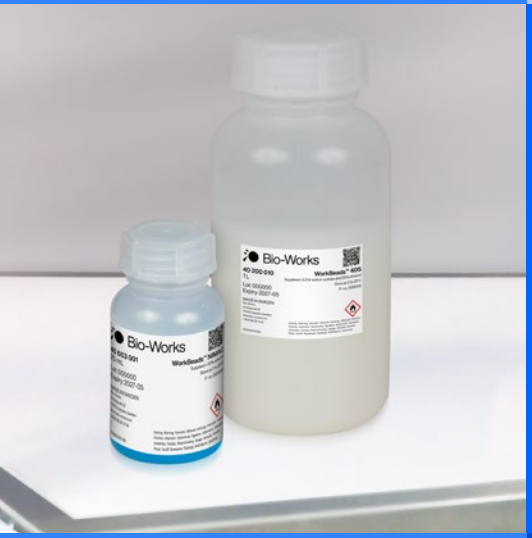
Bio-Works

Bio-Works chromatography resins & prepacked columns

Research & Laboratory – Process Development – Bioprocess Production



Content

Bio-Works provides cutting-edge, proprietary agarose-based resins for purification of biomolecules

Bio-Works is the home of WorkBeads chromatography resins for purification of mAbs, proteins, peptides, oligonucleotides, viruses and vaccines. WorkBeads resins have a unique composition of porous beads with tight bead- and pore-size distribution giving outstanding purity, high binding capacity and high flow rates. The result for our customers is reproducible scale-up, lower total production costs and better process reliability.

WorkBeads are used in small-scale research projects or large-scale industrial production. They vary in agarose content, bead size range and pore size and are therefore suitable for a wide range of applications.

The starting material for WorkBeads resins is agar, an inert, versatile and readily available natural material isolated from red algae. Agarose-based matrices have been successfully used for decades in biotechnology, from research to manufacturing scale, due to the exceptional compatibility of agarose with biomolecules.

The rigidity of the agarose-based beads is important for avoiding compression under high flow rates. Bio-Works patented cross-linking technology leverages high bead rigidity which permits very high flow rates. Large volumes can be processed fast and economically - a key factor in manufacturing processes.

Through our proprietary manufacturing process we are able to offer high quality agarose-based resins which, as well as allowing higher flow rates, give better capacity than traditional resins.

WorkBeads are available in prepacked columns of many sizes as well as in bulk and as pre-activated resin for coupling your own ligands.

Quality management system

Bio-Works quality management system is certified according to the international standard ISO 9001. The system was first fully introduced into the organization in January 2019 and Bio-Works is regularly audited and approved by an external certification organization. The standard is harmonized with EU regulations and the certification endorses the company's ability to provide products that consistently meet both customer requirements and applicable legal requirements.

Located in the home of chromatography

The site for production, development and distribution is located in Uppsala, Sweden, a place strongly associated with chromatography. We work with customers all over the globe, providing agarose-based solutions for purification of peptides, enzymes, antibodies, and other biomolecules.

Our mission is to make important medicines available and accessible to everyone.

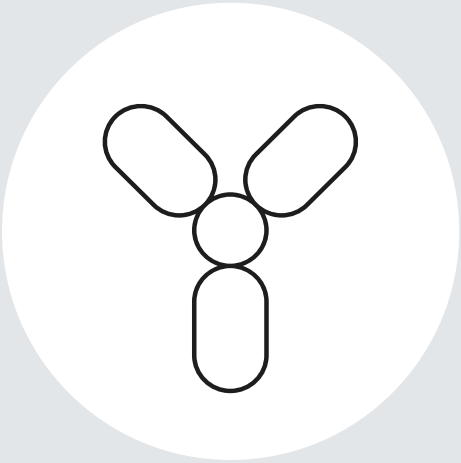
We envision a biotech industry that embraces, develops and builds on new methods and novel ideas.

Our team of "Bio-Workers"

Bio-Works was founded in 2006 by four experienced specialists in protein purification and today we have a strong team with diverse backgrounds. We have as much passion for purification of different target molecules as we have experience in this field. We actively promote equality, in a dynamic, multi-national team with a range of skills. We believe the best recipe for great service is a mixture of innovative thinking and long experience.

Application areas

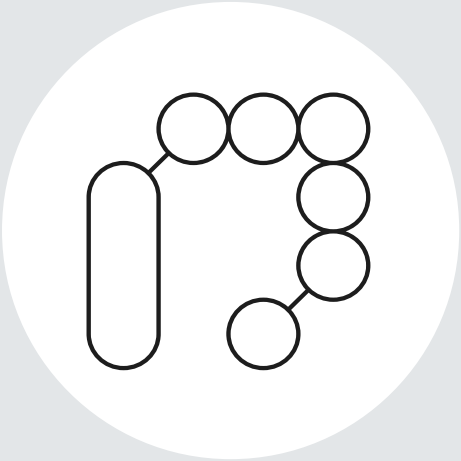
Target molecule – how should you start?



Antibodies

WorkBeads affimAb

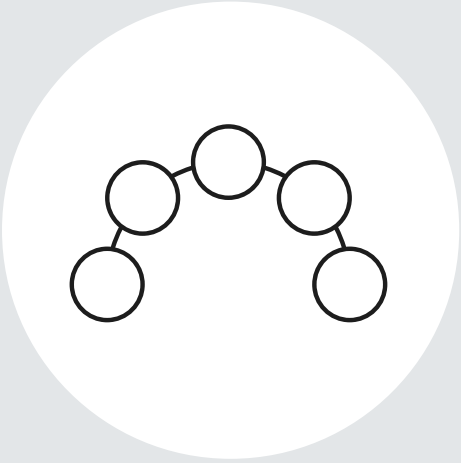
- High dynamic binding capacity at short residence times
- Outstanding alkali stability with 0.5 M NaOH
- WorkBeads 40 TREN for removing host cell proteins and extending the lifetime of the protein A resin



His-tagged proteins

Wide range of IMAC resins

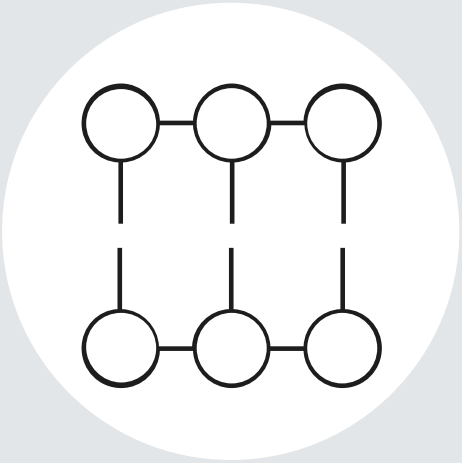
- WorkBeads NiMAC with extra strongly bound Ni^{2+} results in extremely low nickel ion leakage and withstands 20 mM DTT and 20 mM EDTA
- Several precharged and uncharged IMAC resins
- High selectivity, purity and yield
- NTA and IDA chelating ligands



Peptides

WorkBeads 40S and WorkBeads 40Q

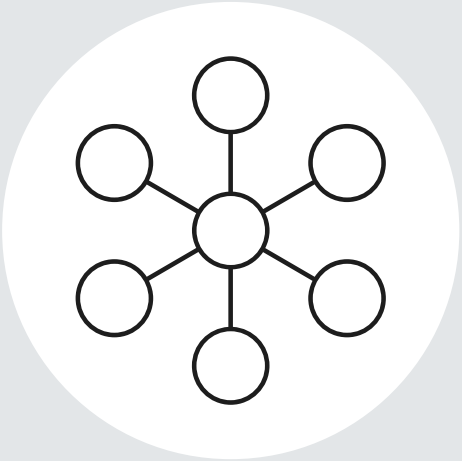
- Higher dynamic binding capacity than other suppliers' products
- Eliminates impurities prior to a polishing step, reducing bioburden on for example high-resolution silica resins
- GoBio Mini Peptide Purification Kit for fast and easy optimization



Oligonucleotides and plasmids

WorkBeads 40Q and WorkBeads 40 Butyl SH

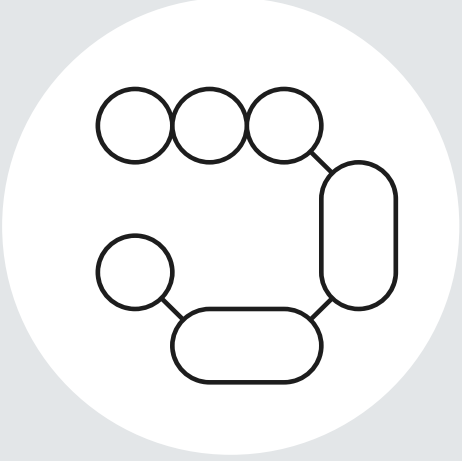
- Higher dynamic binding capacity compared to other suppliers' products
- High purity when using standard low-pressure columns
- Applicable in large-scale industrial purification



Viruses and vaccines

WorkBeads SEC, WorkBeads 40S, WorkBeads 40Q and WorkBeads 40 TREN

- A toolbox for purification of purification of virus-like particles and virus components
- High purity at faster throughputs than non-chromatographic methods



Proteins & enzymes

WorkBeads 40S, WorkBeads 40Q, WorkBeads 40 TREN and WorkBeads 40 Butyl SH

- From capture to polishing
- Lower pressure with efficient purification
- High dynamic binding capacities at short residence times
- GoBio Mini IEX Screening Kit incl. four different 1 mL columns for fast and easy screening for running conditions and selectivity

GoBio prepacked columns

For convenience, reproducible and fast results Bio-Works' WorkBeads resins are available in several different prepacked formats. The GoBio prepacked chromatography columns provide linear scale-up from lab scale to process validation and further to commercial and GMP manufacturing.

- **GoBio Mini 1 mL and 5 mL columns for small scall purifications and screening using packed bed**
- **GoBio Screen 7x100 (3.8 mL) for reproducible process development including fast and easy optimization of different 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 purifications**
- **GoBio Prod columns specifically designed for purification of biological molecules in GMP production processes, such as vaccines, monoclonal antibodies, and recombinant proteins**

GoBio Mini 1 mL
GoBio Mini 5 mL

- Fast and easy small-scale purifications and screenings with packed bed
- Prepacked with most of Bio-Works' different resins
- For easy scale-up, up to five columns can be connected in series
- Use with a syringe, a pump on the bench or with a chromatography system

GoBio Screen 7x100

- GoBio Screen 7x100 (3.8 mL) for reproducible process development
- Small column volume enables small sample and buffer consumption
- Fast and easy optimization of methods and parameters
- Prepacked with most of Bio-Works' different resins

GoBio Prep 16x100
GoBio Prep 26x100

- GoBio Prep 16x100 (20 mL) and GoBio Prep 26x100 (53 mL) for preparative lab-scale purifications
- Quick, easy and reproducible lab scale up
- Prepacked with most of Bio-Works' different resins
- Available for fast desalting of samples up to 15 mL

GoBio Prep 16x600
GoBio Prep 26x600

- GoBio Prep 16x600 (120 mL) and GoBio Prep 26x600 (320 mL) for preparative lab-scale size exclusion chromatography
- Five different size exclusion resins available for optimal results
- Sample volumes from 0.6 mL – 12.8 mL
- Reproducible results without the need for column packing

GoBio Prod 80x200
GoBio Prod 130x200
GoBio Prod 200x200
GoBio Prod 240x200
GoBio Prod 330x250

Both non-cGMP and cGMP grade columns, 1 L, 2.7 L, 6 L, 9 L and 21.4 L.

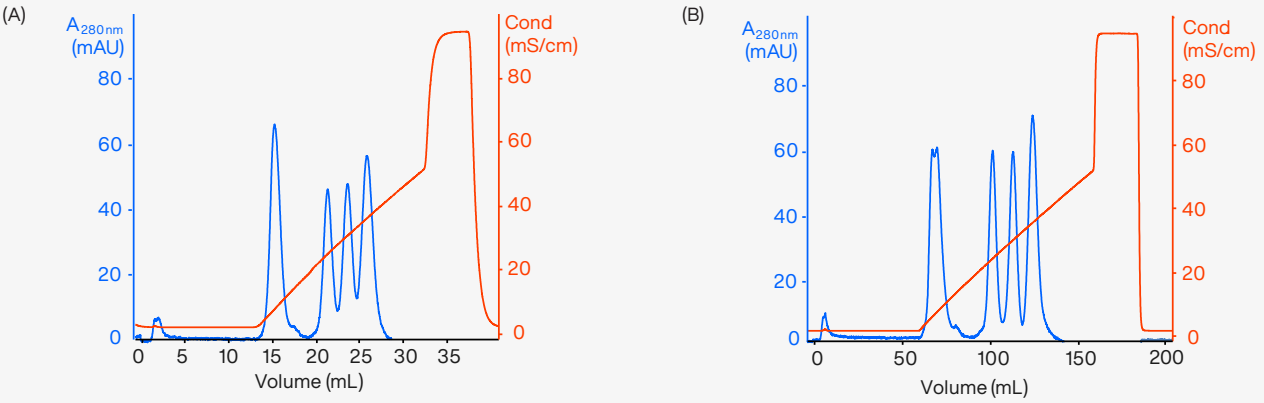
cGMP grade columns are supplied with extended documentation under the following quality standards:

- ISO 9001 Quality Management System
- All materials in direct fluid contact path meet USP Class VI, and USP <88> requirements for In Vivo Biological Reactivity
- All columns are packed in a controlled non-classified clean room that meets ISO Class 7 non-viable particle (NVP) standards at rest
- All fluid contact components are free from materials of animal origin or compliant with EMEA

Applications

5-fold scaling up from GoBio Mini S 1 mL to GoBio Mini S 5 mL

Columns:	(A) GoBio Mini S 1 mL (B) GoBio Mini S 5 mL
Binding buffer:	50 mM MES, pH 6.0
Elution buffer:	50 mM MES, 1 M NaCl, pH 6.0
Sample:	1.5 mg/mL concanavalin A, 1.5 mg/mL ribonuclease A, 0.5 mg/mL α-chymotrypsinogen A, 0.5 mg/mL lysozyme in binding buffer
Flow rate:	150 cm/h (1 mL/min GoBio Mini S 1 mL) (3.5 mL/min GoBio Mini S 5 mL)
Sample volumes:	0.25 mL (GoBio Mini S 1 mL) 1.25 mL (GoBio Mini S 5 mL)
Linear gradient:	0–50% elution buffer in 20 column volumes (CV)

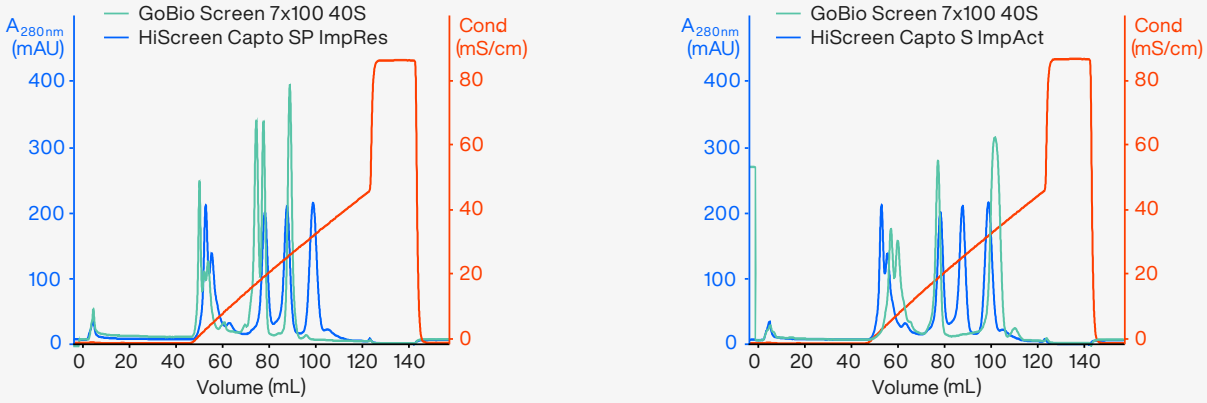


Separation using cation exchange chromatography. Peaks from left to right, concanavalin A, α-chymotrypsinogen A, ribonuclease A and lysozyme. (A) 0.25 mL sample applied onto GoBio Mini S 1 mL and (B) 1.25 mL sample applied onto GoBio Mini S 5 mL. The blue line corresponds to absorbance at 280 nm and the red line to conductivity.

Comparison of GoBio Screen 7x100 40S with HiScreen Capto SP ImpRes and HiScreen Capto S ImpAct

Columns:	GoBio Screen 7x100 40S (3.8 mL) HiScreen™ Capto™ SP ImpRes (7.7 × 100 mm, 4.7 mL) (Cytiva)
Flow rate:	124 cm/h (0.96 mL/min)
Binding buffer:	50 mM MES, pH 6.0
Elution buffer:	50 mM MES, 1 M NaCl, pH 6.0
Sample:	1.5 mg/mL concanavalin A, 1.5 mg/mL ribonuclease A, 0.5 mg/mL α-chymotrypsinogen A, 0.5 mg/mL lysozyme in binding buffer
Sample volume:	1 mL
Linear gradient:	0–50% elution buffer in 20 CV

Columns:	GoBio Screen 7x100 40S HiScreen Capto S ImpAct (7.7 × 100 mm, 4.7 mL) (Cytiva)
Flow rate:	124 cm/h (0.96 mL/min)
Binding buffer:	50 mM MES, pH 6.0
Elution buffer:	50 mM MES, 1 M NaCl, pH 6.0
Sample:	1.5 mg/mL concanavalin A, 1.5 mg/mL ribonuclease A, 0.5 mg/mL α-chymotrypsinogen A, 0.5 mg/mL lysozyme in binding buffer
Sample volume:	1 mL
Linear gradient:	0-50% elution buffer in 20 CV

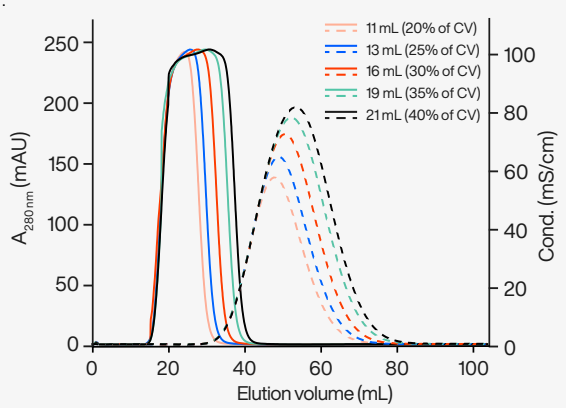


Separation of basic proteins using cation exchange chromatography. Peaks from left to right, concanavalin A, α-chymotrypsinogen A, ribonuclease A and lysozyme. (A) 1 mL sample applied onto GoBio Screen 7x100 40S and HiScreen Capto SP ImpRes. (B) 1 mL sample applied onto GoBio Screen 7x100 40S and HiScreen Capto S ImpAct. The blue and green traces correspond to absorbance at 280 nm and the red line to conductivity.

