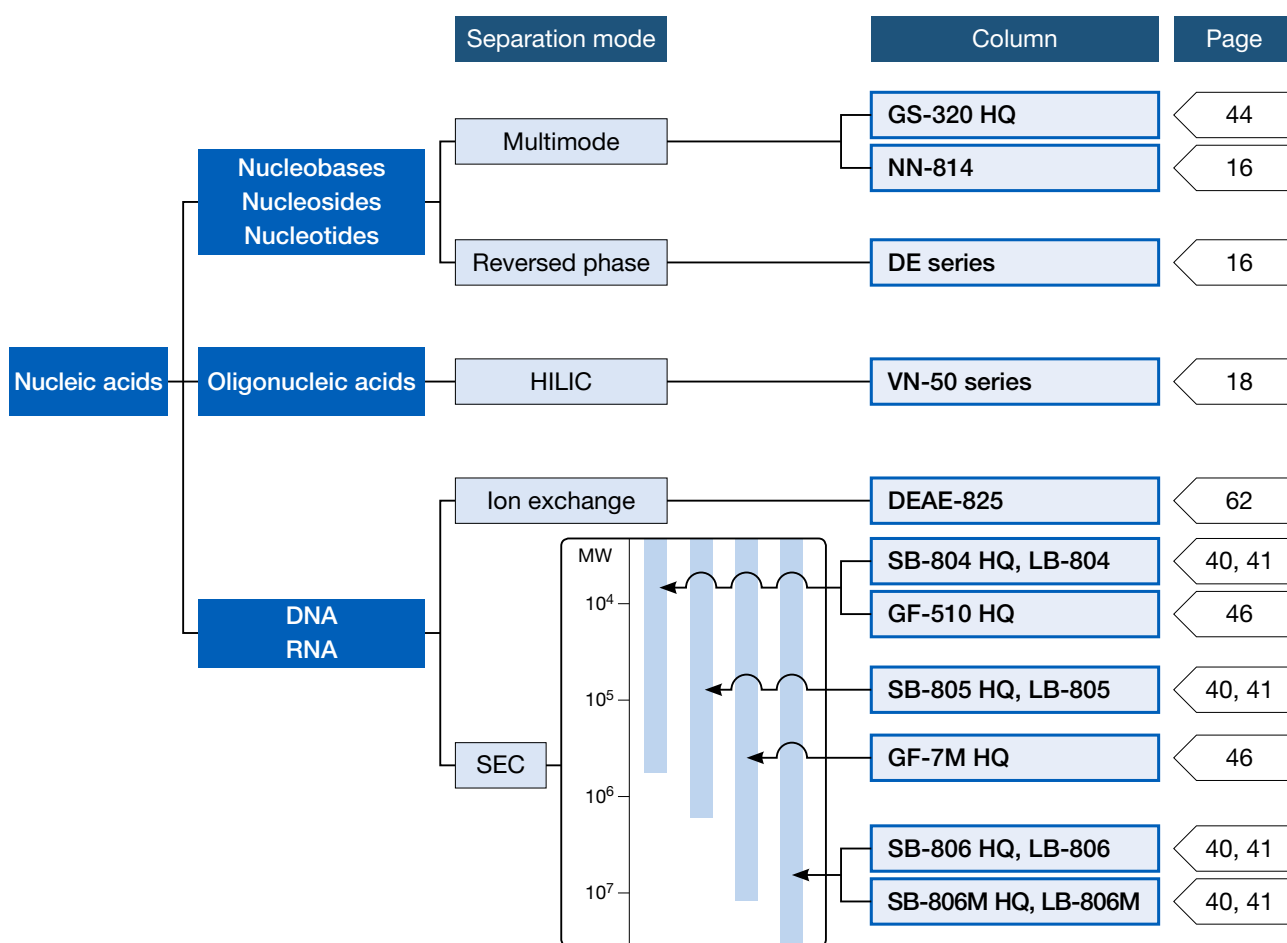


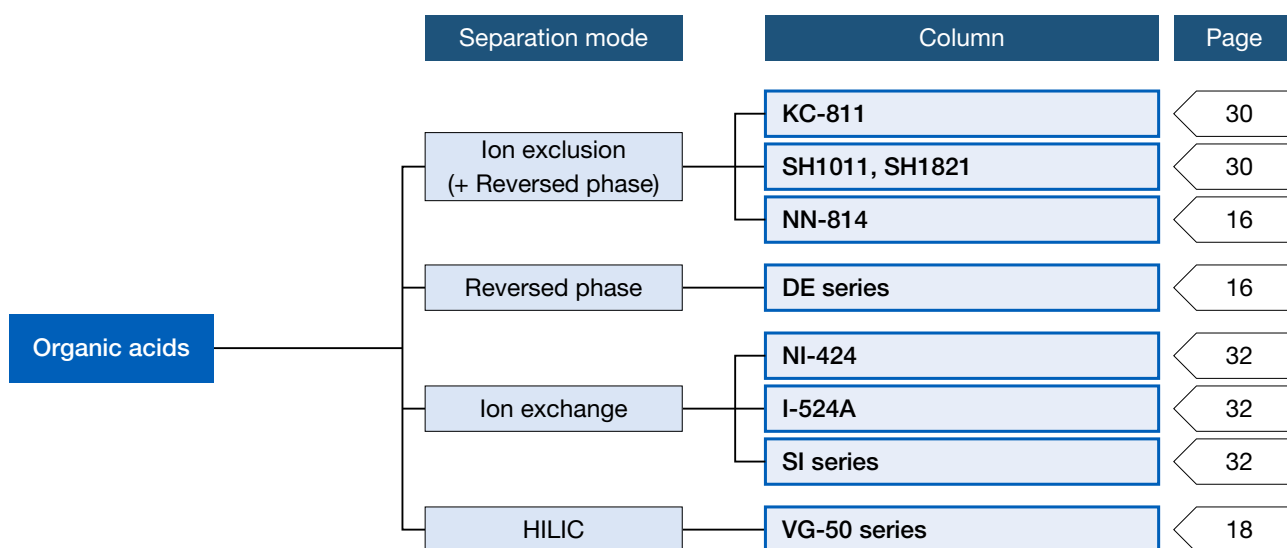
Column Selection (Proteins, Peptides, and Amino Acids)

	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 (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

Anion Exchange Chromatography Columns

<https://www.shodex.de/anion-exchange-columns-strong-weak>

Features

QA-825

DEAE-825

- Suitable for analyzing relatively high molecular weight compounds: proteins, peptides, DNA, and RNA
- Usable in a wide pH range from pH 2 to 12
- QA-825 fulfills USP-NF L23 requirements

ES-502N 7C

- Compared to IEC series columns, polyvinyl alcohol is used as base material and this offers different separation pattern
- Low hydrophobic interaction of proteins allows analysis under mild conditions

Strong anion exchange resin [Functional Group: Quaternary ammonium]

• Standard column

Product Code	Product Name	Ion Exchange Capacity (meq/g)	Base Material	Particle Size (µm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6110011	IEC QA-825	0.45	Polyhydroxymethacrylate	12	5,000	8.0 x 75	50 mM Na ₂ SO ₄ aq.

Weak anion exchange resin [Functional Group: Diethylaminoethyl]

• Standard columns

Product Code	Product Name	Ion Exchange Capacity (meq/g)	Base Material	Particle Size (µm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6118255	IEC DEAE-825	0.6	Polyhydroxymethacrylate	8	5,000	8.0 x 75	50 mM Na ₂ SO ₄ aq.
