$\geq 3,000$	Sulfo (Pb^{2+})	1,000	7	8.0 x 100	H_2O
F6378010	SUGAR KS-801	$\geq 17,000$	Sulfo (Na^{+})	1,000	6	8.0 x 300	H_2O
F6378020	SUGAR KS-802	$\geq 17,000$	Sulfo (Na^{+})	10,000	6	8.0 x 300	H_2O
F6378025	SUGAR KS-803	$\geq 17,000$	Sulfo (Na^{+})	50,000	6	8.0 x 300	H_2O
F6378035	SUGAR KS-804	$\geq 17,000$	Sulfo (Na^{+})	400,000	7	8.0 x 300	H_2O
F6700020	SUGAR KS-G 6B	(guard column)	Sulfo (Na^{+})	—	10	6.0 x 50	H_2O

Base Material: Styrene divinylbenzene copolymer

Ligand exchange and HILIC

• Standard columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group (Counter Ion)	Particle Size (μm)	Pore Size ($\text{\AA}$)	Column Size (mm) I.D. x Length	Shipping Solvent
F7001003	RSpak DC-613	$\geq 5,500$	Sulfo (Na^{+})	6	100	6.0 x 150	$\text{H}_2\text{O}/\text{CH}_3\text{CN} = 30/70$
F6700170	RSpak DC-G 4A	(guard column)	Sulfo (Na^{+})	10	—	4.6 x 10	$\text{H}_2\text{O}/\text{CH}_3\text{CN} = 30/70$
F7001300	SUGAR SZ5532	$\geq 5,500$	Sulfo (Zn^{2+})	6	—	6.0 x 150	$\text{H}_2\text{O}/\text{CH}_3\text{CN} = 30/70$
F6700110	SUGAR SZ-G	(guard column)	Sulfo (Zn^{2+})	6	—	4.6 x 10	$\text{H}_2\text{O}/\text{CH}_3\text{CN} = 30/70$
F7001400	SUGAR SC1211	$\geq 5,500$	Sulfo (Ca^{2+})	6	50	6.0 x 250	$\text{H}_2\text{O}/\text{CH}_3\text{CN} = 75/25$
F6700120	SUGAR SC1211G 4A	(guard column)	Sulfo (Ca^{2+})	10	—	4.6 x 10	$\text{H}_2\text{O}/\text{CH}_3\text{CN} = 75/25$

Base Material: Styrene divinylbenzene copolymer

Pharmacopoeia Method Relevant Columns

● Standard columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group (Counter Ion)	Particle Size (μm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6379300	EP SC1011-7F	≥ 13,000	Sulfo (Ca ²⁺)	8	7.8 x 300	H ₂ O
F6700090	SUGAR SC-G 6B	(guard column)	Sulfo (Ca ²⁺)	10	6.0 x 50	H ₂ O
F6379230	USPpak MN-431	≥ 4,000	Sulfo (Ca ²⁺)	8	4.0 x 250	H ₂ O

See page 72 for USP-NF Column List.

Base Material: Styrene divinylbenzene copolymer

A partial list of saccharide elution volumes analyzed by Shodex columns

(Refer to our website for the complete list)

