

Tricorn MiniBeads

Mini Q 4.6/50 PE, Mini Q PC 3.2/3

ION EXCHANGE CHROMATOGRAPHY

MiniBeads™ prepacked columns are designed for high-performance purification and characterization of biomolecules, using ion exchange chromatography. The extremely small bead diameter (3 µm) of MiniBeads gives exceptional resolution with high reproducibility. MiniBeads are especially suitable for micropreparative and analytical work.

- Small, monodisperse beads for extremely high-resolution purifications
- Analytical and micropreparative applications
- Purification of proteins, peptides, and other biomolecules according to charge
- High chemical and physical stability
- Excellent reproducibility and durability

Resin characteristics

Mini Q™ MiniBeads prepacked columns contain a strong anion exchanger. Table 1 summarizes the main characteristics of MiniBeads.

Small, monodisperse beads for extremely high resolution

High resolution is crucial for success when separating difficult samples containing closely related substances. The high resolution that can be achieved on MiniBeads is a combination of the high efficiency and the high selectivity of the resin.

With MiniBeads, high efficiency is obtained through the use of small (3 µm), completely spherical, monodisperse beads, expertly packed in high-performance columns. The high efficiency, coupled with the excellent selectivity of the Q substituent, results in extremely high-resolution separations.

Due to their smaller bead size, MiniBeads give higher resolution compared with 10 µm MonoBeads™ resin in high-performance ion



Fig 1. Mini Q ion exchange resin is available prepacked in Tricorn™ (4.6/50 PE) and Precision (PC 3.2/3) columns for high-performance purification of protein, peptides, and other biomolecules.

exchange applications. This enhances the chances of obtaining a concentrated target fraction free of contamination. The non-porous matrix of MiniBeads speeds up adsorption/desorption kinetics, which contributes to the high resolution, but gives lower capacity than porous MonoBeads.

Separation of proteins, peptides, and other biomolecules according to charge

Ion exchange purification exploits the different charge characteristics of amino acids and other components on the surface of biomolecules. Purification is based on the reversible interaction between the charged biomolecule and oppositely charged molecules on the chromatography resin. Mini Q is a strong anion exchanger.

Used in this context “strong” means that the ion exchange properties of the resin stay constant during chromatography within the recommended pH range of 3 to 11. This stability allows flexibility in choosing the best working pH for a specific sample. Elution is brought about by changing the buffer ionic strength (with a salt gradient) or the net charge of the bound compounds (with a pH gradient).

High chemical and physical stabilities

The polymer-based MiniBeads provide excellent performance benefits. MiniBeads are very pH-stable, and withstand aqueous solutions and nearly all organic solutions commonly used in the chromatography of biomolecules (Table 1). The columns can therefore be operated at optimal pH for the separation and cleaned effectively using, for example, NaOH or isopropanol.

Table 1. The main characteristics of MiniQ MiniBeads

Properties	
Type of ion exchanger	Strong anion
Charged group	$-\text{O}-\text{CH}_2-\text{CHOH}-\text{CH}_2-\text{O}-\text{CH}_2-\text{CHOH}-\text{CH}_2-\text{N}^+(\text{CH}_3)_3$
Ionic capacity per milliliter packed resin	0.06–0.09 mmol Cl [−]
pH stability *	
working range	3–11
short-term	1–14
Temperature range	
Operating	4°C to 40°C
Storage	4°C to 30°C
Matrix	Non-porous monodisperse polystyrene/divinyl benzene beads
Bead size	3 µm
Chemical stability	<p>Daily use: All commonly used aqueous buffers, pH 3–11; urea, up to 8 M; acetonitrile, up to 30% in aqueous buffers; non-ionic detergents; cationic detergents (Mini Q)</p> <p>Cleaning: Acetonitrile, up to 100%; sodium hydroxide, up to 2 M; ethanol, up to 100%; methanol, up to 100%; acetic acid, up to 75%, isopropanol, up to 100%; hydrochloric acid, up to 1 M; guanidine hydrochloride, up to 6 M</p> <p>Avoid: Unfiltered solution; oxidizing agents; anionic detergents (Mini Q)</p>

* pH stability: Working range refers to the pH range over which the ion exchange groups remain charged and maintain a consistently high capacity; short-term refers to the pH interval for regeneration and cleaning procedures.

The non-porous, monodisperse beads are also physically stable.

The matrix can withstand back pressures up to 18 MPa when packed in Tricorn (4.6/50 PE) columns, and up to 10 MPa in Precision (3.2/3) columns.

Column characteristics

MiniBeads are prepaced in high-performance Tricorn and Precision columns for reproducibility and durability. All parts of the columns are biocompatible.

Tricorn high-performance columns

The design of Tricorn columns gives high performance without compromising user friendliness and reliability. The liquid is distributed evenly over the entire column cross-section to enable high-resolution purifications.

