Bio-Works

INSTRUCTION

GoBio Screen 7x100 40S, 40Q, 40 DEAE and 40 TREN

GoBio Screen 7x100 40S, GoBio Screen 7x100 40Q, GoBio Screen 7x100 40 DEAE and GoBio Screen 7x100 40 TREN

GoBio™ Screen 7x100 40S, GoBio Screen 7x100 40Q, GoBio Screen 7x100 40 DEAE and GoBio Screen 7x100 40 TREN are prepacked columns for fast and easy optimization of methods and parameters such as selectivity, binding and elution conditions, as well as for small-scale purifications. These resins are designed for ion exchange chromatography (Q, S, DEAE) and multimodal anion exchange chromatography (TREN) in both research and industrial scale for purification of proteins, peptides, viruses and oligonucleotides by utilizing differences in surface charge.

- Prepacked, ready-to-use columns for fast and reproducible optimization of methods and parameters
- IEX resins with a variety of selectivities for optimal purity
- Easy scale-up

Intended use

WorkBeads resins are developed and supported for both research and production-scale chromatography. WorkBeads resins are produced according to ISO 9001:2015, and Regulatory Support Files (RSF) are available to assist the process validation and submissions to regulatory authorities.

The GoBio prepacked column family has been developed for convenient, reproducible, and rapid results and can be used for small scale purification and all the way up to process development and full-scale manufacturing.

Safety

Please read the Safety Data Sheets (SDS) for WorkBeads 40S, WorkBeads 40Q, WorkBeads 40 DEAE and WorkBeads 40 TREN, and the safety instructions for any equipment to be used.

Unpacking and inspection

Unpack the shipment as soon as it arrives and inspect it for damage. Promptly report any damage or discrepancies to complaints@bio-works.com

Principle

Ion exchange chromatography

Ion exchange chromatography (IEX) can be used for the purification of biomolecules, such as proteins, peptides, viruses and oligonucleotides, by utilizing differences in surface charge. The biomolecules interact with the immobilized ion exchange groups of opposite charge on the chromatography resin.

Multimodal ion exchange chromatography

Multimodal ion exchange chromatography separates protein, peptides and other biomolecules via a ligand acting with more than one interaction site. The interaction utilizes two or more different properties, for example charge and hydrophobicity. Depending on the chromatographic conditions, the interactions differ and work either together or separately in the purification procedure.

Using multimodal ion exchange chromatography can be an excellent alternative, when the usual techniques (e.g., ion exchange chromatography, size exclusion chromatography or affinity chromatography) are insufficient. To reach the optimal purification using multimodal chromatography, however, the purification process needs to be optimized according to the properties of the target molecule.

GoBio Screen 7x100 column characteristics

When using GoBio Screen 7x100 columns make sure that the connectors are tightened to prevent leakage. The pressure over the packed bed varies depending on parameters such as the resin characteristics, sample/buffer viscosities and the tubings used. Make sure that the flow through the column is according to the arrow on the column.

These columns should not be opened and refilled.

Note: The GoBio Screen 7x100 column hardware is compatible with most aqueous chemicals, but NOT with concentrated alcohol. Maximum alcohol concentration is 20%.

Table 1. GoBio Screen 7x100 column characteristics.

Column characteristics	
Column hardware	Acrylic
Top and bottom plugs	Polypropylene
Top and bottom filters	Polyamide
Connections	1/16” female thread in both ends
Column volume	3.8 mL
Column dimension	7 × 100 mm
Maximum column hardware pressure[1]	5 bar, 0.5 MPa, 70 psi

[1] The maximum pressure the packed bed can withstand depends on the sample/liquid viscosity and chromatography resin characteristics. The pressure also depends on the tubing used to connect the column and the system restrictions after the column outlet.

Resins characteristics

WorkBeads™ 40S is a strong cation exchanger with sulfonate ligands prepacked in GoBio Screen 7x100 40S. It will bind positively charged substances and can be used over a broad pH range (3 - 13).

WorkBeads 40Q is a strong anion exchanger with quaternary amine ligands prepacked in GoBio Screen 7x100 40Q. It will bind negatively charged substances and can also be used over a broad pH range (3 – 13).

