

Aqueous SEC (GFC) Columns: Silica-based

Features

KW-800	• Silica-based packed columns for aqueous SEC (GFC) analysis • Suitable for the analysis of proteins and enzymes • Fulfills USP-NF L20, L33, and L59 requirements
KW400	• Reduced packing material particle size enhances column performance • Three to four-fold higher sensitivity than KW-800 series • KW405-4F is applicable analyzing samples with molecular weight above 1,000,000 • Fulfills USP-NF L20, L33, and L59 requirements
LW-803	• Pore size specifically controlled for analyzing proteins with a molecular weight of several hundred of thousand • High performance analysis of antibody drugs and various proteins • High lot-to-lot reproducibility • Fulfills USP-NF L20, L33, and L59 requirements
LW-403 4D	• Rapid analysis column of LW-803 • Achieves approximately halved analysis time compared with standard column • Fulfills USP-NF L20, L33, and L59 requirements

• Standard columns

Product Code	Product Name	* Plate Number (TP/column)	Particle Size (μm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6989000	PROTEIN KW-802.5	≥ 21,000	5	400	8.0 x 300	H ₂ O
F6989103	PROTEIN KW-803	≥ 21,000	5	1,000	8.0 x 300	H ₂ O
F6989104	PROTEIN KW-804	≥ 16,000	7	1,500	8.0 x 300	H ₂ O
F6700131	PROTEIN KW-G 6B	(guard column)	7	—	6.0 x 50	H ₂ O

* Measured with ethylene glycol

Base Material: Silica
Usable pH Range: pH3.0 - 7.5

• High performance semi-micro columns

* KW400 series is recommended to be used with semi-micro type devices.

Product Code	Product Name	* Plate Number (TP/column)	Particle Size (μm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6989201	KW402.5-4F	≥ 35,000	3	400	4.6 x 300	H ₂ O
F6989202	KW403-4F	≥ 35,000	3	800	4.6 x 300	H ₂ O
F6989203	KW404-4F	≥ 25,000	5	1,500	4.6 x 300	H ₂ O
F6989204	KW405-4F	≥ 25,000	5	2,000	4.6 x 300	H ₂ O
F6700132	KW400G-4A	(guard column)	5	—	4.6 x 10	H ₂ O

* Measured with uridine

Base Material: Silica
Usable pH Range: pH3.0 - 7.5

For antibody drugs analysis

● Standard columns

Product Code	Product Name	* Plate Number (TP/column)	Particle Size (μm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6989303	PROTEIN LW-803	≥ 12,000	3	1,000	8.0 x 300	H ₂ O
F6700133	PROTEIN LW-G 6B	(guard column)	3	—	6.0 x 50	H ₂ O

* Measured with bovine serum albumin

Base Material: Silica
Usable pH Range: pH3.0 - 7.5

● Semi-micro columns

* LW-403 4D is recommended to be used with semi-micro type devices.

Product Code	Product Name	* Plate Number (TP/column)	Particle Size (μm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6989403	PROTEIN LW-403 4D	≥ 11,000	1.9	1,000	4.6 x 150	H ₂ O
F6700134	PROTEIN LS-G 4J	(guard column)	1.9	—	4.6 x 20	H ₂ O

* Measured with bovine serum albumin

Base Material: Silica
Usable pH Range: pH3.0 - 7.5

Usable solvents

Product Name	Solvent			
	Acetonitrile	Methanol	Ethanol	2-Propanol (IPA)
KW-802.5, KW-803, KW-804	✓	✓	✓	✓
KW402.5-4F	✓	✓	✓	△
KW403-4F	✓	✓	✓	×
KW404-4F, KW405-4F	✓	✓	✓	✓
LW-803	✓	✓	✓	✓
LW-403 4D	✓	✓	✓	×

✓ : Solvent replacement possible △ : Solvent replacement possible up to 50 % × : Solvent replacement not possible

Target molecular weight range and exclusion limit

● Measured with protein (eluent: phosphate buffer)

Product Name	Target Molecular Weight Range	Exclusion Limit
KW-802.5	5,000 - 100,000	150,000
KW-803	10,000 - 700,000	* (1,000,000)
KW-804	30,000 - * (4,000,000)	* (4,000,000)
KW402.5-4F	5,000 - 70,000	150,000
KW403-4F	10,000 - 500,000	600,000
KW404-4F	30,000 - * (4,000,000)	* (4,000,000)
KW405-4F	200,000 - * (20,000,000)	* (20,000,000)
LW-803, LW-403 4D	10,000 - 700,000	* (1,000,000)

Please use the above table for reference purposes only when selecting columns.