Dsalting - Influence of sample volume

It is easy to see that the sample volume is important for how efficient the desalting will be and therefore it is important to follow the recommendations of largest sample volumes for the most efficient desalting of the sample.

Column:	GoBio Prep 26x100 Dsalt
Buffer:	20 mM PBS, pH 7.4
Sample:	2 mg/mL BSA in 20 mM PBS, 1 M NaCl, pH 7.4
Sample load:	11 mL (20% of CV) 13 mL (25% of CV) 16 mL (30% of CV) 19 mL (35% of CV) 21 mL (40% of CV)
Flow rate:	300 cm/h (26 mL/min)



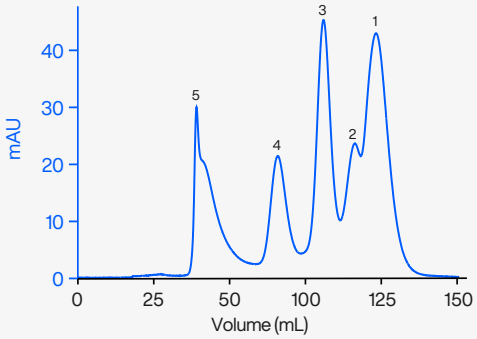
Desalting of 2 mg BSA/mLin 20 mM PBS, 1 M NaCl, pH 7.4 on GoBio Prep 26x100 Dsalt. Sample volume range of 20 – 40% of CV. The solid traces correspond to absorbance at 280 nm (protein) and the dashed traces to the conductivity (salt).

Separations on GoBio Prep 16x600 SEC prepacked columns

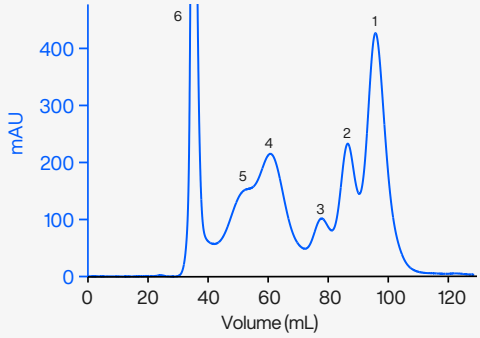
Column:	GoBio Prep 16x600 40/100 SEC
Sample:	1. Cytochrome C, 2.5 mg/mL, M_r 12 000 2. Ribonuclease A, 2.5 mg/mL, M_r 13 700 3. Myoglobin, 2.5 mg/mL, M_r 17 200 4. Ovalbumin, 3 mg/mL, M_r 43 000 5. Thyroglobulin, 3 mg/mL, M_r 669 000
Sample volume:	500 µL
Buffer:	20 mM phosphate buffer 0.15 M NaCl, pH 7.4 (PBS)
Flow rate:	1 mL/min (30 cm/h)

Column:	GoBio Prep 16x600 40/1000 SEC
Sample:	1. Cytochrome C, 5 mg/mL, M_r 12 000 2. Myoglobin, 3 mg/mL, M_r 17 200 3. Ovalbumin, 4 mg/mL, M_r 43 000 4. Ferritin, 4 mg/mL, M_r 440 000 5. Thyroglobulin, 5 mg/mL, M_r 669 000 6. Aggregates
Sample volume:	500 µL
Buffer:	20 mM phosphate buffer 0.15 M NaCl, pH 7.4 (PBS)
Flow rate:	1 mL/min (30 cm/h)

(A)



(B)



Selectivity separations performed on GoBio Prep 16x600 40/100 SEC (A) and GoBio Prep 16x600 40/1000 SEC (B) utilizing proteins of known sizes.

Combinations of resins and column formats

Screening and laboratory scale purifications

	GoBio Mini 1 mL	GoBio Mini 5 mL	GoBio Screen 7x100	GoBio Prep 16x100	GoBio Prep 26x100	GoBio Prep 16x600	GoBio Prep 26x600
Affinity resin							
WorkBeads affimAb	●	●	●	●	●	na	na
IMAC resins							
WorkBeads NiMAC	●	●	●	●	●	na	na
WorkBeads 40 NTA	●	●	●	●	●	na	na
WorkBeads 40 Ni-NTA	●	●	●	●	●	na	na
WorkBeads 40 Co-NTA	●	●	●	●	●	na	na
WorkBeads 40 Cu-NTA	●	●	●	●	●	na	na
WorkBeads 40 Zn-NTA	●	●	●	●	●	na	na
WorkBeads 40 IDA	●	●	●	●	●	na	na
WorkBeads 40 Ni-IDA	●	●	●	●	●	na	na
WorkBeads 40 Co-IDA	●	●	●	●	●	na	na
WorkBeads 40 Cu-IDA	●	●	●	●	●	na	na
WorkBeads 40 Zn-IDA	●	●	●	●	●	na	na
Ion exchange resins							
WorkBeads 40S	●	●	●	●	●	na	na
WorkBeads 100 S	●	●	●	●	●	na	na
WorkBeads 40Q	●	●	●	●	●	na	na
WorkBeads 100 Q	●	●	●	●	●	na	na
WorkBeads 40 DEAE	●	●	●	●	●	na	na
Multimodal ion exchange resin							
WorkBeads 40 TREN	●	●	●	●	●	na	na
Hydrophobic interaction resin							
WorkBeads 40 Butyl SH	●	●	●	●	●	na	na
Desalting resin							
WorkBeads Dsalt	●	●	●	●	●	na	na
Size exclusion resins							
WorkBeads 40/100 SEC	na	na	na	na	na	●	●
WorkBeads 40/1000 SEC	na	na	na	na	na	●	●
WorkBeads 40/10 000 SEC	na	na	na	na	na	●	●
WorkBeads Macro SEC	na	na	na	na	na	●	●
WorkBeads 200 SEC	na	na	na	na	na	●	●
Pre-activated resins							
WorkBeads 40/1000 ACT	●	●	na	na	na	na	na
WorkBeads 40/10 000 ACT	●	●	na	na	na	na	na

● = In stock.
● = Packed on request.
na = Not available.

Production scale purifications

	GoBio Prod 80x200 1 L	GoBio Prod 130x200 2.7 L	GoBio Prod 200x200 6 L	GoBio Prod 240x200 9 L	GoBio Prod 330x250 21.4 L
Affinity resin					
WorkBeads affimAb	●	●	●	●	●
IMAC resins					
WorkBeads NiMAC	●	●	●	●	●
WorkBeads 40 NTA	●	●	●	●	●
WorkBeads 40 Ni-NTA	●	●	●	●	●
WorkBeads 40 Co-NTA	●	●	●	●	●
WorkBeads 40 Cu-NTA	●	●	●	●	●
WorkBeads 40 Zn-NTA	●	●	●	●	●
WorkBeads 40 IDA	●	●	●	●	●
WorkBeads 40 Ni-IDA	●	●	●	●	●
WorkBeads 40 Co-IDA	●	●	●	●	●
WorkBeads 40 Cu-IDA	●	●	●	●	●
WorkBeads 40 Zn-IDA	●	●	●	●	●
Ion exchange resins					
WorkBeads 40S	●	●	●	●	●
WorkBeads 100 S	●	●	●	●	●
WorkBeads 40Q	●	●	●	●	●
WorkBeads 100 Q	●	●	●	●	●
WorkBeads 40 DEAE	●	●	●	●	●
Multimodal ion exchange resin					
WorkBeads 40 TREN	●	●	●	●	●
Hydrophobic interaction resin					
WorkBeads 40 Butyl SH	●	●	●	●	●
Desalting resin					
WorkBeads Dsalt	●	●	●	●	●

● = Packed on request.

Note: On request other column dimensions and bed heights are available.

Technical specifications

GoBio Mini, GoBio Screen and GoBio Prep columns

	GoBio Mini 1 mL & 5 mL	GoBio Screen 7x100	GoBio Prep 16x100	GoBio Prep 26x100
Column hardware	Polypropylene	Acrylic	Acrylic	Acrylic
Top and bottom filters	Polyethylene	Polyamide	Polyamide	Polyamide
Top and bottom plugs	Polypropylene	Polypropylene	Polypropylene	Polypropylene
Connections	1/16" female (top) 1/16" male (bottom)	1/16" female (both ends)	1/16" female (both ends)	1/16" female (both ends)
Column volume	1 mL 5 mL	3.8 mL	20 mL	53 mL
Column dimension	7 × 28 mm (1 mL) 13 × 38 mm (5 mL)	7 × 100 mm	16 × 100 mm	26 × 100 mm
Maximal column hardware pressure[1]	0.3 MPa, 3 bar, 43 psi	0.5 MPa, 5 bar, 70 psi	0.5 MPa, 5 bar, 70 psi	0.5 MPa, 5 bar, 70 psi
Rec. flow rate[2]	See specific instruction for the prepacked column of interest			
Max. flow rate[2]	See specific instruction for the prepacked column of interest			
Chemical stability	1 M NaOH, 30% isopropanol, 70% ethanol	1 M NaOH, 20% isopropanol, 20% ethanol	1 M NaOH, 20% isopropanol, 20% ethanol	1 M NaOH, 20% isopropanol, 20% ethanol

[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.

[2] Specific product instructions are available at www.bio-works.com/documentation.

GoBio Prep columns for size exclusion chromatography

	GoBio Prep 16x600	GoBio Prep 26x600
Column hardware	Acrylic	Acrylic
Top and bottom filters	Polyamide	Polyamide
Top and bottom plugs	Polypropylene	Polypropylene
Connections	1/16" female (both ends)	1/16" female (both ends)
Column volumes	120 mL	320 mL
Column dimensions	16 × 600 mm	26 × 600 mm
Maximal column hardware pressure[1]	0.5 MPa, 5 bar, 70 psi	0.5 MPa, 5 bar, 70 psi
Rec. flow rate[2]	See specific instruction for the prepacked column of interest	
Max. flow rate[2]	See specific instruction for the prepacked column of interest	
Chemical stability	1 M NaOH, 20% isopropanol, 20 % ethanol	1 M NaOH, 20% isopropanol, 20% ethanol

[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.

[2] Specific product instructions are available at www.bio-works.com/documentation

GoBio Prod columns

	GoBio Prod 80x200, GoBio Prod 130x200, GoBio Prod 200x200, GoBio Prod 280x200 and GoBio Prod 330x250
Column hardware	Acrylic
Top and bottom filters	Polyamide
Top and bottom plugs	Polypropylene
Connections	TC-connections
Column volumes	1 L, 2.7 L, 6 L, 9 L, 21.4 L
Column dimensions	80 × 200 mm (1 L), 130 × 200 mm (2.7 L), 200 × 200 mm (6 L), 280 × 200 mm (9 L), 330 × 250 mm (21.4 L)
Rec. flow rate[2]	See specific instruction for the prepacked column of interest
Max. flow rate[2]	See specific instruction for the prepacked column of interest
Max. column hardware pressure[1]	0.5 MPa, 5 bar, 70 psi
Chemical stability	1 M NaOH, 20% isopropanol, 20 % ethanol

[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.

[2] Specific product instructions are available at www.bio-works.com/documentation

Ordering information

Affinity chromatography

Prepacked WorkBeads affimAb

Product name	Pack size	Article number
GoBio Mini affimAb 1 mL	1 mL × 5 1 mL × 5 1 mL × 10	45 800 101 45 800 103 45 800 104
GoBio Mini affimAb 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 800 105 45 800 107 45 800 108
GoBio Screen 7x100 affimAb	3.8 mL × 1	55 800 001
GoBio Prep 16x100 affimAb	20 mL × 1	55 800 021
GoBio Prep 26x100 affimAb	53 mL × 1	55 800 031
GoBio Prod 80x200 affimAb	1 L × 1	55 800 042
GoBio Prod 130x200 affimAb	2.7 L × 1	55 800 062
GoBio Prod 200x200 affimAb	6 L × 1	55 800 072
GoBio Prod 280x200 affimAb	9 L × 1	55 800 082
GoBio Prod 330x200 affimAb	21.4 L × 1	55 800 093

Immobilized Metal Affinity Chromatography

Prepacked WorkBeads NiMAC

Product name	Pack size	Article number
GoBio Mini NiMAC 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 311 45 655 313 45 655 314
GoBio Mini NiMAC 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 655 315 45 655 317 45 655 318
GoBio Screen 7x100 NiMAC	3.8 mL × 1	55 653 001
GoBio Prep 16x100 NiMAC	20 mL × 1	55 653 021
GoBio Prep 26x100 NiMAC	53 mL × 1	55 653 031
GoBio Prod 80x200 NiMAC	1 L × 1	55 653 042
GoBio Prod 130x200 NiMAC	2.7 L × 1	55 653 062
GoBio Prod 200x200 NiMAC	6 L × 1	55 653 072
GoBio Prod 240x200 NiMAC	9 L × 1	55 653 082
GoBio Prod 330x250 NiMAC	21.4 L × 1	55 653 093

Prepacked WorkBeads 40 Ni-NTA

Product name	Pack size	Article number
GoBio Mini Ni-NTA 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 101 45 655 103 45 655 104
GoBio Mini Ni-NTA 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 655 105 45 655 107 45 655 108
GoBio Screen 7x100 Ni-NTA	3.8 mL × 1	55 651 001
GoBio Prep 16x100 Ni-NTA	20 mL × 1	55 651 021
GoBio Prep 26x100 Ni-NTA	53 mL × 1	55 651 031
GoBio Prod 80x200 Ni-NTA	1 L × 1	55 651 042
GoBio Prod 130x200 Ni-NTA	2.7 L × 1	55 651 062
GoBio Prod 200x200 Ni-NTA	6 L × 1	55 651 072
GoBio Prod 240x200 Ni-NTA	9 L × 1	55 651 082
GoBio Prod 330x250 Ni-NTA	21.4 L × 1	55 651 093

Prepacked WorkBeads 40 Co-NTA

Product name	Pack size	Article number
GoBio Mini Co-NTA 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 131 45 655 133 45 655 134
GoBio Mini Co-NTA 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 655 135 45 655 137 45 655 138
GoBio Screen 7x100 Co-NTA	3.8 mL × 1	55 651 401
GoBio Prep 16x100 Co-NTA	20 mL × 1	55 651 421
GoBio Prep 26x100 Co-NTA	53 mL × 1	55 651 431
GoBio Prod 80x200 Co-NTA	1 L × 1	55 651 442
GoBio Prod 130x200 Co-NTA	2.7 L × 1	55 651 462
GoBio Prod 200x200 Co-NTA	6 L × 1	55 651 472
GoBio Prod 240x200 Co-NTA	9 L × 1	55 651 482
GoBio Prod 330x250 Co-NTA	21.4 L × 1	55 651 493

Prepacked WorkBeads 40 Cu-NTA

Product name	Pack size	Article number
GoBio Mini Cu-NTA 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 121 45 655 123 45 655 124
GoBio Mini Cu-NTA 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 655 125 45 655 127 45 655 128
GoBio Screen 7x100 Cu-NTA	3.8 mL × 1	55 651 301
GoBio Prep 16x100 Cu-NTA	20 mL × 1	55 651 321
GoBio Prep 26x100 Cu-NTA	53 mL × 1	55 651 331
GoBio Prod 80x200 Cu-NTA	1 L × 1	55 651 342
GoBio Prod 130x200 Cu-NTA	2.7 L × 1	55 651 362
GoBio Prod 200x200 Cu-NTA	6 L × 1	55 651 372
GoBio Prod 240x200 Cu-NTA	9 L × 1	55 651 382
GoBio Prod 330x250 Cu-NTA	21.4 L × 1	55 651 393

Prepacked WorkBeads 40 Zn-NTA

Product name	Pack size	Article number
GoBio Mini Zn-NTA 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 141 45 655 143 45 655 144
GoBio Mini Zn-NTA 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 655 145 45 655 147 45 655 148
GoBio Screen 7x100 Zn-NTA	3.8 mL × 1	55 651 501
GoBio Prep 16x100 Zn-NTA	20 mL × 1	55 651 521
GoBio Prep 26x100 Zn-NTA	53 mL × 1	55 651 531
GoBio Prod 80x200 Zn-NTA	1 L × 1	55 651 542
GoBio Prod 130x200 Zn-NTA	2.7 L × 1	55 651 562
GoBio Prod 200x200 Zn-NTA	6 L × 1	55 651 572
GoBio Prod 240x200 Zn-NTA	9 L × 1	55 651 582
GoBio Prod 330x250 Zn-NTA	21.4 L × 1	55 651 593

Prepacked WorkBeads NTA

Product name	Pack size	Article number
GoBio Mini NTA 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 111 45 655 113 45 655 114
GoBio Mini NTA 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 655 115 45 655 117 45 655 118
GoBio Screen 7x100 NTA	3.8 mL × 1	55 602 001
GoBio Prep 16x100 NTA	20 mL × 1	55 602 021
GoBio Prep 26x100 NTA	53 mL × 1	55 602 031
GoBio Prod 80x200 NTA	1 L × 1	55 602 042
GoBio Prod 130x200 NTA	2.7 L × 1	55 602 062
GoBio Prod 200x200 NTA	6 L × 1	55 602 072
GoBio Prod 240x200 NTA	9 L × 1	55 602 082
GoBio Prod 330x250 NTA	21.4L × 1	55 602 093