Substance	Elution volume (mL)						
	SP0810	SC1011	KS-801	SZ5532	SC1211	NH2P-50 4E	VG-50 4E
Arabinose	10.42	8.91	8.21	5.11	5.56	6.18	5.65
D-Arabitol	15.86	11.33	7.63	7.27	8.16	6.29	6.05
Dulcitol	20.18	12.76	7.40	9.46	11.28	7.45	N/A
meso-Erythritol	12.70	10.09	7.86	5.73	6.27	5.43	5.10
D(-)-Fructose	11.05	8.85	7.71	5.37	5.90	6.75	6.19
D(+)-Fucose	10.48	8.84	8.09	4.50	4.96	5.43	5.06
D(+)-Galactose	9.74	7.98	7.58	6.46	4.98	8.10	7.37
Gentiobiose	7.22	6.08	5.75	10.50	*	16.36	14.52
Glucose	8.63	7.30	7.17	5.87	4.76	8.61	7.47
myo-Inositol	12.77	8.86	7.99	12.63	7.87	9.96	11.68
Isomaltose	7.68	6.26	5.95	10.57	*	15.18	14.41
Isomaltotriose	7.09	5.75	5.34	21.17	*	27.55	N/A
1-Kestose	6.79	5.75	5.26	13.09	*	20.11	N/A
Kojibiose	7.56	6.21	5.88	9.65	*	14.82	N/A
Lactitol	13.27	8.09	6.13	16.35	6.67	11.82	13.28
Lactose	8.05	6.51	5.99	10.12	4.07	13.27	12.46
Lactulose	9.13	6.99	6.19	9.16	4.65	10.72	10.52
Maltitol	12.23	8.26	6.03	13.04	6.77	11.82	12.37
Maltose	7.85	6.34	5.94	8.67	*	14.24	12.71
Maltotriose	7.48	5.89	5.38	13.79	*	24.96	N/A
Mannitol	15.80	11.10	7.23	8.75	9.03	7.39	7.35
D-Mannose	10.72	8.17	7.64	5.83	5.01	7.84	6.95
Melibiose	8.16	6.45	5.98	11.69	4.23	14.70	15.07
Nystose	6.38	5.45	4.93	20.05	*	31.90	N/A
Palatinin	2 peaks	2 peaks	5.90	2 peaks	2 peaks	12.73	14.23
Palatinose	7.84	6.45	5.89	8.08	3.99	12.12	11.26
Panose	7.14	5.78	5.32	16.87	*	25.60	N/A
D(+)-Raffinose	7.14	5.78	5.29	16.36	*	20.25	N/A
Rhamnose	9.77	8.23	7.37	3.93	4.43	5.52	4.87
D(-)-Ribose	19.35	13.66	9.04	4.82	8.64	5.45	4.93
D(-)-Sorbitol	21.61	13.31	7.42	9.79	11.88	7.09	7.18
Sorbose	9.67	8.03	7.38	5.12	4.92	7.35	6.79
Stachyose	6.82	5.57	4.97	—	*	36.22	N/A
Sucrose	7.54	6.29	5.87	7.91	*	11.87	10.69
α-D-Talose	21.33	12.59	8.76	5.69	8.51	6.47	5.75
Trehalose	7.62	6.27	5.78	10.85	*	13.25	14.36
Trehalulose	8.92	6.95	6.10	9.54	4.78	11.68	11.92
Xylitol	19.87	13.14	7.94	7.77	10.16	6.10	6.04
Xylobiose	8.16	6.68	6.40	5.65	*	9.05	7.83
D(+)-Xylose	9.21	7.90	7.71	4.55	4.48	6.58	5.78
D-Xylulose	10.64	9.02	8.04	4.06	5.07	5.41	N/A

N/A: Data not available (—): Not detected (*): Overlap with solvent peak

Column : SUGAR SP0810, SC1011, KS-801

Eluent : H₂O
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 80 °C

Column : SUGAR SZ5532

Eluent : H₂O/CH₃CN= 25/75
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 60 °C

Column : SUGAR SC1211

Eluent : H₂O/CH₃CN= 65/35
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 70 °C

Column : Asahipak NH2P-50 4E

Eluent : H₂O/CH₃CN= 25/75
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 30 °C

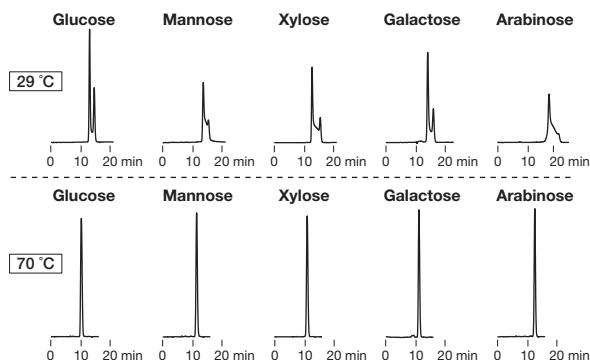
Column : HILICpak VG-50 4E

Eluent : H₂O/CH₃CN= 20/80
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 40 °C