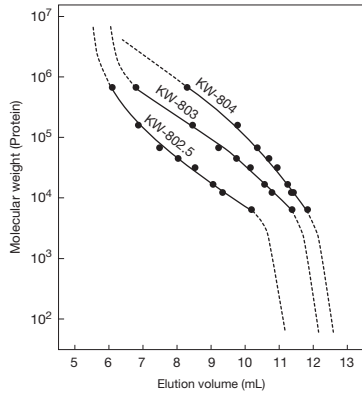
* () Estimated value

● Measured with pullulan (eluent: ultrapure water)

Product Name	Target Molecular Weight Range	Exclusion Limit
KW-802.5	2,000 - 50,000	60,000
KW-803	5,000 - 100,000	170,000
KW-804	20,000 - 300,000	500,000
KW402.5-4F	2,000 - 40,000	60,000
KW403-4F	3,000 - 50,000	80,000
KW404-4F	20,000 - 300,000	400,000
KW405-4F	100,000 - 700,000	1,300,000

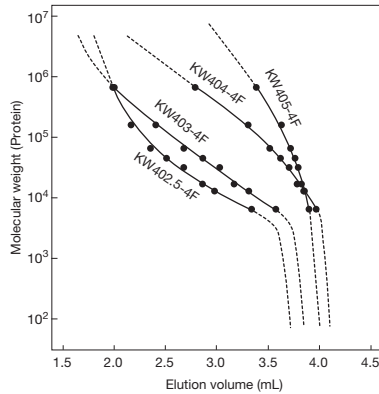
Please use the above table for reference purposes only when selecting columns.

Calibration curves for KW-800 series using protein



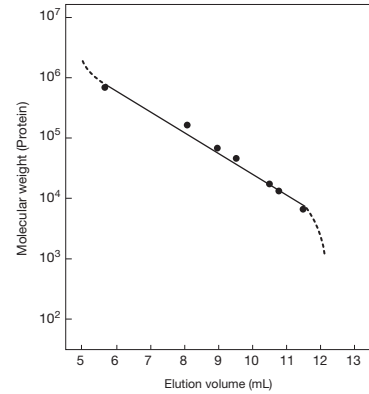
Column : Shodex PROTEIN KW-800 series
Eluent : 50 mM Sodium phosphate buffer (pH7.0) + 0.3 M NaCl
Flow rate : 1.0 mL/min
Detector : UV (280 nm)
Column temp. : 30 °C

Calibration curves for KW400 series using protein



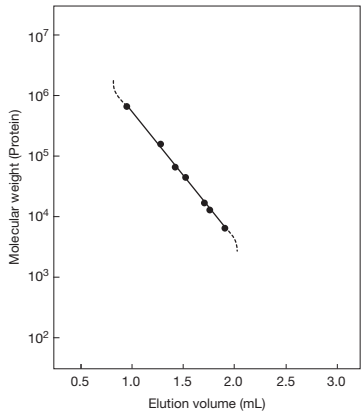
Column : Shodex KW400-4F series
Eluent : 50 mM Sodium phosphate buffer (pH7.0) + 0.3 M NaCl
Flow rate : 0.33 mL/min
Detector : UV (280 nm) (small cell volume)
Column temp. : 30 °C

Calibration curve for LW-803 using protein



Column : Shodex PROTEIN LW-803
Eluent : 50 mM Sodium phosphate buffer (pH7.0) + 0.3 M NaCl
Flow rate : 1.0 mL/min
Detector : UV (280 nm)
Column temp. : Room temp.

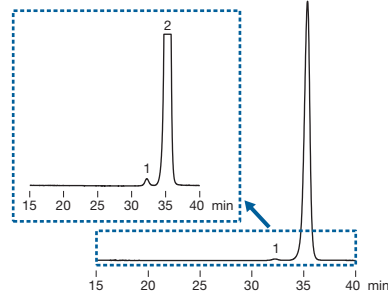
Calibration curve for LW-403 4D using protein



Column : Shodex PROTEIN LW-403 4D
Eluent : 50 mM Sodium phosphate buffer (pH7.0) + 0.3 M NaCl
Flow rate : 0.35 mL/min
Detector : UV (280 nm) (small cell volume)
Column temp. : 30 °C

Analysis of impurities (high molecular weight proteins) in insulin glargine according to USP-NF method

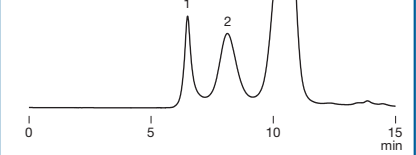
Sample : 100 µL
 System suitability solution (prepared following USP-NF method)
 1. High molecular weight proteins
 2. Insulin glargine



Column : Shodex PROTEIN KW-802.5 x 2
Eluent : CH₃COOH/CH₃CN/H₂O=20/30/50 (pH to 3.0 adjusted with 25 % NH₃ aq.)
Flow rate : 0.5 mL/min
Detector : UV (276 nm)
Column temp. : Ambient

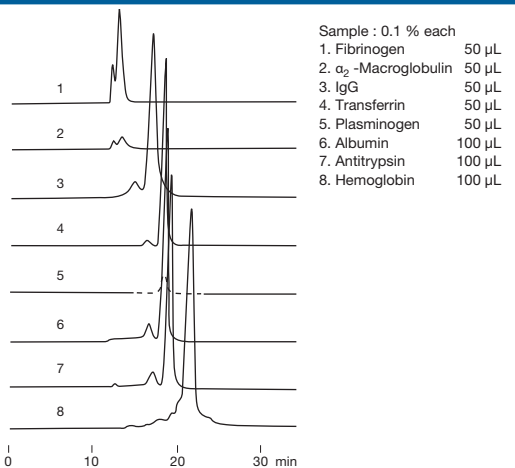
Lipoproteins in serum

Sample : 40 µL
 Whole lipoproteins from serum of a healthy person 1.0 mg/mL
 1. VLDL 2. LDL 3. HDL
 (Sample preparation method)
 1. Use potassium bromide to adjust the specific gravity of serum from a healthy person to 1.210 g/mL. Ultracentrifuge for 24 hours.
 2. Dialyze the supernatant and then substitute the solvent with PBS*.
 3. Measure protein concentration by Lowry method and dilute the sample with PBS* to 1.0 mg/mL.