WorkBeads 40 DEAE is a weak anion exchanger with tertiary amine ligands (diethylaminoethyl). This resin should be used as an alternative to WorkBeads 40Q when looking for alternative selectivities. The density of positive charges in WorkBeads 40 DEAE will decrease gradually when the pH is increased above pH 6. This effect can be used to modulate the selectivity of the resin, although the binding capacity may be reduced at basic pH values. This resin is packed in GoBio Screen 7x100 40 DEAE.

WorkBeads 40 TREN has a ligand that is positively charged below approximately pH 9. Due to its high salt tolerance, this resin can be used for several different applications, e.g. for alternative IEX selectivity, for sample cleanup in peptide purification processes (upstream RPC), and in monoclonal antibody (mAb) and his-tagged purification processes to guard the protein A column and IMAC column respectively from viruses and host cell impurities. The feed can be applied directly onto the column at relatively high ionic strengths without the need for prior dilutions. This resin is prepacked in GoBio Screen 7x100 40 TREN

The functional groups are coupled to the resins via chemically stable linkages. For these resins the strength of the binding will depend on the number of charges involved in the interaction, and the distribution of the charges on the surface of the biomolecule. Areas of the biomolecule with the same charge as the resin ligands may reduce the interaction by repulsion.

The structures of the ligands in WorkBeads 40S, WorkBeads 40Q, WorkBeads 40 DEAE and WorkBeads 40 TREN are shown in Figure 1.

The characteristics of GoBio Screen 7x100 40S, GoBio Screen 7x100 40Q, GoBio Screen 7x100 40 DEAE and GoBio Screen 7x100 40 TREN are listed in section “Product Description”.

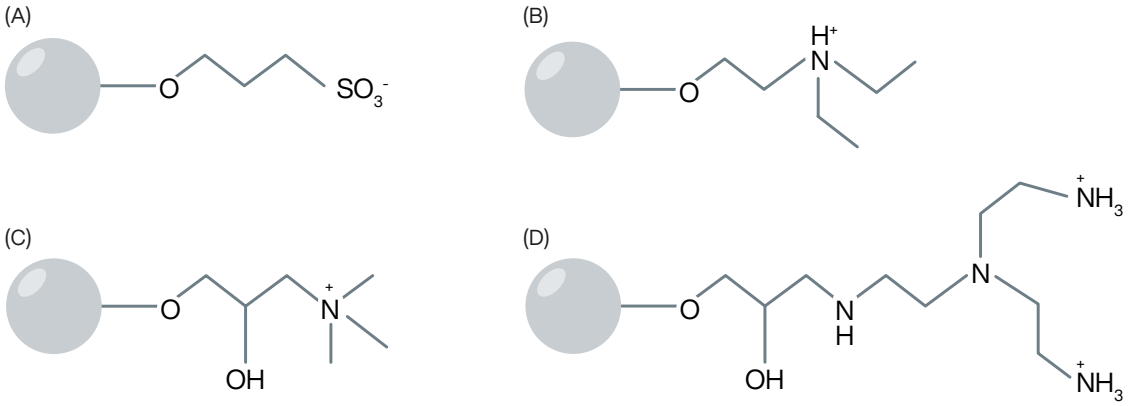

Figure 1. Structure of the ligands used in WorkBeads 40S (A), WorkBeads 40Q (B), WorkBeads 40 DEAE (C) and WorkBeads 40 TREN (D).

General process development

The GoBio Screen 7x100 column format is very useful for screening of parameters and method optimization, as well as for robustness testing when developing a new purification protocol and process. The bed height of 100 mm in combination with the narrow column diameter of 7 mm gives a column volume of only 3.8 mL which minimizes both sample and buffer consumptions when performing scalable experiments at relevant process flow rates.

Below can be seen the typical steps during general process development. Remember to, right from the start, take into consideration process cost, resin cleaning possibilities and environmental constraints.

1. Initial experiments, in which Design of Experiments (DoE) is an effective tool.
2. Screening of parameters and optimization.
3. Find optimal conditions by evaluation of data.
4. Test of robustness.
5. Scale-up.

In process development an important goal is to determine the robustness criteria for the process. The robustness test evaluates factors that may cause variability in, for example, yield and purity.