Saccharides anomer separation

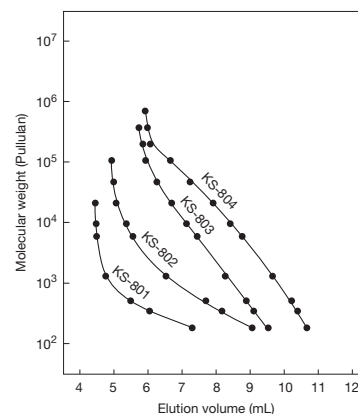
Saccharides may present their anomers at lower temperatures. By setting the SUGAR series columns at higher temperatures will prevent the anomer separation and this results in providing better chromatograms of each saccharide.

Sample : 0.5 % each, 10 μ L



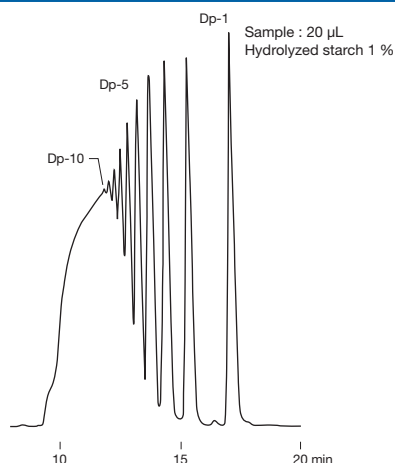
Column : Shodex SUGAR SC1011
Eluent : H₂O
Flow rate : 0.7 mL/min
Detector : RI
Column temp. : 29 °C, 70 °C

Calibration curves for KS-800 series using pullulan



Column : Shodex SUGAR KS-800 series
Eluent : H₂O
Detector : RI
Column temp. : 80 °C

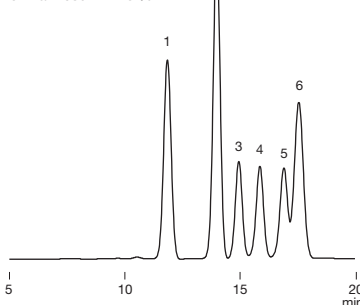
Hydrolyzed starch



Column : Shodex SUGAR KS-802 x 2
Eluent : H₂O
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 80 °C

Biomass sugars

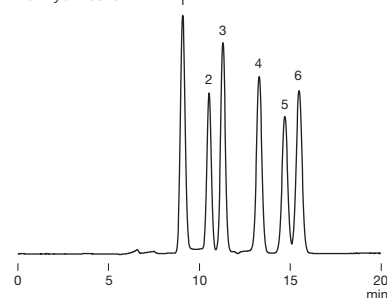
Sample : 5 μ L
1. Cellobiose 1.0 %
2. Glucose 1.5 %
3. Xylose 0.5 %
4. Galactose 0.5 %
5. Arabinose 0.5 %
6. Mannose 1.0 %



Column : Shodex SUGAR SP0810
Eluent : H₂O
Flow rate : 0.6 mL/min
Detector : RI
Column temp. : 85 °C

Pinitol

Sample : 0.1 % each, 20 μ L
1. Sucrose
2. Glucose
3. Pinitol
4. Fructose
5. *chiro*-Inositol
6. *myo*-Inositol

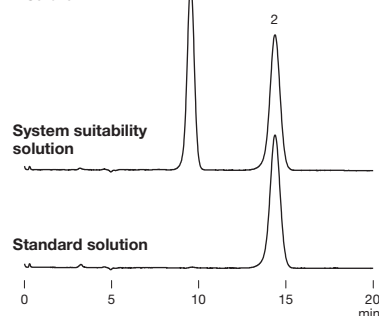


Column : Shodex SUGAR SP0810
Eluent : H₂O
Flow rate : 0.8 mL/min
Detector : RI
Column temp. : 85 °C

