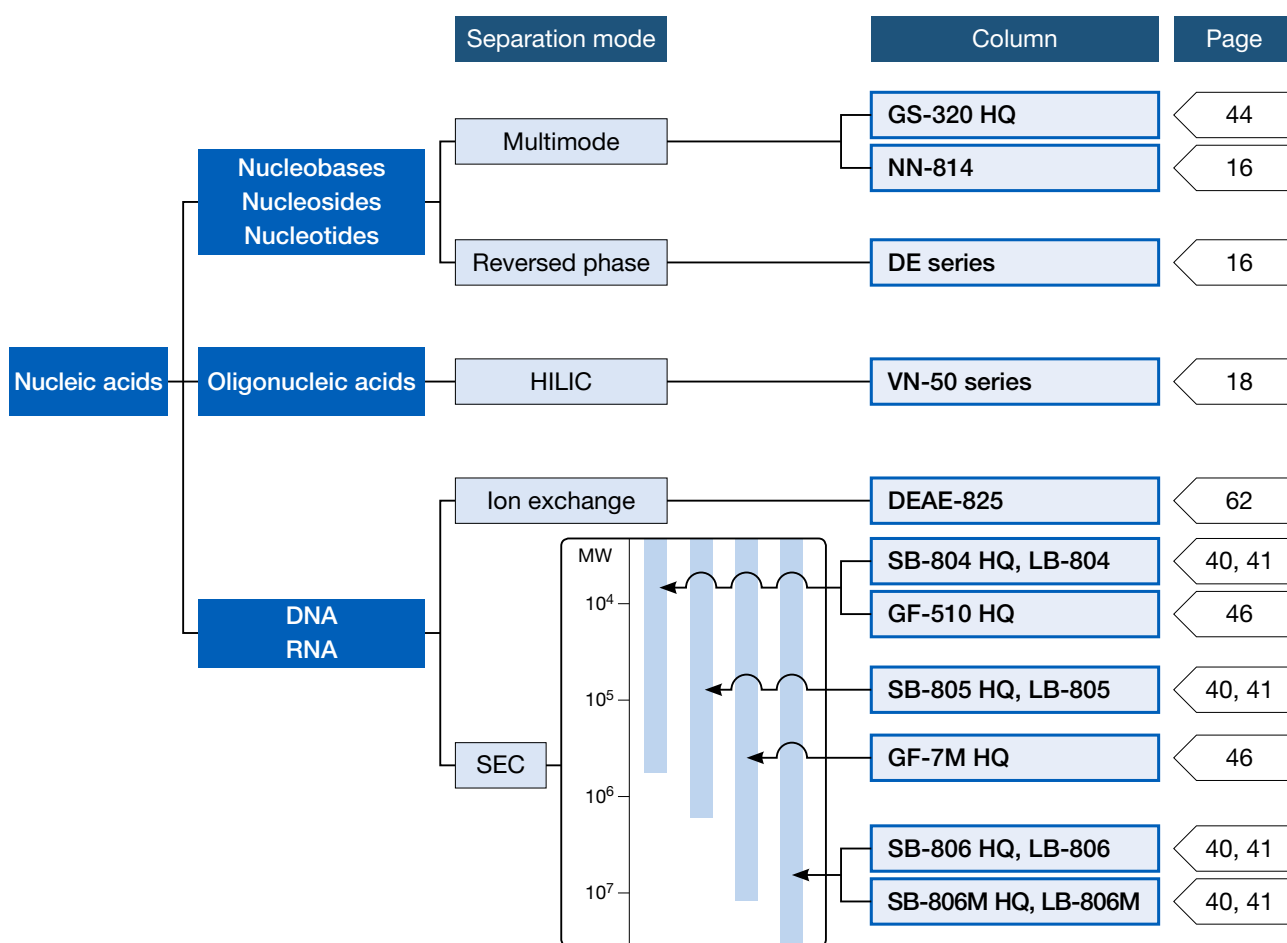


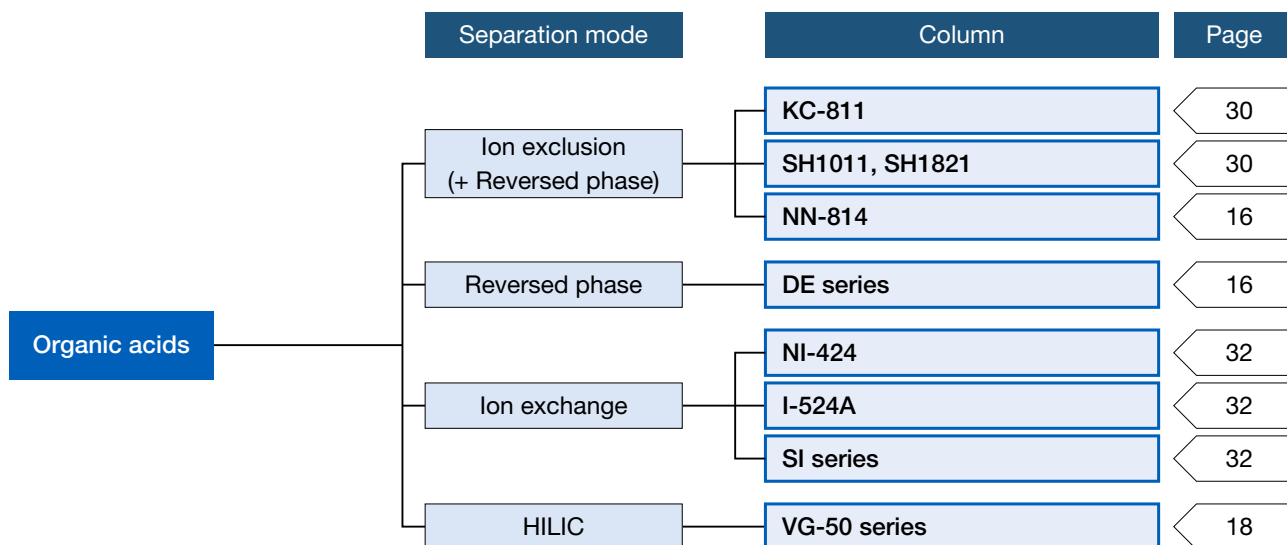
Column Selection (Proteins, Peptides, and Amino Acids)

	Separation mode	Graph	Column	Page
Proteins Peptides	SEC		KW-802.5, KW402.5-4F	36
			LW-803, LW-403 4D	37
			KW-803, KW403-4F	36
			KW-804, KW404-4F	36
			KW405-4F	36
	Reversed phase		DE series	16
			ODP-50 series	14
			C4P-50 4D	14
	HILIC		VC-50 2D	18
			NH2P series	22
	Ion exchange		QA-825	62
			DEAE-825	62
			ES-502N 7C	62
			SP-825, SP-FT 4A	62
			CM-825	62
ES-502C 7C			62	
Multimode		GS-220 HQ	44	
		GS-320 HQ	44	
Amino acids	Ion exchange		NN-814	16
			YS-50	33
			P-421S	62
	Reversed phase		ODP-50 series	14
			VC-50 2D	18
	HILIC		VG-50 series	18
			NH2P series	22

Column Selection (Nucleic Acids)

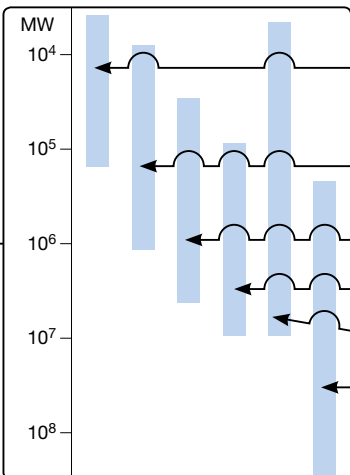
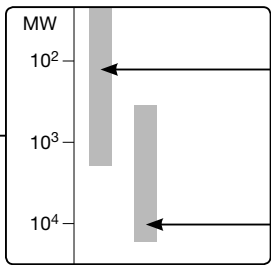


Column Selection (Organic Acids)



Column Selection (Saccharides)

	Separation mode	Column	Page
Mono-, di-saccharides, and sugar alcohols Saccharides and sugar alcohols	Ligand exchange + SEC	SP0810 (Pb ²⁺)	26