Prepacked WorkBeads 40 Ni-IDA

Product name	Pack size	Article number
GoBio Mini Ni-IDA 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 001 45 655 003 45 655 004
GoBio Mini Ni-IDA 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 655 005 45 655 007 45 655 008
GoBio Screen 7x100 Ni-IDA	3.8 mL × 1	55 650 001
GoBio Prep 16x100 Ni-IDA	20 mL × 1	55 650 021
GoBio Prep 26x100 Ni-IDA	53 mL × 1	55 650 031
GoBio Prod 80x200 Ni-IDA	1 L × 1	55 650 042
GoBio Prod 130x200 Ni-IDA	2.7 L × 1	55 650 062
GoBio Prod 200x200 Ni-IDA	6 L × 1	55 650 072
GoBio Prod 240x200 Ni-IDA	9 L × 1	55 650 082
GoBio Prod 330x250 Ni-IDA	21.4 L × 1	55 650 093

Prepacked WorkBeads 40 Co-IDA

Product name	Pack size	Article number
GoBio Mini Co-IDA 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 031 45 655 033 45 655 034
GoBio Mini Co-IDA 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 655 035 45 655 037 45 655 038
GoBio Screen 7x100 Co-IDA	3.8 mL × 1	55 650 401
GoBio Prep 16x100 Co-IDA	20 mL × 1	55 650 421
GoBio Prep 26x100 Co-IDA	53 mL × 1	55 650 431
GoBio Prod 80x200 Co-IDA	1 L × 1	55 650 442
GoBio Prod 130x200 Co-IDA	2.7 L × 1	55 650 462
GoBio Prod 200x200 Co-IDA	6 L × 1	55 650 472
GoBio Prod 240x200 Co-IDA	9 L × 1	55 650 482
GoBio Prod 330x250 Co-IDA	21.4 L × 1	55 650 493

Prepacked WorkBeads 40 Cu-IDA

Product name	Pack size	Article number
GoBio Mini Cu-IDA 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 021 45 655 023 45 655 024
GoBio Mini Cu-IDA 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 655 025 45 655 027 45 655 028
GoBio Screen 7x100 Cu-IDA	3.8 mL × 1	55 650 301
GoBio Prep 16x100 Cu-IDA	20 mL × 1	55 650 321
GoBio Prep 26x100 Cu-IDA	53 mL × 1	55 650 331
GoBio Prod 80x200 Cu-IDA	1 L × 1	55 650 342
GoBio Prod 130x200 Cu-IDA	2.7 L × 1	55 650 362
GoBio Prod 200x200 Cu-IDA	6 L × 1	55 650 372
GoBio Prod 240x200 Cu-IDA	9 L × 1	55 650 382
GoBio Prod 330x250 Cu-IDA	21.4 L × 1	55 650 393

Prepacked WorkBeads 40 Zn-IDA

Product name	Pack size	Article number
GoBio Mini Zn-IDA 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 041 45 655 043 45 655 044
GoBio Mini Zn-IDA 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 655 045 45 655 047 45 655 048
GoBio Screen 7x100 Zn-IDA	3.8 mL × 1	55 650 501
GoBio Prep 16x100 Zn-IDA	20 mL × 1	55 650 521
GoBio Prep 26x100 Zn-IDA	53 mL × 1	55 650 531
GoBio Prod 80x200 Zn-IDA	1 L × 1	55 650 542
GoBio Prod 130x200 Zn-IDA	2.7 L × 1	55 650 562
GoBio Prod 200x200 Zn-IDA	6 L × 1	55 650 572
GoBio Prod 240x200 Zn-IDA	9 L × 1	55 650 582
GoBio Prod 330x250 Zn-IDA	21.4 L × 1	55 650 593

Prepacked WorkBeads IDA

Product name	Pack size	Article number
GoBio Mini IDA 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 011 45 655 013 45 655 014
GoBio Mini IDA 5 mL	5 mL × 1 5 mL ×5 5 mL × 10	45 655 015 45 655 017 45 655 018
GoBio Screen 7x100 IDA	3.8 mL × 1	55 601 001
GoBio Prep 16x100 IDA	20 mL × 1	55 601 021
GoBio Prep 26x100 IDA	53 mL × 1	55 601 031
GoBio Prod 80x200 IDA	1 L × 1	55 601 042
GoBio Prod 130x200 IDA	2.7 L × 1	55 601 062
GoBio Prod 200x200 IDA	6 L × 1	55 601 072
GoBio Prod 240x200 IDA	9 L × 1	55 601 082
GoBio Prod 330x250 IDA	21.4L × 1	55 601 093

Ion Exchange Chromatography – Cation Exchange

Prepacked WorkBeads 40S

Product name	Pack size	Article number
GoBio Mini S 1 mL	1 mL × 1 1 mL × 5 1 m × 10	45 200 101 45 200 103 45 200 104
GoBio Mini S 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 200 105 45 200 107 45 200 108
GoBio Screen 7x100 40S	3.8 mL × 1	55 420 001
GoBio Prep 16x100 40S	20 mL × 1	55 420 021
GoBio Prep 26x100 40S	53 mL × 1	55 420 031
GoBio Prod 80x200 40S	1 L × 1	55 420 042
GoBio Prod 130x200 40S	2.7 L × 1	55 420 062
GoBio Prod 200x200 40S	6 L × 1	55 420 072
GoBio Prod 240x200 40S	9 L × 1	55 420 082
GoBio Prod 330x250 40S	21.4 L × 1	55 420 093

Prepacked WorkBeads 100S

Product name	Pack size	Article number
GoBio Screen 7x100 100S	3.8 mL × 1	55 120 001
GoBio Prep 16x100 100S	20 mL × 1	55 120 021
GoBio Prep 26x100 100S	53 mL × 1	55 120 031
GoBio Prod 80x200 100S	1 L × 1	55 120 042
GoBio Prod 130x200 100S	2.7 L × 1	55 120 062
GoBio Prod 200x200 100S	6 L × 1	55 120 072
GoBio Prod 240x200 100S	9 L × 1	55 120 082
GoBio Prod 330x250 100S	21.4 L × 1	55 120 093

Ion Exchange Chromatography - Anion Exchange

Prepacked WorkBeads 40Q

Product name	Pack size	Article number
GoBio Mini Q 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 100 101 45 100 103 45 100 104
GoBio Mini Q 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 100 105 45 100 107 45 100 108
GoBio Screen 7x100 40Q	3.8 mL × 1	55 410 001
GoBio Prep 16x100 40Q	20 mL × 1	55 410 021
GoBio Prep 26x100 40Q	53 mL × 1	55 410 031
GoBio Prod 80x200 40Q	1 L × 1	55 410 042
GoBio Prod 130x200 40Q	2.7 L × 1	55 410 062
GoBio Prod 200x200 40Q	6 L × 1	55 410 072
GoBio Prod 240x200 40Q	9 L × 1	55 410 082
GoBio Prod 330x250 40Q	21.4 L × 1	55 410 093

Prepacked WorkBeads 100Q

Product name	Pack size	Article number
GoBio Screen 7x100 100Q	3.8 mL × 1	55 110 001
GoBio Prep 16x100 100Q	20 mL × 1	55 110 021
GoBio Prep 26x100 100Q	53 mL × 1	55 110 031
GoBio Prod 80x200 100Q	1 L × 1	55 110 042
GoBio Prod 130x200 100Q	2.7 L × 1	55 110 062
GoBio Prod 200x200 100Q	6 L × 1	55 110 072
GoBio Prod 240x200 100Q	9 L × 1	55 110 082
GoBio Prod 330x250 100Q	21.4 L × 1	55 110 093

Prepacked WorkBeads 40 DEAE

Product name	Pack size	Article number
GoBio Mini DEAE 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 150 101 45 150 103 45 150 104
GoBio Mini DEAE 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 150 105 45 150 107 45 150 108
GoBio Screen 7x100 40 DEAE	3.8 mL × 1	55 415 001
GoBio Prep 16x100 40 DEAE	20 mL × 1	55 415 021
GoBio Prep 26x100 40 DEAE	53 mL × 1	55 415 031
GoBio Prod 80x200 40 DEAE	1 L × 1	55 415 042
GoBio Prod 130x200 40 DEAE	2.7 L × 1	55 415 062
GoBio Prod 200x200 40 DEAE	6 L × 1	55 415 072
GoBio Prod 240x200 40 DEAE	9 L × 1	55 415 082
GoBio Prod 330x250 40 DEAE	21.4 L × 1	55 415 093

Multimodal ion exchange chromatograhy

Prepacked WorkBeads 40 TREN

Product name	Pack size	Article number
GoBio Mini TREN 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 655 211 45 655 213 45 655 214
GoBio Mini TREN 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 655 215 45 655 217 45 655 218
GoBio Screen 7x100 40 TREN	3.8 mL × 1	55 463 001
GoBio Prep 16x100 40 TREN	20 mL × 1	55 463 021
GoBio Prep 26x100 40 TREN	53 mL × 1	55 463 031
GoBio Prod 80x200 40 TREN	1 L × 1	55 463 042
GoBio Prod 130x200 40 TREN	2.7 L × 1	55 463 062
GoBio Prod 200x200 40 TREN	6 L × 1	55 463 072
GoBio Prod 240x200 40 TREN	9 L × 1	55 463 082
GoBio Prod 330x250 40 TREN	21.4 L × 1	55 463 093

Hydrophobic Interaction Chromatography

Prepacked WorkBeads 40 Butyl SH

Product name	Pack size	Article number
GoBio Mini Butyl SH 1 mL	1 mL × 1	45 500 101
	1 mL × 5	45 500 103
	1 mL × 10	45 500 104
GoBio Mini Butyl SH 5 mL	5 mL × 1	45 500 105
	5 mL × 5	45 100 107
	5 mL × 10	45 100 108
GoBio Screen 7x100 Butyl SH	3.8 mL × 1	55 500 001
GoBio Prep 16x100 Butyl SH	20 mL × 1	55 500 021
GoBio Prep 26x100 Butyl SH	53 mL × 1	55 500 031
GoBio Prod 50x200 Butyl SH	380 mL × 1	55 500 022
GoBio Prod 80x200 Butyl SH	1 L × 1	55 500 042
GoBio Prod 130x200 Butyl SH	2.7 L × 1	55 500 062
GoBio Prod 200x200 Butyl SH	6 L × 1	55 500 072
GoBio Prod 240x200 Butyl SH	9 L × 1	55 500 082
GoBio Prod 330x250 Butyl SH	21.4 L × 1	55 500 093

Size Exclusion Chromatography

Prepacked WorkBeads 40/100 SEC

Product name	Pack size	Article number
GoBio Prep 16x600 40/100 SEC	120 mL × 1	55 434 026
GoBio Prep 26x600 40/100 SEC	320 mL × 1	55 434 036

Prepacked WorkBeads 40/1000 SEC

Product name	Pack size	Article number
GoBio Prep 16x600 40/1000 SEC	120 mL × 1	55 430 026
GoBio Prep 26x600 40/1000 SEC	320 mL × 1	55 430 036

Prepacked WorkBeads 40/10 000 SEC

Product name	Pack size	Article number
GoBio Prep 16x600 40/10 000 SEC	120 mL × 1	55 435 026
GoBio Prep 26x600 40/10 000 SEC	320 mL × 1	55 435 036

Prepacked WorkBeads Macro SEC

Product name	Pack size	Article number
GoBio Prep 16x600 Macro SEC	120 mL × 1	55 437 026
GoBio Prep 26x600 Macro SEC	320 mL × 1	55 437 036

Prepacked WorkBeads 200 SEC

Product name	Pack size	Article number
GoBio Prep 16x600 200 SEC	120 mL × 1	55 230 026
GoBio Prep 26x600 200 SEC	320 mL × 1	55 230 036

Desalting/Buffer exchange

Prepacked WorkBeads Dsalt

Product name	Pack size	Article number
GoBio Mini Dsalt 1 mL	1 mL × 1 1 mL × 5 1 mL × 10 1 mL × 100	45 360 101 45 360 103 45 360 104 45 360 110
GoBio Mini Dsalt 5 mL	5 mL × 1 5 mL × 5 5 mL × 10 5 mL × 100	45 360 105 45 360 107 45 360 108 45 360 109
GoBio Prep 16x100 Dsalt	20 mL × 1	55 700 021
GoBio Prep 26x100 Dsalt	53 mL × 1	55 700 031
GoBio Prod 80x200 Dsalt	1 L × 1	55 700 042
GoBio Prod 130x200 Dsalt	2.7 L × 1	55 700 062
GoBio Prod 200x200 Dsalt	6 L × 1	55 700 072
GoBio Prod 240x200 Dsalt	9 L × 1	55 700 082
GoBio Prod 330x250 Dsalt	21.4 L × 1	55 700 093

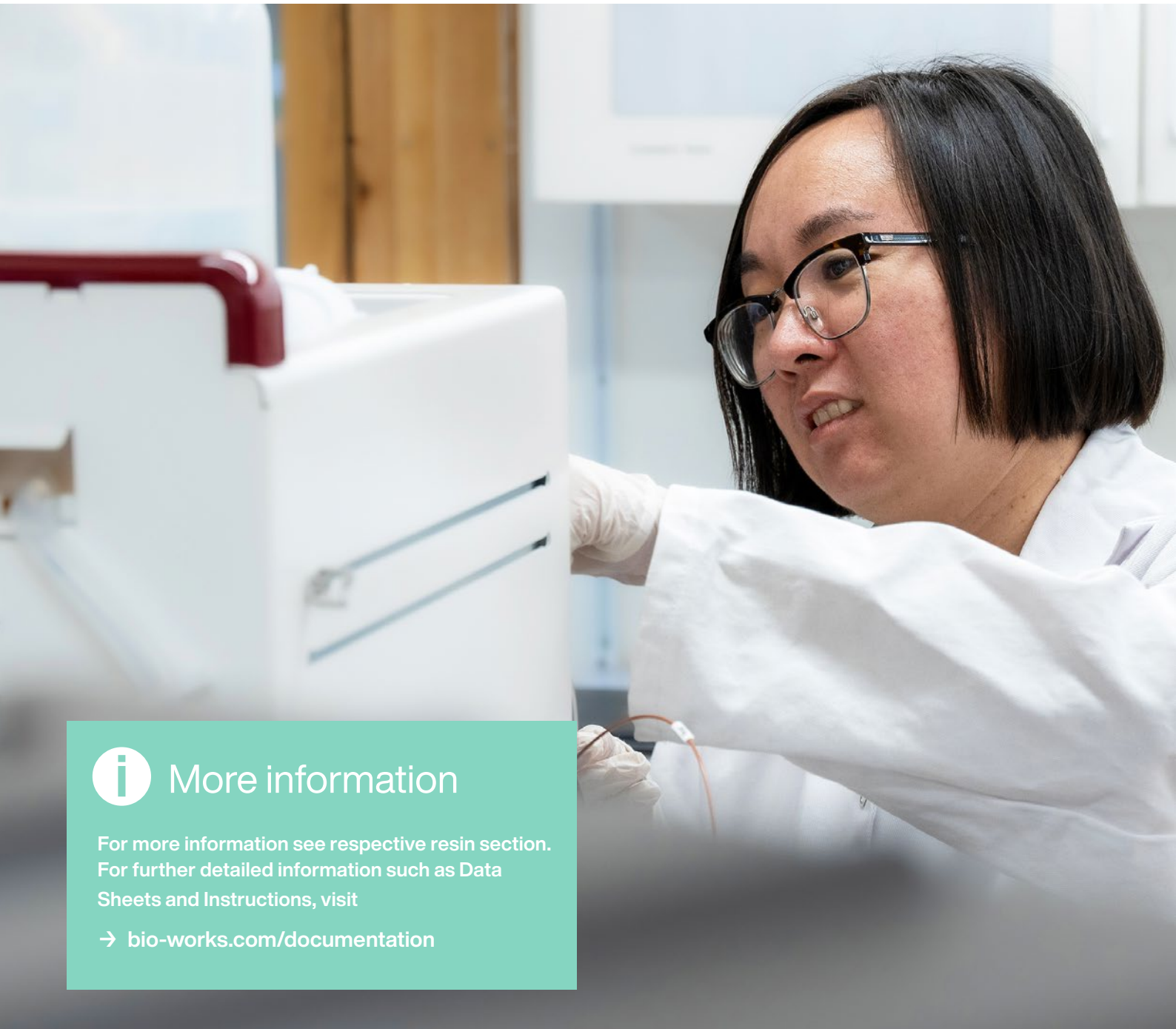
Pre-activated resins

Prepacked WorkBeads 40/1000 ACT

Product name	Pack size	Article number
GoBio Mini ACT 1 mL	1 mL × 1 1 mL × 5 1 mL × 10	45 400 001 45 400 003 45 400 004
GoBio Mini ACT 5 mL	5 mL × 1 5 mL × 5 5 mL × 10	45 400 005 45 400 007 45 400 008

GoBio Mini accessories

Product name	Pack size	Article number
Column plug male 1/16”	10	70 100 010
Column cap female 1/16”	10	70 100 020



More information

For more information see respective resin section. For further detailed information such as Data Sheets and Instructions, visit

→ bio-works.com/documentation

GoBio Mini Screening kits

GoBio Mini Screening kits are products for fast and easy screening of optimal selectivity and to find optimal running conditions in a reliable and convenient way.

Depending on purification scale when the optimal resin has been found for the specific target it is easy to continue using individual GoBio Mini columns or to scale-up using a larger column in the prepacked GoBio column family. Another possibility is to use bulk resin and pack a column of choice.

GoBio Mini NTA His-tag Screening kits

Includes one 1 mL or one 5 mL of each: GoBio Mini Ni-NTA, GoBio Mini Co-NTA, GoBio Mini Cu-NTA and GoBio Mini Zn-NTA.

- Easy screening for optimized purity of His-tagged proteins
- Prepacked with WorkBeads 40 Ni-NTA, WorkBeads 40 Co-NTA, WorkBeads 40 Cu-NTA and WorkBeads 40 Zn-NTA

GoBio Mini IDA His-tag Screening kits

Includes one 1 mL or one 5 mL of each: GoBio Mini Ni-IDA, GoBio Mini Co-IDA, GoBio Mini Cu-IDA and GoBio Mini Zn-IDA.

- Easy screening for optimized purity of His-tagged proteins
- Prepacked with WorkBeads 40 Ni-IDA, WorkBeads 40 Co-IDA, WorkBeads 40 Cu-IDA and WorkBeads 40 Zn-IDA

GoBio Mini IEX Screening kit

Includes one 1 mL of each: GoBio Mini S, GoBio Mini Q, GoBio Mini DEAE and GoBio Mini TREN.