Analysis of sorbitol according to USP-NF method

Sample : 10 μ L
(System suitability solution) Mannitol, Sorbitol 4.8 mg/g each
(Standard solution) Sorbitol 4.8 mg/g

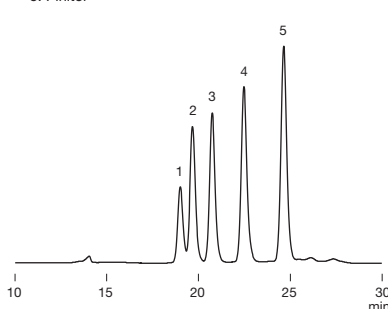
1. Mannitol
2. Sorbitol



Column : Shodex SUGAR SP0810 8C
Eluent : H₂O
Flow rate : 0.7 mL/min
Detector : RI (35 °C)
Column temp. : 50 °C

Oligosaccharides in soybean

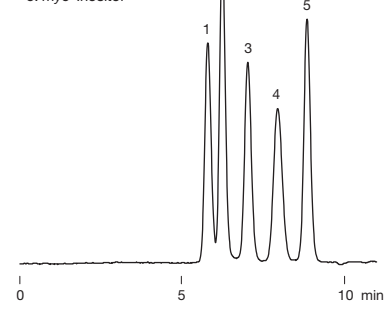
Sample : 0.1 % each, 20 μ L
1. Verbascose
2. Stachyose
3. Raffinose
4. Sucrose
5. Pinitol



Column : Shodex SUGAR KS-802 + KS-801
Eluent : H₂O
Flow rate : 0.6 mL/min
Detector : RI
Column temp. : 85 °C

Saccharides related to raffinose biosynthesis

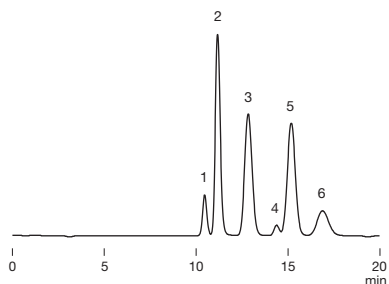
Sample : 0.1 % each, 20 μ L
1. Raffinose
2. Sucrose
3. Galactinol
4. Galactose
5. *myo*-Inositol



Column : Shodex SUGAR SC1011
Eluent : H₂O
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 80 °C

Acesulfame K and sucralose

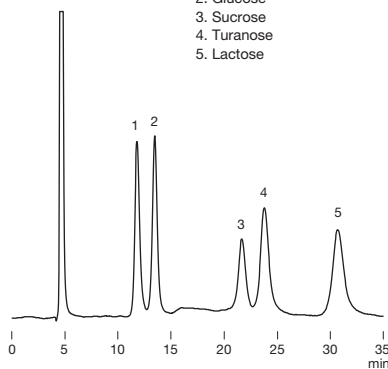
Sample : 20 μ L
 1. Acesulfame K 0.1 %
 2. Sucrose 0.5 %
 3. Glucose 0.5 %
 4. Unknown from Acesulfame K
 5. Fructose 0.5 %
 6. Sucralose 0.1 %



Column : Shodex SUGAR SC1011
 Eluent : 10 mM CaSO_4 aq.
 Flow rate : 0.6 mL/min
 Detector : RI
 Column temp. : 80 $^{\circ}\text{C}$

Sucrose and turanose

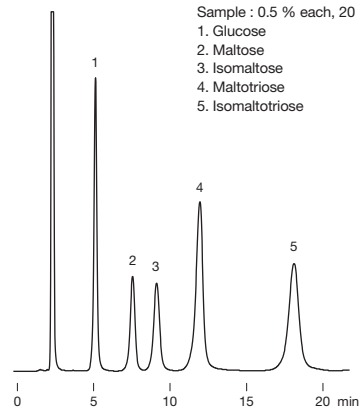
Sample : 0.5 % each, 10 μ L
 1. Fructose
 2. Glucose
 3. Sucrose
 4. Turanose
 5. Lactose



