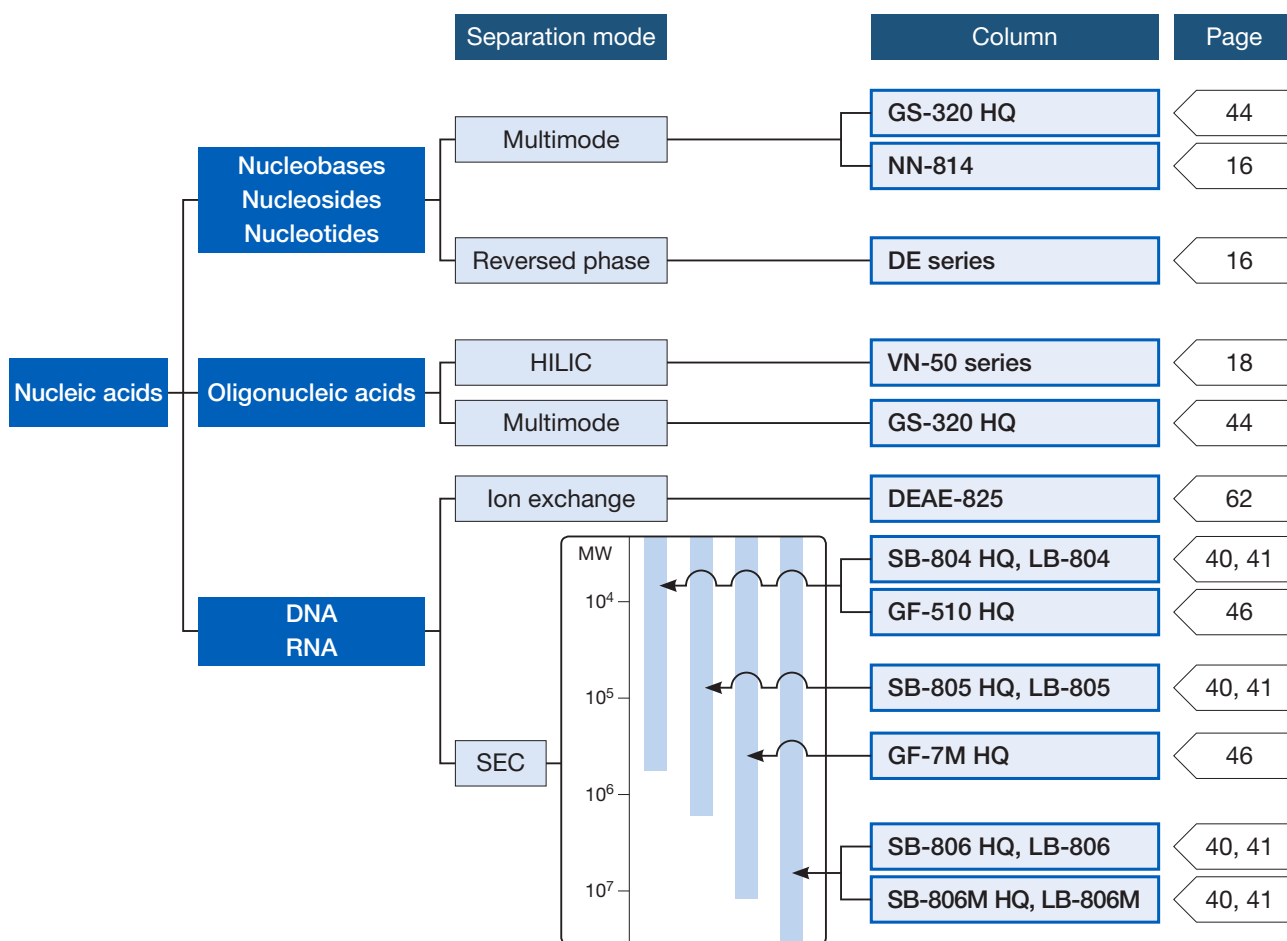


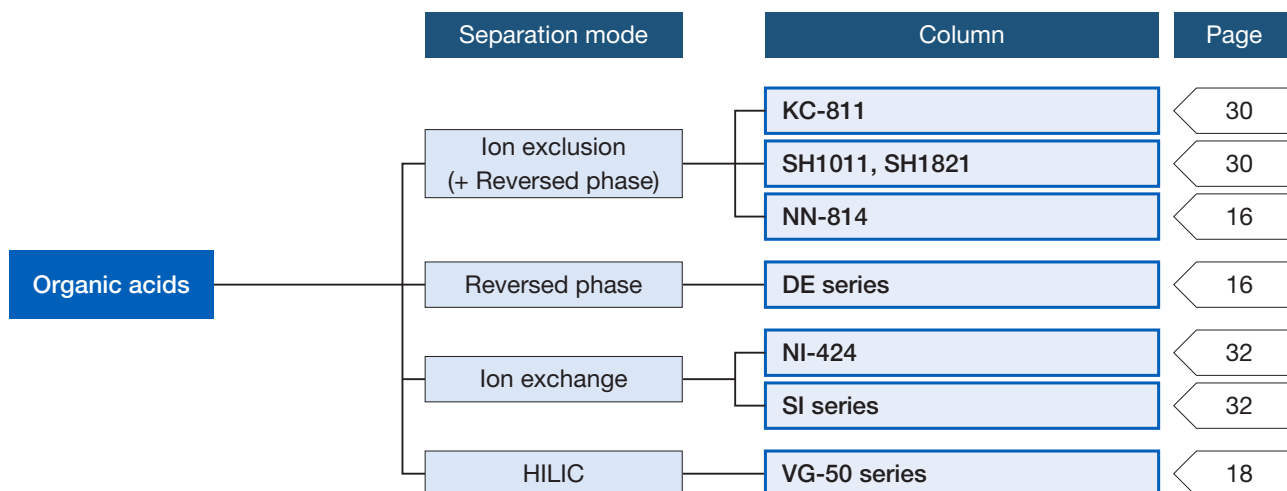
Column Selection (Proteins, Peptides, and Amino Acids)

	Separation mode	Figure	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 (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	I-524A	32	
		NI-424	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
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 Reversed Phase Chromatography Columns (RSpak)

Features

- DS-613**
 - Suitable for reversed phase analysis of highly hydrophilic substances that are not well retained by ODS columns
- DS-413**
 - Fulfill USP-NF L21 requirements

- DE-613**
 - General purpose polymer-based column having similar polarity as ODS columns
- DE-413**
 - Wide working pH range (from pH 2 to 12), usable in 100 % water and buffer solutions
- DE-213**
 - Fulfill USP-NF L71 requirements

- DM-614**
 - Suitable for the analysis of amino acids and water-soluble vitamins
 - Fulfills USP-NF L39 requirements

- NN-814**
 - The packing material modified with sulfo groups supports multimode (reversed phase and cation exchange) analysis
 - Ideal for the analysis of complex samples containing neutral and ionic substances

- JJ-50 2D**