		SC1011 (Ca ²⁺)	26
		KS-801 (Na ⁺)	26
	Ligand exchange + HILIC	SZ5532 (Zn ²⁺)	26
		DC-613 (Na ⁺)	26
	HILIC	VG-50 series	18
		NH2P series	22
Sugar alcohols	Ligand exchange + HILIC	SC1211 (Ca ²⁺)	26
Oligosaccharides and sugar alcohols	Ligand exchange + SEC	KS-801 (Na ⁺) + KS-802 (Na ⁺)	26
Amino sugars	HILIC	VG-50 series	18
		NH2P series	22
	Ion exchange	SC1011 (Ca ²⁺)	26
Acidic sugars	Ion exclusion	SH1011 (H ⁺)	30
		KC-811	30
	Ion exchange	VT-50 2D	18
		NH2P series	22
Saccharides and organic acids	Ion exclusion + SEC	SH1011 (H ⁺), SH1821 (H ⁺)	30
Oligosaccharides	SEC	KS-801 (Na ⁺)	26
		SB-802 HQ	40
		GS-220 HQ	44
		KS-802 (Na ⁺)	26
		SB-802.5 HQ, LB-802.5	40, 41
		GS-320 HQ	44
	HILIC	VN-50 series	18
		NH2P series	22
		KS-803 (Na ⁺)	26
		SB-803 HQ, LB-803	40, 41
Polysaccharides	SEC	KS-804 (Na ⁺)	26
		SB-804 HQ, LB-804	40, 41
		SB-805 HQ, LB-805	40, 41
		SB-806 HQ, LB-806	40, 41
		SB-806M HQ, LB-806M	40, 41
		SB-807 HQ	40