Column : Shodex SUGAR SZ5532
 Eluent : $\text{H}_2\text{O}/\text{CH}_3\text{CN} = 20/80$
 Flow rate : 0.6 mL/min
 Detector : RI
 Column temp. : 60 $^{\circ}\text{C}$

Maltose and isomaltose

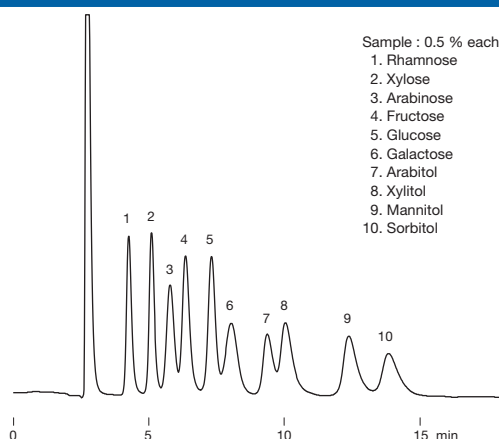
Sample : 0.5 % each, 20 μ L
 1. Glucose
 2. Maltose
 3. Isomaltose
 4. Maltotriose
 5. Isomaltotriose



Column : Shodex SUGAR SZ5532
 Eluent : $\text{H}_2\text{O}/\text{CH}_3\text{CN} = 25/75$
 Flow rate : 1.0 mL/min
 Detector : RI
 Column temp. : 60 $^{\circ}\text{C}$

Saccharides and sugar alcohols

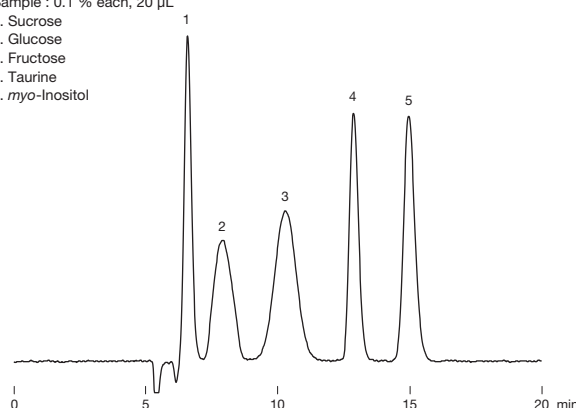
Sample : 0.5 % each, 20 μ L
 1. Rhamnose
 2. Xylose
 3. Arabinose
 4. Fructose
 5. Glucose
 6. Galactose
 7. Arabinol
 8. Xylitol
 9. Mannitol
 10. Sorbitol



Column : Shodex SUGAR SZ5532
 Eluent : $\text{H}_2\text{O}/\text{CH}_3\text{CN} = 20/80$
 Flow rate : 1.0 mL/min
 Detector : RI
 Column temp. : 65 $^{\circ}\text{C}$

Saccharides and taurine

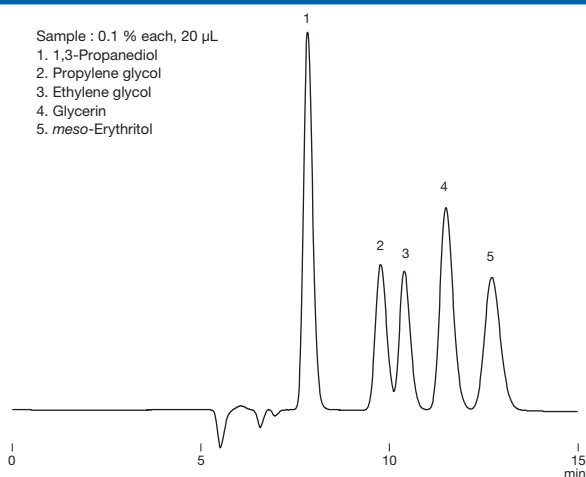
Sample : 0.1 % each, 20 μ L
 1. Sucrose
 2. Glucose
 3. Fructose
 4. Taurine
 5. *myo*-Inositol