- Easy screening for optimal running conditions and selectivity
- Prepacked with WorkBeads 40S, WorkBeads 40Q, WorkBeads 40 DEAE and WorkBeads 40 TREN
- High binding capacity even at high flow rates

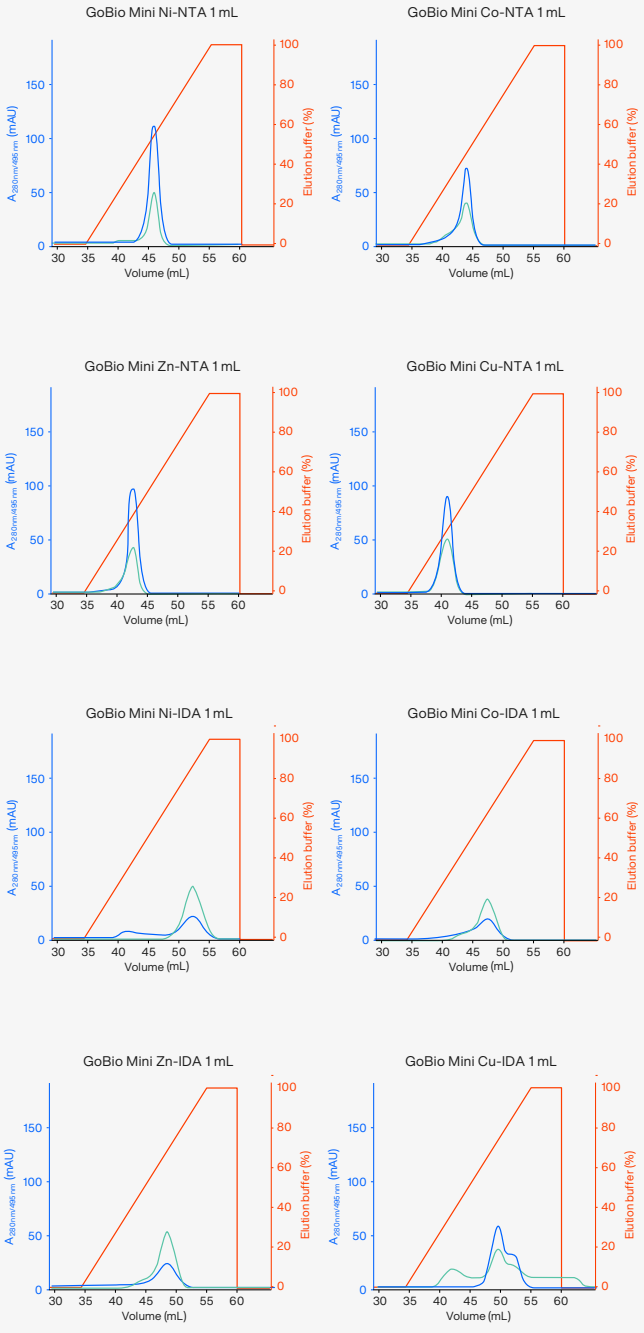
GoBio Mini Peptide Purification kit

Includes one 1 mL of each: GoBio Mini S and GoBio Mini Q.

- Fast screening for optimal peptide purifications
- Prepacked with WorkBeads 40S and WorkBeads 40Q
- Easy screening for optimal running conditions
- High binding capacity even at high flow rates

Applications

Columns:	GoBio Mini Ni-NTA 1 mL, GoBio Mini Co-NTA 1 mL, GoBio Mini Zn-NTA 1 mL, GoBio Mini Cu-NTA 1 mL, GoBio Mini Ni-IDA 1 mL, GoBio Mini Co-IDA 1 mL, GoBio Mini Zn-IDA 1 mL, GoBio Mini Cu-IDA 1 mL
Binding buffer:	50 mM sodium phosphate, 300 mM NaCl, 10 mM imidazole, pH 8.0
Elution buffer:	50 mM sodium phosphate, 300 mM NaCl, 300 mM imidazole, pH 8.0
Sample:	10 mL clarified extract with His-tagged Green Fluorescent Protein (His_6-GFP) expressed in *E. coli*
Flow rate:	1 mL/min (150 cm/h)
Gradient:	0–100% elution buffer, 20 CV



Comparison of purifications of His_6-GFP on GoBio Mini NTA 1 mL and GoBio Mini IDA 1 mL precharged with Ni^{2+}, Co^{2+}, Cu^{2+} and Zn^{2+}.

Blue line: absorbance at 280 nm. Green line: absorbance at 495 nm (specific for His_6-GFP). Red line: elution buffer, %.

Ordering information

Product name	Pack size	Article number
GoBio Mini NTA His-tag Screening kit 1 mL[1]	1 mL × 4	45 700 101
GoBio Mini NTA His-tag Screening kit 5 mL[1]	5 mL × 4	45 700 102
GoBio Mini IDA His-tag Screening kit 1 mL[1]	1 mL × 4	45 700 001
GoBio Mini IDA His-tag Screening kit 5 mL[1]	5 mL × 4	45 700 002
GoBio Mini IEX Screening kit[2]	1 mL × 4	45 900 001
GoBio Mini Peptide Purification kit[3]	1 mL × 2	45 300 102

1 Includes one column each precharged with Ni^{2+}, Co^{2+}, Cu^{2+} or Zn^{2+}.
2 Includes one 1 mL column of each: GoBio Mini S, GoBio Mini Q, GoBio Mini DEAE, GoBio Mini TREN.
3 Bundle of: GoBio Mini S 1 mL × 1 and GoBio Mini Q 1 mL × 1.

More information

Data Sheet, DS 40 650 010
WorkBeads 40 Ni-NTA, WorkBeads 40 Co-NTA,
WorkBeads 40 Zn-NTA, WorkBeads 40 Cu-NTA
WorkBeads 40 Ni-IDA, WorkBeads 40 Co-IDA,
WorkBeads 40 Zn-IDA, WorkBeads 40 Cu-IDA
GoBio Mini NTA His-tag Screening kit
GoBio Mini IDA His-tag Screening kit
GoBio prepacked columns

→ **bio-works.com/product/imac-resin**

Data Sheet, DS 40 100 010
WorkBeads 40S, WorkBeads 40Q, WorkBeads 40 DEAE
GoBio Mini IEX Screening Kit
GoBio Mini Peptide Purification Kit
GoBio prepacked columns

→ **bio-works.com/product/iex-resin**

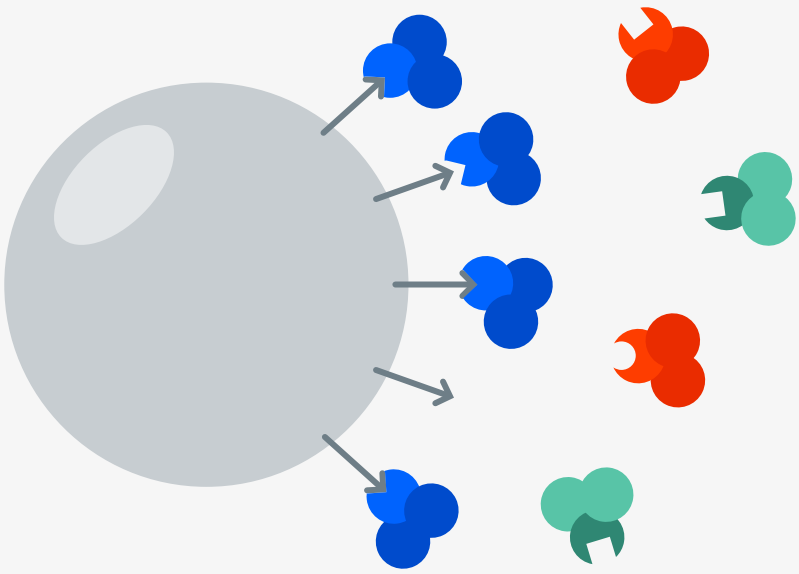
Affinity chromatography

Affinity chromatography (AC) separates proteins on the basis of a reversible interaction between a protein (or group of proteins) and a specific ligand coupled to a chromatography matrix. The technique is ideal for the capture step in a purification protocol. The target protein is collected in a highly pure and concentrated form. The high selectivity of affinity chromatography enables many purifications to be achieved in only one simple step, for example, purification of antibodies.

Target molecules

Monoclonal and polyclonal antibodies, bound via the Fc-region.

See schematic depicting affinity chromatography.



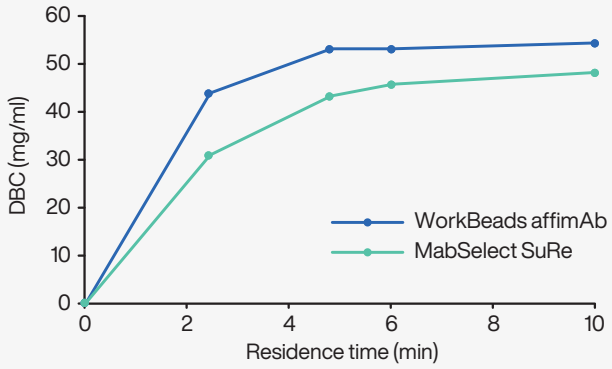
WorkBeads affimAb

- High dynamic binding capacity at short residence times
- Outstanding alkali stability with 0.5 M NaOH, extends the number of purification cycles
- Excellent purity, recovery and reproducibility
- Negligible protein A leakage
- Available in several different GoBio prepacked columns

Applications

Dynamic binding capacity *vs.* residence time

Resins:	WorkBeads affimAb MabSelect SuRe™ (Cytiva)
Column volume:	3.4 mL (6.6 × 100 mm)
Sample:	1 mg/mL human polyclonal IgG in PBS, pH 7.4
Binding buffer:	PBS, pH 7.4
Elution buffer:	0.1 M glycine-HCl, pH 2.7
Cleaning-in-place (CIP):	5 column volumes (CV) 0.5 M NaOH at 2.4 min residence time (RT)
Residence times:	2.4, 4.8, 6 and 10 min (250, 125, 100 and 60 cm/h)



Alkali stability comparison

Resins:	WorkBeads affimAb MabSelect SuRe
Column volume:	3.4 mL (6.6 × 100 mm)

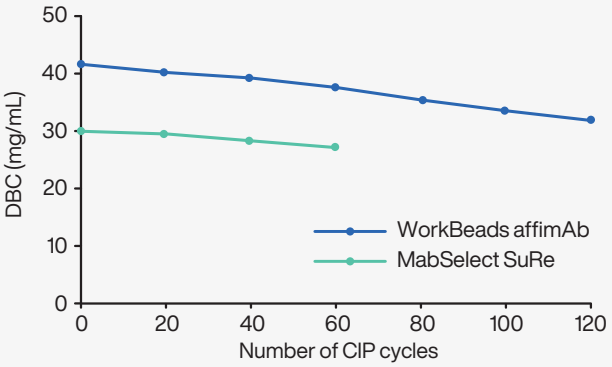
DBC (10% breakthrough) determined at start and after each 20th CIP cycle

Sample:	1 mg/mL human polyclonal IgG in PBS, pH 7.4
Flow rate:	1.4 mL/min (2.4 min RT)
Binding buffer:	PBS, pH 7.4
Elution buffer:	0.1 M glycine-HCl, pH 2.7

Each CIP cycle:

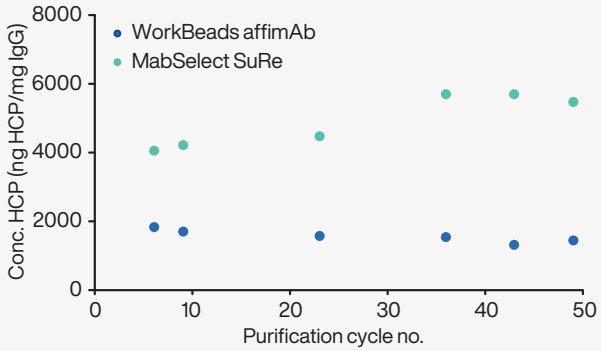
1. 5 CV PBS, pH 7.4 at 1.4 mL/min (2.4 min RT)
2. 0.5 M NaOH, 15 min contact time at 1 mL/min
3. 5 CV PBS, pH 7.4 at 1.4 mL/min
4. 5 CV 0.1 M glycine-HCl, pH 2.7 at 1.4 mL/min
5. 5 CV PBS, pH 7.4 at 1.4 mL/min

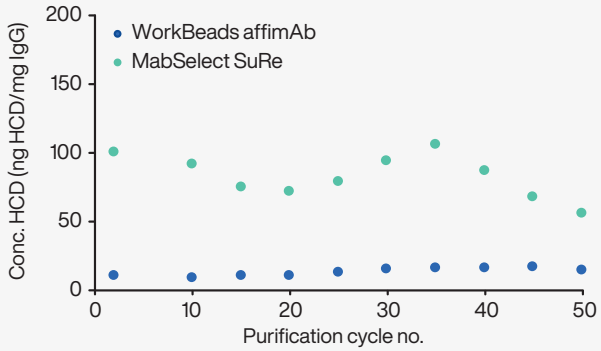
0.5 M NaOH, 15 min contact time for 120 cycles

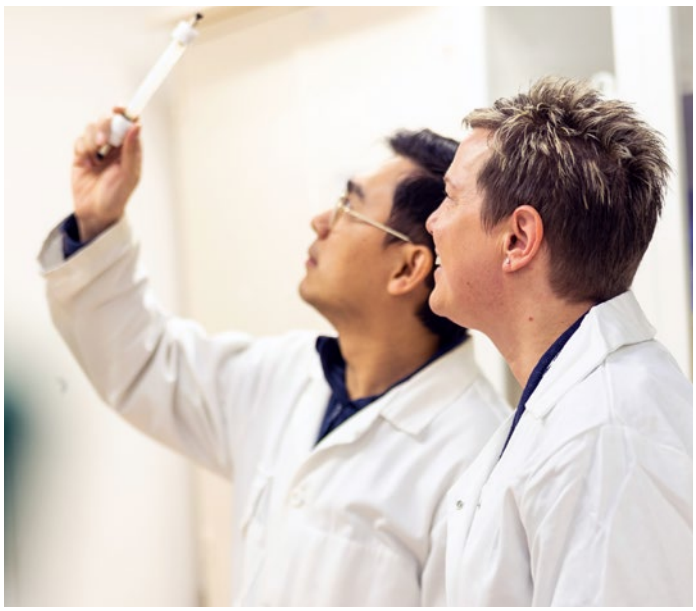


HCP and HCD impurities in eluted mAb

Columns:	WorkBeads affimAb: 6.6 × 50 mm, 1.7 mL MabSelect SuRe: 6.6 × 50 mm, 1.7 mL
Sample:	18 mL clarified cell supernatant from CHO cells (100 cm/h)
Binding/wash buffer:	PBS, pH 7.4 (300 cm/h)
Elution buffer:	100 mM glycine-HCl, pH 2.7 (150 cm/h)
CIP:	0.5 M NaOH (100 cm/h), 10 minutes contact time in each cycle
HCP:	CHO CHP ELISA kit (#F550, Cygnus Technologies)
HCD:	Quant-iT™ PicoGreen™ dsDNA Assay Kit (#P7589, ThermoFisher)







Technical specifications

	WorkBeads affimAb
Matrix	Rigid, highly cross-linked agarose
Average particle size[1] (D_{v50})	50 µm
Ligand	Alkali stable recombinant protein A expressed in *E. coli* using animal-free medium
Dynamic binding capacity[2] (DBC)	> 40 mg human IgG/mL resin
Max. recommended flow rate[3]	300 cm/h
Chemical stability	Compatible with all standard aqueous buffers used for protein purification, 0.5 M NaOH (pH 12), 10 mM HCl (pH 2), 0.1 M sodium citrate-HCl (pH 3), 6 M guanidine-HCl, 20% ethanol Should not be stored at low pH for prolonged time.
pH stability	3 to 12
Cleaning-in-place (CIP) stability	Up to 0.5 M NaOH
Storage	2 to 8°C in 20 % ethanol

[1] The median particle size of the cumulative volume distribution.

[2] DBC was determined at 10% breakthrough ($Q_{B10\%}$) by frontal analysis with 1 mg/mL human polyclonal IgG in PBS, pH 7.4 at 1.4 mL/min (245 cm/h, 2.5 minutes residence time) in a column packed with WorkBeads affimAb resin, column bed 6.6 × 100 mm.

[3] Recommended flow rate at 20°C using aqueous buffers.

Ordering information

Product name	Pack size	Article number
WorkBeads affimAb	25 mL	40 800 001
	200 mL	40 800 002
	1 L	40 800 010
	5 L	40 800 050
	10 L	40 800 060

More information

Data Sheet, DS 40 800 010
WorkBeads affimAb, GoBio prepacked columns

→ **bio-works.com/product/affinity-chromatography**

Immobilized metal ion affinity chromatography

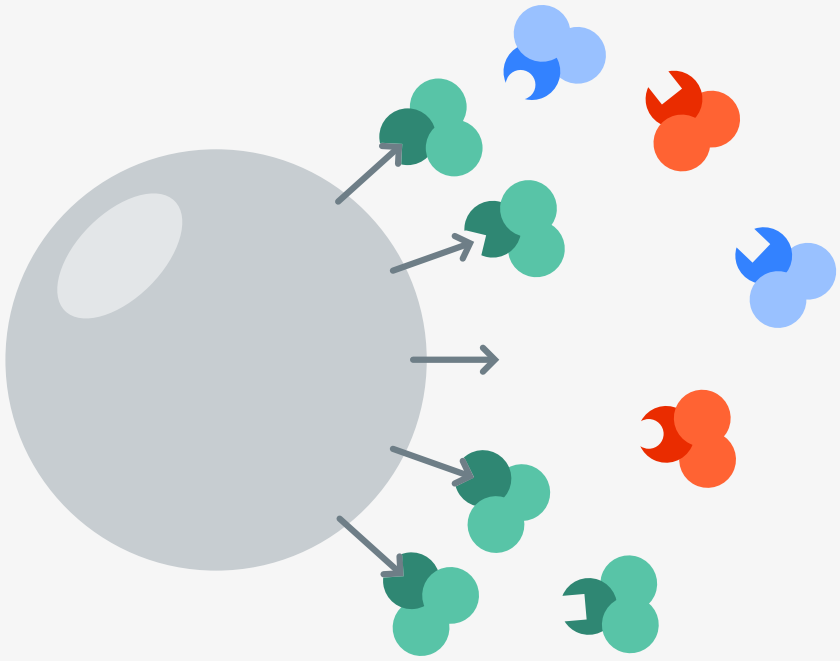
Immobilized metal ion affinity chromatography (IMAC) separates most proteins with exposed histidine, cysteine and tryptophan on their surface. IMAC is an excellent technique for optimization and purification of His-tagged proteins. The technique is ideal for capture directly from clarified cell lysate. The target protein is collected in a highly purified and concentrated form.