Column : Shodex PROTEIN KW-G + KW-804
Eluent : 10-fold diluted x 10 PBS* with H₂O
Flow rate : 1.0 mL/min
Detector : UV (280 nm)
Column temp. : 30 °C
 x10 PBS* : 80 g NaCl + 29 g Na₂HPO₄·12H₂O + 2 g KCl + 2 g KH₂PO₄ in 1000 mL of H₂O
 Data provided by Prof. Ohkawa Ryunosuke, Graduate School of Health Care Sciences, Analytical Laboratory Chemistry, Tokyo Medical and Dental University

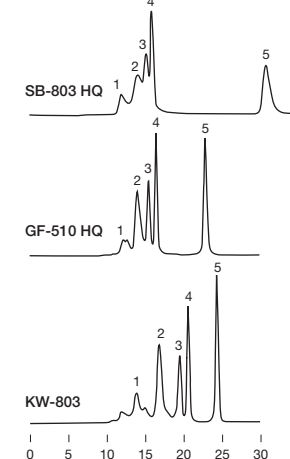
Proteins in human blood serum



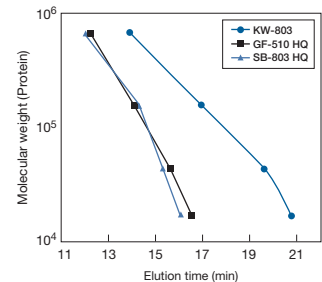
Column : Shodex PROTEIN KW-803
Eluent : 50 mM Sodium phosphate buffer (pH7.0) + 0.3 M NaCl
Flow rate : 1.0 mL/min
Detector : UV (280 nm)
Column temp. : Room temp.

Comparing three GFC columns for the separation of common proteins

Sample :
 1. Thyroglobulin (bovine)
 2. γ-Globulin (bovine)
 3. Ovalbumin (chicken)
 4. Myoglobin (horse)
 5. Cyanocobalamin



Separation performances of three aqueous SEC columns (SB-803 HQ, GF-510 HQ, and KW-803) were compared. KW-803, silica-based column, showed the best separation performance for the analysis of protein standards.



Column : Shodex OHpak SB-803 HQ
 Shodex Asahipak GF-510 HQ
 Shodex PROTEIN KW-803
Eluent : 0.2 M Phosphate buffer (pH6.9)
Flow rate : 0.5 mL/min
Detector : UV (280 nm)
Column temp. : 30 °C

Comparison of LW-803, conventional column, and other manufacturer's column

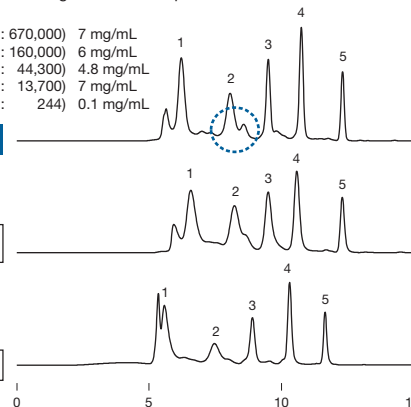
PROTEIN LW-803 is suitable for analyzing a few-hundred-thousand molecular weight size proteins. When comparing LW-803 to our conventional columns and other manufacturer's columns, LW-803 provides a better separation around 160,000 molecular weight range that is about the size of Globulin. This improved separation efficiency is advantageous for the separation of monomer and dimer of IgG which is a mainstream of antibody drug.

Sample : 5 μ L
 1. Thyroglobulin (MW : 670,000) 7 mg/mL
 2. γ -Globulin (MW : 160,000) 6 mg/mL
 3. Ovalbumin (MW : 44,300) 4.8 mg/mL
 4. Ribonuclease A (MW : 13,700) 7 mg/mL
 5. Uridine (MW : 244) 0.1 mg/mL

LW-803

KW-803
(conventional type)

Company A

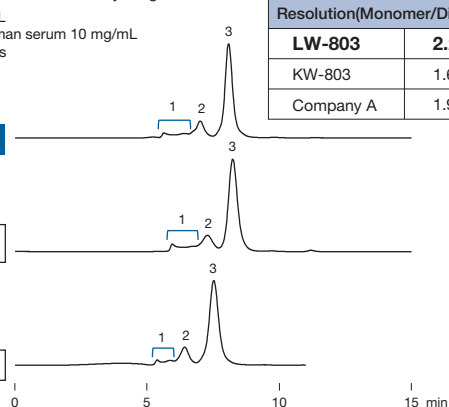


Sample : 5 μ L
 IgG from human serum 10 mg/mL
 1. Aggregates
 2. Dimer
 3. Monomer

LW-803

KW-803
(conventional type)

Company A

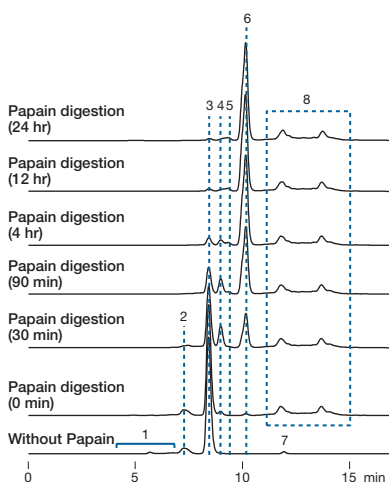


Resolution(Monomer/Dimer)	
LW-803	2.2
KW-803	1.6
Company A	1.9

Column : Shodex PROTEIN LW-803, Shodex PROTEIN KW-803, Silica-based SEC column from other manufacturer
 Eluent : 50 mM Sodium phosphate buffer (pH7.0) + 0.3 M NaCl
 Flow rate : 1.0 mL/min
 Detector : UV (280 nm)
 Column temp. : Room temp.