Column : Shodex SUGAR SC1211
 Eluent : $\text{H}_2\text{O}/\text{CH}_3\text{CN} = 60/40$
 Flow rate : 0.6 mL/min
 Detector : RI
 Column temp. : 70 $^{\circ}\text{C}$

Moisturizing components

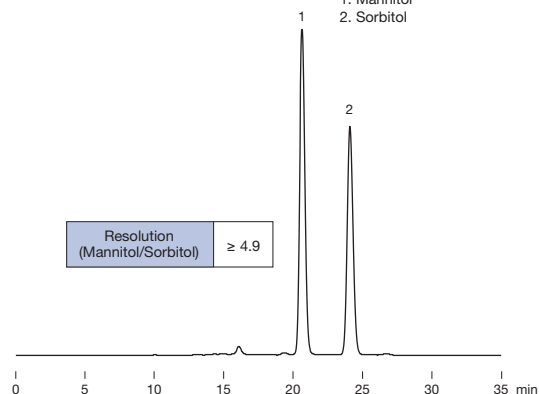
Sample : 0.1 % each, 20 μ L
 1. 1,3-Propanediol
 2. Propylene glycol
 3. Ethylene glycol
 4. Glycerin
 5. *meso*-Erythritol



Column : Shodex SUGAR SC1211
 Eluent : $\text{H}_2\text{O}/\text{CH}_3\text{CN} = 60/40$
 Flow rate : 0.6 mL/min
 Detector : RI
 Column temp. : 40 $^{\circ}\text{C}$

Analysis of mannitol according to Pharmacopeias (JP, USP and EP)

Sample : 25 mg/mL each, 20 μ L
 1. Mannitol
 2. Sorbitol



Column : Shodex EP SC1011-7F
 Eluent : H_2O
 Flow rate : 0.5 mL/min
 Detector : RI
 Column temp. : 85 $^{\circ}\text{C}$

Ion Exclusion Chromatography Columns

Features

SH1011 SH1821

- Columns for simultaneous analysis of saccharides and organic acids (counter ion: H⁺)
- Separates neutral sugars by size exclusion mode and organic acids by ion exclusion mode
- Suitable for the analysis of uronic and aldonic acids
- Fulfill USP-NF L17 and L22 requirements

KC-811

- Columns suitable for the analysis of organic acids
- Separates compounds by ion exclusion mode and reversed phase mode
- Highly selective when used with post column method
- KC-811 6E is suitable for cyanide ions and cyanogen chloride analysis in accordance with the Japanese Water Supply Act
- Fulfills USP-NF L17 and L22 requirements

For simultaneous analysis of saccharides and organic acids

• Standard columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Exclusion Limit (Pullulan)	Particle Size (μm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6378100	SUGAR SH1011	≥ 17,000	Sulfo	1,000	6	8.0 x 300	H ₂ O
F6378101	SUGAR SH1821	≥ 17,000	Sulfo	10,000	6	8.0 x 300	H ₂ O
F6700080	SUGAR SH-G	(guard column)	Sulfo	—	10	6.0 x 50	H ₂ O
F6378104	SUGAR SH1011 8C	≥ 5,000	Sulfo	1,000	6	8.0 x 100	H ₂ O

Base Material: Styrene divinylbenzene copolymer

For organic acids, cyanide ions and cyanogen chloride

• Standard columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (μm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6378030	RSpak KC-811	≥ 17,000	Sulfo	6	8.0 x 300	0.1 % H ₃ PO ₄ aq.
F6378033	RSpak KC-811 6E	≥ 13,000	Sulfo	6	6.0 x 250	0.1 % H ₃ PO ₄ aq.
F6700030	RSpak KC-G 6B	(guard column)	Sulfo	10	6.0 x 50	0.1 % H ₃ PO ₄ aq.
F6700010	RSpak KC-G 8B	(guard column)	Sulfo	13	8.0 x 50	0.1 % H ₃ PO ₄ aq.