Purification

Unpacking and connecting GoBio Screen 7x100 column to a chromatography system

*Each packed column is sealed with a pressure syringe in the **bottom** end of the column. It is then placed in a sealed plastic bag.*

1. Cut the plastic bag and remove the column with care.
2. Follow the flow direction (indicated by an arrow on the column label) to clamp the column onto the chromatography system or to a vertical stand.
3. Prepare the chromatography system for connecting the column. The GoBio Screen 7x100 columns are compatible with 1/16" male connectors with narrow heads. The length of the connector thread must be at least 7 mm to avoid leakage.

   Note: It is recommended to use the two red connectors attached to the transport syringe when connecting the column to a chromatography system. One red connector should be used in each end of the column.
4. Gently unhook the springs from the shaft top of the transport syringe using even force.
5. Remove the syringe and keep it for further use during storage.
6. Unscrew the top plug, some liquid may come out. Connect the column to the chromatography system using one of the red connectors "drop-to-drop" avoiding introducing air into the packed column.
7. Connect the bottom of the column to the chromatography system using the second red connector.

Buffer preparation

The buffer species and buffer concentration are important for robust and reproducible methods. Choose a suitable pH and buffer for the binding of the target protein. Good starting points are one pH unit below pI for WorkBeads 40S and one pH unit above pI for WorkBeads 40Q, WorkBeads 40 DEAE and WorkBeads 40 TREN.

The binding conditions should be optimized to achieve binding of the target molecule, while minimizing the binding of impurities (vice versa if operated in "negative mode"). When scouting for the best binding conditions it is important to start with sufficiently low ionic strength. See examples of buffers to use for samples with unknown charge properties in Table 2.

Table 2. Typical buffer compositions for purification using WorkBeads 40S, WorkBeads 40Q, WorkBeads 40 DEAE and WorkBeads 40 TREN.

Resin	Buffer composition
WorkBeads 40S	Binding buffer: 20 mM phosphate, pH 7.0 Elution buffer: 20 mM phosphate, 1 M NaCl, pH 7.0 or Binding buffer: 50 mM sodium acetate, pH 5.0 Elution buffer: 50 mM sodium acetate, 1 M NaCl, pH 5.0
WorkBeads 40Q	Binding buffer: 20 mM Tris-buffer, pH 8.0 Elution buffer: 20 mM Tris-buffer, 1 M NaCl, pH 8.0
WorkBeads 40 DEAE	Binding buffer: 20 mM Tris-buffer, pH 8.0 Elution buffer: 20 mM Tris-buffer, 1 M NaCl, pH 8.0
WorkBeads 40 TREN	Binding buffer: 50 mM Tris-HCl, pH 7.4 Elution buffer: 50 mM Tris-HCl, 1 M NaCl, pH 7.4

Note: Peptides may require a lower ionic strength of the buffers to achieve optimal binding capacities. The buffers used for oligonucleotide and peptide purifications may require addition of organic solvents, such as 5-30% acetonitrile, for optimal performance

Sample preparation

After cell disruption or extraction, clarify the sample by centrifugation at 10 000 - 20 000 × g for 15 - 30 minutes. It is generally also recommended to pass the sample through a 0.22 - 0.45 µm filter, e.g., a syringe filter, to avoid transferring any remaining contaminating particles onto the column. Application of a sample that has not been properly clarified may reduce the performance and lifetime of the column.

The sample should have a pH that confers a net charge to the target protein that is opposite to the charge of the column resin. The ionic strength should be low. Optimal binding conditions are a result of the combination of the pH and the ionic strength. The sample solution may therefore be adjusted before being applied to the column. It is generally recommended that the sample should have a pH and conductivity similar to the binding buffer. Sample adjustments can be done by dilution using for example the binding buffer, by fast chromatographic desalting (see "Related products") or diafiltration, or through adjusting the pH by addition of an acid or base.

Purification

Note: Do not exceed the maximum recommended flow rate and back pressure for the column, see "Product description".

1. Wash out the storage solution with 1 - 2 column volumes (CV) deionized/distilled water if there is a risk that the binding buffer salts may precipitate upon exposure to ethanol. Use a reduced flow rate, 50% of the maximum flow rate when washing out the storage solution.

   This step can be omitted if precipitation is not likely to be a problem.
2. Equilibrate with 5 - 10 CV binding buffer.
3. Apply the adjusted sample.
4. Wash with 5 - 20 CV binding buffer until the UV trace of the effluent returns to near baseline.

