

● Anion Exchange Chromatography Columns

Features

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|----------------------------------|--|
| QA-825
DEAE-825 | <ul style="list-style-type: none"> • 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 L23 requirements |
| DEAE3N-4T | <ul style="list-style-type: none"> • Non-porous base material • For rapid analysis |
| DEAE-2B | <ul style="list-style-type: none"> • Non-porous base material • Can be used with UHPLC (available under hyperbaric conditions up to 30 MPa) |
| ES-502N 7C | <ul style="list-style-type: none"> • 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 |
| WA-624 | <ul style="list-style-type: none"> • Suitable for anion exchange analysis of low molecular weight compounds such as nucleotides |

■ Standard columns

[Strong anion exchange resin] Functional Group: Quaternary ammonium

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	50mM Na ₂ SO ₄ aq.

[Weak anion exchange resin] Functional Group: Diethylaminoethyl

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	50mM Na ₂ SO ₄ aq.
F6112100	IEC DEAE3N-4T	0.4	Polyhydroxymethacrylate	2.5	–	4.6 x 35	H ₂ O
F7640002	Asahipak ES-502N 7C	0.55	Polyvinyl alcohol	9	2,000	7.5 x 100	50mM 1,3-Diaminopropane + 50mM NaCl (pH10.0)
F6356240	AXpak WA-624	1.2	Polyhydroxymethacrylate	10	2,000	6.0 x 150	0.1M Sodium phosphate buffer (pH3.0)/CH ₃ CN =80/20
F6700245	AXpak WA-G (guard column)	–	Polyhydroxymethacrylate	10	–	4.6 x 10	0.1M Sodium phosphate buffer (pH3.0)/CH ₃ CN =80/20

[Weak anion exchange resin] Functional Group: Diethylaminoethyl (UHPLC column)

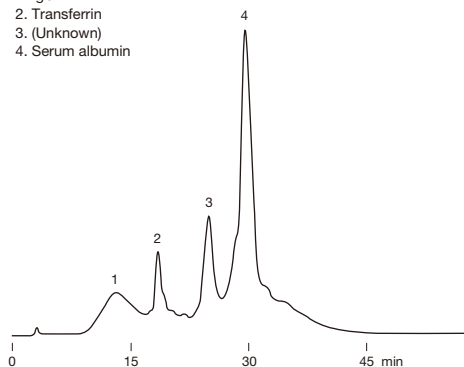
Product Code	Product Name	Ion Exchange Capacity (meq/g)	Base Material	Particle Size (µm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6112110	PIKESS DEAE-2B	0.4	Polyhydroxymethacrylate	2.5	–	2.0 x 50	H ₂ O

■ Preparative columns *Preparative columns are made to order.

Product Code	Product Name	Particle Size (µm)	Column Size (mm) I.D. x Length	Standard column
F6548000	IEC QA-2025	20	20.0 x 150	QA-825
F6709602	IEC QA-G 8B (IEC QA-LG)	20	8.0 x 50	(guard column)
F6548001	IEC DEAE-2025	20	20.0 x 150	DEAE-825
F6709603	IEC DEAE-G 8B (IEC DEAE-LG)	20	8.0 x 50	(guard column)
F6840004	Asahipak ES-502N 20C	13	20.0 x 100	ES-502N 7C
F6710021	Asahipak GS-20G 7B	20	7.5 x 50	(guard column)

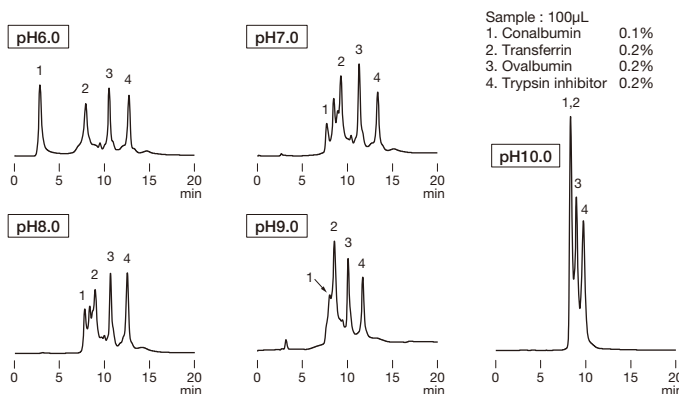
Proteins in human serum

Sample : Human serum 0.5%, 200 μ L
 1. IgG
 2. Transferrin
 3. (Unknown)
 4. Serum albumin