 - The packing material is modified with trace amounts of quaternary ammonium groups, and supports multimode (reversed phase and anion exchange) analysis
 - Ideal for analysis of complex samples containing neutral and ionic substances

DS

• 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
F7001001	RSpak DS-613	≥ 6,500	—	6	200	6.0 x 150	H ₂ O/CH ₃ CN/THF = 30/40/30
F6700140	RSpak DS-G	(guard column)	—	10	—	4.6 x 10	H ₂ O/CH ₃ CN/THF = 30/40/30
F7001012	RSpak DS-413	≥ 11,000	—	3.5	200	4.6 x 150	H ₂ O/CH ₃ CN/THF = 40/30/30

Base Material: Styrene divinylbenzene copolymer

DE

• 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
F7001004	RSpak DE-613	≥ 7,000	—	6	25	6.0 x 150	H ₂ O
F7001005	RSpak DE-413	≥ 11,000	—	4	25	4.6 x 150	H ₂ O/CH ₃ CN = 50/50
F6700150	RSpak DE-G 4A	(guard column)	—	10	—	4.6 x 10	H ₂ O

Base Material: Polymethacrylate

• 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
F7001007	RSpak DE-213	≥ 8,000	—	4	25	2.0 x 150	H ₂ O/CH ₃ CN = 50/50
F6700151	RSpak DE-G 2A	(guard column)	—	6	—	2.0 x 10	H ₂ O/CH ₃ CN = 50/50

Base Material: Polymethacrylate

DM

• 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
F7001002	RSpak DM-614	≥ 4,500	—	10	200	6.0 x 150	5 mM H ₃ PO ₄ aq.
F6700160	RSpak DM-G 4A	(guard column)	—	12	—	4.6 x 10	5 mM H ₃ PO ₄ aq.