Several factors influence the final purity of a His-tagged protein after an IMAC purification, for example, position of the tag (C- or N-terminal), the length of the tag, immobilized metal ion (Ni^{2+}, Co^{2+}, Zn^{2+}, Cu^{2+}) and the ligand immobilized on the matrix (NTA or IDA). To make the optimization of His-tagged protein purifications as efficient as possible, Bio-Works offers products with many combinations of metal ion and immobilized ligand, as well as GoBio Mini His-tag NTA Screening kits and GoBio Mini His-tag IDA Screening kits.

Target molecules

His-tagged proteins and other proteins with exposed histidine, cysteine and tryptophan on their surface.

See schematic depicting immobilized metal ion affinity chromatography.



Precharged IMAC resin resistant to DTT and EDTA

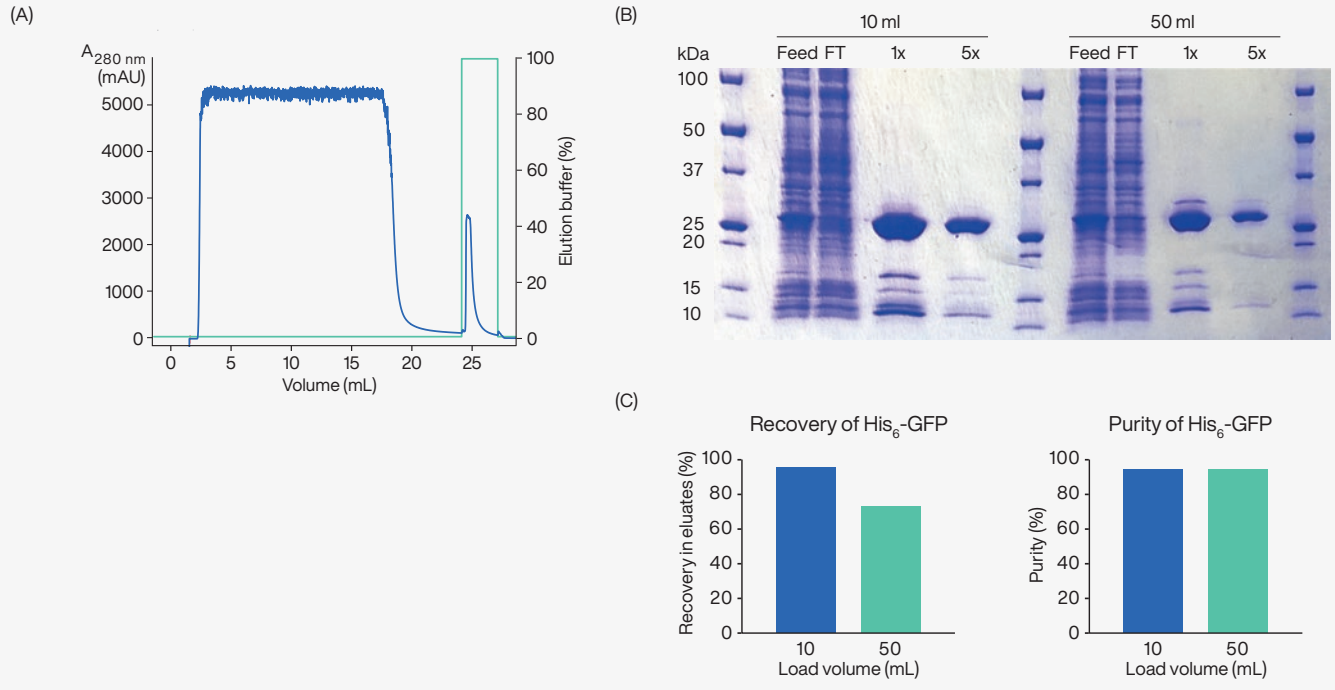
WorkBeads NiMAC

- Resin with extra strongly bound Ni^{2+} resulting in extremely low nickel ion leakage
- Highly resistant to reducing agents up to 20 mM DTT
- Highly resistant to chelating substances present in eukaryotic extracts or up to 20 mM EDTA
- Excellent purity, recovery and reproducible results
- Outstanding alkali stability with 0.5 M NaOH, extends the number of purification cycles
- Available in several different GoBio prepacked columns

Applications

Larger sample load incl. 20 mM DTT and 20 mM Na_2-EDTA

Column:	GoBio Mini NiMAC 1 mL
Sample:	50 mL His_6-GFP in binding buffer with 20 mM DTT and 20 mM Na_2-EDTA
Binding buffer:	50 mM sodium phosphate, 300 mM NaCl, 10 mM imidazole, pH 8.0
Elution buffer:	50 mM sodium phosphate, 300 mM NaCl, 300 mM imidazole, pH 8.0
Elution:	Step gradient, 100% elution buffer, 10 column volumes (CV)
Flow rates:	0.5 mL/min (78 cm/h; elution); 1 mL/min (loading)



(A) Chromatogram with 50 mL load of His_6-GFP, (B) SDS-PAGE under reducing conditions of the feed, flow-through (FT) and eluted pool (1x: concentrated eluate, 5x: 1:5 diluted eluate) from 10 mL sample load and 50 mL sample load. (C) Comparison of target recovery and purity for the two different sample load purifications.

IMAC resins precharged with different metal ions

WorkBeads 40 Ni-NTA
WorkBeads 40 Co-NTA
WorkBeads 40 Zn-NTA
WorkBeads 40 Cu-NTA
WorkBeads 40 Ni-IDA
WorkBeads 40 Co-IDA
WorkBeads 40 Zn-IDA
WorkBeads 40 Cu-IDA

- Resins immobilized with either NTA (Nitrilotriacetic acid) or IDA (Iminodiacetic acid) and four different choices of metal ions Ni^{2+}, Co^{2+}, Zn^{2+} or Cu^{2+}
- Precharged with different metal ions for ease of use
- Low leakage of immobilized ligand and metal ions
- Resistant to harsh cleaning agents (NaOH). Note! The metal ions have to be stripped off before cleaning
- High binding capacity and flow rate
- Available in several different GoBio prepacked columns

Applications

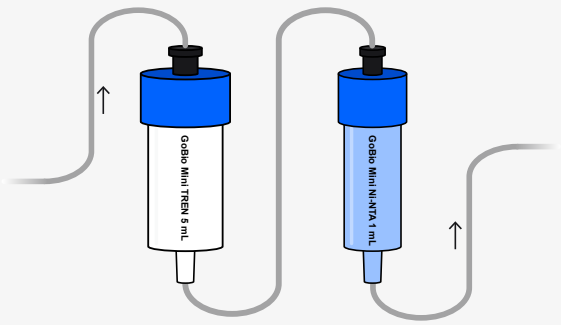
Purification of His-tagged protein on GoBio Mini Ni-NTA *vs.* HisTrap™ FF +/- upstream GoBio Mini TREN

Purification of complex feeds expressed in different host cells can result in an extensive bioburden on the capture column in the form of DNA and different protein impurities when the feed is directly loaded without major pre-treatments. These impurities also often bind non-specifically to the target molecules and/or resin, and thus may be co-eluted with the final product.

One example of such a complex feed is His-tagged proteins expressed in bacteria. Therefore, WorkBeads 40 TREN prepacked in a GoBio Mini TREN column was introduced as a pre-treatment step upstream the IMAC column when purifying the *E. coli* translation initiation factor 3 (IF-3-His_6). Since this protein has a nucleic acid binding domain, host cell nucleic acids can potentially be a major co-eluting impurity in the eluates.

The GoBio Mini TREN column was operated in flow-through mode to capture impurities. This resin binds host cell nucleic acid (HCD), viruses and various host cell proteins (HCP), thereby reducing the foulant load on the subsequent IMAC column. The effect of the TREN column was evaluated by examining the removal of HCD and HCPs, see analysis.

Schematic view of GoBio Mini TREN upsteam GoBio Mini Ni-NTA



IF-3-His_6 purification on GoBio Mini Ni-NTA and HisTrap FF +/- upstream GoBio Mini TREN

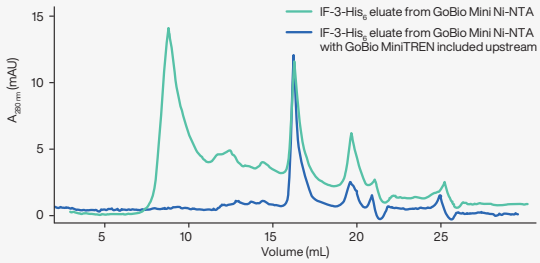
The effects of WorkBeads 40 TREN as a pre-treatment step:

- Increased purity in flow-throughs and eluates (Figures A-D)
- > 99.9% HCD removal in feed and 96-98% HCD removal in eluates
- No significant loss of target protein recovery (Figure B)
- ELISA showed that GoBio Mini TREN removes 49-62% more HCPs in eluates
- GoBio Mini Ni-NTA and HisTrap FF show analogous results (Figures B-D)

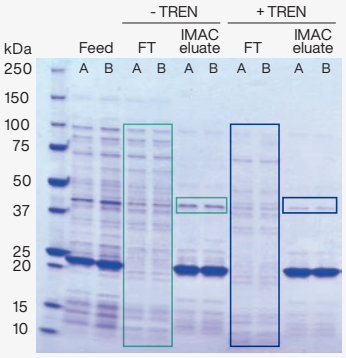
Analytical SEC of eluted IF-3-His_6 from only GoBio Mini Ni-NTA compared to GoBio Mini Ni-NTA in combination with GoBio Mini TREN

Sample volumes: 200 µL
Column: Superdex™ 200 10/300 GL (Cytiva)
Buffer: 20 mM PBS, pH 7.4
Flow rate: 30 cm/h (0.3 mL/min)

(A)

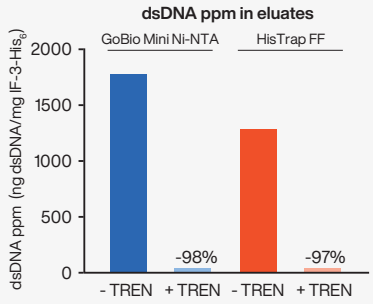


(B)

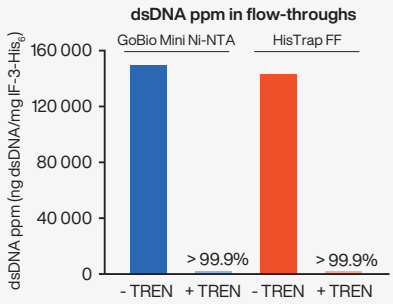


A – Samples from GoBio Mini Ni-NTA run
B – Samples from HisTrap FF (Cytiva) run

(C)



(D)



Conclusion

The final purity of the eluted His-tagged proteins, regarding HCD presence, was increased 97–98% when GoBio Mini TREN was placed upstream the IMAC column compared to a stand-alone step with only IMAC. Moreover, the purity was increased in terms of less co-eluted HCPs. In conclusion, the addition of an upstream pre-treatment step is highly advantageous to include early in a purification process to remove especially host-cell DNA that tend to interfere with downstream chromatographic processes.

Uncharged IMAC resins

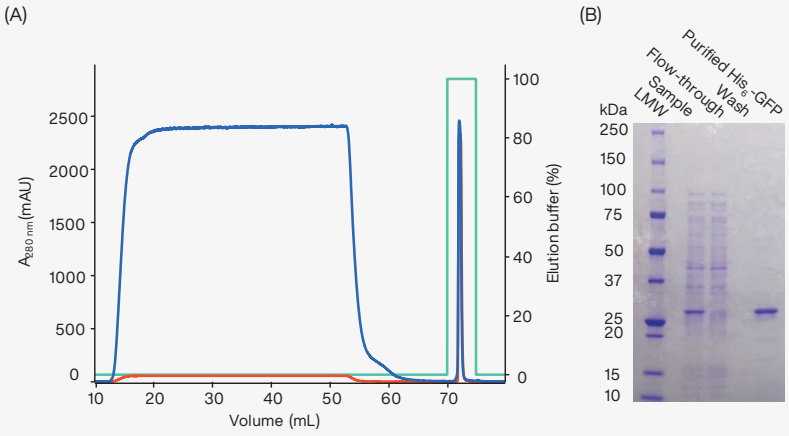
WorkBeads 40 NTA
WorkBeads 40 IDA

- Resins immobilized with either NTA (nitrilotriacetic acid) or IDA (iminodiacetic acid) for immobilization of your choice of metal ion
- Low leakage of immobilized ligand and metal ions of choice
- Resistant to harsh cleaning agents (NaOH). Note! The metal ions have to be stripped off before cleaning
- High binding capacity and flow rate
- Available in several different GoBio prepacked columns

Applications

Purification of clarified His_6-GFP on GoBio Mini Ni-NTA

Column:	GoBio Mini Ni-NTA 1 mL
Sample:	40 mL His_6-GFP in binding buffer
Binding buffer:	50 mM sodium phosphate, 300 mM NaCl, 10 mM imidazole, pH 8.0
Elution buffer:	50 mM sodium phosphate, 300 mM NaCl, 300 mM imidazole, pH 8.0
Elution:	100% elution buffer in 5 CV
Elution flow rate:	0.5 mL/min (75 cm/h)



(A) Chromatogram of the capture and elution of His_6-GFP. Absorbance at 280 nm (blue), absorbance at 490 nm (red) and percentage of elution buffer (green). (B) SDS-PAGE analysis of sample, flow-through, wash and eluted peak.

Technical specifications

	WorkBeads NiMAC
Target substance	His-tagged proteins
Matrix	Highly cross-linked agarose
Average particle size[1] (D_{V50})	45 µm
Precharged ions	Nickel (II)
Static binding capacity	> 80 mg/mL resin
Dynamic binding capacity[2]	> 40 mg/mL resin
Metal ion capacity[3]	> 60 µmol Cu^{2+}/mL resin
Max flow rate (20 cm bed height and 5 bar)	600 cm/h
Chemical stability	Compatible with all standard aqueous buffers used for protein purification, and additives such as 20 mM Na_2-EDTA, 20 mM dithiothreitol (DTT), 20 mM TECP, 20 mM β-mercaptoethanol, 8 M urea, 6 M guanidine-HCl, non-ionic detergents, 500 mM imidazole, 30% isopropanol, 0.5 M NaOH
pH stability	3 to 9 (working range) 2 to 14 (cleaning-in-place)
Storage	2 to 25°C in 20% ethanol

1 Optimal flow rate during binding is depending on the sample. During column wash and elution, a flow rate of 1 mL/min and 5 mL/min can be used for 1 mL and 5 mL columns, respectively. Note: 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.
2 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 or presence of additives. Use half of the maximum flow rate for 20% ethanol for example.

	WorkBeads 40 Ni-NTA WorkBeads 40 Ni-IDA	WorkBeads 40 Co-NTA WorkBeads 40 Co-IDA	WorkBeads 40 Cu-NTA WorkBeads 40 Cu-IDA	WorkBeads 40 Zn-NTA WorkBeads 40 Zn-IDA
Matrix	Highly cross-linked agarose	Highly cross-linked agarose	Highly cross-linked agarose	Highly cross-linked agarose
Average particle size[1] (D_{V50})	45 µm	45 µm	45 µm	45 µm
Chelating ligand	Nitrilotriacetic acid (NTA) or Iminodiacetic acid (IDA)	NTA or IDA	NTA or IDA	NTA or IDA
Metal ion	Nickel (II)	Cobalt (II)	Copper (II)	Zink (II)
Metal ion capacity for the chelating ligand[2]	N/A	N/A	50 to 60 µmol Cu^{2+}/mL (WorkBeads 40 Cu-IDA)	N/A
Dynamic binding capacity[3] (DBC)	> 60 mg His_6-GFP/mL resin	N/A	N/A	N/A
Maximum flow rate (20 cm bed height, 5 bar)	600 cm/h	600 cm/h	600 cm/h	600 cm/h
Chemical stability	Compatible with all standard aqueous buffers used for protein purification, 8 M urea, 6 M guanidine-HCl, non-ionic detergents, 20% ethanol. Chelating substances (e.g. EDTA) will strip off the metal ions. Stripped resin: 10 mM HCl (pH 2), 10 mM NaOH (pH 12), 10 mM sodium citrate-HCl (pH 3).			
pH stability	7 to 9 (working) 2 to 12 (cleaning, stripped resin)	7 to 9 (working) 2 to 12 (cleaning, stripped resin)	7 to 9 (working) 2 to 12 (cleaning, stripped resin)	7 to 9 (working) 2 to 12 (cleaning, stripped resin)
Storage	2 to 25°C in 20% ethanol	2 to 25°C in 20% ethanol	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 Metal ion capacity is determined by frontal analysis at 50% breakthrough using copper solution.
3 The binding capacity is determined using a GoBio Mini Ni-NTA 1 mL, equal value is expected for IDA resins. The binding capacity is dependent on the size of the target protein, and on the competition from impurities.

	WorkBeads 40 NTA	WorkBeads 40 IDA
Matrix	Highly cross-linked agarose	Highly cross-linked agarose
Average particle size[1] (D_{V50})	45 µm	45 µm
Chelating ligand	Nitrilotriacetic acid (NTA)	Iminodiacetic acid (IDA)
Metal ion capacity[2]	20 to 30 µmol Cu^{2+}/mL resin	50 to 60 µmol Cu^{2+}/mL resin
Maximum flow rate	600 cm/h (20 cm bed height, 5 bar)	600 cm/h (20 cm bed height, 5 bar)
Chemical stability	Compatible with all standard aqueous buffers used for protein purification, 8 M urea, 6 M guanidine-HCl, non-ionic detergents, 20% ethanol. Chelating substances (e.g. EDTA) will strip off the metal ions. Stripped resin: 10 mM HCl (pH 2), 10 mM NaOH (pH 12), 10 mM sodium citrate-HCl (pH 3).	
pH stability	7 to 9 (working range) 2 to 12 (cleaning, stripped resin)	7 to 9 (working range) 2 to 12 (cleaning, stripped resin)
Storage	2 to 25°C in ethanol	2 to 25°C in ethanol

1 The median particle size of the cumulative volume distribution.
2 Metal ion capacity is determined by frontal analysis at 50% breakthrough using copper solution.