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

Effects of eluent pH on DEAE-825 analysis

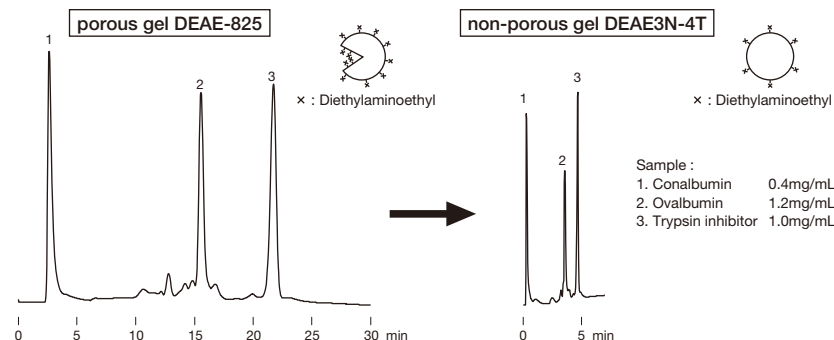


Sample : 100 μ L
 1. Conalbumin 0.1%
 2. Transferrin 0.2%
 3. Ovalbumin 0.2%
 4. Trypsin inhibitor 0.2%

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

Comparison of porous DEAE-825 and non-porous DEAE3N-4T for protein separation

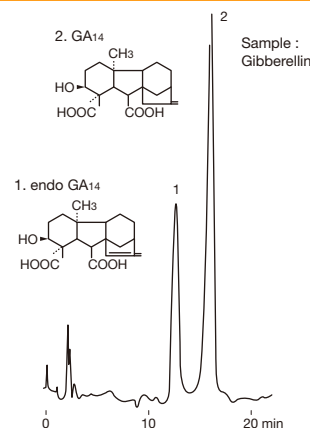
IEC DEAE3N-4T is a weak anion exchange column, having diethylaminoethyl functional group modified on non-porous gel. The non-porous gel enables rapid analysis of proteins and peptides. DEAE3N-4T is also suitable for the analysis of small-volume samples, as it provides sharp peaks even with small injection volume.



Column : Shodex IEC DEAE-825
Eluent : (A); 20mM Piperazine-HCl buffer (pH6.0)
 (B); (A) + 0.5M NaCl
 Linear gradient; (A) to (B), 60min
Flow rate : 1.0mL/min
Detector : UV (280nm)
Column temp. : Room temp.
Injection vol. : 100 μ L

Column : Shodex IEC DEAE3N-4T
Eluent : (A); 25mM Piperazine-HCl buffer (pH6.0)
 (B); (A) + 0.5M NaCl
 Linear gradient; (A) to (B), 10min
Flow rate : 1.5mL/min
Detector : UV (280nm)
Column temp. : Room temp.
Injection vol. : 20 μ L

Gibberellin Isomers

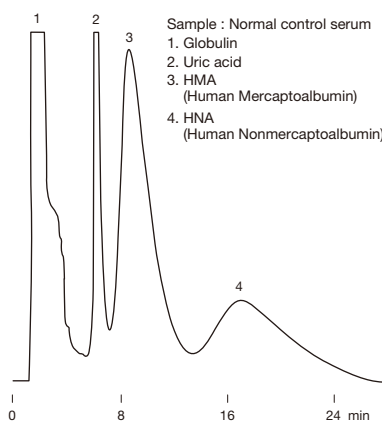


Column : Shodex Asahipak ES-502N 7C
Eluent : CH₃COOH/H₂O/CH₃OH
 =0.1/0.4/99.5
Flow rate : 1.5mL/min
Detector : UV (210nm)
Column temp. : 50°C

