

## WorkBeads 40 DEAE

The WorkBeads™ 40 DEAE resin for ion exchange chromatography is designed for research and industrial purification of proteins, peptides and oligonucleotides, by utilizing the difference in their surface charge. WorkBeads 40 DEAE is a weak anion exchanger with tertiary amine ligands. This resin has the property of high-resolution separation while generating low backpressure allowing its use for both capture and polishing purification applications in standard bioprocess columns.

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



The functional groups are coupled to the resin via chemically stable linkages. This weak ion exchanger resin should be used as an alternative to WorkBeads 40Q, a strong anion exchange resin, when looking for alternative selectivities. The density of positive charges in WorkBeads 40 DEAE will decrease gradually when the pH is increased above pH 6. This effect can be used to modulate the selectivity of the resin, although the binding capacity may be reduced at basic pH values.

The main characteristics of WorkBeads 40 DEAE resin are shown in Table 1. For more details, please see instruction, IN 40 100 020.

### Resin description

WorkBeads are agarose-based chromatographic resins manufactured by a proprietary method that results in porous beads with a tight size distribution and exceptional mechanical stability. Agarose based matrices have been successfully used for decades in biotechnology from research to production scale purification, due to their exceptional compatibility with biomolecules including proteins, peptides, nucleic acids and carbohydrates. WorkBeads resins are designed for separations that require optimal capacity and purity.

WorkBeads 40 DEAE is a weak anion exchange resin employing Diethylaminoethyl (a tertiary amine) as functional groups (Figure 1).

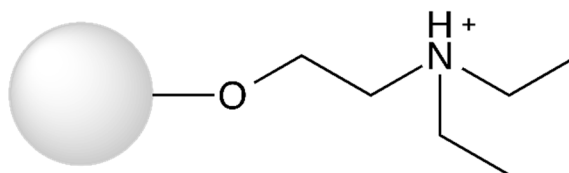


Figure 1. Structure of the ligand used in WorkBeads 40 DEAE.

Table 1. Main characteristics of WorkBeads 40 DEAE resin.

	WorkBeads 40 DEAE
Target substance	Proteins, peptides and oligonucleotides
Matrix	Rigid, highly cross-linked agarose
Average particle size <sup>1</sup> (D <sub>V50</sub> )	45 µm
Ligand	Diethylaminoethyl (a tertiary amine) (-CH <sub>2</sub> CH <sub>2</sub> N <sup>+</sup> H(CH <sub>2</sub> CH <sub>3</sub> ) <sub>2</sub> )
Ion capacity	0.11 - 0.16 mmol Cl <sup>-</sup> /ml resin
Dynamic binding capacity <sup>2</sup> (DBC)	40 mg BSA/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, 1 M NaOH, 30% isopropanol or 70% ethanol. Should not be stored at < pH 3 for prolonged time.
pH stability	3 - 13
Recommended pH	3 - 9
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 in 50 mM Tris-HCl, 50 mM NaCl, pH 8.0.

## Applications

WorkBeads 40 DEAE resin is designed for ion exchange chromatography (IEX). The resins have a slightly different selectivity than WorkBeads 40Q. The selectivity can be modulated by selection of different pH values for the separation.

### Principle

Ion exchange chromatography separates biomolecules according to surface charge. For example, proteins interact with opposite charged groups on the resin with different affinities depending on the number of charges involved in the interaction and on the distribution of the charges on the specific protein. The surface charge of proteins depends on the pH of their environment. When the pH is equal to the isoelectric point (pI) of the protein the net charge is zero. At pH values below the pI the net charge will be positive, and at a pH above the pI the net charge will be negative. It should be noted that the interaction of the protein depends on the presence and distribution of both positive and negative charged groups on the surface. A protein may therefore also interact with the resin at the isoelectric point. The likelihood of binding will increase when the pH is increased moving away from the pI.

IEX is one of the most frequently used chromatography techniques because of its versatility and ability to separate proteins even with small differences in charge. Another advantage is that target proteins can be highly enriched from large sample volume. It is also one of the more cost-effective chromatography techniques and is therefore excellent for scale-up.

For additional information about the ion exchange chromatography principle, see instruction IN 40 100 020.

### Protein selectivity

In Figure 2, the acidic proteins apo-transferrin, α-lactalbumin and soybean trypsin inhibitor are separated using BabyBio DEAE 5 ml column that is prepacked with WorkBeads 40 DEAE resin.

