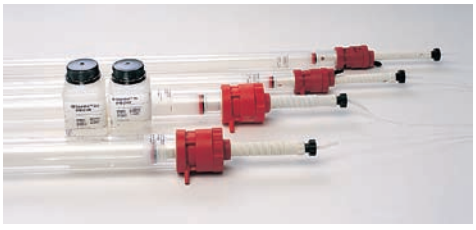
GE Healthcare

Gel Filtration columns and media

Selection guide and product profile



Technical information

Choice of eluent

- Eluent composition does not directly influence resolution
- To avoid ionic interactions, the ionic strength of the eluent should be at least 0.15 M
- Choose an eluent providing good solubility and stability for the sample protein/s
- The eluent can often be chosen to simplify a later separation stage e.g. the column can be equilibrated and eluted with the start buffer for a subsequent ion exchange separation

Eluent preparation

- Use distilled water
- Use HPLC or analytical grade solvents, salts, and buffers
- Make and store the eluents in clean glassware
- Filter the eluents through a 0.22 µm sterile filter and de-gas before use
- Store the eluents at 4°C when not in use; to prevent bacterial growth an antimicrobial agent can be added
- Equilibrate the eluents to ambient temperature before use to prevent formation of air bubbles (it is recommended to de-gas before use if the eluent has been in storage)

Sample preparation

- Choose a sample volume of ≤0.5% of the column volume for media with average particle sizes in the range of 10–15 µm and ≤5% of the volume for media with average particle sizes in the range 30–100 µm
- In group separations (desalting) the sample volumes can be up to 30% of the column volume
- When repeating runs, prepare the sample using the same method and keep the sample concentration and volumes constant
- Choose chromatographic conditions under which the sample is stable and soluble
- Centrifuge (e.g., 10 000 g for 10 min) or filter sample to remove microparticles (be sure to select a solvent-resistant filter if samples are dissolved in organic solvents)
- If the sample has high viscosity, dilute it with the eluent (avoid >30 mg protein/ml sample)
- Never apply a turbid solution to the column; turbidity indicates sample insolubility which may be due to incorrect ionic strength or pH
- Store samples in the cold unless this leads to precipitation; avoid long storage unless you can store at –70°C
- Use distilled water
- Use HPLC or analytical grade solvents, salts, and buffers

Sample application

- Make sure the sample is recently filtered or centrifuged before applying it to the column
- A prefilter between injector and column is not recommended unless automated injections are performed (a prefilter reduces the resolution)

Optimization

Parameters to change are:

1. Sample volume – a smaller sample volume gives better resolution
2. Flow rate – a lower flow rate gives better resolution for high molecular weight components (proteins), but the opposite may be true for small components (small peptides) since they diffuse more quickly, and the longer the separation time, the wider the sample zones become
3. Column length – the resolution of two separated zones increases by the square root of the column length; the effective bed height can be increased by coupling two columns in series

Buffer choice and pH are normally of minor importance. However, low pH may enhance hydrophobic interactions and can be used to improve separation in some cases (e.g., peptides; mixed-mode separation)

Cleaning protocols

Three cleaning protocols are recommended:

A. Simple: for regular cleaning

B. Rigorous: when the column is contaminated

C. Harsh: to be used as a last resort

A. Simple cleaning

- The packing efficiency is crucial – to avoid losing any performance, only clean the column when the contamination causes an increase in backpressure

1. Wash with 1/5 column volume (CV) 0.1 M NaOH
2. Wash with 1/5 CV 1 M acetic acid
3. Equilibrate with eluent until the baseline is stable

B. Rigorous cleaning

Clean a column if you observe:

- An increase in backpressure
  - before cleaning, make sure that the high backpressure in the system is in fact caused by the column: disconnect one piece of equipment at a time (starting at the fraction collector) with the pumps working, check the pressure reading after each piece is disconnected to determine the source of the backpressure (you will often find that a dirty prefilter causes the increase in backpressure)
  - check the backpressure at the same stage during each run since the backpressure can vary within one run (e.g., injecting a sample and mixing different eluents may cause an increase in backpressure)
- A space visible between the adaptor and filter
- A color change at the top of the column
- A loss of resolution