Base Material: Polyhydroxymethacrylate

NN

• 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
F7008140	RSpak NN-814	≥ 9,000	Sulfo	10	200	8.0 x 250	0.1 M Sodium phosphate buffer (pH3.0)
F6700510	RSpak NN-G	(guard column)	Sulfo	10	—	6.0 x 50	0.1 M Sodium phosphate buffer (pH3.0)

Base Material: Polyhydroxymethacrylate

JJ

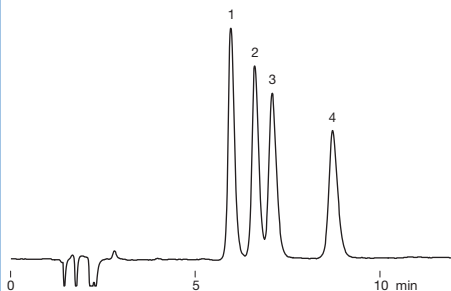
• Semi-micro columns

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
F7008220	RSpak JJ-50 2D	≥ 3,500	Quaternary ammonium	5	100	2.0 x 150	H ₂ O/CH ₃ CN = 40/60

Base Material: Polyvinyl alcohol

Fatty acid methyl esters

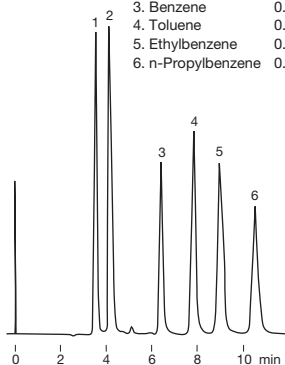
Sample : 0.2 % each, 20 μ L
 1. Methyl linoleate
 2. Methyl palmitate
 3. Methyl oleate
 4. Methyl stearate



Column : Shodex RSpak DS-413
 Eluent : H₂O/CH₃CN/THF = 25/45/30
 Flow rate : 1.0 mL/min
 Detector : RI
 Column temp. : 40 °C

Alkylbenzenes

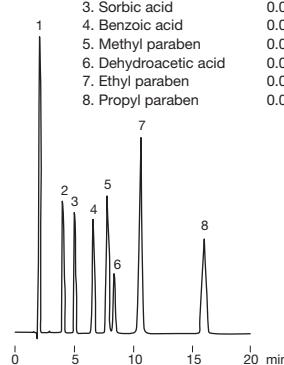
Sample : 5 μ L
 1. m-Cresol 0.1 %
 2. 2,4-Xylenol 0.1 %
 3. Benzene 0.5 %
 4. Toluene 0.5 %
 5. Ethylbenzene 0.5 %
 6. n-Propylbenzene 0.5 %



Column : Shodex RSpak DS-613
 Eluent : H₂O/CH₃CN/THF = 30/40/30
 Flow rate : 1.0 mL/min
 Detector : UV (254 nm)
 Column temp. : 40 °C

Food additives (Preservatives)

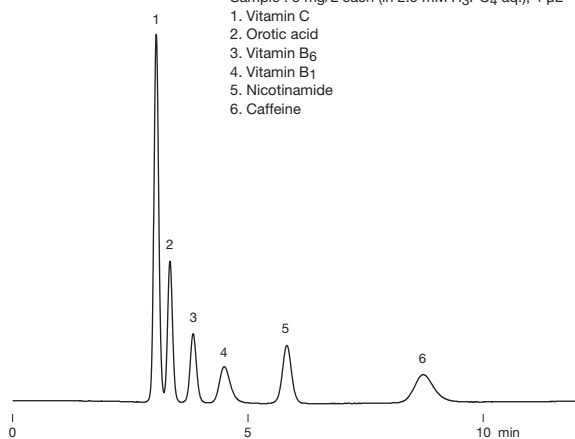
Sample : 10 μ L
 1. Saccharin sodium 0.005 %
 2. p-Hydroxybenzoic acid 0.005 %
 3. Sorbic acid 0.02 %
 4. Benzoic acid 0.02 %
 5. Methyl paraben 0.01 %
 6. Dehydroacetic acid 0.01 %
 7. Ethyl paraben 0.02 %
 8. Propyl paraben 0.02 %