Monitoring papain digestion of humanized monoclonal IgG

Papain digestion of humanized monoclonal IgG was monitored using PROTEIN LW-803, an aqueous SEC (GFC) column. During the papain digestion of IgG, Fc and Fab fragments from the IgG and their decomposition intermediates are expected to be observed. LW-803 separates IgG and decomposed fragments and intermediates well from each other, thus it is suitable for the monitoring of papain digestion of IgG.



Sample : 10 μ L
 Humanized monoclonal IgG
 1. Aggregates of IgG
 2. Dimer of IgG
 3. Monomer of IgG
 4 - 6. Fragments of IgG from papain digestion
 7. Citric acid
 8. Papain

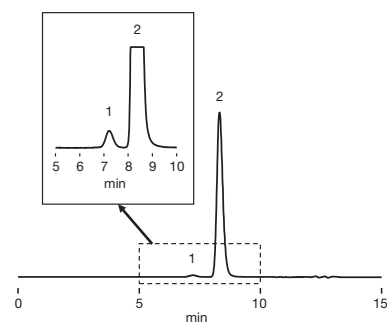
(Procedures for digestion monitoring)

- (1) Dissolve 3 mg of humanized monoclonal IgG in 500 μ L of the eluent. (6 mg/mL conc.)
- (2) Dissolve 1 mg of papain in 500 μ L of the eluent. (1 mg/mL conc.)
- (3) Filter (1) and (2) using 0.2- μ m membrane filters
- (4) Mix two solutions in 1:1 ratio.
- (5) Keep the mixture at 25 $^{\circ}$ C.
- (6) Take samples at set timings and analyze them by HPLC.

Column : Shodex PROTEIN LW-803
 Eluent : 0.1 M Sodium phosphate buffer (pH7.0) + 0.3 M NaCl
 Flow rate : 1.0 mL/min
 Detector : UV (280 nm)
 Column temp. : 25 $^{\circ}$ C

Antibody-drug Conjugate (ADC)

Sample : 20 μ L
 Antibody-drug conjugate formulation 5 mg/mL
 (in H₂O)
 1. Dimer
 2. Monomer

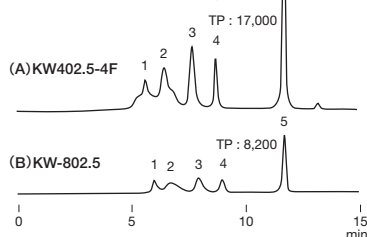


Column : Shodex PROTEIN LW-803
 Eluent : 50 mM Sodium phosphate buffer (pH7.0) + 0.3 M NaCl
 Flow rate : 1.0 mL/min
 Detector : UV (280 nm)
 Column temp. : 25 $^{\circ}$ C

Comparison of KW402.5-4F and KW-802.5

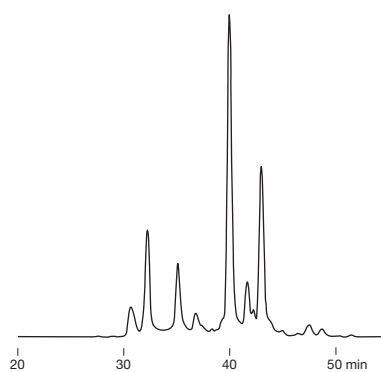
KW400 series is a high performance type semi-micro columns. It offers approximately 1.5 times larger theoretical plate number and 3 to 4 times higher detection sensitivity (peak height) than KW-800 series columns do.

Sample : 10 μ L
 1. Blue dextran 2000 0.2 mg/mL
 2. γ -Globulin 0.8 mg/mL
 3. Ovalbumin 0.8 mg/mL
 4. Myoglobin 0.56 mg/mL
 5. Uridine 0.04 mg/mL



Column : (A) Shodex KW402.5-4F
 (B) Shodex PROTEIN KW-802.5
 Eluent : 50 mM Sodium phosphate buffer (pH7.0) + 0.3 M NaCl
 Flow rate : (A) 0.33 mL/min, (B) 1.0 mL/min
 Detector : UV (280 nm) (small cell volume)
 Column temp. : 25 $^{\circ}$ C

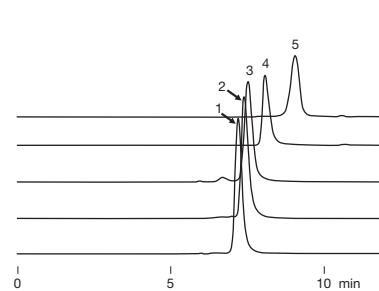
Yogurt whey

Sample : Whey, 5 μ L

Column : Shodex KW403-4F + KW402.5-4F
 Eluent : 50 mM Sodium phosphate buffer (pH7.0) + 0.3 M NaCl
 Flow rate : 0.20 mL/min
 Detector : UV (280 nm) (small cell volume)
 Column temp. : 30 $^{\circ}$ C