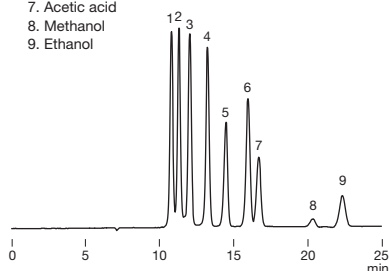
Use KC-G 8B for samples with relatively high impurities and KC-G 6B for samples with relatively low impurities.

Base Material: Styrene divinylbenzene copolymer

Maltooligosaccharides, organic acids and ethanol

Sample : 0.05 % each, 20 μ L

1. Maltotetraose
2. Maltotriose
3. Maltose
4. Glucose
5. Lactic acid
6. Glycerin
7. Acetic acid
8. Methanol
9. Ethanol

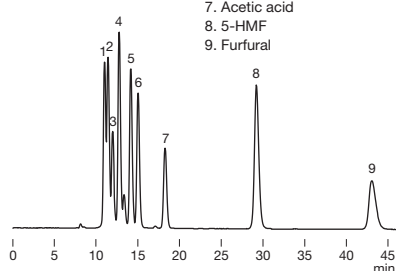


Column : Shodex SUGAR SH1821
Eluent : 0.5 mM H₂SO₄ aq.
Flow rate : 0.6 mL/min
Detector : RI
Column temp. : 75 °C

Cello-oligosaccharides and furfurals

Sample : 0.1 % each, 10 μ L

1. Cellopentaose
2. Cellotetraose
3. Cellotriose
4. Cellobiose
5. Glucose
6. Glyceric acid
7. Acetic acid
8. 5-HMF
9. Furfural

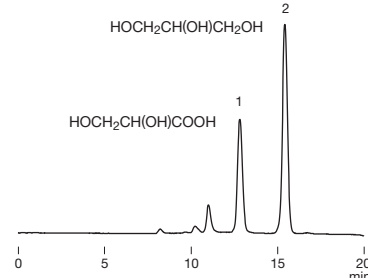


Column : Shodex SUGAR SH1821
Eluent : 2 mM H₂SO₄ aq.
Flow rate : 0.6 mL/min
Detector : RI
Column temp. : 60 °C

Glycerin and glyceric acid

Sample : 0.1 % each, 10 μ L

1. Glyceric acid
2. Glycerin



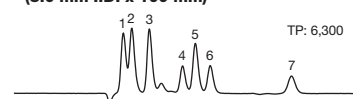
Column : Shodex SUGAR SH1011
Eluent : 2 mM H₂SO₄ aq.
Flow rate : 0.6 mL/min
Detector : RI
Column temp. : 60 °C

Rapid analysis of maltooligosaccharides, organic acids and ethanol

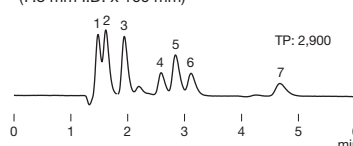
Sample : 0.1 % each, 5 μ L

1. Maltotriose
2. Maltose
3. Glucose
4. Lactic acid
5. Acetic acid
6. Glycerin
7. Ethanol

(1) Shodex SUGAR SH1011 8C (8.0 mm I.D. x 100 mm)



(2) Ion exclusion column from other manufacturer (7.8 mm I.D. x 100 mm)

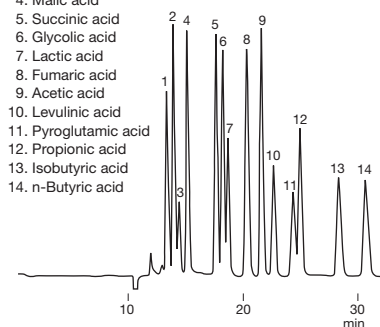


Column : (1) Shodex SUGAR SH1011 8C
(2) Ion exclusion column from other manufacturer
Eluent : 1 mM H₂SO₄ aq.
Flow rate : (1) 1.0 mL/min
(2) 0.95 mL/min
Detector : RI
Column temp. : 65 °C