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

Mercaptoalbumin and non-mercaptoalbumin

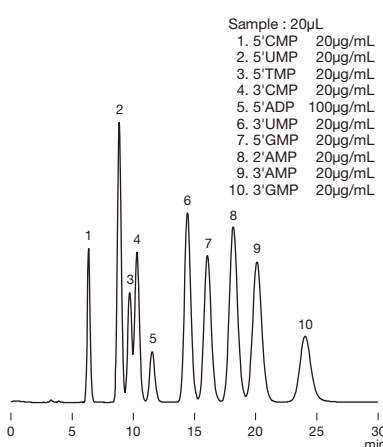
Sample : Normal control serum
 1. Globulin
 2. Uric acid
 3. HMA
 (Human Mercaptoalbumin)
 4. HNA
 (Human Nonmercaptoalbumin)



Column : Shodex Asahipak ES-502N 7C
Eluent : 50mM N-methylpiperazine-HCl
 buffer (pH4.8) + 400mM Na₂SO₄
 + 0.3% C₂H₅OH
Flow rate : 1.0mL/min
Detector : UV (280nm)
Column temp. : 35°C

Nucleotides

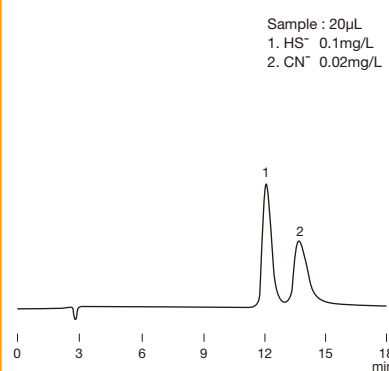
Sample : 20 μ L
 1. 5'CMP 20 μ g/mL
 2. 5'UMP 20 μ g/mL
 3. 5'TMP 20 μ g/mL
 4. 3'CMP 20 μ g/mL
 5. 5'ADP 100 μ g/mL
 6. 3'UMP 20 μ g/mL
 7. 5'GMP 20 μ g/mL
 8. 2'AMP 20 μ g/mL
 9. 3'AMP 20 μ g/mL
 10. 3'GMP 20 μ g/mL



Column : Shodex Axpak WA-624
Eluent : 0.35M CH₃COOH aq.
 /0.35M CH₃COONH₄ aq.=240/100
Flow rate : 1.0mL/min
Detector : UV (260nm)
Column temp. : 60°C

Sulfide ion and cyanide ion

Sample : 20 μ L
 1. HS⁻ 0.1mg/L
 2. CN⁻ 0.02mg/L



Column : Shodex IEC DEAE-825
Eluent : 10mM Na₂CO₃
 + 1mM Ethylenediamine aq.
 + 10% CH₃OH
Flow rate : 1.0mL/min
Detector : Electrochemical
 (Electrode; Silver, 0mV SCE)
Column temp. : 25°C

Cation Exchange Chromatography Columns

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-420N**
 - Non-porous base material
 - For rapid analysis
- New SP-FT 4A**
 - Non-porous base material
 - Provides ultra-rapid analysis using conventional devices
- SP-2B**
 - Non-porous base material
 - Can be used with UHPLC (available under hyperbaric conditions for up to 30 MPa)
- 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 L22 and L58 requirements

Standard columns

[Strong cation exchange resin] Functional Group: Sulfopropyl

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 × 75	50mM Na ₂ SO ₄ aq.
F6113000	IEC SP-420N	0.3	Polyhydroxymethacrylate	2.5	–	4.6 × 35	20mM Sodium acetate buffer + 0.5M Na ₂ SO ₄ (pH5.0)
F6113100	New IEC SP-FT 4A	0.2	Polyhydroxymethacrylate	2.7	–	4.6 × 10	20mM *MES buffer (pH5.6)

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

[Strong cation exchange resin] Functional Group: Sulfopropyl (UHPLC 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
F6113110	PIKESS SP-2B	0.3	Polyhydroxymethacrylate	2.5	–	2.0 × 50	20mM Sodium acetate buffer + 0.5M Na ₂ SO ₄ (pH5.0)

[Weak cation exchange resin] Functional Group: Carboxymethyl

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 × 75	50mM Na ₂ SO ₄ aq.
F7640001	Asahipak ES-502C 7C	0.55	Polyvinyl alcohol	9	2,000	7.5 × 100	0.1M Sodium phosphate buffer (pH4.4)

[For amino acid analysis] Functional Group: Sulfo (Na⁺)