Lectins

Sample : 5 μ L
 1. Lectin from soybean 0.6 mg/mL
 2. Lectin from arachis hypogaea 1.1 mg/mL
 3. Lectin from canavalia ensiformis (Con A) 0.9 mg/mL
 4. Lectin from lens culinaris (LCA) 0.7 mg/mL
 5. Lectin from triticum vulgaris (WGA) 0.8 mg/mL



Column : Shodex KW402.5-4F
 Eluent : 50 mM Sodium phosphate buffer (pH7.0) + 0.3 M NaCl
 Flow rate : 0.33 mL/min
 Detector : UV (220 nm) (small cell volume)
 Column temp. : 30 $^{\circ}$ C

Aqueous SEC (GFC) Columns: Polymer-based

Features

SB-800 HQ

- Polymer-based packed columns for aqueous SEC (GFC) analysis
- Supports a wide range of molecular weight sample analysis
- The eluent can be replaced with DMF (except SB-802 HQ and SB-807 HQ), enabling the analysis of polar polymers
- Method using SB-804 HQ or SB-805 HQ for gelatin's mean molecular weight determination is comparable with PAGI method (Ver. 10, Japan)
- Fulfills USP-NF L38 and L39 requirements
- SB-802 HQ fulfills USP-NF L25 requirements
- SB-802.5 HQ fulfills USP-NF L25 and L89 requirements
- SB-803 HQ fulfills USP-NF L37 requirements

SB-807 HQ

- Column for the analysis of water-soluble ultra high molecular weight polymers
- Large particle-size gel prevents shear degradation of polymers
- Fulfills USP-NF L38 and L39 requirements

LB-800

- Polymer-based packed columns for aqueous SEC (GFC) analysis
- Low column bleeding allows its use with light scattering detectors
- The eluent can be replaced with DMF enabling the analysis of polar polymers
- Fulfills USP-NF L38 and L39 requirements
- LB-802.5 fulfills USP-NF L25 and L89 requirements
- LB-803 fulfills USP-NF L37 requirements

Standard columns

Product Code	Product Name	Plate Number (TP/column)	Particle Size (μm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6429100	OHpak SB-802 HQ	≥ 12,000	8	100	8.0 x 300	0.02 % NaN ₃ aq.
F6429101	OHpak SB-802.5 HQ	≥ 16,000	6	200	8.0 x 300	0.02 % NaN ₃ aq.
F6429102	OHpak SB-803 HQ	≥ 16,000	6	800	8.0 x 300	0.02 % NaN ₃ aq.
F6429103	OHpak SB-804 HQ	≥ 16,000	10	2,000	8.0 x 300	0.02 % NaN ₃ aq.
F6429104	OHpak SB-805 HQ	≥ 12,000	13	7,000	8.0 x 300	0.02 % NaN ₃ aq.
F6429105	OHpak SB-806 HQ	≥ 12,000	13	15,000	8.0 x 300	0.02 % NaN ₃ aq.
F6429106	OHpak SB-806M HQ	≥ 12,000	13	15,000	8.0 x 300	0.02 % NaN ₃ aq.
F6709430	OHpak SB-G 6B	(guard column)	10	—	6.0 x 50	0.02 % NaN ₃ aq.

SB-806M HQ is a mixed-gel column capable of analyzing samples over a wide range of molecular weight distribution.

Base Material: Polyhydroxymethacrylate
Usable pH Range: pH3 - 10

Aqueous high molecular weight analysis column

Standard columns

Product Code	Product Name	Plate Number (TP/column)	Particle Size (μm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6429108	OHpak SB-807 HQ	≥ 1,500	35	30,000	8.0 x 300	H ₂ O
F6709431	OHpak SB-807G	(guard column)	35	—	8.0 x 50	H ₂ O

Base Material: Polyhydroxymethacrylate
Usable pH Range: pH3 - 10

Preparative columns [Preparative columns are made to order]

Product Code	Product Name	Plate Number (TP/column)	Particle Size (μm)	Column Size (mm) I.D. x Length	Shipping Solvent	Standard Column
F6516011	OHpak SB-2002	≥ 9,000	15	20.0 x 300	0.02 % NaN ₃ aq.	SB-802 HQ
F6516012	OHpak SB-2002.5	≥ 12,000	10	20.0 x 300	0.02 % NaN ₃ aq.	SB-802.5 HQ
F6516013	OHpak SB-2003	≥ 12,000	10	20.0 x 300	0.02 % NaN ₃ aq.	SB-803 HQ
F6516014	OHpak SB-2004	≥ 12,000	18	20.0 x 300	0.02 % NaN ₃ aq.	SB-804 HQ
F6516015	OHpak SB-2005	≥ 12,000	20	20.0 x 300	0.02 % NaN ₃ aq.	SB-805 HQ
F6516016	OHpak SB-2006	≥ 12,000	20	20.0 x 300	0.02 % NaN ₃ aq.	SB-806 HQ
F6516017	OHpak SB-2006M	≥ 12,000	20	20.0 x 300	0.02 % NaN ₃ aq.	SB-806M HQ
F6709555	OHpak SB-G 8B	(guard column)	18	8.0 x 50	0.02 % NaN ₃ aq.	(guard column)