The following steps should be performed in sequence (NEVER exceed the column pressure limits):

1. Change the filter at the top of the column (Tricorn and HiLoad columns; see instructions for individual columns or filter kits) – since the contaminants are introduced with the liquid flow, many of them are trapped in the filter
2. Set the pressure limit control to the pressure limit given in the column instructions
3. Wash with 1 column volume (CV) 1 M acetic acid
4. Wash with 1 CV water
5. Wash with 1 CV 20% ethanol (run at a low flow rate)
6. Wash with 1 CV 0.1 M NaOH
7. Rinse with 1 CV water and a few injections of 1 M acetic acid
8. Equilibrate with buffer until the baseline is stable

Cleaning volume of 1 CV is only a guideline – the practical requirements are best determined by monitoring the baseline, which should be stable at the end of each step

C. Harsh cleaning

1. Chemical operations

- when planning a recovery operation, always take into account what caused the problem in the first place; various alternatives are given for each type of contaminant — choose the most convenient according to the reagents you have available: if this does not work, try another
- do not exceed pressure limits given in the column instructions

Hydrophilic proteins and peptides:

- Wash the column (overnight, at low flow rate 15–30 cm/h) with the solution which previously dissolved the material during sample preparation for example, an extraction solution or detergent
- Wash the column overnight in 1 M acetic acid at 15–30 cm/h
- Fill the column with 1 mg/ml pepsin in 0.1 M acetic acid and 0.5 M NaCl and incubate overnight at room temperature, or 1 h at 37°C. After enzymatic digestion, thoroughly rinse the column with equilibration buffer

Hydrophobic proteins and peptides:

- These are usually soluble in polar organic solvents such as 90% ethanol, 30% acetonitrile or 30% isopropanol
- If the percentage of organic solvent that best dissolves the contaminant is known, run this overnight at a low flow rate

Nucleic acids:

- General: RNA and DNA are very soluble in solutions of low ionic strength: wash with 10 mM Tris-HCl, 1 mM EDTA, pH 8.0 at low flow rate for 24 h at room temperature to dissolve precipitated nucleic acids

RNA:

Inject 0.1–2 M NaOH (see Instruction for NaOH stability) and leave for 1 h, rinse with water, inject 0.1 column volume of ribonuclease I solution (1 mg/ml in 0.1 M NaCl, 50 mM Tris-HCl, pH 7.5), incubate the column for 2 h at 37°C, rinse with at least 2 column volumes of 10 mM Tris-HCl, 1 mM EDTA, pH 8.0

DNA:

Add 0.1 column volume Deoxyribonuclease I solution (1 mg/ml in 0.1 M NaCl, 10 mM $MgCl_2$, 50 mM Tris-HCl, pH 7.5) to the column, incubate the column for 2 h at 37°C, rinse with at least 2 column volumes of 10 mM Tris-HCl, 1 mM EDTA, pH 8.0. After enzymatic digestion, thoroughly rinse the column with equilibration buffer to remove trace amounts of enzyme remaining in the system; special caution is recommended if subsequent separations of RNA or DNA are planned.

Lipids:

- Wash the column overnight at a flow rate of 15–30 cm/h with detergent such as 0.2%–1% Berol™ 185 in a basic or acidic solution. Remove detergent by washing with methanol, ethanol, or isopropanol.

Carbohydrates:

- Wash with 1 column volume of 0.1 M sodium tetraborate (borax) titrated to pH 8 with HCl. Note that borax precipitates with some metal ions such as Cu^{2+}.

2. Mechanical operations

- Change the bottom filter — note that this may reduce the column efficiency
- Remove the top 2–3 mm of medium and discard
- Always check the efficiency of the column after mechanical operations

Storage of unused medium

- +4°C to +30°C
- Make sure the unused medium is protected against bacterial growth (e.g., store in 20% ethanol or buffer containing an antimicrobial agent)

Storage of column

- +4°C to +30°C

Short term storage (e.g., overnight)

- Store the column connected to the system; a low flow rate through the column will prevent bacterial growth
- Store in the eluent used in separation

Long-term storage

The following steps should be performed in sequence (NEVER exceed the column pressure limits):