The columns are simple to use, with Valco™ fittings for uncomplicated connection to ÄKTA design and other high-performance LC systems, and can be run according to their specifications where the systems have the appropriate pressure capacity (Table 2). The columns are robust and simple, both to operate and maintain.

Precision columns

PC 3.2/30 columns are designed for micropurification of subnanogram to microgram amounts of sample. For optimum results, it is important to check the compatibility of the column and the system specifications.

Table 2. The main characteristics of MiniBeads columns

	Tricorn columns	PC columns
Product	Mini Q 4.6/50 PE	Mini Q PC 3.2/3
Bed dimensions (inner diameter × bed height)	4.6 × 50 mm	3.2 × 30 mm
Bed volume (mL)	0.8 mL	0.24 mL
Tube material	PEEK*	Glass
Filter material	Titanium	Titanium
Max. loading capacity	5 mg	1.5 mg
Flow rate:		
Recommended	0.5–2.0 mL/min	-
Maximum	2.0 mL/min	1.0 mL/min
Maximum pressure over column	180 bar (2600 psi, 18 MPa)	100 bar (1450 psi, 10 MPa)

* PEEK = polyetheretherketone

Excellent reproducibility and durability

Reproducible results are essential in all research. The long working life and high reproducibility of MiniBeads prepacked columns, both run-to-run and column-to-column, are a result of optimized column design, the stable nature of MiniBeads, and well-proven, reliable column-packing procedures. In addition, column manufacturing and resin synthesis are subject to rigorous control, and strict quality testing of every production batch of MiniBeads and each prepacked column is performed.

Applications

Separation of synthetic oligonucleotides Mini Q is an excellent choice for analyzing the purity of synthetic oligonucleotides. Figure 2 shows the separation of a crude synthesis mixture, with specific detection of the label (CyTM5) at 648 nm, and general detection of nucleotides at 260 nm.

Column: Mini Q prepacked column 4.6 × 50 (i.d. × bed height)
Start buffer: 10 mM NaOH
Elution buffer: 10 mM NaOH, 2 M NaCl
Flow rate: 1.0 mL/min
System: ÄKTATM

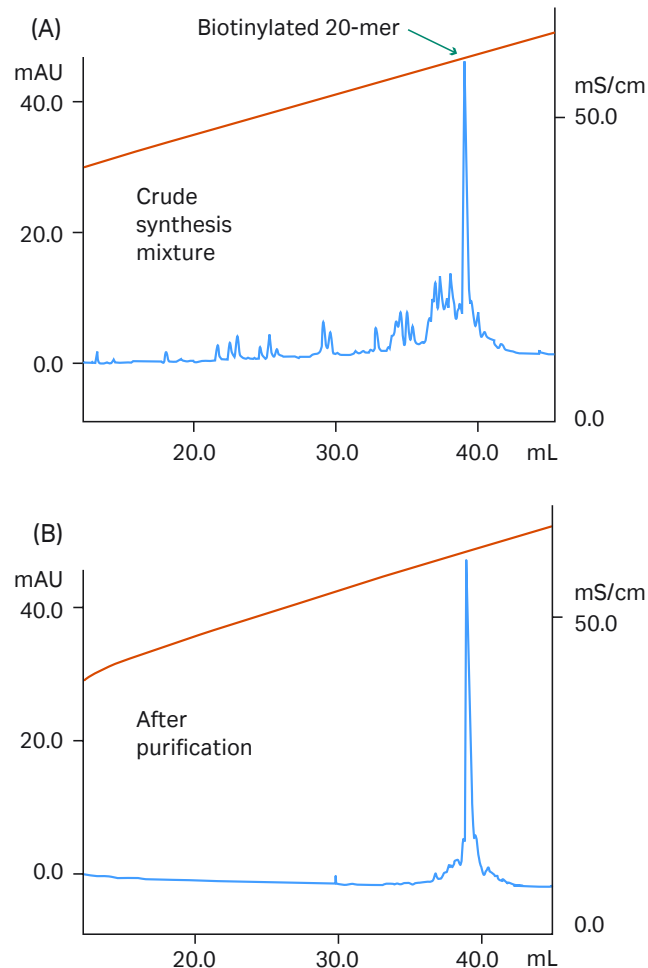


Fig 2. Purity check of a 5'-biotinylated synthetic oligonucleotide 20-mer on Mini Q. Purity checking was done before (A) and after (B) purification on a RESOURCETM RPC column.

Ordering information

Product	Code no.
Mini Q 4.6/50 PE	17 5177 01
Mini Q PC 3.2/3	17 0686 01

Related products	Code no.
Mono Q TM 5/50 GL	17 5166 01
Mono Q 10/100 GL	17 5167 01
Mono Q 4.6/100 PE	17 5179 01
Mono S TM 5/50 GL	17 5168 01
Mono S 10/100 GL	17 5169 01
Mono S 4.6/100 PE	17 5180 01
SOURCE TM 15Q 4.6/100 PE	17 5181 01
SOURCE 15S 4.6/100 PE	17 5182 01

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