F7640002	Asahipak ES-502N 7C	0.55	Polyvinyl alcohol	9	2,000	7.5 x 100	50 mM 1,3-Diaminopropane + 50 mM NaCl (pH10.0)

Cation Exchange Chromatography Columns

<https://www.shodex.de/cation-exchange-columns-strong-weak>

Features

SP-825

CM-825

- Suitable for analyzing relatively high molecular weight compounds: proteins, peptides, DNA, and RNA
- Usable in a wide pH range from pH 2 to 12

SP-FT 4A

- Non-porous base material
- Provides ultra-rapid analysis using conventional devices

ES-502C 7C

- Compared to IEC series columns, polyvinyl alcohol is used as base material offering different separation pattern
- Low hydrophobic interaction with proteins allows analysis under mild conditions

P-421S

- Column for amino acids analysis by cation exchange mode
- Provides simultaneous analysis of different amino acids
- Fulfills USP-NF L22 and L58 requirements

Strong cation exchange resin [Functional Group: Sulfoethyl]

• Standard columns

Product Code	Product Name	Ion Exchange Capacity (meq/g)	Base Material	Particle Size (µm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6118250	IEC SP-825	0.4	Polyhydroxymethacrylate	8	5,000	8.0 x 75	50 mM Na ₂ SO ₄ aq.
F6113100	IEC SP-FT 4A	0.2	Polyhydroxymethacrylate	2.7	—	4.6 x 10	20 mM MES buffer (pH5.6)

Housing Material of SP-FT 4A: PEEK
*MES: 2-(N-Morpholino)ethanesulfonic acid

Weak cation exchange resin [Functional Group: Carboxymethyl]