Column Selection (Drugs, Metabolites and Chiral Compounds)

	Separation mode	Column	Page	
Drugs Metabolites	Reversed phase	ODP2 HP	12	
		ODP-50 series, C4P-50 4D	14	
		DS-413, DS-613	16	
		DE series	16	
		C18M, C18U	24	
	HILIC	VC-50 2D	18	
		VT-50 2D	18	
		NH2P series	22	
	Ion exchange	NI-424	32	
		I-524A	32	
		YK-421	33	
		ES-502C 7C	62	
		Multimode	GS-320 HQ	44
	Chiral compounds	Chiral separation	CDBS-453	64

Column Selection (Vitamins, Hormones / Neurotransmitters and Lipids)

	Separation mode	Column	Page
Water-soluble vitamins	Reversed phase	ODP-50 series	14
		DE series	16
		DM-614	16
		C18M, C18U	24
	HILIC	VG-50 series	18
		VT-50 2D	18
		NH2P series	22
Multimode	NN-814	16	
Fat-soluble vitamins	Reversed phase	ODP-50 series	14
		C18M, C18U	24
	SEC	KF-801, KF-401HQ	48, 52
Hormones / Neurotransmitters	Reversed phase	ODP-50 series	14
		DE series	16
		C18M, C18U	24
		SB-802.5 HQ, LB-802.5	40, 41
	HILIC	VC-50 2D	18
		VT-50 2D	18
		NH2P series	22
	Ion exchange	ES-502N 7C	62
		ES-502C 7C	62
Lipids	Reversed phase	ODP-50 series	14
		DS-413, DS-613	16
		DE series	16
	SEC	GF-310 HQ	46
		KF-801, KF-802, KF-802.5	48
		KF-402HQ	52

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

<https://www.shodex.de/hilicpak-vg-50-amino-column>

Features

- VG-50**
 - Suitable for saccharide analysis using HILIC mode
 - Recovers reducing saccharides with high ratio
 - Polymer-based packing material provides excellent chemical stability and minimum deterioration over an extended time period
 - Easily regenerated by washing in an alkaline solution
 - Appropriate for evaporative light scattering detector, corona charged aerosol detector, and LC/MS
- VT-50 2D**
 - Suitable for anionic substances (especially phosphate compounds) analysis using HILIC mode
 - Use of some eluents add ion exchange mode
 - Polymer-based packing material provides excellent chemical stability and minimum deterioration over an extended time period
 - Suitable for LC/MS analysis
- VC-50 2D**
 - Modified carboxyl group is suitable for cationic substance analysis including amines
 - The dominant separation mode is RP or IEX rather than HILIC mode
- VN-50**
 - The modified diol groups on the packing material create the HILIC mode
 - Suitable for oligonucleotide and oligosaccharide separation which is not possible by SEC or conventional HILIC columns

VG-50

- Standard columns (Housing Material: SUS)

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
F7630200	HILICpak VG-50 4D	≥ 5,500	tert. Amino	5	100	4.6 x 150	H ₂ O/CH ₃ CN = 20/80
F7630100	HILICpak VG-50 4E	≥ 7,500	tert. Amino	5	100	4.6 x 250	H ₂ O/CH ₃ CN = 20/80
F6711100	HILICpak VG-50G 4A	(guard column)	tert. Amino	5	100	4.6 x 10	H ₂ O/CH ₃ CN = 20/80

Base Material: Polyvinyl alcohol

- Semi-micro columns (Housing Material: PEEK)

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
F7630300	HILICpak VG-50 2D	≥ 3,500	tert. Amino	5	100	2.0 x 150	H ₂ O/CH ₃ CN = 15/85
F6711200	HILICpak VG-50G 2A	(guard column)	tert. Amino	5	100	2.0 x 10	H ₂ O/CH ₃ CN = 15/85

Base Material: Polyvinyl alcohol

VT-50

- Semi-micro columns (Housing Material: PEEK)