   Note: If the resin is used in "negative mode" the target molecule will elute in the wash step.
5. Elute with elution buffer using either a linear gradient, 0 - 100% elution buffer in 10 - 20 CV or a step elution, 5 - 10 CV with binding buffer including the preferred salt concentration.
6. Wash with 5 CV elution buffer including e.g. 1 M NaCl to remove any remaining ionically bound material.
7. If required, perform a cleaning-in-place (CIP), see page 8.
8. For storage wash the column with at least 5 CV 20% ethanol, 0.2 M sodium acetate (GoBio Screen 7x100 40S) or 20% ethanol (GoBio Screen 7x100 40Q, GoBio Screen 7x100 40 DEAE, and GoBio Screen 7x100 40 TREN). Use a reduced flow rate, 50% of the maximum flow rate when equilibrating with the storage solution.
9. Make sure that the stop plugs are tight to prevent leakage.

   For prolonged storage, connect the included syringe filled with storage solution to the bottom end of the column.

Optimization

The goal when optimizing a purification is to identify the parameters that promote binding of the highest amount of the target molecule in the shortest possible time with greatest possible recovery of the target at lowest cost.

The key conditions to be optimized are usually pH and conductivity (by addition of NaCl or other salts, or dilution). Conditions should be selected to achieve binding of the target while avoiding the binding of impurities to maximize purity and yield of the target molecule. If the target molecule is a protein, conditions must also be selected that preserve the protein in its native state.

The following paragraphs will give indications of some parameters that can be tuned to get the optimal conditions. For other useful buffers and their pK_a-values at 25 °C see reference: Methods in Enzymology, Volume 463, pp 46 - 47, Burgess, R.R and Deutcher, M.P.

Strong ion exchangers, such as WorkBeads S and WorkBeads Q, can be used with a broad pH range. A weak ion exchanger such as WorkBeads 40 DEAE will gradually have lower charge density as the pH increases. This allows modulation of its selectivity. When decreasing the charge density, the binding capacity may decrease and because of this, WorkBeads 40 DEAE can be used in a pH range of 3 - 9.5. The limitations in pH that can be used with an ion exchanger will also depend on the target molecule stability. It is often possible to use either an anion exchange column or a cation exchange column to purify the same target. This can be carried out by altering the pH of the buffers to below or above the molecule's pI to change its overall charge.

Optimization of flow rate

The flow rate during sample loading affects the binding capacity and resolution during the elution. A low flow rate during sample application promotes binding capacity since more time is allowed for mass transport of the target substance into the pores of the resin. A small substance, e.g., a peptide, that has a high diffusion rate will have rapid mass transport into the resin and can thus be adsorbed efficiently at higher flow rates. A large target substance (e.g., a large protein or a pegylated molecule) has a lower diffusion rate and is more hindered by the walls in the pores, resulting in slower mass transport. Achieving a high binding capacity of this substance may require lowering the flow rate. If only a part of the binding capacity of the column is used, sample application can be done at a higher flow rate without loss of the target substance.

The residence time can be defined as the time between a molecule entering and exiting the column. The residence time depend on the flow rate and the dimensions of the column and is typically 1 to 5 minutes in IEX. Typical linear flow rates are 150 - 300 cm/h. See further discussion about flow in the section "Scale-up".

Optimization of binding conditions

Selecting a buffer with optimal binding conditions for the target protein will improve the result of the purification. The buffer should have a good buffering capacity and preferably a pK_a-value within 0.5 units from the intended pH. The buffer substance selected should have the same charge as the resin.

Screen for optimal binding conditions by testing a range of pH values in which the target molecule is known to be stable. In some cases, sample conductivity is as important as the pH when screening for optimal binding conditions. Usually, binding buffer with low conductivity is preferred but optimization of the conductivity can improve binding capacity. An increase in ionic strength may decrease the ability of contaminants to bind while the target protein remains bound. As described above, the flow rate is also important for achieving optimal binding conditions. However, it is important that chromatographic conditions are chosen so that the target molecule is stable during the purification. Screen at the temperature at which the process is planned to be run.

Optimization of washing

A continuously decreasing UV signal is an indication of unbound material still being washed out. The washing should continue until the UV signal is stable and the same as in the buffer used for washing, or at least not more than 20 mAU. The washing buffer can be the same as the binding buffer, but it may be useful to add an additional step with a dedicated washing buffer to improve purification.

