Bio-Works

INSTRUCTION

GoBio Prep 100S and 100Q

GoBio Prep 16x100 100S, GoBio Prep 26x100 100S, GoBio Prep 16x100 100Q, and GoBio Prep 26x100 100Q

GoBio™ Prep 16x100 and GoBio 26x100 are columns prepacked with WorkBeads™ 100S and WorkBeads 100Q resins. These resins are designed for use in industrial purification that requires high flow rate and low back pressure when performing purification of proteins, peptides, viruses and oligonucleotides by utilizing the differences in their surface charge.

- Prepacked, ready-to-use columns for fast, reproducible and convenient lab scale purifications
- Reliable and reproducible results
- 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.

GoBio prepacked column family is developed for convenient, reproducible, and fast results and can be used from small scale purification through process development to full-scale manufacturing.

Safety

Please read the associated Safety Data Sheets (SDS) for WorkBeads 100S and WorkBeads 100Q 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 and oligonucleotides, by utilizing the difference in their surface charge. The biomolecules interact with the immobilized ion exchange groups on the chromatography resin with opposite charge. 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. Charges on the biomolecule that is same as on the resin may reduce the interaction by repulsion.

GoBio Prep column characteristics

Make sure when using GoBio Prep columns that the connectors are tightened to prevent leakage. The pressure over the packed bed varies depending on different 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: GoBio Prep column hardware is compatible with most aqueous chemicals, but NOT with concentrated alcohol. Maximal alcohol concentration is 20%.

Table 1. GoBio Prep 16x100 and GoBio Prep 26x100 columns characteristics.

Column characteristics	
Column hardware	Acrylic
Top and bottom plugs	Polypropylene
Top and bottom filters	Polyamid
Connections	1/16” female thread in both ends
Column volumes	20 mL (GoBio Prep 16x100) 53 mL (GoBio Prep 26x100)
Column dimensions	16 × 100 mm (GoBio Prep 16x100) 26 × 100 mm (GoBio Prep 26x100)
Maximal 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 100S is a strong cation exchanger with sulfonate ligands prepacked in GoBio Prep 16x100 100S and GoBio Prep 26x100 100S. It will bind positively charged substances and can be used over a broad pH range (3 - 13).

WorkBeads 100Q is a strong anion exchanger with quaternary amine ligands prepacked in GoBio Prep 16x100 100Q and GoBio Prep 26x100 100Q. It will bind negatively charged substances and can also be used over a broad pH range (3 - 13).

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 100S and WorkBeads 100Q are shown in Figure 1.

The characteristics of GoBio Prep 16x100 100S, GoBio Prep 26x100 100S, GoBio Prep 16x100 100Q and GoBio Prep 26x100 100Q are listed in section “Product description”.

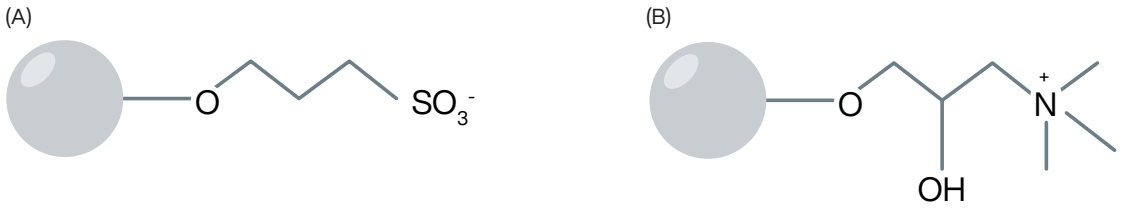

Figure 1. Structure of the chelating ligands used in WorkBeads 40 NTA (A) and WorkBeads 40 IDA (B) resins.

Purification planning

Unpacking and connecting GoBio Prep 16x100 and GoBio Prep 26x100 columns 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 Prep 16x100 and GoBio Prep 26x100 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. One pH unit below pI for WorkBeads 100S and one pH unit above pI for WorkBeads 100Q.

The binding conditions should be optimized to achieve binding of the target protein, while minimizing the binding of impurities (opposite if run 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 100S and WorkBeads 100Q.

Product	Binding buffer	Elution buffer
WorkBeads 100S	50 mM sodium phosphate, pH 7.0 50 mM sodium acetate, pH 5.0	50 mM sodium phosphate, 1 M NaCl, pH 7.0 50 mM sodium acetate, 1 M NaCl, pH 5.0
WorkBeads 100Q	50 mM Tris-HCl, pH 7.4 50 mM Tris-HCl, pH 8.0 50 mM sodium carbonate, pH 9.2	50 mM Tris-HCl, 1 M NaCl, pH 7.4 50 mM Tris-HCl, 1 M NaCl, pH 8.0 50 mM sodium carbonate, 1 M NaCl, pH 9.2

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. The optimal binding conditions depend on 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 pH and conductivity similar with the binding buffer. Sample adjustments can be done by dilution using for example the binding buffer, by fast chromatographic desalting, see “Related products”.