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
F7630400	HILICpak VT-50 2D	≥ 4,500	Quaternary ammonium	5	100	2.0 x 150	25 mM HCOONH ₄ aq./ CH ₃ CN = 15/85
F6711300	HILICpak VT-50G 2A	(guard column)	Quaternary ammonium	5	100	2.0 x 10	25 mM HCOONH ₄ aq./ CH ₃ CN = 15/85

Base Material: Polyvinyl alcohol

VC-50

- Semi-micro columns (Housing Material: PEEK)

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
F7630700	HILICpak VC-50 2D	≥ 3,500	Carboxyl	5	100	2.0 x 150	H ₂ O
F6711600	HILICpak VC-50G 2A	(guard column)	Carboxyl	5	100	2.0 x 10	H ₂ O

Base Material: Polyvinyl alcohol

VN-50

- Standard columns (Housing Material: PEEK)

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
F7630500	HILICpak VN-50 4D	≥ 10,000	Diol	5	100	4.6 x 150	H ₂ O/CH ₃ CN = 25/75
F6711400	HILICpak VN-50G 4A	(guard column)	Diol	5	100	4.6 x 10	H ₂ O/CH ₃ CN = 25/75

Base Material: Polyvinyl alcohol

- Semi-micro columns (Housing Material: PEEK)

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
F7630600	HILICpak VN-50 2D	≥ 3,500	Diol	5	100	2.0 x 150	H ₂ O/CH ₃ CN = 25/75
F6711500	HILICpak VN-50G 2A	(guard column)	Diol	5	100	2.0 x 10	H ₂ O/CH ₃ CN = 25/75

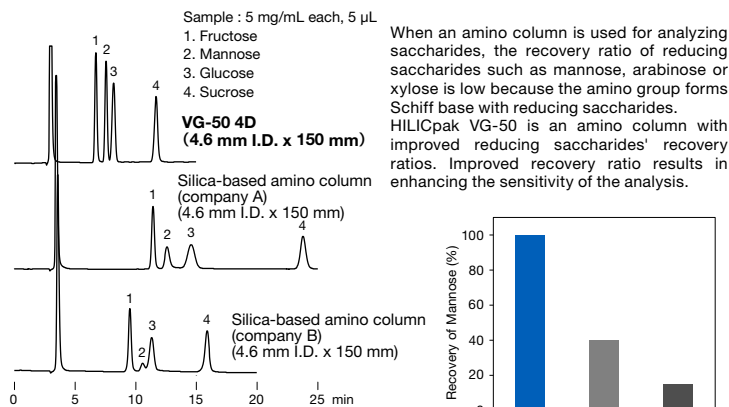
Base Material: Polyvinyl alcohol

- Preparative columns (Housing Material: SUS [VT-50 10E], PEEK [VT-50G 4A]) [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
F6830100	HILICpak VN-50 10E	≥ 11,000	Diol	5	10.0 x 250	H ₂ O/CH ₃ CN = 25/75
F6711400	HILICpak VN-50G 4A	(guard column)	Diol	5	4.6 x 10	H ₂ O/CH ₃ CN = 25/75

Base Material: Polyvinyl alcohol

Recovery of reducing sugar



Column : Shodex HILICpak VG-50 4D
Silica based amino columns from other manufacturers

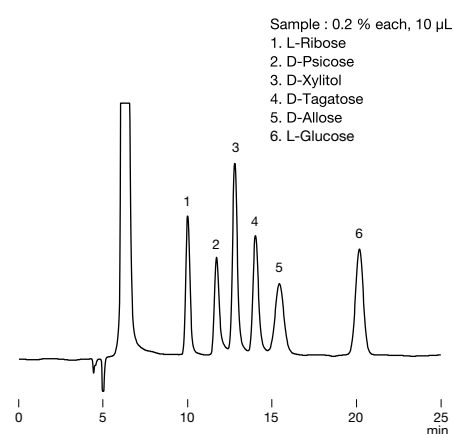
Eluent : H₂O/CH₃CN = 20/80

Flow rate : 0.6 mL/min (VG-50 4D)
1.0 mL/min (Silica based amino column)