Optimization of elution conditions

For optimizing the elution condition, it is recommended to always use a linear ionic strength gradient. The results will then be used for the optimal elution buffer when moving to a step elution method which is often the preferred method in process scale as the target molecule is eluted in a more concentrated form. Buffer consumption can be decreased and purification cycle times shortened.

Elution is in most cases carried out using a high salt concentration but altering the pH to change the charge of the adsorbed target molecule is an alternative. A stronger binding may require higher salt concentration for elution. The optimal salt concentration is dependent on the purity and recovery requirements, as well as the properties of the target molecule.

Applying gradient elution gives higher purity than step elution, but step elution may be preferred to obtain the highest possible concentration of the target. To optimize the salt concentration for step elution an initial linear gradient test run should be carried out to determine suitable step elution conditions, see Figure 2.

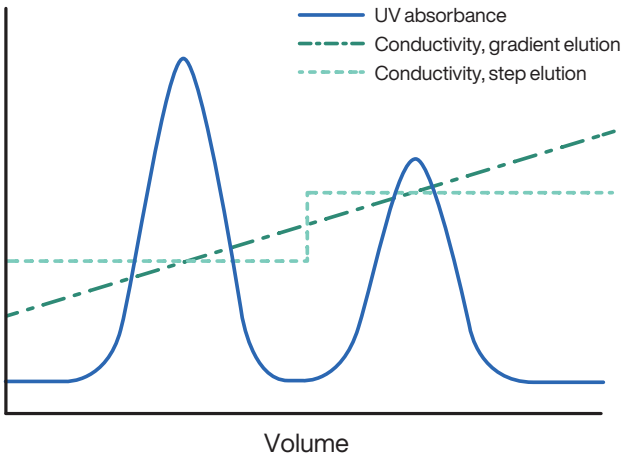

Figure 2. Optimization of step elution with salt. A test run with linear gradient elution gives information about suitable salt concentrations to be used in step elution. Note: Remember to take the system dead volume into account when comparing the gradient and the trace.

Scale-up

After developing a chromatographic procedure using GoBio Screen 7x100 column, the column volume can easily be scaled-up by using larger prepacked columns such as, GoBio Prep 16x100 (20 mL), GoBio Prep 26x100 (53 mL). GoBio Prod prepacked columnsare starting from 1 L. Bulk WorkBeads resins can also be packed into other column formats of choice.

Large-scale purification is often carried out in columns with bed heights of 200 - 300 mm. The column diameter is selected based on the required column volume.

To find out more about Bio-Works' chromatography products visit www.bio-works.com

Scale-up principles

During scale-up the ratio between sample volume and column volume should be kept constant. The column volume is scaled up by increasing the column diameter while keeping the bed height the same (e.g., 200 mm). The linear flow rate should remain the same while the volumetric flow rate increases. The volumetric flow rate for each column can be calculated according to:

$$\text{Volumetric flow rate (mL/min)} = \frac{\text{Linear flow rate (cm/h)} \times \text{Column cross sectional area (cm}^2\text{)}}{60}$$

Flow

The concepts of volumetric flow, linear flow rate and residence time are important when scaling-up in chromatography. Volumetric flow is measured in mL/min or L/min, linear flow in cm/h and residence time in minutes. The relationship between these metrics is:

$$\text{Linear flow rate (cm/h)} = \frac{\text{Volumetric flow (mL/min)} \times 60}{\text{Column cross sectional area (cm}^2\text{)}}$$

$$\text{Residence time (minutes)} = \frac{\text{Column bed height (cm)} \times 60}{\text{Linear flow rate (cm/h)}}$$

In the initial process development work it is common to use a small column, e.g., 7 × 100 mm, to save sample, buffers and time. This column has a shorter bed height than the final column which may have a bed height of 200 mm or more. The flow rate for the larger column can be calculated from the flow that was established on the small column, using the equation above by keeping the residence time of the small column the same as for the larger column. This will allow an increase of the linear flow in proportion to the increase in bed height between the columns, see Table 3 for examples. If the column bed height is kept constant during scale-up, the linear flow rate should be kept constant (as well as the residence time).

Table 3. Example of scale-up parameters.