1. Clean the column according to "Simple cleaning"
2. Rinse the column and the system thoroughly with water to remove salt
3. Equilibrate the column with 2–3 column volumes of 20% ethanol: start the equilibration at a low flow rate and check the backpressure while equilibrating the column (mixing water and ethanol increases the backpressure)
4. Disconnect the column from the system
5. Seal the column inlet and outlet

Antimicrobial treatment

Prepacked columns: Sanitize

Bulk media: Sanitize/autoclave

Sanitization is the inactivation of microbial populations. When a packed column is washed with a sanitizing agent, the risk of contaminating the purified product with viable microorganisms is reduced. The most commonly used sanitization method in chromatography today is to wash the column with NaOH. NaOH has a very good sanitizing effect and also has the additional advantage of cleaning the column; See product specific instructions

Bulk medium may be autoclaved in a wet format at pH 7 for up to 30 minutes at +120°C

Product		Ordering information			Fractionation range globular proteins M, (relative molecular weight, Daltons)	Fractionation range dextrans M, (relative molecular weight, Daltons)	Exclusion limit DNA (base pairs)	Particle size range (µm)	Number of theoretical plates/meter	pH stability[1] (working and long term)	Maximum operating back pressure[2] (MPa/psi)	Maximum operating flow rate[2] approx.	Recommended sample volume	Bed volume approx. (ml)	Applications
Prepacked column/Bulk media		**Code No.**	**Column dim. id × bed height (mm)**	**Pack size**											
Superdex™ Peptide PC 3.2/30		17-1458-01	3.2 × 300	1	100 – 7000	No data	No data	13 – 15	> 30 000	1 – 14	2.0/290	0.15 ml/min	5–25 µl	2.4	Micropreparative analytical high resolving separation of peptides and other small biomolecules
Superdex Peptide 10/300 GL (Tricorn™)		17-5176-01	10 × 300	1	100 – 7000	No data	No data	13 – 15	> 30 000	1 – 14	1.8/260	1.2 ml/min	25–250 µl	24	Semi-preparative and analytical high performance separation of peptides and other small biomolecules
Superdex 75 PC 3.2/30		17-0771-01	3.2 × 300	1	3000 – 70 000	500 – 30 000	No data	11 – 15	> 30 000	3 – 12	2.4/350	0.1 ml/min	2–25 µl	2.4	Micropreparative analytical high resolving separation of proteins, peptides, polynucleotides and other biomolecules
Superdex 75 10/300 GL (Tricorn)		17-5174-01	10 × 300	1	3000 – 70 000	500 – 30 000	No data	11 – 15	> 30 000	3 – 12	1.8/260	1.5 ml/min	25–250 µl	24	Semi-preparative and analytical high performance separation of proteins, peptides, polynucleotides and other biomolecules
Superdex 75 5/150 GL (Tricorn)		28-9205-04	5 × 150	1	3000 – 70 000	500 – 30 000	No data	11 – 15	> 25 000	3 – 12	1.8/260	0.7 ml/min	4–50 µl	3	Rapid size analysis of protein homogeneity in screening experiments
Superdex 200 PC 3.2/30		17-1089-01	3.2 × 300	1	10 000 – 600 000	1000 – 100 000	200	13 – 15	> 30 000	3 – 12	1.5/220	0.1 ml/min	2–25 µl	2.4	Micropreparative analytical high resolving separation of proteins, DNA fragments and other biomolecules
Superdex 200 10/300 GL (Tricorn)		17-5175-01	10 × 300	1	10 000 – 600 000	1000 – 100 000	200	13 – 15	> 30 000	3 – 12	1.5/220	1.0 ml/min	25–250 µl	24	Semi-preparative and analytical high performance separation of proteins, DNA fragments and other biomolecules
Superdex 200 5/150 GL (Tricorn)		28-9065-61	5 × 150	1	10 000 – 600 000	1000 – 100 000	200	13 – 15	> 25 000	3 – 12	1.5/220	0.8 ml/min	4–50 µl	3	Rapid size analysis of protein homogeneity in screening experiments
HiLoad™ 16/60 Superdex 30 pg	■	17-1139-01	16 × 600	1	< 10 000	No data	No data	22 – 44	> 13 000	3 – 12	0.3/44	1.7 ml/min	≤ 5 ml	120	Preparative separation of peptides and other small biomolecule