Detector : RI

Column temp. : 40 °C

Rare sugar



Column : Shodex HILICpak VG-50 4E

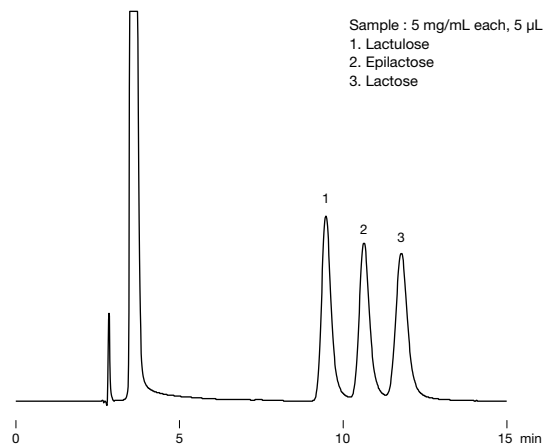
Eluent : H₂O/CH₃CN/CH₃OH = 5/85/10

Flow rate : 0.6 mL/min

Detector : RI

Column temp. : 50 °C

Lactose, epilactose, and lactulose



Column : Shodex HILICpak VG-50 4E

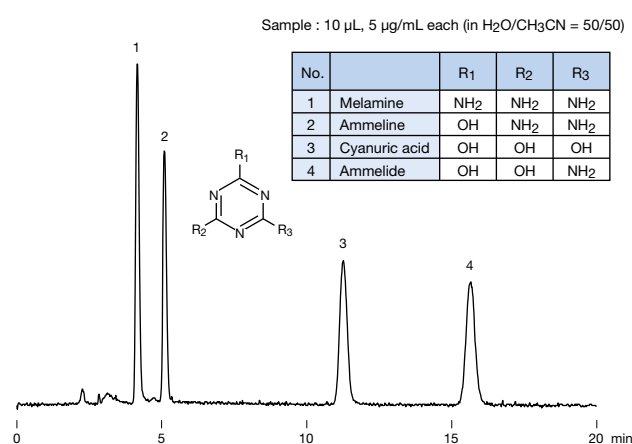
Eluent : H₂O/CH₃CN/CH₃OH = 5/75/20

Flow rate : 1.0 mL/min

Detector : RI

Column temp. : 40 °C

Melamine and related substances



Column : Shodex HILICpak VG-50 4D

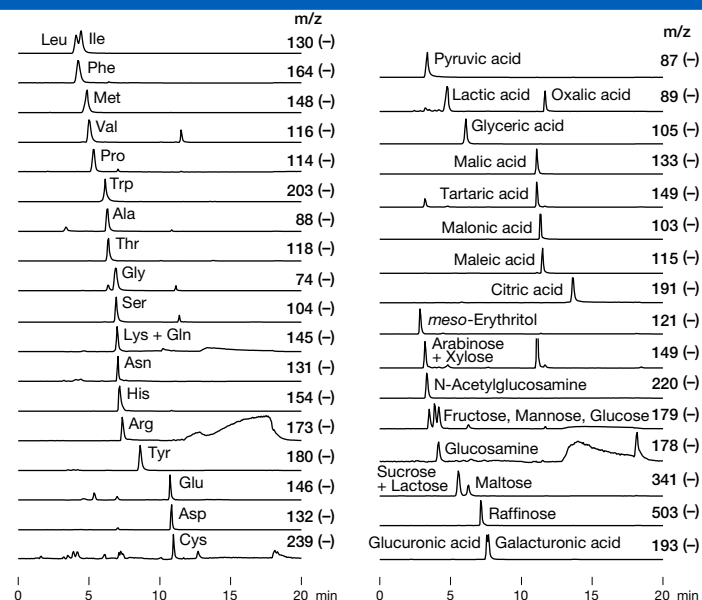
Eluent : 30 mM HCOONH₄ aq./CH₃CN = 35/65

Flow rate : 0.6 mL/min

Detector : Corona charged aerosol

Column temp. : 40 °C

Simultaneous analysis of saccharides, organic acids and amino acids with LC/MS



Sample : 1 μ g/mL each (in H₂O/CH₃CN = 1/4), 5 μ L

VG-50 2D allows simultaneous analysis of saccharides, organic acids and amino acids with LC/MS detection under alkaline conditions. High anionic substances elute under alkaline conditions. Furthermore, alkaline conditions promote the deprotonation of hydroxyl groups at the time of ionization. Therefore, alkaline conditions are suitable for high sensitive detection of substances with hydroxyl groups such as saccharides under the negative mode.

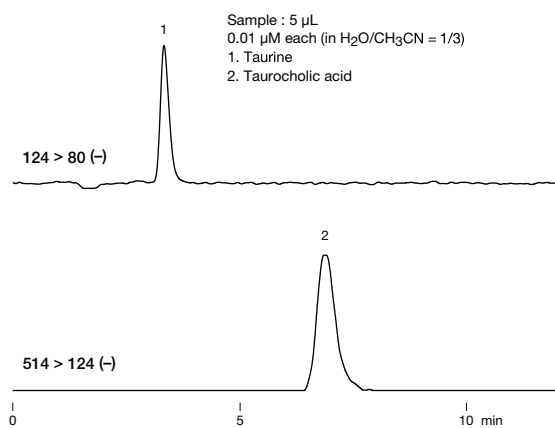
Column : Shodex HILICpak VG-50 2D

Eluent : (A); 0.5 % NH₃ aq./ (B); CH₃CN
Linear gradient (High pressure);
80 B % (0 to 2 min), 80 B % to 10 B % (2 to 12 min),
10 B % (12 to 15 min), 80 B % (15 to 20 min)