Column dimension	Residence time (minutes)	Linear flow rate (cm/h)	Volumetric flow rate (mL/min)
16x100	4	150	5.0
26x100	4	150	13.3
80x200	8	150	126
130x200	8	150	332
200x200	8	150	785
240x200	8	150	1131
330x250	10	150	2138

Maintenance

Cleaning and sanitization

During purification, cell-derived impurities such as cell debris, lipids, nucleic acids and protein precipitates, or synthesis-derived impurities such as failure sequences and counter ions from the samples may gradually build-up in the resin and cause fouling. The severity of this process depends on the type of sample applied to the column, and the pre-treatment of the sample. The impurities coating the resin may reduce the performance of the column over time. Regular cleaning (cleaning-in-place, CIP) reduces the rate of further fouling and prolongs the capacity, resolution and flow properties of the column. Cleaning using 1 M NaOH applied at a low flow for 15 - 30 min is often sufficient. Do not use elevated temperature during the CIP treatment, since this may reduce the lifetime of the resin.

Some resins become yellowish during CIP with NaOH (0.5 M or 1 M) due to dehydration which makes the resin more compact, but they will become white again after washing with deionized water (recommended 3-5 column volumes, CV) followed by applying the preferred equilibration buffer.

Our studies show that for example WorkBeads 40S can tolerate up to 1 M NaOH (one week at room temperature) without significant decrease in ionic capacity and dynamic binding capacity or any significant change in pattern of selectivity.

Sanitization (reduction of microorganisms) can be carried out using combinations of NaOH and ethanol. The sanitization procedure and its effectiveness will depend on the microorganisms to be removed and needs to be evaluated for each case.

Storage

Store the resin at 2 to 25°C in 20% ethanol.

For GoBio Screen 7x100 40S it is recommended to include 0.2 M sodium acetate in the storage solution.

For prolonged storage, connect the included transport syringe filled with storage solution to the bottom end of the column.

Note: Use a reduced flow rate during equilibration with 20% ethanol, maximum 50% of the maximum flow rate.

Product descriptions

	GoBio Screen 7x100 40S	GoBio Screen 7x100 40Q
Target substance	Proteins, peptides	Proteins, peptides, oligonucleotides, viruses
Resin	WorkBeads 40S	WorkBeads 40Q
Matrix	Rigid, highly cross-linked agarose	Rigid, highly cross-linked agarose
Average particle size (D_{V50})[1]	45 µm	45 µm
Ligand	Sulfonate ($-SO_3^-$)	Quaternary amine ($-N^+(CH_3)_3$)
Ion capacity	180 - 250 µmol H^+/mL resin	180 - 250 µmol Cl^-/mL resin
Dynamic binding capacity	130 mg BSA/mL resin[2]	50 mg BSA/mL resin[3]
Column volume	3.8 mL	3.8 mL
Column dimension	7 × 100 mm	7 × 100 mm
Recommended flow rate[4]	1.0 - 2.6 mL/min (155 - 405 cm/h)	1.0 - 2.6 mL/min (155 - 405 cm/h)
Maximum flow rate[5]	5 mL/min (780 cm/h)	5 mL/min (780 cm/h)
Maximum back pressure[6]	5 bar, 0.5 MPa, 70 psi	5 bar, 0.5 MPa, 70 psi
Chemical stability[7]	Compatible with all standard aqueous buffers used for protein purification, 1 M NaOH, 20% isopropanol and 20% ethanol. Should not be stored at low pH for prolonged time.	
Operational pH range[8]	3 - 12	2 - 13
CIP and screening pH range[8]	2 - 14	2 - 14
Storage	2 to 25 °C in 20% ethanol with 0.2 M sodium acetate	2 to 25 °C in 20% ethanol

1 The median particle size of the cumulative volume distribution.
2 Dynamic binding capacity determined at 4 minutes residence time in 20 mM sodium citrate, pH 4.0.
3 Dynamic binding capacity determined at 2.5 minutes residence time in 50 mM Tris-HCl, 50 mM NaCl, pH 8.0.
4 Optimal flow rate during binding is depending on the sample.
5 Maximum flow rate for aqueous buffers at 20 °C. Decrease the maximum flow rate if the liquid has a higher viscosity. Higher viscosities can be caused by low temperature (use half of the maximum flow rate for 20% ethanol).
6 The maximum pressure the packed bed can withstand depends on the sample/liquid viscosity and chromatography resin characteristics. The pressure also depends on the tubing used to connect the column and the system restrictions after the column outlet.
7 For more information, see CIP on page 8.
8 Within the operational pH range, the resin can be operated without significant change in function. Within the CIP (Cleaning-in-place) and screening pH range the resin can be subjected to the denoted pH range without significant change in function.