• Standard columns

Product Code	Product Name	Ion Exchange Capacity (meq/g)	Base Material	Particle Size (µm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6110002	IEC CM-825	0.4	Polyhydroxymethacrylate	8	5,000	8.0 x 75	50 mM Na ₂ SO ₄ aq.
F7640001	Asahipak ES-502C 7C	0.55	Polyvinyl alcohol	9	2,000	7.5 x 100	0.1 M Sodium phosphate buffer (pH4.4)

Amino acid analysis column [Functional Group: Sulfo (Na⁺)]

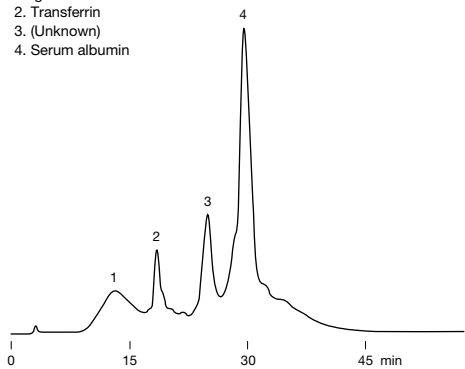
• Standard columns

Product Code	Product Name	Plate Number (TP/column)	Base Material	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6354211	CXpak P-421S	≥ 3,500	Styrene divinylbenzene copolymer	6	4.6 x 150	H ₂ O
F6700210	CXpak P-G	(guard column)	Styrene divinylbenzene copolymer	6	4.6 x 10	H ₂ O

Proteins in human serum

Sample : Human serum 0.5 %, 200 μ L

- 1. IgG
- 2. Transferrin
- 3. (Unknown)
- 4. Serum albumin

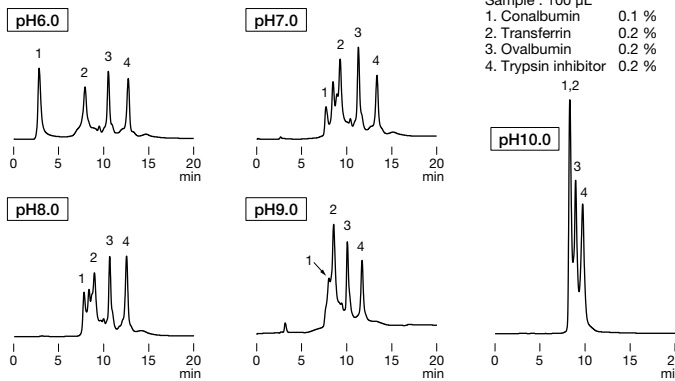


Column : Shodex IEC QA-825
Eluent : (A); 20 mM Tris-HCl buffer (pH8.6)
 (B); (A) + 0.5 M NaCl
 Linear gradient; 100 % (A) to 50 % (B), 60 min
Flow rate : 1.0 mL/min
Detector : UV (280 nm)
Column temp. : Room temp.

Effects of eluent pH on DEAE-825 analysis

Sample : 100 μ L

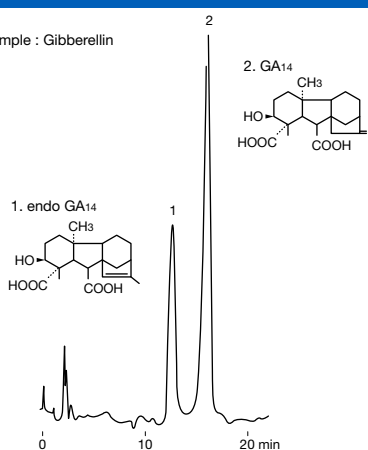
- 1. Conalbumin 0.1 %
- 2. Transferrin 0.2 %
- 3. Ovalbumin 0.2 %
- 4. Trypsin inhibitor 0.2 %



Column : Shodex IEC DEAE-825
Eluent : (A); 20 mM Piperazine-HCl buffer (pH6.0), 20 mM Bis-Tris-HCl buffer (pH7.0)
 20 mM Tris-HCl buffer (pH8.0), 20 mM Ethanolamine-HCl buffer (pH9.0)
 20 mM 1,3-Diaminopropane-HCl buffer (pH10.0)
 (B); (A) + 0.5 M NaCl
 Linear gradient; (A) to (B), 20 min
Flow rate : 1.0 mL/min
Detector : UV (280 nm)
Column temp. : 25 $^{\circ}$ C

Gibberellin isomers

Sample : Gibberellin



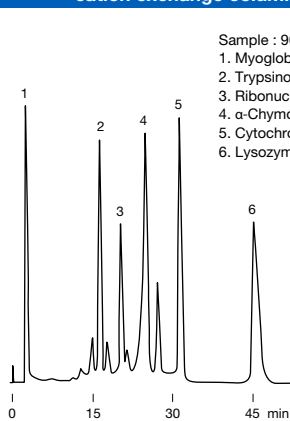
Column : Shodex Asahipak ES-502N 7C
Eluent : CH₃COOH/H₂O/CH₃OH = 0.1/0.4/99.5
Flow rate : 1.5 mL/min
Detector : UV (210 nm)
Column temp. : 50 $^{\circ}$ C

Data provided by Prof. Yamaguchi,
 Faculty of Agriculture, University of Tokyo.