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 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 binding buffer, 5 - 10 CV.
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 Prep 16x100 100S and GoBio Prep 26x100 100S) or 20% ethanol (GoBio Prep 16x100 100Q and GoBio Prep 26x100 100Q).

   Use a reduced flow rate, 50% of the maximum flow rate when equilibration 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 highest 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 protein. The conditions must also be selected to keep the protein in its native state.

The following paragraphs will give indications on 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 100S and WorkBeads 100Q, can be used with a broad pH range. The limitations in pH that can be used with an ion exchanger will also depend on the protein stability. It is often possible to use either an anion exchange column or a cation exchange column to purify the same target protein. This can be carried out by moving the pH of the buffers below or above the protein 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 fast 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 giving it slower mass transport. A high binding capacity of this substance may require a lowered flow rate. If only a part of the binding capacity of the column is used the sample application can be at a higher flow rate without loss of the target substance.

The residence time can be defined as the time between a molecule is 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 be chosen with a good buffering capacity and preferably with a pKa-value within 0.5 units from the intended pH. The buffer substance should be selected to have the same charge as the resin.

Screen for optimal binding conditions by testing a range of pH values where the target molecule is known to be stable. In some cases, the sample conductivity is equally 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 to achieve optimal binding conditions. However, it is important that the chromatographic conditions are chosen so that the target molecule is stable during the purification. Screen at the temperature where 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 obtained results will then be used for the optimal elution buffer when moving to a step elution method which often is preferred in process scale due to that the target molecule is eluted in a more concentrated form, thus decreasing buffer consumption and shortening purification cycle times.

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 can be used as 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 desired 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 obtain suitable step elution conditions, see Figure 2.

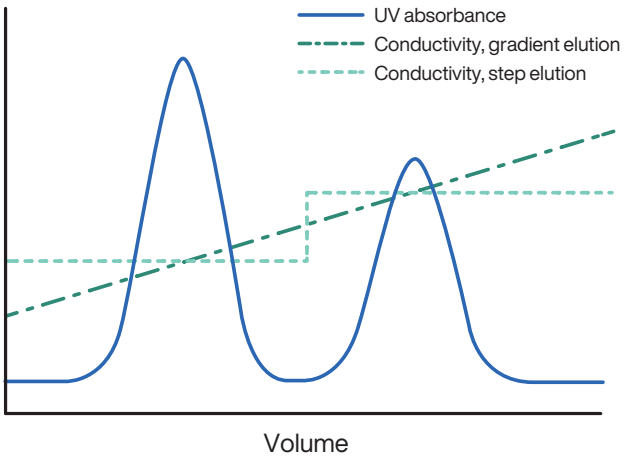

Figure 2. Optimization of step elution with salt. A test run with linear gradient elution gives information about suitable salt concentrations to be used in step elution. Note: Remember to take the system dead volume into account when comparing the gradient and the trace.

Scale-up

After developing a chromatographic procedure using GoBio Prep 16x100 or GoBio Prep 26x100 column the column volume can easily be scaled-up by using larger prepacked columns such as, GoBio Prod prepacked columns starting from 1 L. Bulk packages of 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 and a diameter depending on the needed column volume.

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 doing scale-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 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

Additional purification

Optimization of the purification process by tuning the binding, washing and/or elution conditions of the IEX purification step may not be enough to obtain the required purity. Combining two or more purification step based on additional chromatography techniques is then recommended. For example, cation exchange, anion exchange and multimodal ion exchange chromatography can be combined in a purification process. Other techniques, such as size exclusion chromatography (gel filtration) and hydrophobic interaction chromatography (HIC) are commonly used alternatives. Each purification step should be thoroughly optimized, and preferably in the context of the other steps applied on the overall process.

Desalting and buffer exchange

Buffer exchange or desalting of a sample can be used before analysis and/or after purification by ion exchange chromatography. This can be carried out quickly and easily in lab-scale using GoBio Mini Dsalt 1 mL, GoBio Mini Dsalt 5 mL, GoBio Prep 16x100 Dsalt (20 mL) and GoBio Prep 26x100 Dsalt (53 mL) prepacked columns depending on sample volumes. Go Bio Prod prepacked columns starting from 1 L are available for larger sample volumes, see “Related products”.

These columns are very useful alternatives to dialysis for larger sample volumes or when samples need to be processed rapidly to avoid degradation.

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

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 contaminants 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 covering 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 by 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.