Product descriptions

	GoBio Screen 7x100 40 DEAE	GoBio Screen 7x100 40 TREN
Target substance	Proteins, peptides, oligonucleotides	Proteins, peptides, oligonucleotides, viruses
Resin	WorkBeads 40 DEAE	WorkBeads 40 TREN
Matrix	Rigid, highly cross-linked agarose	Rigid, highly cross-linked agarose
Average particle size (D_{V50})[1]	45 µm	45 µm
Ligand	Diethylaminoethyl (-$CH_2CH_2N^+H(CH_2CH_3)_2$)	Tris(2-aminoethyl)amine (TAEA)
Ion capacity	110 - 160 µmol Cl-/mL resin	130 - 200 µmol Cl^-/mL resin
Dynamic binding capacity	40 mg BSA/mL resin[3]	50 mg BSA/mL resin[2]
Column volume	3.8 mL	3.8 mL
Column dimension	7 × 100 mm	7 × 100 mm
Recommended flow rate[4]	1.0 - 2.6 mL/min (155 - 405 cm/h)	1.0 - 2.6 mL/min (155 - 405 cm/h)
Maximum flow rate[5]	5 mL/min (780 cm/h)	5 mL/min (780 cm/h)
Maximum back pressure[6]	5 bar, 0.5 MPa, 70 psi	5 bar, 0.5 MPa, 70 psi
Chemical stability[7]	Compatible with all standard aqueous buffers used for protein purification, 1 M NaOH, 20% isopropanol and 20% ethanol. Should not be stored at low pH for prolonged time.	
Operational pH range[8]	2 - 13 3 - 9 (recommended pH)	2 - 13
CIP and screening pH range[8]	2 - 14	2 - 14
Storage	2 to 25 °C in 20% ethanol	2 to 25 °C in 20% ethanol

1 The median particle size of the cumulative volume distribution.
2 Dynamic binding capacity determined at 4 min residence time in 50 mM Tris-HCl, 50 mM NaCl, pH 8.0.
4 Optimal flow rate during binding is depending on the sample.
5 Maximum flow rate for aqueous buffers at 20 °C. Decrease the maximum flow rate if the liquid has a higher viscosity. Higher viscosities can be caused by low temperature (use half of the maximum flow rate for 20% ethanol).
6 The maximum pressure the packed bed can withstand depends on the sample/liquid viscosity and chromatography resin characteristics. The pressure also depends on the tubing used to connect the column and the system restrictions after the column outlet.
7 For more information, see CIP on page 8.
8 Within the operational pH range, the resin can be operated without significant change in function. Within the CIP (Cleaning-in-place) and screening pH range the resin can be subjected to the denoted pH range without significant change in function.

GoBio prepacked column family

GoBio prepacked column family is developed for convenient, reproducible and fast results and includes columns with different sizes and formats.

GoBio Mini 1 mL and GoBio Mini 5 mL for small scale purification and screening using a shorter packed bed.

GoBio Screen 7x100 (3.8 mL) for reproducible process development including fast and easy optimization of methods and parameters.

GoBio Prep 16x100 (20 mL) and GoBio Prep 26x100 (53 mL) for lab-scale purifications and scaling up.

GoBio Prep 16x600 (120 mL) and GoBio Prep 26x600 (320 mL) for preparative lab-scale size exclusion chromatography.

GoBio Prod 80x200 (1 L), GoBio Prod 130x200 (2.7 L), GoBio Prod 200x200 (6 L), GoBio Prod 240x200

(9 L) and GoBio Prod 330x250 (21.4 L) for production-scale purifications.