Ordering information

Product name	Pack size	Article number
WorkBeads NiMAC	25 mL 150 mL 1 L 5 L	40 653 001 40 653 003 40 653 010 40 653 050
WorkBeads 40 Ni-NTA	25 mL 150 mL 1 L 5 L 10 L	40 651 001 40 651 003 40 651 010 40 651 050 40 651 060
WorkBeads 40 Co-NTA	25 mL 150 mL 1 L	40 651 401 40 651 403 40 651 410
WorkBeads 40 Cu-NTA	25 mL 150 mL 1 L	40 651 301 40 651 303 40 651 310
WorkBeads 40 Zn-NTA	25 mL 150 mL 1 L	40 651 501 40 651 503 40 651 510
WorkBeads 40 Ni-IDA	25 mL 150 mL 1 L 5 L 10 L	40 650 001 40 650 003 40 650 010 40 650 050 40 650 060
WorkBeads 40 Co-IDA	25 mL 150 mL 1 L	40 650 401 40 650 403 40 650 410
WorkBeads 40 Cu-IDA	25 mL 150 mL 1 L	40 650 301 40 650 303 40 650 310
WorkBeads 40 Zn-IDA	25 mL 150 mL 1 L	40 650 501 40 650 503 40 650 510
WorkBeads 40 NTA	25 mL 150 mL 1 L 5 L 10 L	40 602 001 40 602 003 40 602 010 40 602 050 40 602 060
WorkBeads 40 IDA	25 mL 150 mL 1 L 5 L 10 L	40 601 001 40 601 003 40 601 010 40 601 050 40 601 060

More information

Data Sheet, DS 40 653 010
WorkBeads NiMAC, GoBio prepacked columns

Data Sheet, DS 40 600 010
WorkBeads 40 NTA, WorkBeads 40 IDA, GoBio prepacked columns

Data Sheet, DS 40 650 010
WorkBeads 40 Ni-NTA, WorkBeads 40 Co-NTA, WorkBeads 40 Zn-NTA, WorkBeads 40 Cu-NTA, GoBio prepacked columns

WorkBeads 40 Ni-IDA, WorkBeads 40 Co-IDA, WorkBeads 40 Zn-IDA, WorkBeads 40 Cu-IDA, GoBio prepacked columns

→ **bio-works.com/product/imac-resin**

Ion exchange chromatography

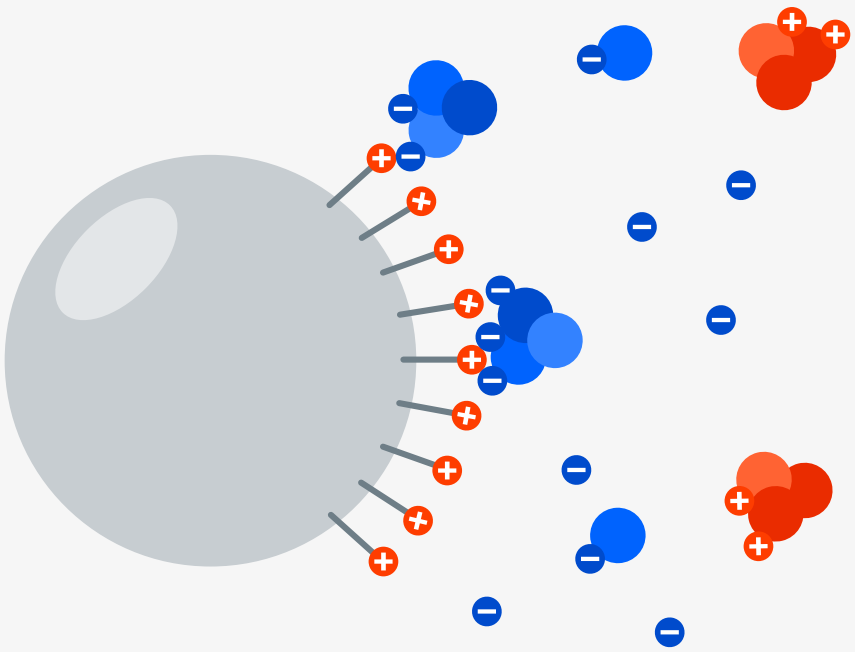
Ion exchange chromatography (IEX) is a very useful technique that separates proteins on the basis of differences in their net surface charge in relation to the pH of the surroundings. Every protein has its own charge/pH relationship.

WorkBeads ion exchangers are also ideal for peptides, viruses, vaccines and oligonucleotides. They show excellent results for larger peptides, particularly insulin. Two different bead sizes are available for optimal purity in all steps of a purification process (capture, enhancement and polishing).

Target molecules

IEX is suitable for most proteins, peptides, viruses, vaccines and oligonucleotides. IEX is a universal purification technique suitable in all purification steps in a process.

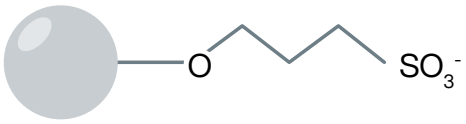
Schematic depicting ion exchange chromatography.



Cation exchangers

WorkBeads 40S
WorkBeads 100S

- Designed for research and industrial scale purifications of proteins and peptides
- Two different bead sizes, 45 µm and 100 µm
- High chemical stability for easy cleaning-in-place
- High binding capacity also during high flow rates
- Available in several different GoBio prepacked columns

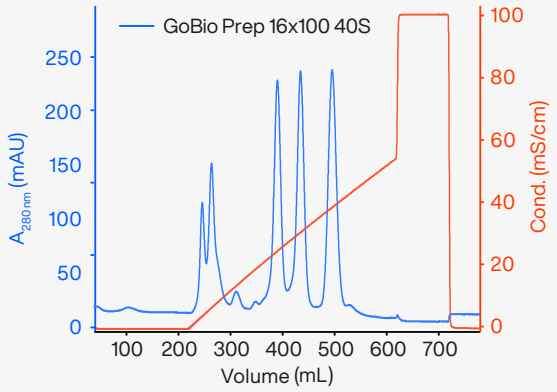


Structure of the ligand used in WorkBeads 40S

Applications

Separation using GoBio Prep 16x100 40S

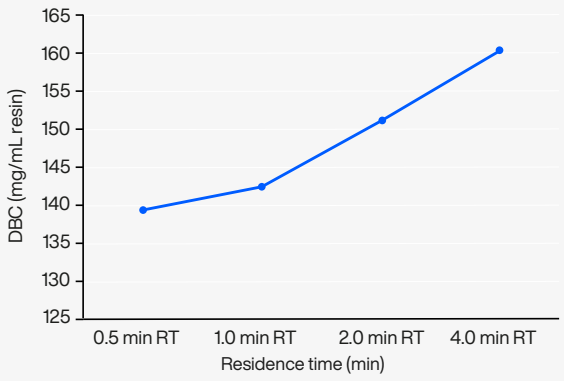
Column:	GoBio Prep 16x100 40S (20 mL)
Flow rate:	150 cm/h (5.0 mL/min)
Binding buffer:	50 mM MES, pH 6.0
Elution buffer:	50 mM MES, 1 M NaCl, pH 6.0
Sample:	1.5 mg/mL concanavalin A, 1.5 mg/mL ribonuclease A, 0.5 mg/mL α-chymotrypsinogen A, 0.5 mg/mL lysozyme in binding buffer
Sample volume:	4.6 mL
Linear gradient:	0-50% elution buffer in 20 CV



Separation using cation exchange chromatography. Peaks from left to right, concanavalin A, α-chymotrypsinogen A, ribonuclease A and lysozyme. 4.6 mL sample applied on GoBio Prep 16x100 40S. The blue trace corresponds to absorbance at 280 nm and the red line to conductivity.

Peptide purification, comparison of dynamic binding capacity at different flow rates

Column:	GoBio Mini S 1 mL
Sample:	1 mg 39 aa-long peptide (pure)
Binding buffer:	5 mM NH_4Ac, 15% ACN, pH 4.1
Elution buffer:	250 mM NH_4Ac, 15% ACN, pH 5.6
Flow rates:	0.3, 0.6, 1 and 2 mL/min
Residence times:	4, 2, 1 and 0.5 minutes



Relationship between DBC and residence time for a 39 aa-long peptide on GoBio Mini S (cation exchanger).

Technical specifications

	WorkBeads 40S	WorkBeads 100S
Matrix	Rigid, highly cross-linked agarose	Rigid, highly cross-linked agarose
Average particle size[1] (D_{v50})	45 µm	90 to 110 µm
Ionic group (ligand)	Sulfonate ($-SO_3^-$)	Sulfonate ($-SO_3^-$)
Ionic capacity	180 to 250 µmol H^+/mL resin	180 to 250 µmol H^+/mL resin
Dynamic binding capacity[2] (DBC)	130 mg BSA/mL resin	> 100 mg BSA/mL resin
Pressure flow characteristic	N/A	2 bar at 900 cm/h, 25 mm diameter × 20 cm bed height
Maximum flow rate	600 cm/h (20 cm bed height, 5 bar)	N/A
Chemical stability	Compatible with all standard aqueous buffers used for protein purification, 1 M NaOH, 30% isopropanol or 70% ethanol. Should not be stored at < pH 3 for prolonged time.	
Operational pH range[3]	3 to 12	3 to 12
CIP and screening pH range[3]	2 to 14	2 to 14
Storage	2 to 25°C in 20% ethanol with 0.2 M sodium acetate	2 to 25°C in 20% ethanol with 0.2 M sodium acetate

1 The median particle size of the cumulative volume distribution.
2 Dynamic binding capacity determined at 4 minutes residence time in 20 mM Na-citrate, pH 4.0.
3 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

Ordering information

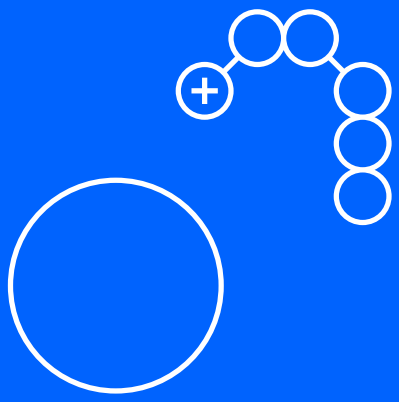
Product name	Pack size	Article number
WorkBeads 40S	25 mL 200 mL 1 L 5 L 10 L	40 200 001 40 200 002 40 200 010 40 200 050 40 200 060
WorkBeads 100S	25 mL 200 mL 1 L 5 L 10 L	10 200 001 10 200 002 10 200 010 10 200 050 10 200 060

More information

Data Sheet, DS 40 100 010
WorkBeads 40S, WorkBeads 40Q, WorkBeads 40 DEAE
GoBio Mini IEX Screening kit, GoBio Mini Peptide Purification kit,
GoBio prepacked columns

Data Sheet, DS 10 200 010
WorkBeads 100S, WorkBeads 100Q
GoBio prepacked columns

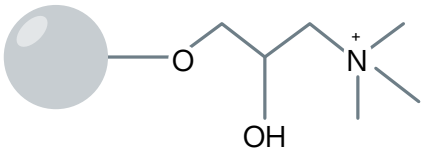
→ **bio-works.com/product/iex-resin**



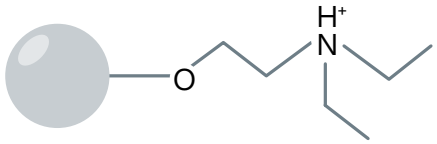
Anion exchangers

WorkBeads 40Q
WorkBeads 100Q
WorkBeads 40 DEAE

- Available with two different ligands, strong anion exchanger (Q) and weak anion exchanger (DEAE)
- Designed for research and industrial scale purifications of proteins, peptides and oligonucleotides
- Two different bead sizes, 45 µm and 100 µm
- High chemical stability for easy cleaning-in-place
- High binding capacity also during high flow rates
- Available in several different GoBio prepacked columns



Structure of the ligand used in WorkBeads 40Q

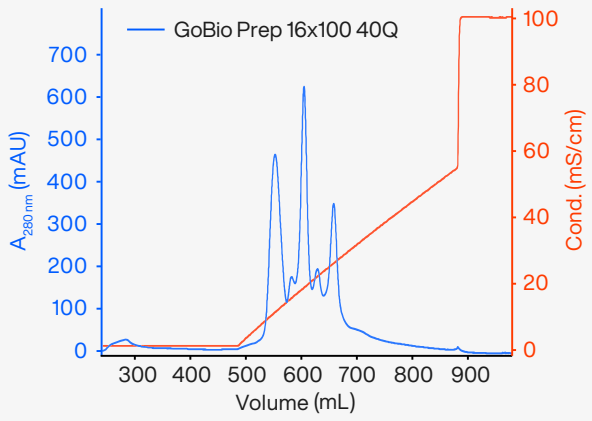


Structure of the ligand used in WorkBeads 40 DEAE

Application

Separation on GoBio Prep 16x100 40Q

Column:	GoBio Prep 16x100 40Q (20 mL)
Flow rate:	150 cm/h (5.0 mL/min)
Binding buffer:	50 mM Tris-HCl, pH 7.4
Elution buffer:	50 mM Tris-HCl, 1 M NaCl, pH 7.4
Sample:	0.3 mg/mL apo-transferrin, 0.2 mg/mL α-lactalbumin, 0.6 mg/mL soybean trypsin inhibitor in binding buffer
Sample volume:	46 mL
Linear gradient:	0 – 40% elution buffer in 20 CV



Separation using anion exchange chromatography. Peaks from left to right, apo-transferrin, α-lactalbumin and soybean trypsin inhibitor. 46 mL sample applied on GoBio Prep 16x100 40Q. The blue trace corresponds to absorbance at 280 nm and the red line to conductivity.

Technical specifications

	WorkBeads 40Q	WorkBeads 100Q
Matrix	Rigid, highly cross-linked agarose	Rigid, highly cross-linked agarose
Average particle size[1] (D_{v50})	45 µm	90 to 110 µm
Ionic group (ligand)	Quaternary amine (-$N^+(CH_3)_3$)	Quaternary amine (-$N^+(CH_3)_3$)
Ionic capacity	180 to 250 µmol Cl^-/mL resin	140 to 200 µmol Cl^-/mL resin
Dynamic binding capacity[2] (DBC)	47 mg BSA/mL resin	> 40 mg BSA/mL resin
Pressure flow characteristic	N/A	2 bar at 900 cm/h, 25 mm diameter × 20 cm bed height
Maximum flow rate[3]	600 cm/h (20 cm bed height, 5 bar)	N/A
Chemical stability	Compatible with all standard aqueous buffers used for protein purification, 1 M NaOH, 30% isopropanol or 70% ethanol. Should not be stored at < pH 3 for prolonged time.	
Operational pH range[4]	2 to 13	2 to 13
CIP and screening pH range[4]	2 to 14	2 to 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 2.5 minutes residence time in 50 mM Tris-HCl, 50 mM NaCl, pH 8.0.
3 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).
4 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.

	WorkBeads 40 DEAE
Matrix	Rigid, highly cross-linked agarose
Average particle size[1] (D_{v50})	45 µm
Ionic group (ligand)	Diethylaminoethyl (-$CH_2CH_2N^+H(CH_2CH_3)_2$)
Ion capacity	110 to 160 µmol Cl^-/mL resin
Dynamic binding capacity[2] (DBC)	40 mg BSA/mL resin
Maximum flow rate[3]	600 cm/h (20 cm bed height, 5 bar)
Chemical stability	Compatible with all standard aqueous buffers used for protein purification, 1 M NaOH, 30% isopropanol or 70% ethanol. Should not be stored at < pH 3 for prolonged time
Operational pH range[4]	2 to 13
CIP and screening pH range[4]	2 to 14
Storage	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 (0.25 mL/min in 1 mL column) in 50 mM Tris-HCl, pH 8.0.
3 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).
4 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.

Ordering information

Product name	Pack size	Article number
WorkBeads 40Q	25 mL 200 mL 1 L 5 L 10 L	40 100 001 40 100 002 40 100 010 40 100 050 40 100 060
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 40 DEAE	25 mL 200 mL 1 L 5 L 10 L	40 150 001 40 150 002 40 150 010 40 150 050 40 150 060

More information

Data Sheet, DS 40 100 010
WorkBeads 40S, WorkBeads 40Q, WorkBeads 40 DEAE
GoBio Mini IEX Screening kit, GoBio Mini Peptide Purification kit, GoBio prepacked columns

Data Sheet, DS 10 200 010
WorkBeads 100S, WorkBeads 100Q, GoBio prepacked columns

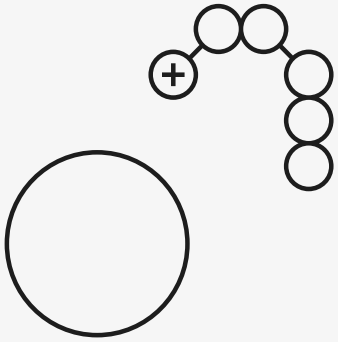
→ **bio-works.com/product/iex-resin**

Multimodal ion exchange chromatography

Multimodal ion exchange chromatography is also referred to as mixed-mode ion exchange chromatography. It utilizes ionic interaction in combination with hydrophobic and other types of interactions. The combined effect gives the resin unique selectivities that adds new possibilities in biomolecule separation.

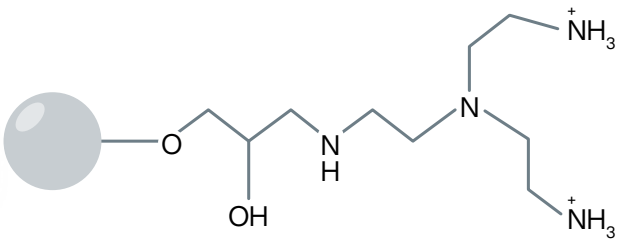
Target molecules

WorkBeads 40 TREN resin has a ligand that is positively charged below approx. pH 9. This resin can be used for several different applications, especially due to its higher salt tolerant properties, *e.g.*, for alternative IEX selectivity, for sample cleanup in monoclonal antibody (mAb) purification processes to guard the protein A column from viruses and other host cell impurities, or as a polishing step in the mAb purification process.