Base Material: Polyhydroxymethacrylate

GFC columns to be used with light scattering detector

● Standard columns

Product Code	Product Name	Plate Number (TP/column)	Particle Size (μm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6429206	OHpak LB-802.5	≥ 16,000	6	200	8.0 x 300	H ₂ O
F6429201	OHpak LB-803	≥ 16,000	6	800	8.0 x 300	H ₂ O
F6429204	OHpak LB-804	≥ 16,000	10	2,000	8.0 x 300	H ₂ O
F6429203	OHpak LB-805	≥ 12,000	13	7,000	8.0 x 300	H ₂ O
F6429205	OHpak LB-806	≥ 12,000	13	15,000	8.0 x 300	H ₂ O
F6429202	OHpak LB-806M	≥ 12,000	13	15,000	8.0 x 300	H ₂ O
F6709434	OHpak LB-G 6B	(guard column)	13	—	6.0 x 50	H ₂ O

LB-806M is a mixed-gel column capable of analyzing samples over a wide range of molecular weight distribution.

Base Material: Polyhydroxymethacrylate
Usable pH Range: pH3 - 10

Usable solvents

Product Name	Maximum Usable Concentration (%)			
	Methanol	Acetonitrile	N,N-Dimethylformamide (DMF)	*Dimethyl sulfoxide (DMSO)
SB-802 HQ	0	0	0	0
SB-802.5 HQ, SB-803 HQ	100	75	100	100
SB-804 HQ - SB-806M HQ	75	75	100	100
SB-G 6B	75	75	100	100
SB-807 HQ, SB-807G	30	30	0	0
LB-802.5 - LB-806M, LB-G 6B	100	100	100	—

(Note)

The maximum solvent tolerance of SB-2000 series, preparative columns of SB-800 HQ series, is 50 % methanol, acetonitrile, or DMF. (SB-2002 is not tolerant to organic solvents)

*Use at 50 - 70 °C

Target molecular weight range and exclusion limit

● Measured with pullulan (eluent: ultrapure water)

Product Name	Target Molecular Weight Range	Exclusion Limit
SB-802 HQ	200 - 1,000	1,000
SB-802.5 HQ	500 - 10,000	10,000
SB-803 HQ	1,000 - 100,000	100,000
SB-804 HQ	5,000 - 400,000	1,000,000
SB-805 HQ	100,000 - 1,000,000	* (4,000,000)
SB-806 HQ	100,000 - * (20,000,000)	* (20,000,000)
SB-806M HQ	500 - * (20,000,000)	* (20,000,000)
SB-807 HQ	500,000 - * (500,000,000)	* (500,000,000)
LB-802.5	500 - 10,000	10,000
LB-803	1,000 - 100,000	100,000
LB-804	5,000 - 400,000	1,000,000
LB-805	100,000 - 1,000,000	* (4,000,000)
LB-806	100,000 - * (20,000,000)	* (20,000,000)
LB-806M	500 - * (20,000,000)	* (20,000,000)

Please use the above table for reference purposes only when selecting columns.

* () Estimated value

● Measured with *PEG/PEO (eluent: DMF)

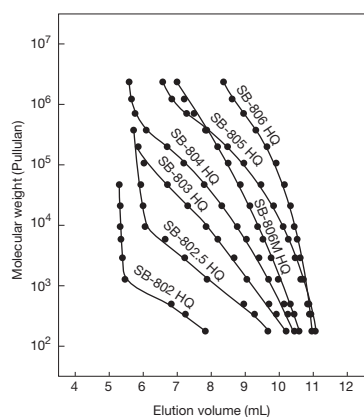
Product Name	Target Molecular Weight Range
SB-802.5 HQ	100 - 2,000
SB-803 HQ	200 - 40,000
SB-804 HQ	500 - 300,000
SB-805 HQ	50,000 - 700,000
SB-806 HQ	70,000 - ** (20,000,000)
SB-806M HQ	200 - ** (20,000,000)
LB-802.5	100 - 5,000
LB-803	500 - 50,000
LB-804	500 - 300,000
LB-805	50,000 - 700,000
LB-806	70,000 - ** (20,000,000)
LB-806M	200 - ** (20,000,000)

Please use the above table for reference purposes only when selecting columns.

*PEG: Polyethylene glycol

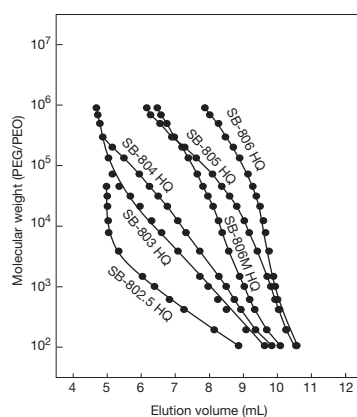
*PEO: Polyethylene oxide

** () Estimated value

Calibration curves for SB-800 HQ series using pullulan (eluent: H₂O)

Column : Shodex OHpak SB-800 HQ series
Eluent : H₂O
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 30 °C

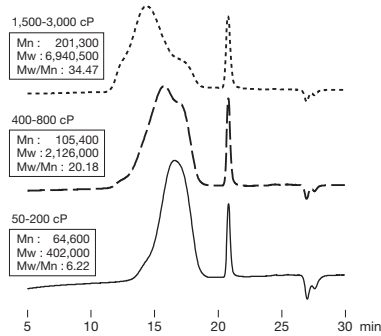
Calibration curves for SB-800 HQ series using PEG/PEO (eluent: DMF)