Protein separation using cation exchange columns

Sample : 90 μ L

- 1. Myoglobin
- 2. Trypsinogen
- 3. Ribonuclease A
- 4. α -Chymotrypsinogen A
- 5. Cytochrome c
- 6. Lysozyme

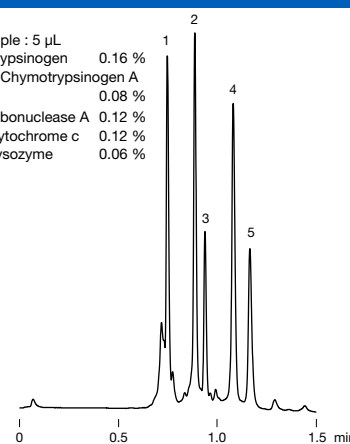


Column : Shodex IEC CM-825
Eluent : (A); 20 mM Sodium phosphate buffer (pH7.0)
 (B); (A) + 0.5 M NaCl
 Linear gradient; (A) to (B), 60 min
Flow rate : 1.0 mL/min
Detector : UV (280 nm)
Column temp. : Room temp.

Ultra-rapid analysis of hemoglobins

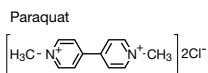
Sample : 5 μ L

- 1. Trypsinogen 0.16 %
- 2. α -Chymotrypsinogen A 0.08 %
- 3. Ribonuclease A 0.12 %
- 4. Cytochrome c 0.12 %
- 5. Lysozyme 0.06 %

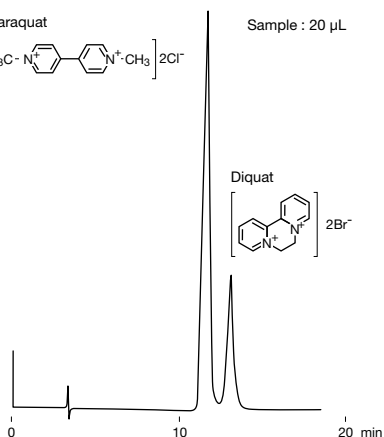
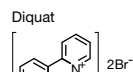


Column : Shodex IEC SP-FT 4A
Eluent : (A); 20 mM MES buffer (pH5.6)
 (B); (A) + 0.5 M Na₂SO₄
 Linear gradient; (A) to (B), 2 min
Flow rate : 1.7 mL/min
Detector : UV (280 nm)
Column temp. : 30 $^{\circ}$ C

Paraquat and diquat



Sample : 20 μ L

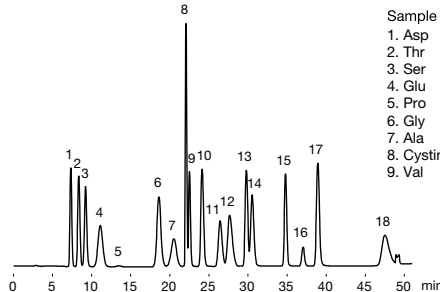


Column : Shodex Asahipak ES-502C 7C
Eluent : 50 mM Sodium phosphate buffer (pH7.0) + 150 mM NaCl
Flow rate : 1.0 mL/min
Detector : UV (288 nm)
Column temp. : 30 $^{\circ}$ C

Standard amino acids

Sample : 0.1 μ M each, 100 μ L

- 1. Asp
- 2. Thr
- 3. Ser
- 4. Glu
- 5. Pro
- 6. Gly
- 7. Ala
- 8. Cystine
- 9. Val
- 10. Met
- 11. Ile
- 12. Leu
- 13. Tyr
- 14. Phe
- 15. Lys
- 16. NH₃
- 17. His
- 18. Arg



Column : Shodex CXPak P-421S
Eluent : MCI BUFFER™ PH Kit (Mitsubishi Chemical Corporation)
 Low pressure step gradient;
 PH-1 (0 min), PH-2 (0.2 min), PH-3 (13.5 min), PH-4 (23.2 min), PH-RG (47.0 min)
Reagent : Ninhydrin Coloring Solution Kit for HITACHI
 (FUJIFILM Wako Pure Chemical Corporation)
 R1:R2 = 50:50
Flow rate : (Eluent) 0.5 mL/min
 (Reagent) 0.35 mL/min
Detector : VIS (570 nm)
Column Temp. : 63 $^{\circ}$ C
Reaction Temp. : 120 $^{\circ}$ C