HiLoad 26/60 Superdex 30 pg	■	17-1140-01	26 × 600	1	< 10 000	No data	No data	22 – 44	> 13 000	3 – 12	0.3/44	4.4 ml/min	≤ 13 ml	320	
HiLoad 16/60 Superdex 75 pg	■	17-1068-01	16 × 600	1	3000 – 70 000	500 – 30 000	No data	22 – 44	> 13 000	3 – 12	0.3/44	1.7 ml/min	≤ 5 ml	120	Rapid, preparative separation of proteins, peptides, polynucleotides and other biomolecules
HiLoad 26/60 Superdex 75 pg	■	17-1070-01	26 × 600	1	3000 – 70 000	500 – 30 000	No data	22 – 44	> 13 000	3 – 12	0.3/44	4.4 ml/min	≤ 13 ml	320	
HiLoad 16/60 Superdex 200 pg	■	17-1069-01	16 × 600	1	10 000 – 600 000	1000 – 100 000	No data	22 – 44	> 13 000	3 – 12	0.3/44	1.7 ml/min	≤ 5 ml	120	Rapid, preparative separation of proteins, DNA fragments and other biomolecules
HiLoad 26/60 Superdex 200 pg	■	17-1071-01	26 × 600	1	10 000 – 600 000	1000 – 100 000	No data	22 – 44	> 13 000	3 – 12	0.3/44	4.4 ml/min	≤ 13 ml	320	
Superdex 30 prep grade	* ■	17-0905-10	–	25 ml	< 10 000	No data	No data	22 – 44	–	3 – 12	0.3/44	90 cm/h[3]	–	–	Preparative separation of peptides and other small biomolecules
		17-0905-01	–	150 ml											
Superdex 75 prep grade	* ■	17-1044-10	–	25 ml	3000 – 70 000	500 – 30 000	No data	22 – 44	–	3 – 12	0.3/44	90 cm/h[3]	–	–	Rapid, preparative separation of proteins, peptides, polynucleotides and other biomolecules
		17-1044-01	–	150 ml											
Superdex 200 prep grade	* ■	17-1043-10	–	25 ml	10 000 – 600 000	1000 – 100 000	No data	22 – 44	–	3 – 12	0.3/44	90 cm/h[3]	–	–	Rapid, preparative separation of proteins, DNA fragments and other biomolecules
		17-1043-01	–	150 ml											
Superose™ 12 PC 3.2/30		17-0674-01	3.2 × 300	1	1000 – 300 000	No data	150	9 – 13	> 40 000	3 – 12	2.4/350	0.1 ml/min	2–25 µl	2.4	Micropreparative analytical high resolving separation of proteins, peptides, oligonucleotides and polysaccharides
Superose 12 10/300 GL (Tricorn)		17-5173-01	10 × 300	1	1000 – 300 000	No data	150	9 – 13	> 40 000	3 – 12	3/435	1.5 ml/min	25–250 µl	24	Semi-preparative and analytical high performance separation of proteins, peptides, oligonucleotides and polysaccharides
Superose 6 PC 3.2/30		17-0673-01	3.2 × 300	1	5000 – 5 000 000	No data	450	11 – 15	> 30 000	3 – 12	1.2/175	0.1 ml/min	2–25 µl	2.4	Micropreparative analytical high resolving separation of proteins, peptides, oligonucleotides, polysaccharides and nucleic acids
Superose 6 10/300 GL (Tricorn)		17-5172-01	10 × 300	1	5000 – 5 000 000	No data	450	11 – 15	> 30 000	3 – 12	1.5/220	1.0 ml/min	25–250 µl	24	Semi-preparative and analytical high performance separation of proteins, peptides, oligonucleotides, polysaccharides and nucleic acids
Superose 12 prep grade		17-0536-01	–	125 ml	1000 – 300 000	No data	150	20 – 40	–	3 – 12	0.7/100	40 cm/h[3]		–	Preparative high performance separation of proteins, peptides, oligonucleotides and polysaccharides
Superose 6 prep grade		17-0489-01	–	125 ml	5000 – 5 000 000	No data	450	20 – 40	–	3– 12	0.4/58	40 cm/h[3]		–	Preparative high performance separation of proteins, peptides, oligonucleotides, polysaccharides and nucleic acids
HiPrep™ 16/60 Sephacryl™ S-100 HR	■	17-1165-01	16 × 600	1	1000 – 100 000	No data	No data	25 – 75	> 5000	3 – 11	0.15/22	1.0 ml/min	≤ 5 ml	120	Preparative separation of proteins and peptides
HiPrep 26/60 Sephacryl S-100 HR	■	17-1194-01	26 × 600	1	1000 – 100 000	No data	No data	25 – 75	> 5000	3 – 11	0.15/22	2.7 ml/min	≤ 13 ml	320	
HiPrep 16/60 Sephacryl S-200 HR	■	17-1166-01	16 × 600	1	5000 – 250 000	1000 – 80 000	30	25 – 75	> 5000	3 – 11	0.15/22	1.0 ml/min	≤ 5 ml	120	Preparative separation of proteins e.g. small serum proteins such as albumin
HiPrep 26/60 Sephacryl S-200 HR	■	17-1195-01	26 × 600	1	5000 – 250 000	1000 – 80 000	30	25 – 75	> 5000	3 – 11	0.15/22	2.7 ml/min	≤ 13 ml	320	