Column : Shodex OHpak SB-800 HQ series
Eluent : DMF
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 40 °C

Carboxymethylcellulose

Sample : Carboxymethylcellulose 0.1 % each, 50 µL



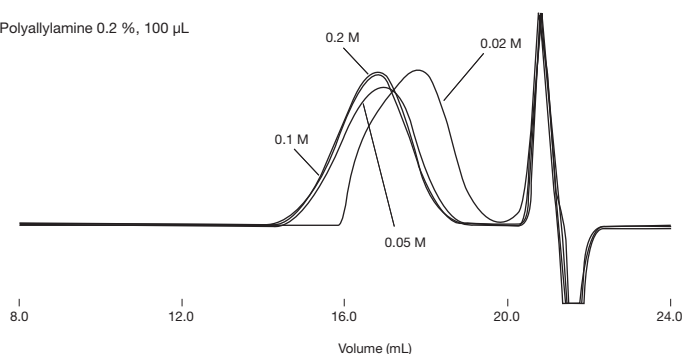
Molecular weight was determined from the calibration curve of pullulan.

Column : Shodex OHpak SB-806M HQ x 2
Eluent : 0.1 M NaCl aq.
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 40 °C

Effects of sodium nitrate in eluent on polyallylamine analysis

For the analysis of cationic polymers, such as polyallylamine, the polymer is observed to adsorb on the column or delayed in elution when low sodium nitrate eluent was used. These phenomena can be suppressed by increasing the concentration of sodium nitrate in the eluent. In the case of polyallylamine, a good shape chromatogram is obtained when sodium nitrate concentration is 0.1 M or higher.

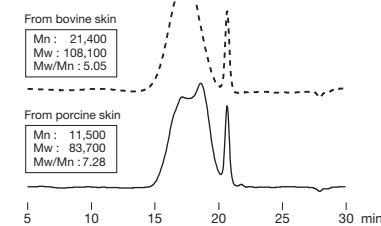
Sample : Polyallylamine 0.2 %, 100 µL



Column : Shodex OHpak SB-806M HQ x 2
Eluent : 0.5 M CH₃COOH + NaNO₃ aq.
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 40 °C

Gelatin

Sample : 0.1 % each, 100 µL
 Gelatin from bovine skin
 (Acid treatment, Gel strength : 225 g)
 Gelatin from porcine skin
 (Alkali treatment, Gel strength : 90-100 g)

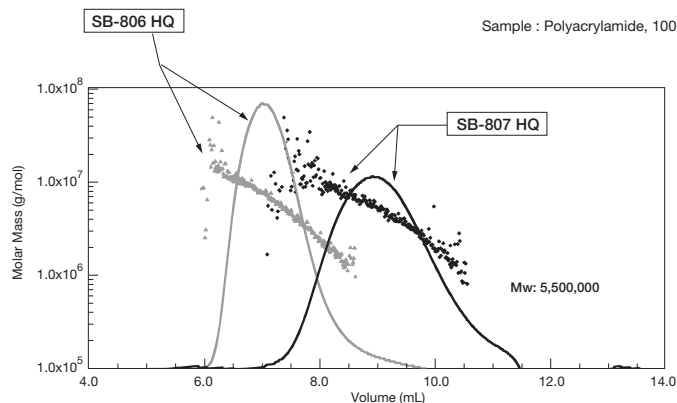


*Molecular weight was determined from the calibration curve of pullulan.

Column : Shodex OHpak SB-806M HQ x 2
Eluent : 0.1 M KH₂PO₄ aq./
 0.1 M Na₂HPO₄ aq. = 50/50
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 40 °C

Polyacrylamide

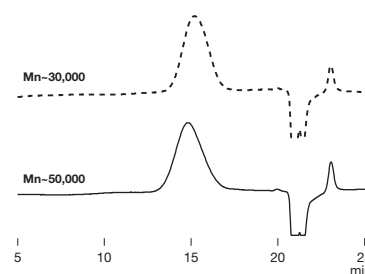
Sample : Polyacrylamide, 100 µL



Column : Shodex OHpak SB-807 HQ, SB-806 HQ
Eluent : 0.2 M NaCl aq.
Flow rate : 0.5 mL/min
Detector : RI
 MALS (Multi angle light scattering)
Column temp. : 30 °C

Cellulose acetate

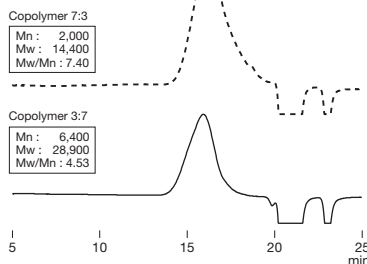
Sample : Cellulose acetate 0.1 % each, 100 µL



Column : Shodex OHpak SB-806M HQ x 2
Eluent : 20 mM LiBr in DMF
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 40 °C

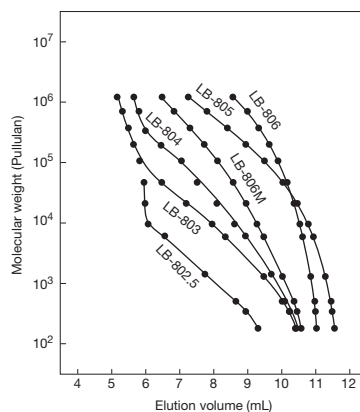
Copolydones

Sample : 100 μ L
Poly(1-vinylpyrrolidone-co-vinyl acetate) 0.1 % each



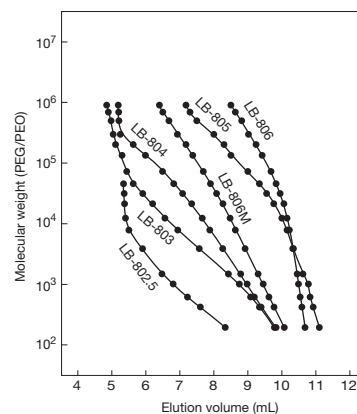
Molecular weight was determined from the calibration curve of PEG/PEO.