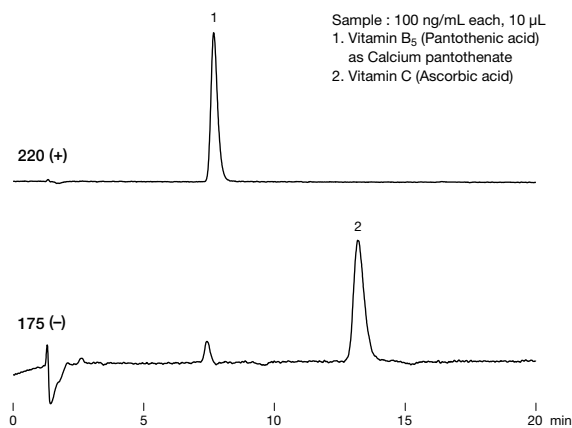
Flow rate : 0.2 mL/min

Detector : ESI-MS (SIM)

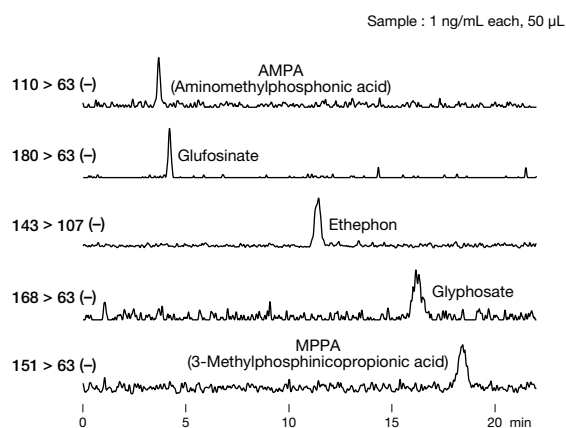
Column temp. : 40 °C

LC/MS/MS analysis of organic sulfonic acids


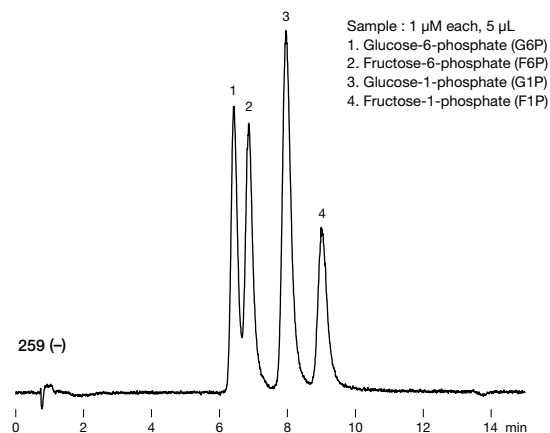
Column : Shodex HILICpak VT-50 2D
Eluent : 50 mM HCOONH₄ aq./CH₃CN = 20/80
Flow rate : 0.3 mL/min
Detector : ESI-MS/MS (MRM)
Column temp. : 30 °C

LC/MS analysis of pantothenic acid and vitamin C


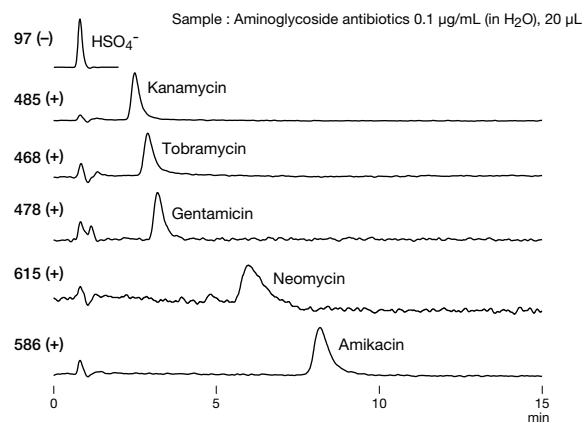
Column : Shodex HILICpak VT-50 2D
Eluent : 50 mM HCOONH₄ aq./CH₃CN = 30/70
Flow rate : 0.2 mL/min
Detector : ESI-MS (SIM)
Column temp. : 30 °C