Related products

Product name	Pack size[1]	Article number
Prepacked columns		
GoBio Mini IEX Screening Kit[2]	1 mL × 4	45 900 001
GoBio Mini Peptide Purification Kit[3]	1 mL × 2	45 300 102
GoBio Mini S 1 mL	1 mL × 5	45 200 103
GoBio Mini S 5 mL	5 mL × 5	45 200 107
GoBio Mini Q 1 mL	1 mL × 5	45 100 103
GoBio Mini Q 5 mL	5 mL × 5	45 100 107
GoBio Mini DEAE 1 mL	1 mL × 5	45 150 103
GoBio Mini DEAE 5 mL	5 mL × 5	45 150 107
GoBio Mini TREN 1 mL	1 mL × 5	45 655 213
GoBio Mini TREN 5 mL	5 mL × 5	45 655 217
GoBio Mini Dsalt 1 mL	1 mL × 5	45 360 103
GoBio Mini Dsalt 5 mL	5 mL × 5	45 360 107
GoBio Prep 16x100 40S	20 mL × 1	55 420 021
GoBio Prep 16x100 40Q	20 mL × 1	55 410 021
GoBio Prep 16x100 40 DEAE[4]	20 mL × 1	55 415 021
GoBio Prep 16x100 40 TREN	20 mL × 1	55 463 021
GoBio Prep 16x100 Dsalt[4]	20 mL × 1	55 700 021
GoBio Prep 26x100 40S[4]	53 mL × 1	55 420 031
GoBio Prep 26x100 40Q[4]	53 mL × 1	55 410 031
GoBio Prep 26x100 40 DEAE[4]	53 mL × 1	55 415 031
GoBio Prep 26x100 40 TREN[4]	53 mL × 1	55 463 031
GoBio Prep 26x100 Dsalt	53 mL × 1	55 700 031
GoBio Prod 80x200 40S[4]	1 L	55 420 042
GoBio Prod 80x200 40Q[4]	1 L	55 410 042
GoBio Prod 80x200 40 DEAE[4]	1 L	55 415 042
GoBio Prod 80x200 40 TREN[4]	1 L	55 463 042
GoBio Prod 130x200 40S[4]	2.7 L	55 420 062
GoBio Prod 130x200 40Q[4]	2.7 L	55 410 062
GoBio Prod 130x200 40 DEAE[4]	2.7 L	55 415 062
GoBio Prod 130x200 40 TREN[4]	2.7 L	55 463 062
GoBio Prod 200x200 40S[4]	6 L	55 420 072
GoBio Prod 200x200 40Q[4]	6 L	55 410 072
GoBio Prod 200x200 40 DEAE[4]	6 L	55 4150 72
GoBio Prod 200x200 40 TREN[4]	6 L	55 463 072
GoBio Prod 240x200 40S[4]	9 L	55 420 082
GoBio Prod 240x200 40Q[4]	9 L	55 410 082
GoBio Prod 240x200 40 DEAE[4]	9 L	55 415 082

Product name	Pack size[1]	Article number
GoBio Prod 240x200 40 TREN[4]	9 L	55 463 082
GoBio Prod 330x250 40S[4]	21.4 L	55 420 093
GoBio Prod 330x250 40Q[4]	21.4 L	55 410 093
GoBio Prod 330x250 40 DEAE[4]	21.4 L	55 415 093
GoBio Prod 330x250 40 TREN[4]	21.4 L	55 463 093
Bulk resins		
WorkBeads 40S	25 mL 200 mL 1 L	40 200 001 40 200 002 40 200 010
WorkBeads 40Q	25 mL 200 mL 1 L	40 100 001 40 100 002 40 100 010
WorkBeads 40 DEAE	25 mL 200 mL 1 L	40 150 001 40 150 002 40 150 010
WorkBeads 40 TREN	25 mL 150 mL 1 L	40 603 001 40 603 003 40 603 010
WorkBeads Dsalt	300 mL 1 L	40 360 003 40 360 010

[1] All different pack sizes are available on www.bio-works.com
[2] GoBio Mini IEX Screening Kit includes one of each: GoBio Mini S 1 mL, GoBio Mini Q 1 mL, GoBio Mini DEAE 1 mL and GoBio Mini TREN 1 mL.
[3] GoBio Mini Peptide Purification Kit is a bundle of: GoBio Mini S 1 mL × 1 and GoBio Mini Q 1 mL × 1.
[4] Packed on request.

Ordering information

Product name	Pack size	Article number
GoBio Screen 7x100 40S	3.8 mL × 1	55 420 001
GoBio Screen 7x100 40Q	3.8 mL × 1	55 410 001
GoBio Screen 7x100 40 DEAE[1]	3.8 mL × 1	55 415 001
GoBio Screen 7x100 40 TREN	3.8 mL × 1	55 463 001

[1] Packed on request.

Orders: sales@bio-works.com or contact your local distributor.

For more information about local distributor and products visit www.bio-works.com or contact us at info@bio-works.com

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