WorkBeads 40 TREN

- Differential selectivity due to higher salt tolerance and multimodal properties
- Reduced fouling of e.g. protein A resins by viruses and host cell impurity removal
- High binding capacity and purity
- Available in several different GoBio prepacked columns



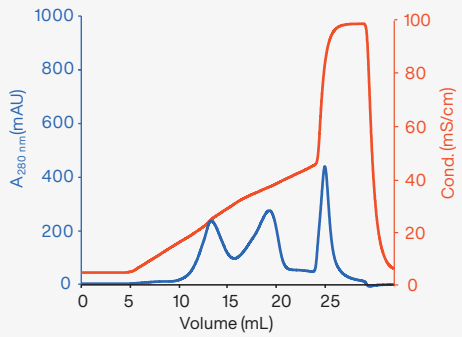
Structure of the ligand used in WorkBeads 40 TREN.

Applications

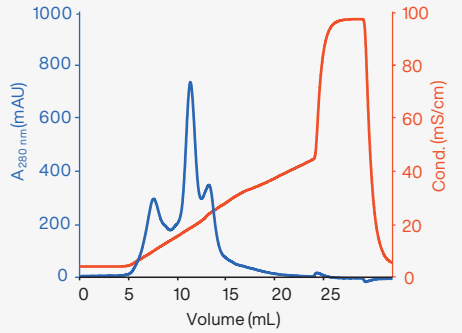
Comparison of prepacked GoBio Mini TREN and GoBio Mini DEAE

Columns:	GoBio Mini TREN 1 mL GoBio Mini DEAE 1 mL
Binding buffer:	50 mM Tris-HCl, pH 7.4
Elution buffer:	50 mM Tris-HCl, 1 M NaCl, pH 7.4
Sample:	2.5 mL of 0.3 mg/mL apo-transferrin, 0.2 mg/mL α-lactalbumin, 0.6 mg/mL soybean trypsin inhibitor in binding buffer
Flow rate:	1 mL/min (150 cm/h)
Gradient:	0 to 40% elution buffer in 20 CV

GoBio Mini TREN



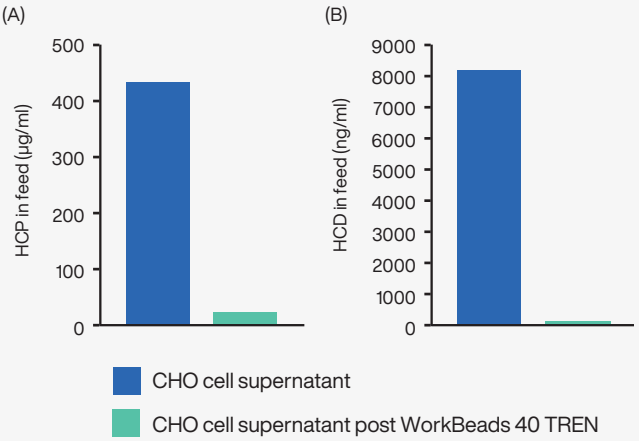
GoBio Mini DEAE

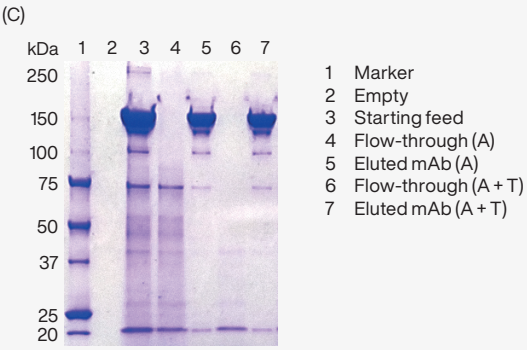


The peaks from left to right correspond to apo-transferrin, α-lactalbumin and soybean trypsin inhibitor. The blue line corresponds to the absorbance at 280 nm and the red line to the conductivity.

Using WorkBeads 40 TREN as a guard column before protein A

Using WorkBeads 40 TREN upstream of protein A resins is an excellent option for eliminating the extensive bioburden on the protein A resin caused by the impurities from the host cells, and thus extending the lifetime of the protein A resin. The advantage of using WorkBeads 40 TREN upstream of WorkBeads affimAb is shown below. In this experiment up to 95% of HCP and 99% of HCD have been removed from the mAb feed loaded onto the protein A resin.

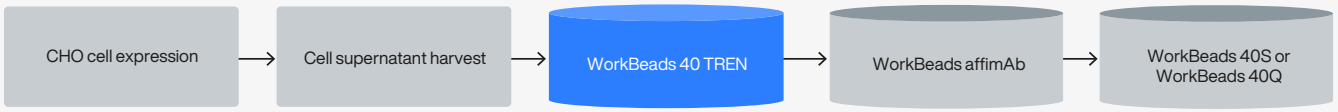




Levels of impurities in CHO cell supernatant before and after WorkBeads 40 TREN treatment. (A) HCP and (B) HCD in mAb sample loaded onto the protein A resin. (C) SDS-PAGE analyses of the feed, flow-through and eluted mAb, with or without WorkBeads 40 TREN (T) upstream of WorkBeads affimAb (A).

Example of usage of WorkBeads 40 TREN in mAb purification processes

Flow-through mode, protection of Protein A resin (guard column).



Technical specifications

	WorkBeads 40 TREN
Matrix	Rigid, highly cross-linked agarose
Average particle size[1] (D_{v50})	45 µm
Ligand	Tris(2-aminoethyl)amine (TAEA)
Ionic capacity	130 – 200 µmol Cl^-/mL resin
Dynamic binding capacity[2]	50 mg BSA/mL resin
Maximum flow rate	600 cm/h (20 cm bed height, 5 bar)
Chemical stability	Compatible with all standard aqueous buffers used for protein purification. Should not be stored at low pH for prolonged time.
Operational pH range[3]	2 to 13
CIP and screening pH range[3]	2 to 14
Storage	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 (0.25 mL/min in 1 mL column) in 50 mM Tris-HCl, 50 mM NaCl, pH 8.0. Optimal flow rate during binding is depending on the sample.
[3] 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.

Ordering information

	Pack size	Article number
WorkBeads 40 TREN	25 mL	40 603 001
	150 mL	40 603 003
	1 L	40 603 010
	5 L	40 603 050
	10 L	40 603 060

More information

Data Sheet, DS 40 600 020
WorkBeads 40 TREN, GoBio prepacked columns

Data Sheet, DS 40 100 010
WorkBeads 40S, WorkBeads 40Q,
WorkBeads 40 DEAE, GoBio Mini IEX Screening kit,
GoBio Mini Peptide Purification kit,
GoBio prepacked columns

→ **bio-works.com/product/iex-resin**

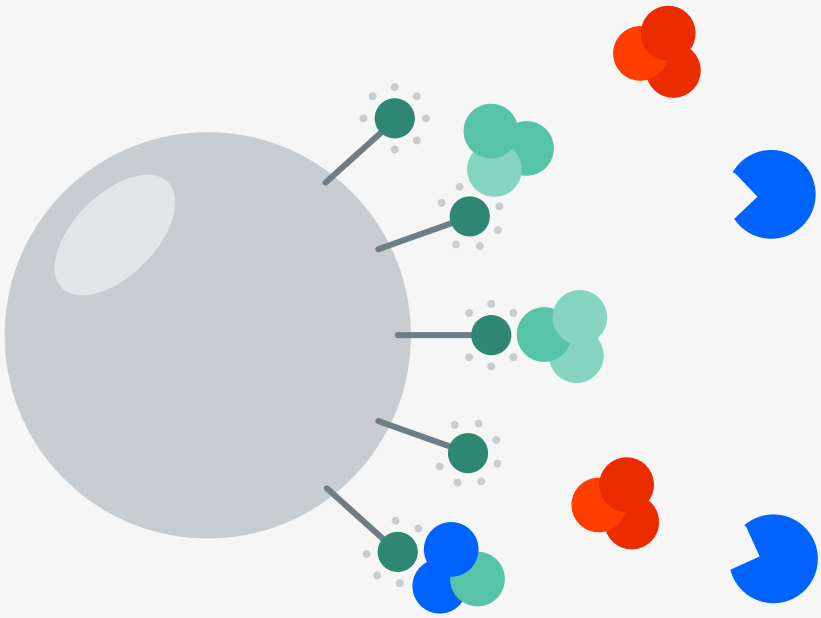
Hydrophobic interaction chromatography

Hydrophobic interaction chromatography (HIC) separates molecules according to differences in their surface hydrophobicity through a reversible interaction between the molecules and the hydrophobic surface of the HIC resin. A high salt concentration enhances the interaction, while a low salt concentration weakens the interaction. The extent of the reversible interaction between the molecule and the HIC resin depends on the properties of the HIC resin and target molecule, and the salt concentration.

Target molecules

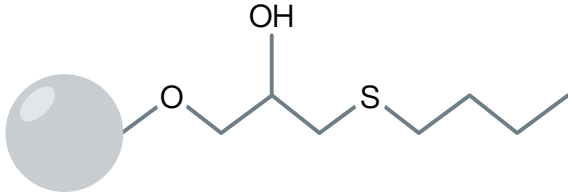
HIC is suitable for purification of proteins, peptides, plasmids, and oligonucleotides by utilizing the difference in their surface hydrophobicity.

Schematic depicting hydrophobic interaction chromatography.



WorkBeads 40 Butyl SH

- High throughput, binding capacity, and purity
- Reliable and reproducible results
- High chemical stability for easy cleaning-in-place



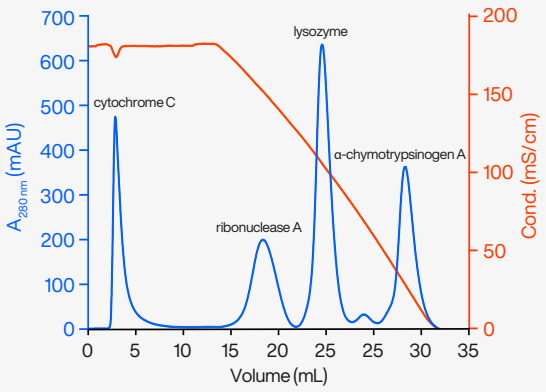
Structure of the ligand used in WorkBeads 40 Butyl SH.

Applications

Separation using GoBio Mini Butyl SH

Column:	GoBio Mini Butyl SH 1 mL
Binding buffer:	1.5 M $(NH_4)_2SO_4$, 0.1 M $NaHPO_4$, pH 7.0
Elution buffer:	0.1 M $NaHPO_4$, pH 7.0
Sample load:	1.25 mg/mL resin of ribonuclease A & 0.625 mg/mL resin of lysozyme, cytochrome C, and α-chymotrypsinogen A in binding buffer
Flow rate:	39 cm/h (0.25 mL/min)
Linear gradient:	0 – 100% elution buffer in 20 CV

Separation using hydrophobic interaction chromatography. Peaks from left to right, cytochrome C, ribonuclease A, lysozyme, and α-chymotrypsinogen A. 0.5 mL sample applied on GoBio Mini Butyl SH 1 mL. The blue trace corresponds to absorbance at 280 nm and the red line to conductivity.



Technical specifications

	WorkBeads 40 Butyl SH
Target substances	Proteins, peptides, plasmids, oligonucleotides
Matrix	Rigid, highly cross-linked agarose
Average particle size (D_{V50})[1]	45 µm
Ligand	*n*-butyl thioether (CH_3 - CH_2 - CH_2 - CH_2 - S -)
Ligand concentration	46 – 62 µmol/mL resin
Dynamic binding capacity (DBC)[2]	43 mg/mL resin
Max flow rate[3] (20 cm bed height, 5 bar)	600 cm/h
Chemical stability	Compatible with all standard aqueous buffers exhibiting some conductivity, 1 M NaOH, 30% isopropanol, 30% ethanol. Note: Sensitive to oxidants, e.g., H_2O_2.
pH stability	2 – 13
Storage	2 to 25 °C in 20% ethanol

[1] The median particle size of the cumulative volume distribution.
[2] Dynamic binding capacity at 10% breakthrough determined at a residence time of 4 min (150 cm/h) in a 6.6x100 mm column. Buffer conditions: 0.1 M sodium phosphate, 2 M ammonium sulfate, pH 7.
[3] 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 when operation at +4°C) or by additives (e.g. use half of the maximum flow rate for 20% ethanol).

Ordering information

	Pack size	Article number
WorkBeads 40 Butyl SH	25 mL	45 500 001
	200 mL	45 500 002
	1 L	45 500 010
	5 L	45 500 050
	10 L	45 500 060

More information

Data Sheet, DS 40 500 010
WorkBeads 40 Butyl SH, GoBio prepacked columns
→ **bio-works.com/product/hic-resin**

Size exclusion chromatography

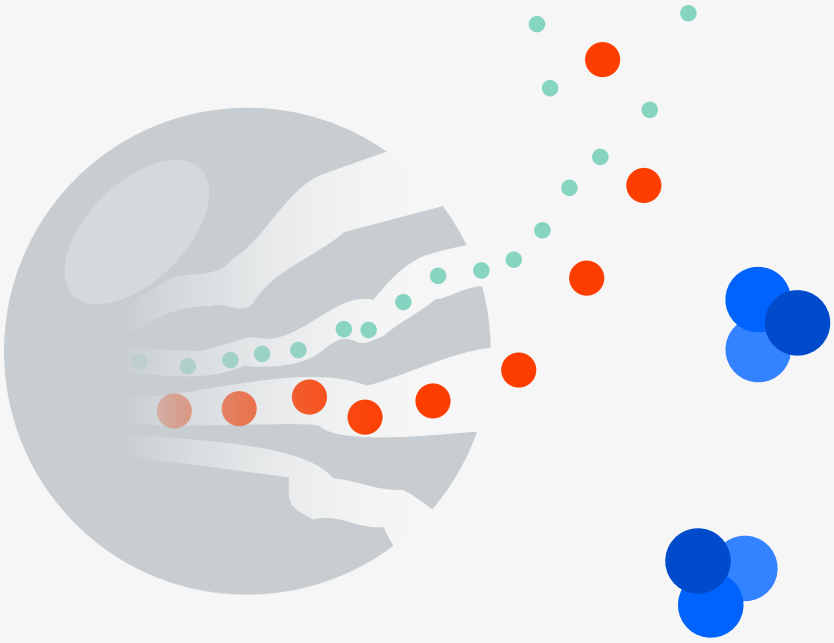
Size exclusion chromatography (SEC) (also called gel filtration, GF) separates molecules on the basis of differences in size. As this is a non-binding technique, the choice of running buffers is large and can be optimized for the target molecule. For best resolution when using SEC, a slow flow rate and a sample volume of maximum 4% of the column volume should be used. This technique is therefore best suited for the polishing step in a purification process.

Target molecules

Polishing

Proteins, peptides, viruses, tagged proteins and oligonucleotides. Several different pore sizes are available of WorkBeads SEC resins which makes them suitable for a large range of target molecules of different sizes. WorkBeads 200 SEC is designed with a larger bead size optimized for separation of viscous samples,

See schematic depicting size exclusion chromatography.

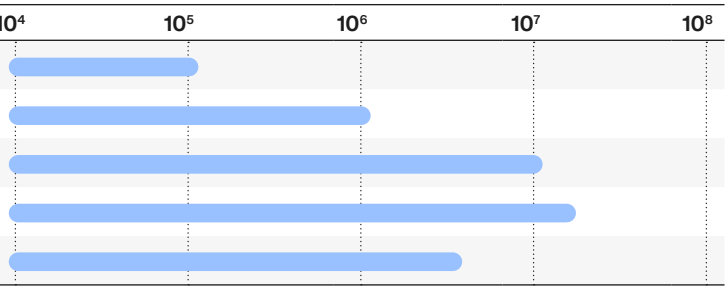


WorkBeads 40/100 SEC
WorkBeads 40/1000 SEC
WorkBeads 40/10 000 SEC
WorkBeads Macro SEC
WorkBeads 200 SEC

- Produced using a proprietary cross-linking method that results in highly porous and physically stable matrices
- Availability in several different porosities give robust and wide separation ranges
- Alternative bead sizes for viscous samples
- Resistant to harsh cleaning agents (NaOH)
- Available in several different GoBio prepacked columns

Comparison of WorkBeads SEC resins

	Average bead size, µm	Separation range, kD	Exclusion limit, kD	Separation range, D
WorkBeads 40/100 SEC	45	10 – 150	150	
WorkBeads 40/1000 SEC	45	10 – 1200	1200	
WorkBeads 40/10 000 SEC	45	10 – 10 000	10 000	
WorkBeads Macro SEC	45	10 – 30 000	30 000	
WorkBeads 200 SEC	180	10 – 6000	6000	

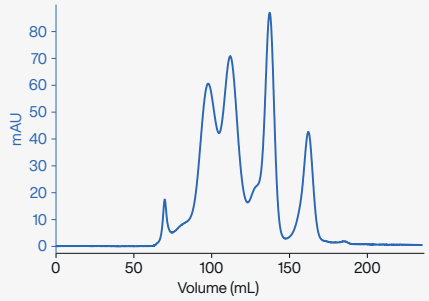


Applications

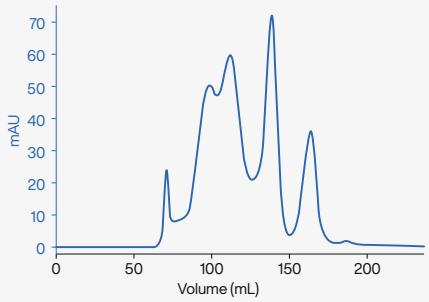
WorkBeads 40/1000 SEC, different flow rates

Resin: WorkBeads 40/1000 SEC
Column: 16 × 950 mm, 181 mL
Sample: 250 µL, 0.5 mg/mL thyroglobulin, 0.5 mg/mL ferritin, 0.5 mg/mL ovalbumin and 0.5 mg/mL ribonuclease A (in order of elution)
Buffer: PBS, pH 7.2
Flow rates: 25 cm/h (0.84 mL/min)
50 cm/h (1.68 mL/min)
100 cm/h (3.35 mL/min)