LC/MS/MS analysis of glyphosate and glufosinate


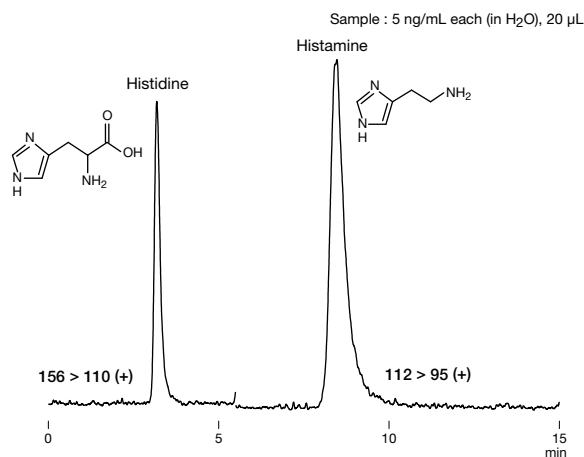
Column : Shodex HILICpak VT-50 2D
Eluent : 50 mM NH₄HCO₃ aq./CH₃CN = 50/50
Flow rate : 0.3 mL/min
Detector : ESI-MS/MS (MRM)
Column temp. : 40 °C

LC/MS analysis of phosphorylated saccharides


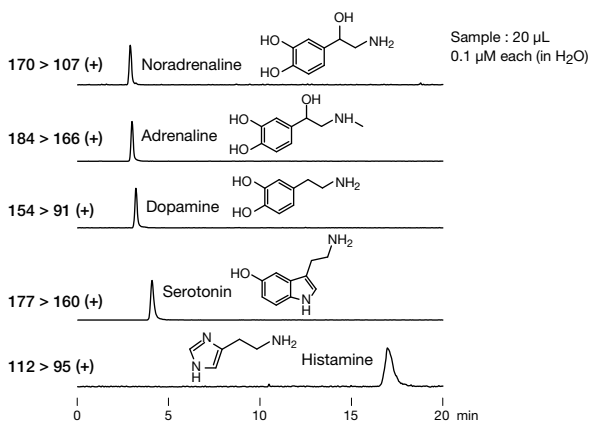
Column : Shodex HILICpak VT-50 2D
Eluent : 25 mM HCOONH₄ aq./CH₃CN = 80/20
Flow rate : 0.3 mL/min
Detector : ESI-MS (SIM)
Column temp. : 60 °C

LC/MS analysis of aminoglycoside antibiotics


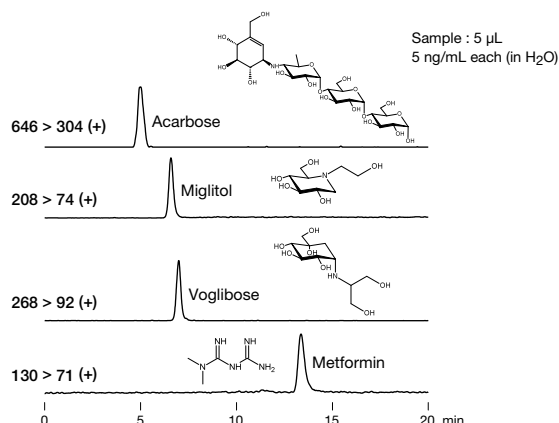
Column : Shodex HILICpak VC-50 2D
Eluent : (A); 1.5 % NH₃ aq./ (B); CH₃CN
 Linear gradient (High pressure);
 30 B % to 10 B % (0 to 5 min), 10 B % (5 to 15 min)
Flow rate : 0.3 mL/min
Detector : ESI-MS (SIM)
Column temp. : 40 °C

LC/MS/MS analysis of histamine and histidine


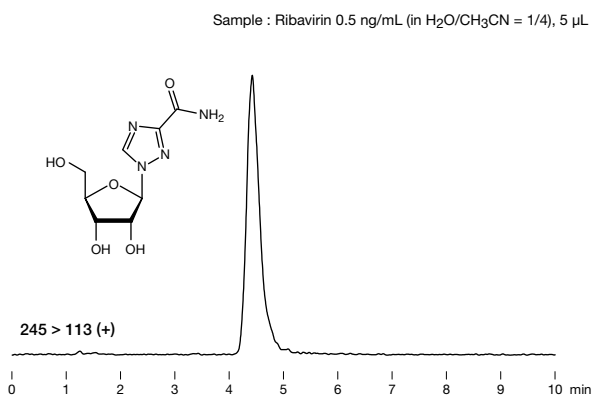
Column : Shodex HILICpak VC-50 2D
Eluent : 250 mM HCOOH aq./CH₃CN = 70/30
Flow rate : 0.3 mL/min
Detector : ESI-MS/MS (MRM)
Column temp. : 40 °C