HiPrep 16/60 Sephacryl S-300 HR	■	17-1167-01	16 × 600	1	10 000 – 1 500 000	2000 – 400 000	118	25 – 75	> 5000	3 – 11	0.15/22	1.0 ml/min	≤ 5 ml	120	Preparative separation of proteins e.g. membrane proteins and serum protein such as antibodies
HiPrep 26/60 Sephacryl S-300 HR	■	17-1196-01	26 × 600	1	10 000 – 1 500 000	2000 – 400 000	118	25 – 75	> 5000	3 – 11	0.15/22	2.7 ml/min	≤ 13 ml	320	
Sephacryl S-100 HR	* ■	17-0612-10	–	150 ml	1000 – 100 000	No data	No data	25 – 75	–	3 – 11	0.2/29	60 cm/h[3]	–	–	Preparative separation of proteins and peptides
		17-0612-01	–	750 ml											
Sephacryl S-200 HR	* ■	17-0584-10	–	150 ml	5000 – 250 000	1000 – 80 000	30	25– 75	–	3 – 11	0.2/29	60 cm/h[3]	–	–	Preparative separation of proteins e.g. small serum proteins such as albumin
		17-0584-01	–	750 ml											
Sephacryl S-300 HR	* ■	17-0599-10	–	150 ml	10 000 – 1 500 000	2000 – 400 000	118	25 – 75	–	3 – 11	0.2/29	60 cm/h[3]	–	–	Preparative separation of proteins e.g. membrane proteins and serum protein such as antibodies
		17-0599-01	–	750 ml											
Sephacryl S-400 HR	* ■	17-0609-10	–	150 ml	20 000 – 8 000 000	10 000 – 2 000 000	271	25 – 75	–	3 – 11	0.2/29	60 cm/h[3]	–	–	Preparative separation of polysaccharides and other macromolecules with extended structures e.g. proteoglycans and liposomes
		17-0609-01	–	750 ml											
Sephacryl S-500 HR	* ■	17-0613-10	–	150 ml	No data	40 000 – 20 000 000	1078	25 – 75	–	3 – 11	0.2/29	50 cm/h[3]	–	–	Preparative separation of large macromolecules e.g. group separation of DNA restriction fragments
		17-0613-01	–	750 ml											
Sephacryl S-1000 SF		17-0476-01	–	750 ml	–	500 000 –> 100 000 000	20 000	40 – 105	–	3 – 11	Not determined	40 cm/h[3]	–	–	Preparation of DNA and separation of very large polysaccharides, proteoglycans and small particles e.g. membrane-bound vesicles and viruses
HiTrap™ Desalting	■	17-1408-01	16 × 25	5	1000 – 5000	100 – 5000	10	15 – 90	Not specified	2 – 13	0.3/44	15 ml/min	0.25–1.5 ml	5	Fast and convenient group separation between high and low molecular weight substances
HiTrap Desalting	† ■	11-0003-29	16 × 25	100											
HiPrep 26/10 Desalting	■	17-5087-01	26 × 100	1	1000 – 5000	100 – 5000	10	20 – 80 (dry)	Not specified	2 – 13	0.15/22	40 ml/min	2.5–15 ml	53	Fast and convenient group separation between high and low molecular weight substances
HiPrep 26/10 Desalting	■	17-5087-02	26 × 100	4											
PD-10 Desalting Columns	■	17-0851-01	14.7 × 50	1	1000 – 5000	100 – 5000	10	86 – 258	Not specified	2 – 13	–	–	1.5–2.5 ml	8.5	Disposable column for group separation and buffer exchange
Sephadex™ G-10	* ■	17-0010-01	–	100 g	< 700	< 700	2	40 – 120 (dry)	–	2 – 13	Can be calculated using Darcy's Law	40 cm/h[3]	–	–	Fast and convenient group separation between peptides and low molecular weight substances
		17-0010-02	–	500 g											
Sephadex G-25 Superfine	* ■	17-0031-01	–	100 g	1000 – 5000	100 – 5000	10	20 – 50 (dry)	–	2 – 13		20 cm/h[3]	–	–	Fast and convenient group separation between high and low molecular weight substances
		17-0031-02	–	500 g											
Sephadex G-25 Fine	* ■	17-0032-01	–	100 g	1000 – 5000	100 – 5000	10	20 – 80 (dry)	–	2 – 13		60 cm/h[3]	–	–	
		17-0032-02	–	500 g											
Sephadex G-25 Medium	*	17-0033-10	–	25 g	1000 – 5000	100 – 5000	10	50 – 150 (dry)	–	2 – 13		150 cm/h[3]	–	–	
		17-0033-01	–	100 g											
		17-0033-02	–	500 g											
Sephadex G-50 Fine	*	17-0042-01	–	100 g	1000 – 30 000	500 – 10 000	No data	20 – 80 (dry)	–	2 – 10		60 cm/h[3]	–	–	
		17-0042-02	–	500 g											
Sephadex LH-20	*	17-0090-10	–	25 g	< 5000	No data	–	27 – 163 (dry)	–	2 – 11	0.15/22	30 cm/h[3]	–	–	Separation of natural products, such as steroids, terpenoids and lipids, in organic solvents
		17-0090-01	–	100 g											
		17-0090-02	–	500 g											