Column: BabyBio DEAE 5 ml  
 Binding buffer: 50 mM Tris-HCl, pH 7.4  
 Elution buffer: 50 mM Tris-HCl, 1 M NaCl, pH 7.4  
 Sample: 10 ml of 0.3 mg/ml apo-transferrin, 0.2 mg/ml  $\alpha$ -lactalbumin and 0.6 mg/ml soybean trypsin inhibitor in binding buffer  
 Flow rate: 150 cm/h (3.5 ml/min)  
 Gradient: 0 - 40% elution buffer in 20 CV

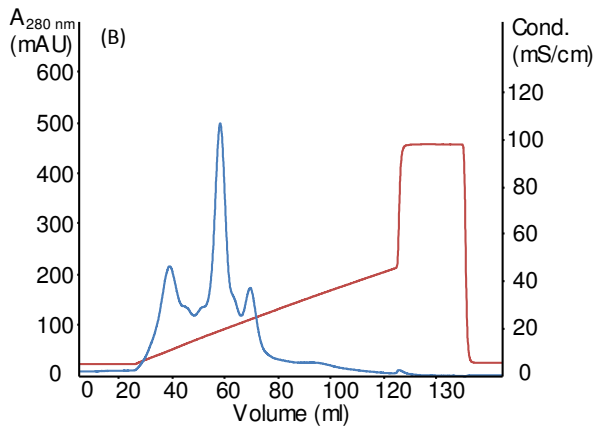


Figure 2. Separation on anion exchange chromatography resin of, peaks from left to right, apo-transferrin,  $\alpha$ -lactalbumin and soybean trypsin inhibitor using BabyBio DEAE 5 ml column that is prepacked with WorkBeads 40 DEAE. The blue line corresponds to the absorbance at 280 nm and the red line to the conductivity.

### Flow properties

The WorkBeads 40 DEAE ion exchange chromatography resin is designed for high throughput protein separations under a variety of conditions. The high resolution that can be obtained at high protein loadings and high flow rates makes it ideal for process applications. Pressure-flow properties for WorkBeads 40 DEAE is shown in Figure 3.

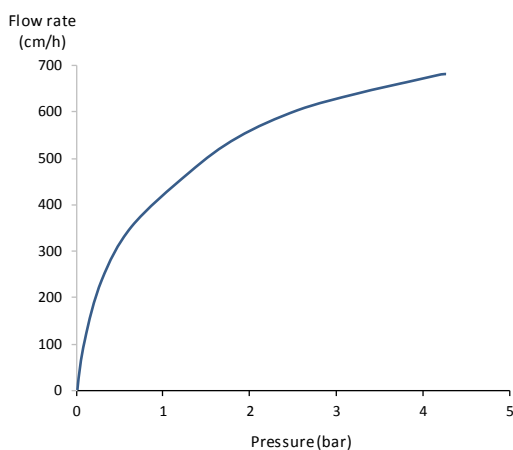


Figure 3. Pressure to flow rate properties of WorkBeads 40 DEAE with deionized water in a 25 x 200-mm column.

### Cleaning-in-place

During purification impurities such as cell debris, lipids, nucleic acids, proteins and protein precipitates from the samples may gradually build up in the resin. This is typical also for well-clarified samples. The severity of this process depends on the composition of the sample applied to the column. The impurities adsorbed will reduce the performance of the column over time. Regular cleaning (Cleaning-in-place, CIP) keeps the resin clean, reduces the rate of further fouling, and maintains the capacity, resolution and flow properties of the column. Cleaning of a column using 1 M NaOH applied by a low reversed flow for 2 hours or overnight is often sufficient.

Sanitization (reduction of microorganisms) can be done using combinations of NaOH and ethanol (e.g., incubation with a mixture of 0.5 M NaOH and 40% ethanol for 3 hours). The sanitization procedure and its effectiveness will depend on the microorganisms to be removed, and needs to be evaluated for each case.

### Storage

Store at 2 to 25°C in 20% ethanol.

## Related products

Product name	Pack size <sup>1</sup>	Article number
<b>Prepacked columns</b>		
BabyBio S 1 ml	1 ml x 1	45 200 101
BabyBio Q 1 ml	1 ml x 1	45 100 101
BabyBio DEAE 1 ml	1 ml x 1	45 150 101
BabyBio Dsalt 5 ml	5 ml x 1	45 360 105
OptioBio 40S 10x100	7.9 ml x 1	55 420 011
OptioBio 40Q 10x100	7.9 ml x 1	55 410 011
<b>Bulk resins</b>		
WorkBeads 40S	25 ml	40 200 001
	200 ml	40 200 002
	1 L	40 200 010
	5 L	40 200 050
	10 L	40 200 060
WorkBeads 40Q	25 ml	40 100 001
	200 ml	40 100 002
	1 L	40 100 010
	5 L	40 100 050
	10 L	40 100 060
WorkBeads 100S	25 ml	10 200 001
	200 ml	10 200 002
	500 ml	10 200 005
	1 L	10 200 010
	5 L	10 200 050
WorkBeads 100Q	25 ml	10 210 001
	200 ml	10 210 002
	500 ml	10 210 005
	1 L	10 210 010
	5 L	10 210 050
	10 L	10 210 060

1. Other pack sizes can be found in the complete product list on [www.bio-works.com](http://www.bio-works.com)

## Ordering information

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

Orders: [sales@bio-works.com](mailto:sales@bio-works.com) or contact your local distributor.

For more information about local distributor and products please visit [www.bio-works.com](http://www.bio-works.com) or contact us at [info@bio-works.com](mailto:info@bio-works.com)



**Bio-Works**  
Virdings allé 18  
754 50 Uppsala  
Sweden