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 Prep 16x100 100S and GoBio Prep 26x100 100S 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 description

	GoBio Screen 16x100 100S GoBio Screen 26x100 100S	GoBio Screen 16x100 100Q GoBio Screen 26x100 100Q
Target substances	Proteins and peptides	Proteins, peptides and oligonucleotides
Resin	WorkBeads 100S	WorkBeads 100Q
Matrix	Rigid, highly cross-linked agarose	Rigid, highly cross-linked agarose
Average particle size (D_{v50})[1]	90 - 110 µm	90 - 110 µm
Ligand	Sulfonate (-SO_3^-)	Quaternary amine (-$N^+(CH_3)_3$)
Ionic capacity	180 - 250 µmol H^+/mL resin	140 - 200 µmol Cl^-/mL resin
Dynamic binding capacity (DBC)	>100 mg BSA/mL resin[2]	>40 mg BSA/mL resin[3]
Column volumes	20 mL (16 × 100) 53 mL (26 × 100)	20 mL (16 × 100) 53 mL (26 × 100)
Column dimensions	16 × 100 mm 26 × 100 mm	16 × 100 mm 26 × 100 mm
Recommended flow rate[4] 16 × 100 26 × 100	 4 - 6 mL/min (120 - 180 cm/h) 10 - 15 mL/min (115 - 170 cm/h)	 4 - 6 mL/min (120 - 180 cm/h) 10 - 15 mL/min (115 - 170 cm/h)
Maximum flow rate[5] 16 × 100 26 × 100	 16 mL/min (475 cm/h) 40 mL/min (450 cm/h)	 16 mL/min (475 cm/h) 40 mL/min (450 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 min residence time in 20 mM sodium citrate, pH 4.0.
3 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 Q 1 mL	1 mL × 5	45 100 103
GoBio Mini Dsalt 1 mL	1 mL × 5	45 360 103
GoBio Mini S 5 mL	5 mL × 5	45 200 107
GoBio Mini Q 5 mL	5 mL × 5	45 100 107
GoBio Mini Dsalt 5 mL	5 mL × 5	45 360 107
GoBio Screen 7x100 100S[4]	3.8 mL × 1	55 120 001
GoBio Screen 7x100 100Q[4]	3.8 mL × 1	55 110 001
GoBio Screen 7x100 40S	3.8 mL × 1	55 420 001
GoBio Screen 7x100 40Q	3.8 mL × 1	55 410 001
GoBio Prep 16x100 40S	20 mL × 1	55 420 021
GoBio Prep 16x100 40Q	20 mL × 1	55 410 021
GoBio Prep 16x100 Dsalt[4]	20 mL × 1	55 700 021
GoBio Prep 26x100 40S	53 mL × 1	55 420 031
GoBio Prep 26x100 40Q	53 mL × 1	55 410 031
GoBio Prep 26x100 Dsalt	53 mL × 1	55 700 031
GoBio Prod 80x200 100S[4]	1 L	55 120 042
GoBio Prod 80x200 100Q[4]	1 L	55 110 042
GoBio Prod 80x200 40S[4]	1 L	55 420 042
GoBio Prod 80x200 40Q[4]	1 L	55 410 042
GoBio Prod 130x200 100S[4]	2.7 L	55 120 062
GoBio Prod 130x200 100Q[4]	2.7 L	55 110 062
GoBio Prod 130x200 40S[4]	2.7 L	55 420 062
GoBio Prod 130x200 40Q[4]	2.7 L	55 410 062
GoBio Prod 200x200 100S[4]	6 L	55 120 072
GoBio Prod 200x200 100Q[4]	6 L	55 110 072
GoBio Prod 200x200 40S[4]	6 L	55 420 072
GoBio Prod 200x200 40Q[4]	6 L	55 410 072
GoBio Prod 240x200 100S[4]	9 L	55 120 082
GoBio Prod 240x200 100Q[4]	9 L	55 110 082
GoBio Prod 240x200 40S[4]	9 L	55 420 082
GoBio Prod 240x200 40Q[4]	9 L	55 410 082
GoBio Prod 330x250 100S[4]	21.4 L	55 120 093
GoBio Prod 330x250 100Q[4]	21.4 L	55 110 093
GoBio Prod 330x250 40S[4]	21.4 L	55 420 093
GoBio Prod 330x250 40Q[4]	21.4 L	55 410 093

Product name	Pack size[1]	Article number
Bulk resins		
WorkBeads 100S	25 mL 200 mL 1 L 5 L 10 L	10 200 001 10 200 002 10 200 010 10 200 050 10 200 060
WorkBeads 100Q	25 mL 200 mL 1 L 5 L 10 L	10 100 001 10 100 002 10 100 010 10 100 050 10 100 060
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 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 Prep 16x100 100S[1]	20 mL × 1	55 120 021
GoBio Prep 16x100 100Q[1]	20 mL × 1	55 110 021
GoBio Prep 26x100 100S[1]	53 mL × 1	55 120 031
GoBio Prep 26x100 100Q[1]	53 mL × 1	55 110 031

[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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