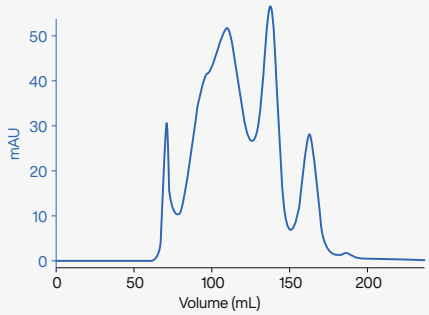
25 cm/h



50 cm/h



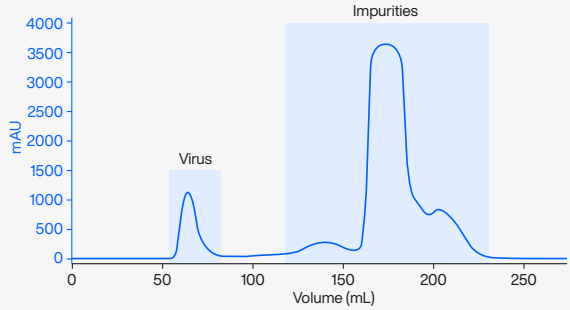
100 cm/h



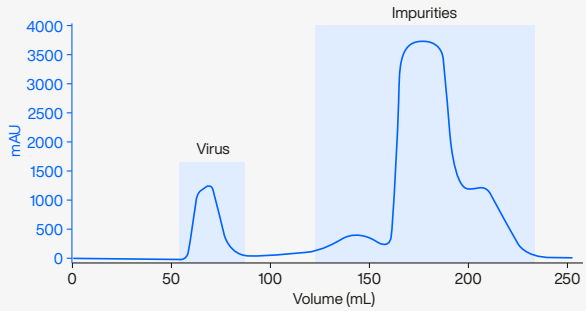
Purification of animal viral vaccine

Resin: WorkBeads 40/1000 SEC
Sample: Inactivated rabies virus
(A) 10 mL (5.7% of CV)
(B) 15 mL (8.5% of CV)
Column: 16 × 880 mm, 176 mL
Flow rate: 5 mL/min, 150 cm/h
Buffer: PBS, pH 7.2

(A) Sample volume 5.7% of CV



(B) Sample volume 8.5 % of CV



Technical specifications

	WorkBeads 40/100 SEC	WorkBeads 40/1000 SEC	WorkBeads 40/10 000 SEC
Matrix	Rigid, highly cross-linked agarose	Rigid, highly cross-linked agarose	Rigid, highly cross-linked agarose
Separation range[1]	10 to 150 kD	10 to 1200 kD	10 to 10 000 kD
Exclusion limit	150 kD	1200 kD	10 000 kD
Average particle size[2] (D_{V50})	45 µm	45 µm	45 µm
Recommended flow rate[3]	15 to 150 cm/h	15 to 150 cm/h	15 to 150 cm/h
Maximum flow rate[4,5]	600 cm/h	600 cm/h	300 cm/h
Chemical stability	Compatible with all standard aqueous buffers used for protein purification. Should not be stored at low pH for prolonged time.		
pH stability	2 to 13	2 to 13	2 to 13
Storage	2 to 25°C in 20% ethanol	2 to 25°C in 20% ethanol	2 to 25°C in 20% ethanol

1 Globular proteins.
2 The median particle size of the cumulative volume distribution.
3 The flow rate is important for the resolution and a lower flow rate often gives an increased resolution. A higher flow rate can be used during equilibration to speed up the separation.
4 Determined in water using a 25 × 200 mm column.
5 Note: Make sure that the column hardware max pressure is not exceeded.

	WorkBeads Macro SEC	WorkBeads 200 SEC
Separation range[1]	10 to 30 000 kD	10 to 6000 kD
Exclusion limit	30 000 kD	6000 kD
Matrix	Highly cross-linked agarose	Highly cross-linked agarose
Average particle size[2] (D_{V50})	45 µm	180 µm
Recommended flow rate[3]	15 to 150 cm/h	15 to 150 cm/h
Max flow rate[4,5]	300 cm/h	900 cm/h
Chemical stability	Compatible with all standard aqueous buffers used for protein purification. Should not be stored at low pH for prolonged time.	
pH stability	2 to 13	2 to 13
Storage	2 to 25°C in 20% ethanol	2 to 25°C in 20% ethanol

1 Globular proteins.
2 The median particle size of the cumulative volume distribution.
3 The flow rate is important for the resolution and a lower flow rate often gives an increased resolution. A higher flow rate can be used during equilibration to speed up the separation.
4 Determined in water using a 25 × 200 mm column.
5 Note: Make sure that the column hardware max pressure is not exceeded.

Ordering information

Product name	Pack size	Article number
WorkBeads 40/100 SEC	25 mL	40 340 001
	300 mL	40 340 003
	1 L	40 340 010
	5 L	40 340 050
	10 L	40 340 060
WorkBeads 40/1000 SEC	25 mL	40 300 001
	300 mL	40 300 003
	1 L	40 300 010
	5 L	40 300 050
	10 L	40 300 060
WorkBeads 40/10 000 SEC	25 mL	40 350 001
	300 mL	40 350 003
	1 L	40 350 010
	5 L	40 350 050
	10 L	40 350 060
WorkBeads Macro SEC	25 mL	40 370 001
	300 mL	40 370 003
	1 L	40 370 010
	5 L	40 370 050
	10 L	40 370 060
WorkBeads 200 SEC	300 mL	20 300 003
	1 L	20 300 010
	5 L	20 300 050
	10 L	20 300 060

More information

Data Sheet, DS 40 300 010
WorkBeads 40/100 SEC, WorkBeads 40/1000 SEC, WorkBeads 40/10 000 SEC, WorkBeads Macro SEC, WorkBeads 200 SEC, GoBio prepacked columns

→ **bio-works.com/product/sec-resin**

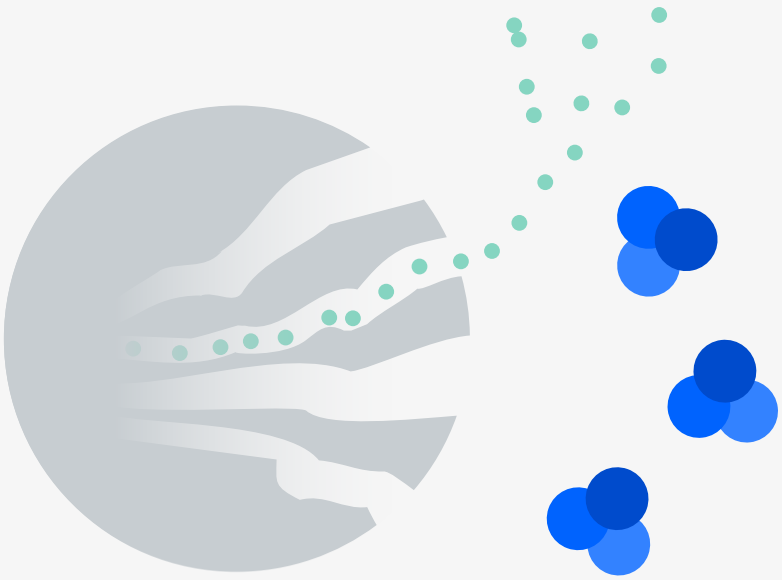
Desalting/buffer exchange

Size exclusion chromatography run on low-porosity resins allows for group-separation of salt, buffer and other low molecular weight substances from larger biomolecules and proteins. This technique gives faster, simpler and a more effective desalting or buffer exchange compared to the traditional time consuming dialysis that may harm sensitive proteins and cause reduced yield. Desalting is done with sample volumes up to 30% of the column volume and in minutes for lab scale volumes.

Target molecules

Proteins, large peptides (Mr > 5000), tagged proteins, nucleic acids and other biomolecules of similar size.

See schematic depicting desalting.



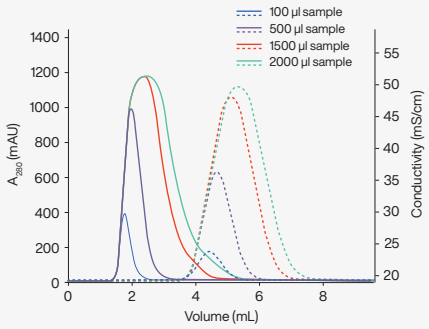
WorkBeads Dsalt

- Pre-swollen for fast and convenient handling
- Designed for rapid and efficient desalting and/or buffer exchange
- Group separation of high molecular weight substances from low molecular weight substances
- Available in several different GoBio prepacked columns

Applications

Desalting of 100 µL to 2000 µL sample

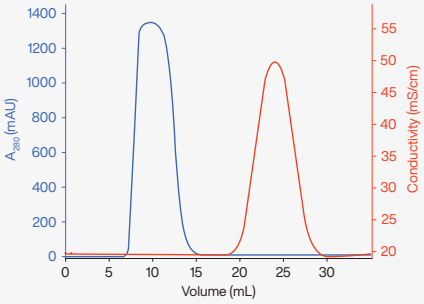
Column:	GoBio Mini Dsalt 5 mL
Buffer:	25 mM sodium phosphate, 150 mM NaCl, pH 7.0
Sample:	2 mg/mL BSA in 20 mM sodium phosphate, 0.5 M NaCl, pH 7.0
Flow rate:	5 mL/min



The solid lines correspond to absorbance at 280 nm and the dashed lines to the conductivity.

GoBio Mini 5 mL × 5

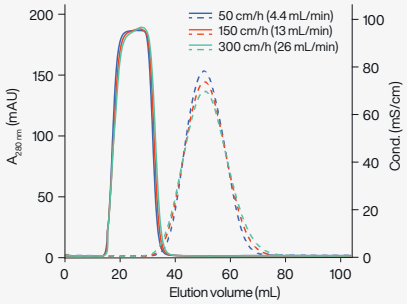
Column:	GoBio Mini Dsalt 5 mL × 5 (5 columns connected in series)
Total column volume:	25 mL
Buffer:	25 mM sodium phosphate, 150 mM NaCl, pH 7.0
Sample:	5 mL, 2 mg/mL BSA in 20 mM sodium phosphate, 0.5 M NaCl, pH 7.0
Flow rate:	5 mL/min



The blue line corresponds to the absorbance at 280 nm and the red line to conductivity.

GoBio Prep 26x100 Dsalt

Columns:	GoBio Prep 26x100 Dsalt
Buffer:	20 mM PBS, pH 7.4
Sample:	16 mL, 2 mg/mL BSA in 20 mM PBS, 1 M NaCl, pH 7.4 (30% of CV)
Flow rates:	50 cm/h (4.4 mL/min) 150 cm/h (13 mL/min) 300 cm/h (26 mL/min



Chromatograms of efficient desalting of 16 mL sample (30% of CV) on GoBio Prep 26x100 Dsalt using different flow rates. The solid traces corresponds to the absorbance at 280 nm (protein) and the red dashed traces to conductivity (salt).

Technical specifications

	WorkBeads Dsalt
Target substance	Proteins, large peptides (M_r > 5 000), nucleic acids and other biomolecules of similar size
Matrix	Highly cross-linked dextran
Average particle size[1] (D_{v50})	150 µm
Typical sample volume	20 to 30% of the column volume (0.3 CV)
Typical flow rate	150 to 300 cm/h
Chemical stability	Compatible with all standard aqueous buffers used for protein purification, 0.2 M NaOH, 0.2 M HCl, 1 M acetic acid, 8 M urea, 6 M guanidine HCl
pH stability	2 to 12
Storage	2 to 25°C in 20% ethanol or other suitable storage solution
Shipping solution	0.15% ProClin™ 150 in deionized water

[1] The median particle size of the cumulative volume distribution.

Ordering information

Product name	Pack size	Article number
WorkBeads Dsalt	300 mL	40 360 003
	1 L	40 360 010
	5 L	40 360 050
	10 L	40 360 060

More information

Data Sheet, DS 40 360 010
WorkBeads Dsalt, GoBio prepacked columns

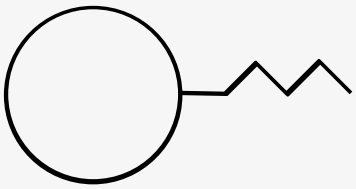
→ **bio-works.com/product/sec-resin**

Pre-activated resins

Pre-activated resin enables successful, convenient immobilization of ligands without the need for complex syntheses or special equipment. We have developed two different pre-activated resins in which the bromohydrin active group reacts with thiol, amine and hydroxyl groups of the substance to be coupled. Two different resin porosities are available to facilitate optimized coupling of ligands of different sizes, or to optimize the prepared affinity resin for target molecules of different sizes.

Target molecules

To prepared customized chromatography resin by coupling substances with thiol, amine and hydroxyl groups.

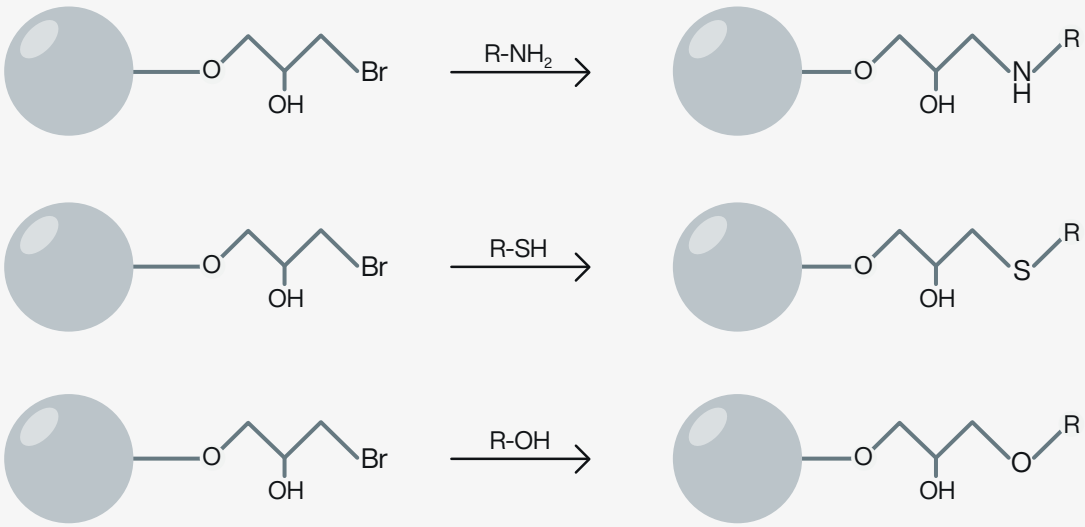


WorkBeads 40/1000 ACT
WorkBeads 40/10 000 ACT

- Ideal for coupling of specific customer designed resins
- Stable covalent linkage
- Suitable for coupling of ligands containing thiol, amine and hydroxyl groups
- Two different porosities for optimized results
- WorkBeads 40/1000 ACT is available in GoBio Mini 1 mL and 5 mL prepacked columns

Applications

Reaction scheme for coupling from top to bottom, primary amine, thiol and alcohol to bromohydrin activated resin.



Type of ligand and most suitable coupling conditions

Type of ligand	Functional group of ligand	Coupling conditions
Organic molecules, peptides	Thiol (Sulfhydryl) (-SH)	pH > 7 and higher
Organic molecules, peptides	Amines[1] (-NH_2, -NH, -N)	pH > 8 and higher[2]
Proteins, polypeptides	Thiol (Sulfhydryl) (-SH)	pH 7 and higher
Proteins, polypeptides	Primary amino (-NH_2)	Carbonate buffer pH 8 and higher[3]
Substance stable at high pH	Hydroxyl (-OH)	pH > 12[4]

1 Substances containing primary, secondary and tertiary amines.
2 Alkaline ligands used in excess may give high enough pH for the reaction to take place. Dissolve it in distilled water and let the basicity of the ligand determine the coupling pH.
3 Sufficient coupling without denaturation of sensitive polypeptides and proteins. Coupling reaction at a lower temperature is also possible.
4 High pH is required due to the low nucleophilicity of the hydroxyl group.

Technical specifications

	WorkBeads 40/1000 ACT	WorkBeads 40/10 000 ACT
Matrix	Rigid, highly cross-linked agarose	Rigid, highly cross-linked agarose
Average particle size[1] (D_{v50})	45 µm	45 µm
Reactive groups	Bromohydrin	Bromohydrin
Exclusion limit	1200 kDa (globular proteins)	10 000 kDa (globular proteins)
Maximum flow rate[2]	600 cm/h	600 cm/h
Reactive-groups content	200 µmol/mL	200 µmol/mL
Chemical stability (before coupling[3])	Buffers pH < 8.0	Buffers pH < 8.0
Chemical stability (after coupling[4])	Compatible with all standard aqueous buffers used for protein purification, 1 M NaOH, 30% isopropanol or 70% ethanol. Should not be stored at < pH 3 for prolonged time.	
pH stability[4]	2 to 13 (after coupling)	2 to 13 (after coupling)
Storage[5]	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 Determined in water using a 10 × 300 mm column. Note: When doing a purification the optimal flow rate during binding is depending on the sample.
3 Avoid substances containing thiol and amino groups. Substances containing hydroxyl groups will only react if deprotonated. The unreacted resin is generally stable in alcohols at neutral pH.
4 Agarose matrix and linker. Stability of the coupled substance may differ.
5 The choice of storage conditions for the coupled resin depends on the nature of the ligand.

Ordering information

Product name	Pack size	Article number
WorkBeads 40/1000 ACT	50 mL 300 mL 1 L 5 L	40 400 001 40 400 003 40 400 010 40 400 050
WorkBeads 40/10 000 ACT	50 mL 300 mL 1 L 5 L	40 450 001 40 450 003 40 450 010 40 450 050

More information

Data Sheet, DS 40 400 010
WorkBeads 40/1000 ACT, WorkBeads 40/10 000 ACT, GoBio Mini ACT

→ **bio-works.com/product/activated-resin**

Bio-Works

To purchase Bio-Works products contact Bio-Works, your local distributor or visit the web.

bio-works.com

MM 10 001 003 BC

Bio-Works believes in sustainability and care about the environment.
Please give me to a friend or recycle me.