Column : Shodex RSpak DE-413
 Eluent : 50 mM KH₂PO₄ + 0.1 % H₃PO₄ aq./CH₃CN = 65/35
 Flow rate : 1.0 mL/min
 Detector : UV (210 nm)
 Column temp. : 40 °C

Vitamins

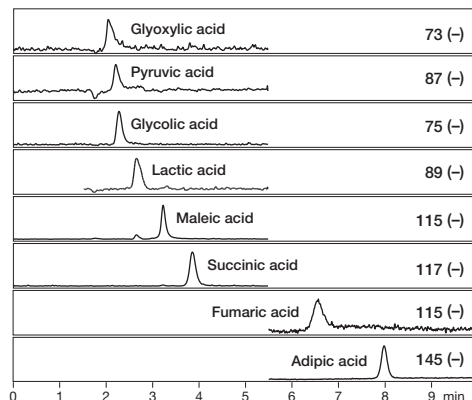
Sample : 5 mg/L each (in 2.5 mM H₃PO₄ aq.), 4 μ L
 1. Vitamin C
 2. Orotic acid
 3. Vitamin B₆
 4. Vitamin B₁
 5. Nicotinamide
 6. Caffeine



Column : Shodex RSpak DM-614
 Eluent : 0.055 M Na₂HPO₄ + 0.045 M KH₂PO₄ aq.
 Flow rate : 1.0 mL/min
 Detector : UV (254 nm)
 Column temp. : 30 °C

LC/MS analysis of organic acids

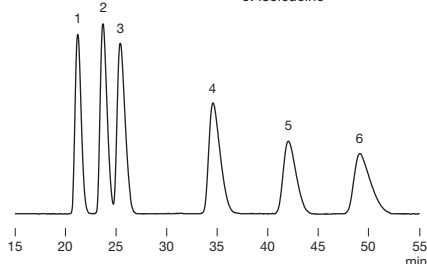
Sample : 50 ng/mL each, 10 μ L



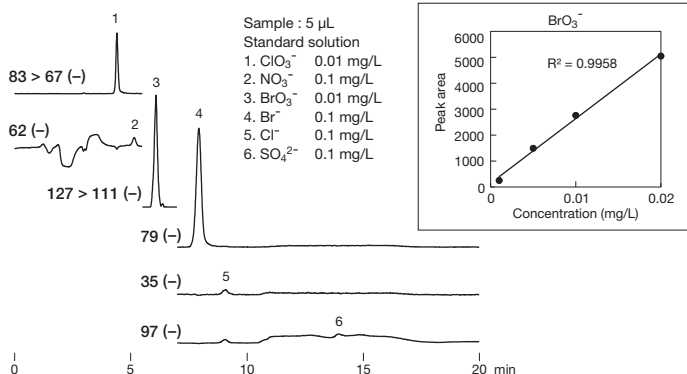
Column : Shodex RSpak DE-213
 Eluent : (A); 0.1 % (v/v) Formic acid aq./ (B); CH₃CN
 Linear gradient; 5 B % (0 to 2 min),
 5 B % to 15 B % (2 to 2.5 min), 15 B % (2.5 to 10 min)
 Flow rate : 0.2 mL/min
 Detector : ESI-MS (SIM)
 Column temp. : 30 °C

Amino acids

Sample : 0.1 % each, 20 μ L
 1. Aspartic acid
 2. Glycine
 3. Alanine
 4. Valine
 5. Methionine
 6. Isoleucine



Column : Shodex RSpak NN-814
 Eluent : 40 mM H₃PO₄ aq.
 Flow rate : 1.0 mL/min
 Detector : RI
 Column temp. : 40 °C

High sensitive analysis of bromate by LC/MS/MS


Column : Shodex RSpak JJ-50 2D
 Eluent : (A); 200 mM HCOONH₄ aq./ (B); CH₃CN
 Linear gradient (High pressure);
 85 B % (0 to 8 min), 85 B % to 50 B % (8 to 9 min), 50 B % (9 to 14 min),
 50 B % to 85 B % (14 to 15 min), 85 B % (15 to 20 min)
 Flow rate : 0.3 mL/min
 Detector : ESI-MS/MS (MRM) for ClO₃⁻, BrO₃⁻
 ESI-MS (SIM) for NO₃⁻, Br⁻, Cl⁻, SO₄²⁻
 Column temp. : 50 °C