■ BioProcess Media — Made for bioprocessing.

* Process scale quantities are avaible. Please contact GE Healthcare for further information.

† Pack size available by special order.

Tricorn columns are designed for analytical and semi-preparative use with ÄKTAdesign™ systems and other high performance chromatography systems.

PC 3.2/30 is designed for analytical and micropreparative use with SMART System. Precision Column Holder (Code No. 17-1455-01) also enables the columns to be used with ÄKTAdesign systems and other high performance chromatography systems.

HiLoad and HiPrep columns are designed for preparative applications with high performace systems such as ÄKTAdesign systems as well as low pressure systems.

LabMate™ buffer reservoir (Code No. 18-3216-03) can be used with PD-10 Desalting Columns for easier and more convenient equilibration.

Prepacked HiTrap columns are designed for convenient, fast and easy preparative separations. The columns can be used either alone or connected in series. Use the columns with a syringe, peristaltic pump, or chromatography system.

1. pH stability long term refers to the pH interval where the medium is stable over a long period of time without adverse effects on its subsequent chromatographic performance. All ranges given are estimates based on our knowledge and experience.
2. At room temperature in aqueous buffer. The flow rate giving optimal resolution depends on the sample. Refer to instructions for each column and media.
3. Flow rate is calculated from measurement in packed columns with an i.d. of 2.6 cm. A column heigth of 60 cm is used for Superose, Superdex and Sephacryl. For Sephadex the column i.d. is 2.6 cm and the height 30 cm.

Selection Guide — Gel Filtration Media

This selection guide provides some general guidelines, based on the biomolecule of interest and the preferred fractionation range. Additional information can be found in Gel Filtration, Principles and Methods, available from GE Healthcare.