LC/MS/MS analysis of monoamine neurotransmitters


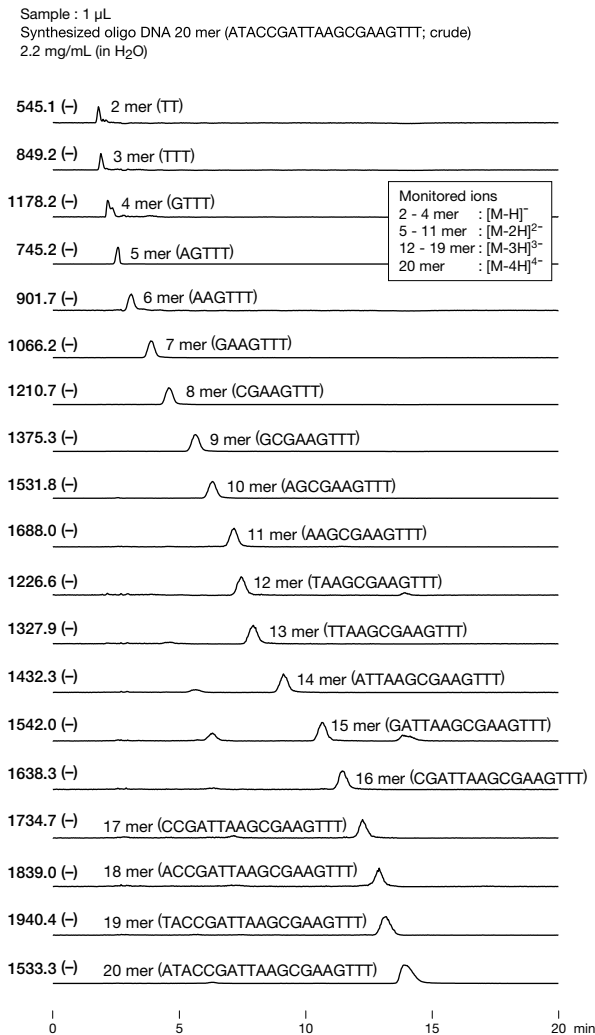
Column : Shodex HILICpak VC-50 2D
 Eluent : (A); 200 mM HCOOH aq./ (B); CH₃CN
 Linear gradient (High pressure);
 60 B % (0 to 5 min), 60 B % to 10 B % (5 to 6 min), 10 B % (6 to 20 min)
 Flow rate : 0.3 mL/min
 Detector : ESI-MS/MS (MRM)
 Column temp. : 40 °C

LC/MS/MS analysis of oral anti-diabetes drugs


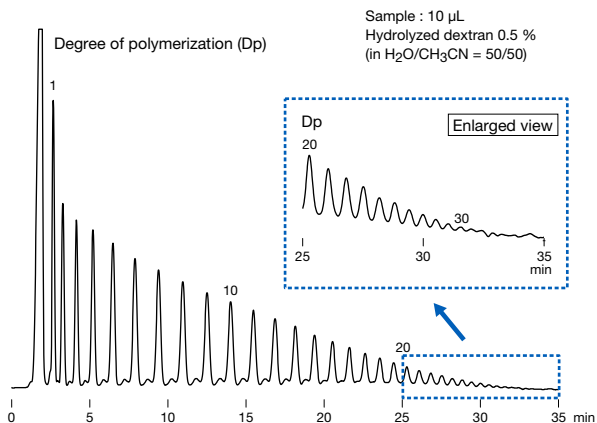
Column : Shodex HILICpak VC-50 2D
 Eluent : (A); 200 mM HCOOH aq./ (B); CH₃CN
 Linear gradient (High pressure);
 60 B % (0 to 5 min), 60 B % to 20 B % (5 to 6 min), 20 B % (6 to 20 min)
 Flow rate : 0.3 mL/min
 Detector : ESI-MS/MS (MRM)
 Column temp. : 40 °C

LC/MS/MS analysis of ribavirin


Column : Shodex HILICpak VC-50 2D
 Eluent : 50 mM HCOOH aq./CH₃CN = 10/90
 Flow rate : 0.25 mL/min
 Detector : ESI-MS/MS (MRM)
 Column temp. : 40 °C

LC/MS analysis of oligo DNA


Column : Shodex HILICpak VN-50 2D
 Eluent : (A); 50 mM HCOONH₄ aq./ (B); CH₃CN
 Linear gradient;
 60 B % (0 to 10 min), 60 B % to 55 B % (10 to 15 min),
 60 B % (15 to 20 min)
 Flow rate : 0.2 mL/min
 Detector : ESI-MS (SIM)
 Column temp. : 40 °C

Hydrolyzed dextran


Column : Shodex HILICpak VN-50 4D
 Eluent : (A); H₂O/ (B); CH₃CN
 Linear gradient; 70 B % to 50 B % (0 to 40 min)
 Flow rate : 1.0 mL/min
 Detector : Corona charged aerosol
 Column temp. : 40 °C