Common organic acids

Sample :

1. Citric acid
2. Tartaric acid
3. Pyruvic acid
4. Malic acid
5. Succinic acid
6. Glycolic acid
7. Lactic acid
8. Fumaric acid
9. Acetic acid
10. Levulinic acid
11. Pyroglutamic acid
12. Propionic acid
13. Isobutyric acid
14. n-Butyric acid

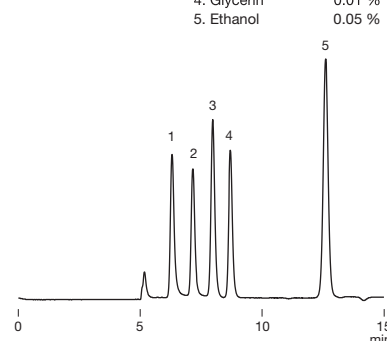


Column : Shodex RSpak KC-811 x 2
Eluent : 6 mM HClO₄ aq.
Flow rate : 1.0 mL/min
Detector : VIS (430 nm)
post column method
Column temp. : 50 °C

Glucuronolactone and organic acids

Sample : 20 μ L

1. Citric acid 0.01 %
2. Malic acid 0.01 %
3. Glucuronolactone 0.01 %
4. Glycerin 0.01 %
5. Ethanol 0.05 %

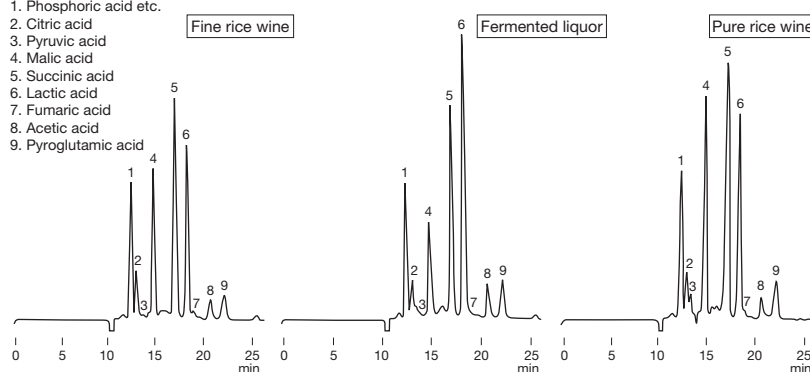


Column : Shodex RSpak KC-811
Eluent : 3 mM HClO₄ aq.
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 40 °C

Organic acids in sake

Sample : 100 μ L

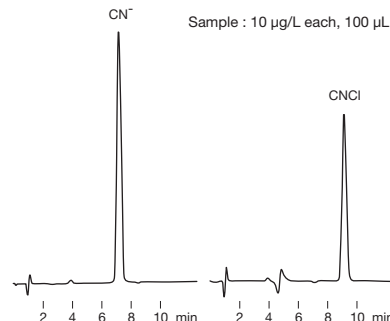
1. Phosphoric acid etc.
2. Citric acid
3. Pyruvic acid
4. Malic acid
5. Succinic acid
6. Lactic acid
7. Fumaric acid
8. Acetic acid
9. Pyroglutamic acid



Column : Shodex RSpak KC-G 8B + KC-811 x 2
Eluent : 4.8 mM HClO₄ aq.
Flow rate : 1.0 mL/min
Detector : VIS (430 nm)
post column method
Column temp. : 63 °C

Analysis of cyanide ion and cyanogen chloride with post column method

Sample : 10 μ g/L each, 100 μ L



Column : Shodex RSpak KC-811 6E
Eluent : 1 mM H₂SO₄ aq.
Reagent A : Chloramine T solution
Reagent B : 4-Pyridinecarboxylic acid-Pyrazolone solution
Flow rate : (Eluent) 1.0 mL/min
(Reagent) 0.5 mL/min each
Detector : VIS (638 nm)
Column temp. : 40 °C
Reaction temp. : (Reagent A) 40 °C
(Reagent B) 80 °C