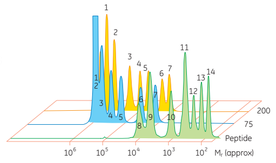
Start from the bottom left.

Start here

- <70% organic solvents / >70% organic solvents
  - Fractionation — Group separation, Desalting
    - Preparative & analytical (M_r 100–5 000 000)
      - Preparative/ Macro fractionation (M_r 1000–5 000 000)
        - Analytical (M_r 100–5 000 000) / Preparative (M_r 500–5 000 000)
          - High selectivity (M_r 100–600 000)
          - High selectivity (M_r 500–600 000)
        - Wide range (M_r 1000–5 000 000)
    - Wide range (M_r 1000–5 000 000)

Superdex

- Upper - medium pressure systems
- High recovery
- High stability
- High selectivity

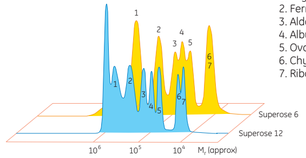


1. Thyroglobulin (M_r 669 000)
2. Ferritin (M_r 440 000)
3. Aldolase (M_r 158 000)
4. Albumin (M_r 67 000)
5. Ovalbumin (M_r 43 000)
6. Chymotrypsinogen A (M_r 25 000)
7. Ribonuclease A (M_r 13 700)
8. Cytochrome C (M_r 12 500)
9. Aprotinin (M_r 6500)
10. Gastrin I (M_r 2126)
11. Substance P (M_r 1348)
12. $(Gly)_6$ (M_r 260)
13. $(Gly)_5$ (M_r 189)
14. Gly (M_r 75)

Semi-preparative Analytical separation	Peptides	Superdex Peptide	
	Small proteins Polynucleotides	Superdex 75	
	Proteins DNA-fragment	Superdex 200	
Preparative separation	Peptides	Superdex 30 prep grade	
	Small proteins Polynucleotides	Superdex 75 prep grade	
	Proteins DNA-fragment	Superdex 200 prep grade	

Superose

- Medium pressure systems
- High recovery
- Wide M_r fractionation range



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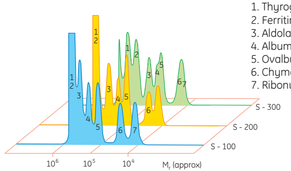
3. Aldolase (M_r 158 000)
4. Albumin (M_r 67 000)
5. Ovalbumin (M_r 43 000)
6. Chymotrypsinogen A (M_r 25 000)
7. Ribonuclease A (M_r 13 700)

Semi-preparative Analytical separation	Wide fractionation range	Superose 6	
	Intermediate fractionation range	Superose 12	
Preparative separation	Wide fractionation range	Superose 6 prep grade	
	Intermediate fractionation range	Superose 12 prep grade	

Sephacryl

- Lower - medium pressure systems
- Macromolecule separation
- Product line covering wide fractionation range



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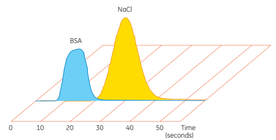
4. Albumin (M_r 67 000)
5. Ovalbumin (M_r 43 000)
6. Chymotrypsinogen A (M_r 25 000)
7. Ribonuclease A (M_r 13 700)

Proteins	Small proteins	Sephacryl S-100 HR	
	Proteins	Sephacryl S-200 HR	
	Large proteins	Sephacryl S-300 HR	
Macro molecules	Fractionation of macromolecules	Sephacryl S-400 HR	
	Purification of macromolecules	Sephacryl S-500 HR	
	Small particles Virus	Sephacryl S-1000 SF	

Sephadex

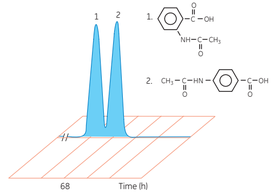
- Desalting
- Group separation



Small peptides		Sephadex G-10 Sephadex G-25 SF Sephadex G-25 F Sephadex G-25 M Sephadex G-50 F
Peptides/small proteins		
Proteins		