Column : Shodex OHPak SB-806M HQ x 2
Eluent : 20 mM LiBr in DMF
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 40 °C

Calibration curves for LB-800 series using pullulan (eluent: H₂O)

Column : Shodex OHPak LB-800 series
Eluent : H₂O
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 30 °C

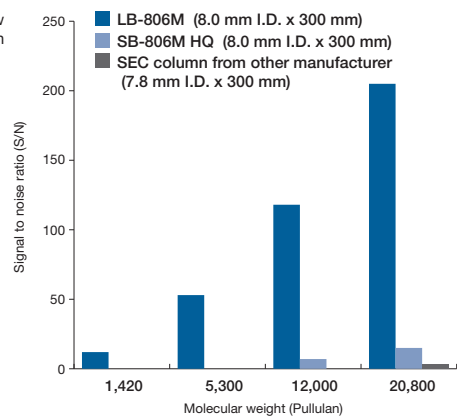
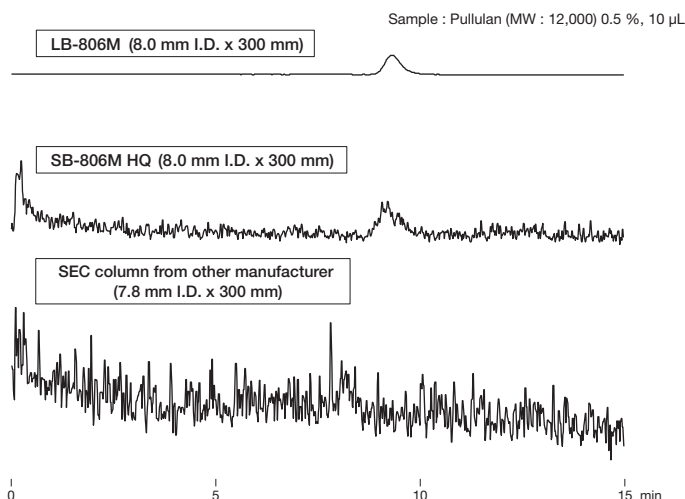
Calibration curves for LB-800 series using PEG/PEO (eluent: DMF)



Column : Shodex OHPak LB-800 series
Eluent : DMF
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 40 °C

Comparison of pullulan detection using multi angle light scattering detector

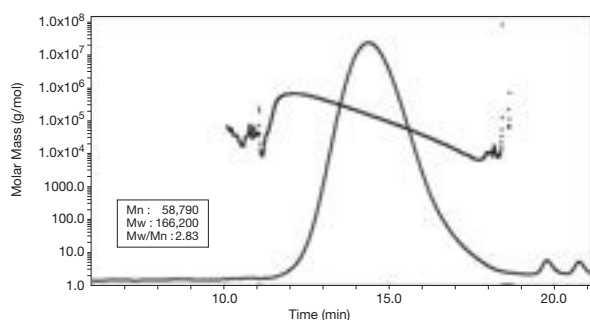
The OHPak LB-800 series is able to detect low molecular weight substances owing to its improved low baseline noise level while using it with a multiangle light scattering detector. This cannot be achieved with other manufacturer's SEC column.



Column : Shodex OHPak LB-806M
Shodex OHPak SB-806M HQ
SEC column from other manufacturer
Eluent : 0.1 M NaNO₃ aq.
Flow rate : 1.0 mL/min
Detector : MALS (Multi angle light scattering) (90 °)
Column temp. : 30 °C

Sodium alginate

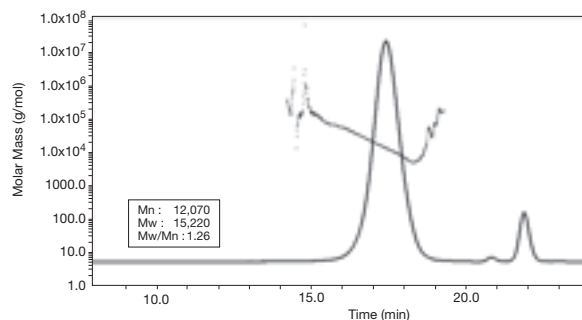
Sample : Sodium alginate 0.1 %, 100 μ L



Column : Shodex OHPak LB-806M x 2
Eluent : 0.1 M NaNO₃ aq.
Flow rate : 1.0 mL/min
Detector : RI
MALS (Multi angle light scattering)
Column temp. : 30 °C

Sodium heparin

Sample : Sodium heparin 0.1 %, 100 μ L



Column : Shodex OHPak LB-806M x 2
Eluent : 0.1 M NaNO₃ aq.
Flow rate : 1.0 mL/min
Detector : RI
MALS (Multi angle light scattering)
Column temp. : 30 °C