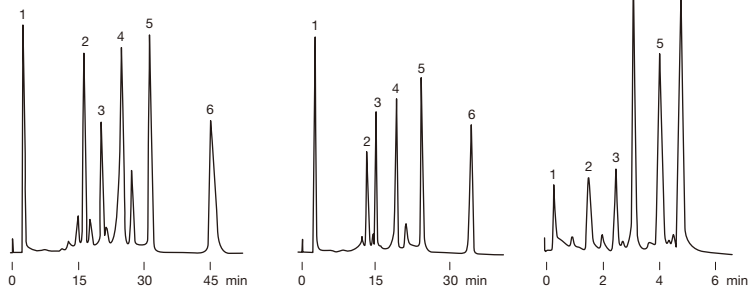
Product Code	Product Name	Plate Number (TP/column)	Base Material	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6354211	CXpak P-421S	≥ 3,500	Styrene divinylbenzene copolymer	6	4.6 × 150	H ₂ O
F6700210	CXpak P-G	(guard column)	Styrene divinylbenzene copolymer	6	4.6 × 10	H ₂ O

Preparative columns *Preparative columns are made to order.

Product Code	Product Name	Particle Size (µm)	Column Size (mm) I.D. x Length	Standard column
F6548002	IEC SP-2025	20	20.0 × 150	SP-825
F6709604	IEC SP-G 8B (IEC SP-LG)	20	8.0 × 50	(guard column)
F6548003	IEC CM-2025	20	20.0 × 150	CM-825
F6709605	IEC CM-G 8B (IEC CM-LG)	20	8.0 × 50	(guard column)
F6840003	Asahipak ES-502C 20C	13	20.0 × 100	ES-502C 7C
F6710021	Asahipak GS-20G 7B	20	7.5 × 50	(guard column)

Protein separation using cation exchange columns

(I) CM-825 (Weak cation exchange) 90µL injection
 (II) SP-825 (Strong cation exchange) 30µL injection
 (III) SP-420N (Strong cation exchange) non-porous type gel

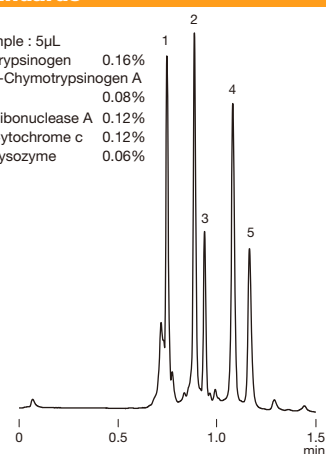


Column : (I) Shodex IEC CM-825, (II) Shodex IEC SP-825, (III) Shodex IEC SP-420N
Eluent : (A); 20mM Sodium phosphate buffer (pH7.0) (B); (A) + 0.5M NaCl (I,II) Linear gradient; (A) to (B), 60min (III) Linear gradient; (A) to (B), 10min
Flow rate : (I,II) 1.0mL/min (III) 1.5mL/min
Detector : UV (280nm)
Column temp. : Room temp.

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

Ultra-rapid analysis of protein standards

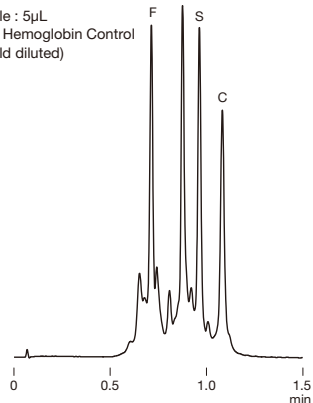
Sample : 5µL
 1. Trypsinogen 0.16%
 2. α-Chymotrypsinogen A 0.08%
 3. Ribonuclease A 0.12%
 4. Cytochrome c 0.12%
 5. Lysozyme 0.06%



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

Ultra-rapid analysis of hemoglobins

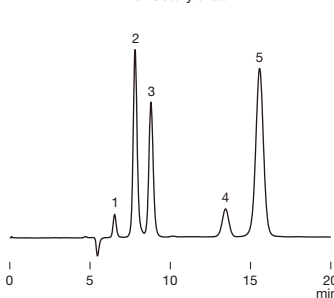
Sample : 5µL
 AFSC Hemoglobin Control (51-fold diluted)