Sephadex LH

- Separation in (nonpolar) organic solvents



Low molecular steroids Terpenoids, lipids and peptides		Sephadex LH-20

Fractionation range (globular proteins)

10^2 10^3 10^4 10^5 10^6 10^7 10^8

High resolution

Exclusion limit

Exclusion limit

Exclusion limit

Ordering Information

Columns	Code No.
Superdex Peptide PC 3.2/30	17-1458-01
Superdex Peptide 10/300 GL (Tricorn)	17-5176-01
Superdex 75 PC 3.2/30	17-0771-01
Superdex 75 10/300 GL (Tricorn)	17-5174-01
Superdex 75 5/150 GL	28-9205-04
Superdex 200 PC 3.2/30	17-1089-01
Superdex 200 10/300 GL (Tricorn)	17-5175-01
Superdex 200 5/150 GL	28-9065-61
HiLoad 16/60 Superdex 30 pg	17-1139-01
HiLoad 26/60 Superdex 30 pg	17-1140-01
HiLoad 16/60 Superdex 75 pg	17-1068-01
HiLoad 26/60 Superdex 75 pg	17-1070-01
HiLoad 16/60 Superdex 200 pg	17-1069-01
HiLoad 26/60 Superdex 200 pg	17-1071-01
Superose 12 PC 3.2/30	17-0674-01
Superose 12 10/300 GL (Tricorn)	17-5173-01
Superose 6 PC 3.2/30	17-0673-01
Superose 6 10/300 GL (Tricorn)	17-5172-01
HiPrep 16/60 Sephacryl S-100 HR	17-1165-01
HiPrep 26/60 Sephacryl S-100 HR	17-1194-01
HiPrep 16/60 Sephacryl S-200 HR	17-1166-01
HiPrep 26/60 Sephacryl S-200 HR	17-1195-01
HiPrep 16/60 Sephacryl S-300 HR	17-1167-01
HiPrep 26/60 Sephacryl S-300 HR	17-1196-01
HiTrap Desalting (5×5 ml)	17-1408-01
HiTrap Desalting (100×5 ml)*	11-0003-29
HiPrep 26/10 Desalting (1×53 ml)	17-5087-01
HiPrep 26/10 Desalting (4×53 ml)	17-5087-02
PD-10 Desalting Columns (30 pcs)	17-0851-01

**Pack size available by special order*

Media	Pack size	Code No.
Superdex 30 prep grade	25 ml	17-0905-10
	150 ml	17-0905-01
Superdex 75 prep grade	25 ml	17-1044-10
	150 ml	17-1044-01
Superdex 200 prep grade	25 ml	17-1043-10
	150 ml	17-1043-01
Superose 12 prep grade	125ml	17-0536-01
Superose 6 prep grade	125ml	17-0489-01
Sephacryl S-100 HR	150 ml	17-0612-10
	750 ml	17-0612-01
Sephacryl S-200 HR	150 ml	17-0584-10
	750 ml	17-0584-01
Sephacryl S-300 HR	150 ml	17-0599-10
	750 ml	17-0599-01
Sephacryl S-400 HR	150 ml	17-0609-10
	750 ml	17-0609-01
Sephacryl S-500 HR	150 m	17-0613-10
	750 ml	17-0613-01
Sephacryl S-1000 SF	750 ml	17-0476-01
Sephadex G-10	100g	17-0010-01
	500g	17-0010-02
Sephadex G-25 Superfine	100g	17-0031-01
	500g	17-0031-02
Sephadex G-25 Fine	100g	17-0032-01
	500g	17-0032-02
Sephadex G-25 Medium	25g	17-0033-10
	100g	17-0033-01
	500g	17-0033-02
Sephadex G-50 Fine	100g	17-0042-01
	500g	17-0042-02
Sephadex LH-20	25g	17-0090-10
	100g	17-0090-01
	500g	17-0090-02

Related products

Gel Filtration Calibration Kit, LMW	28-4038-41
Gel Filtration Calibration Kit, HMW	28-4038-42
Handbook: Gel Filtration Principles and Methods	18-1022-18

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Validated Manufacture	• Validated methods for manufacturing & quality control within ISO9001 certified quality system. • A certificate of analysis is available for every lot and an MSDS for every product.
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