Column : Shodex IEC SP-FT 4A
Eluent : (A); 20mM MES buffer (pH5.6) (B); (A) + 0.5M Na₂SO₄ Linear gradient; 5% (B) to 100% (B), 2min
Flow rate : 1.7mL/min
Detector : VIS (415nm)
Column temp. : 30°C

Analysis of nitrogen compounds following the testing methods for fertilizers

Sample : 10µg/mL each, 10µL
 1. Urea
 2. Biuret
 3. Dicyandiamide
 4. Guanidine
 5. Guanylurea

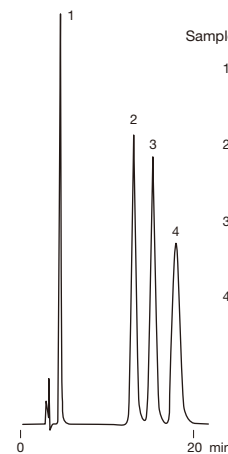


Column : Shodex Asahipak ES-502C 7C
Eluent : 3.92g KH₂PO₄ + 0.12g H₃PO₄ in 1000mL of H₂O
Flow rate : 0.6mL/min
Detector : UV (190nm)
Column temp. : 40°C

Catecholamines

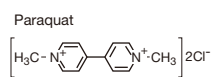
Sample : 300µg/mL each, 10µL

1. DOPA
Oc1ccc(O)cc1CC(N)C(=O)O
2. Adrenaline
Oc1ccc(O)cc1CC(N)C(C)O
3. Noradrenaline
Oc1ccc(O)cc1CC(N)O
4. Dopamine
Oc1ccc(O)cc1CCN

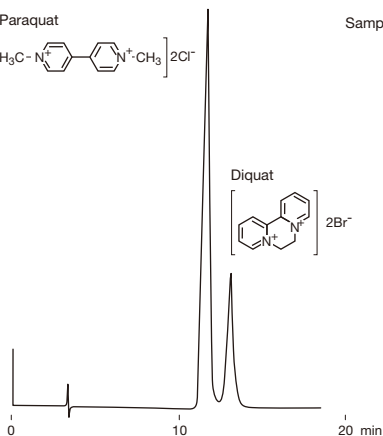
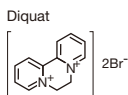


Column : Shodex Asahipak ES-502C 7C
Eluent : 20mM Sodium malonate buffer (pH6.0) + 0.5M NaCl
Flow rate : 1.0mL/min
Detector : UV (280nm)
Column temp. : 30°C

Paraquat and diquat



Sample : 20µL

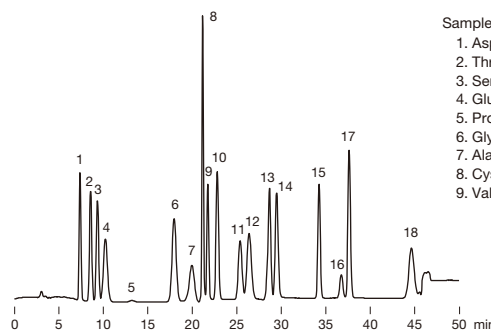


Column : Shodex Asahipak ES-502C 7C
Eluent : 50mM Sodium phosphate buffer (pH7.0) + 150mM NaCl
Flow rate : 1.0mL/min
Detector : UV (288nm)
Column temp. : 30°C

Standard amino acids

Sample : 0.1µM each, 100µL

1. Asp
2. Thr
3. Ser
4. Glu
5. Pro
6. Gly
7. Ala
8. Cys
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 L-8500-PH Kit (Mitsubishi Chemical Corporation) Low pressure gradient: 0min; PH-1, 0.2min; PH-2, 12.5min; PH-3, 22.7min; PH-4 40.0-53.0min; PH-RG
Reagent : Ninhydrin Coloring Solution Kit for HITACHI (Wako Pure Chemical Industries, Ltd.) 0-52min; R1:R2=50:50
Flow rate : (Eluent) 0.5mL/min (Reagent) 0.35mL/min
Detector : VIS (570nm)
Column Temp. : 63°C
Reaction Temp. : 120°C