Tricorn MiniBeads

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

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 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

Fig 1. Mini Q and Mini S ion exchange media are 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.

Media characteristics

MiniBeads prepacked columns are available with two different media (resins): Mini Q™ or Mini S™, which are strong anion and cation ion exchangers, respectively. 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 media.

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 and S substituents, results in extremely high-resolution separations.

Due to their smaller bead size, MiniBeads give higher resolution compared with 10 µm MonoBeads™ media in high-performance ion 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 medium. Mini Q and Mini S are strong anion and cation exchangers, respectively.

Used in this context "strong" means that the ion exchange properties of the media 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 MiniBeads

Properties	Mini Q	Mini S
Type of ion exchanger	Strong anion	Strong cation
Charged group	-O-CH_2-CHOH-CH_2-O-CH_2-CHOH-CH_2-$N^+(CH_3)_3$	-O-CH_2-CHOH-CH_2-O-CH_2-CHOH-CH_2-SO_3^-
Ionic capacity per milliliter packed medium	0.06–0.09 mmol Cl^-	0.018–0.034 mmol H^+
pH stability *		
working range	3–11	3–11
short-term	1–14	1–14
Temperature range		
Operating	4°C to 40°C	4°C to 40°C
Storage	4°C to 30°C	4°C to 30°C
Matrix	Non-porous monodisperse polystyrene/divinyl benzene beads	Non-porous monodisperse polystyrene/divinyl benzene beads
Bead size	3 µm	3 µm
Chemical stability		
	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); anionic detergents (Mini S)	
	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	
	Avoid: Unfiltered solution; oxidizing agents; anionic detergents (Mini Q); cationic detergents (Mini S)	

* 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 prepacked 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. These columns are recommended for use with Ettan™ LC System, using the Precision Column Holder. 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 S 4.6/50 PE	Mini Q PC 3.2/3 Mini S 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 (Fig 2) 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 media synthesis are subject to rigorous control, and strict quality testing of every production batch of MiniBeads and each prepacked column is performed.

Column: Mini S PC 3.2/3
Sample: Chymotrypsinogen A, ribonuclease A, lysozyme (6 mg) in proportions 1:3:1
Start buffer: 20 mM acetic acid, pH 5.0
Elution buffer: 20 mM acetic acid, pH 5.0 with 400 mM NaCl
Flow rate: 0.4 ml/min
Gradient: 0% to 100% elution buffer in 12 min

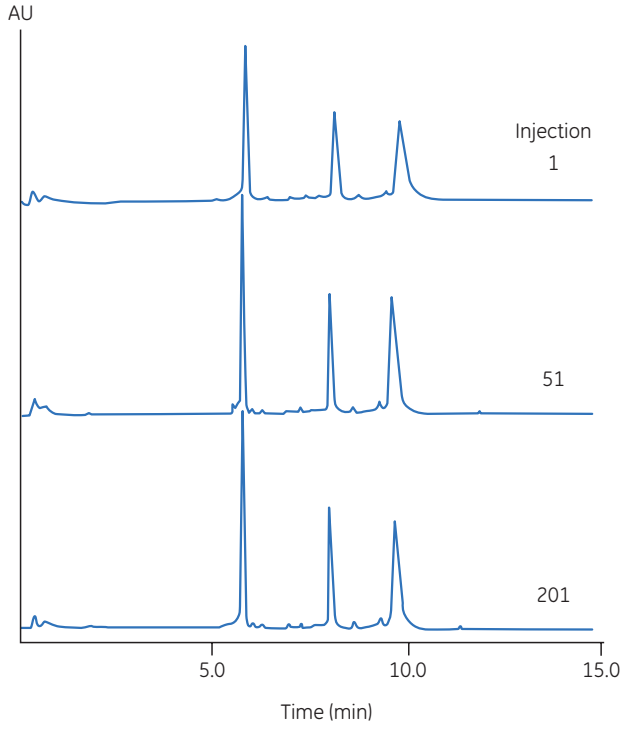

Fig 2. Long-term reproducibility test on Mini S PC 3.2/3 shows the reliability of prepacked MiniBeads columns after numerous purification runs.

Applications

Separation of synthetic oligonucleotides Mini Q is an excellent choice for analyzing the purity of synthetic oligonucleotides. Figure 3 shows the separation of a crude synthesis mixture, with specific detection of the label (Cy™5) 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: ÄKTApurifier™

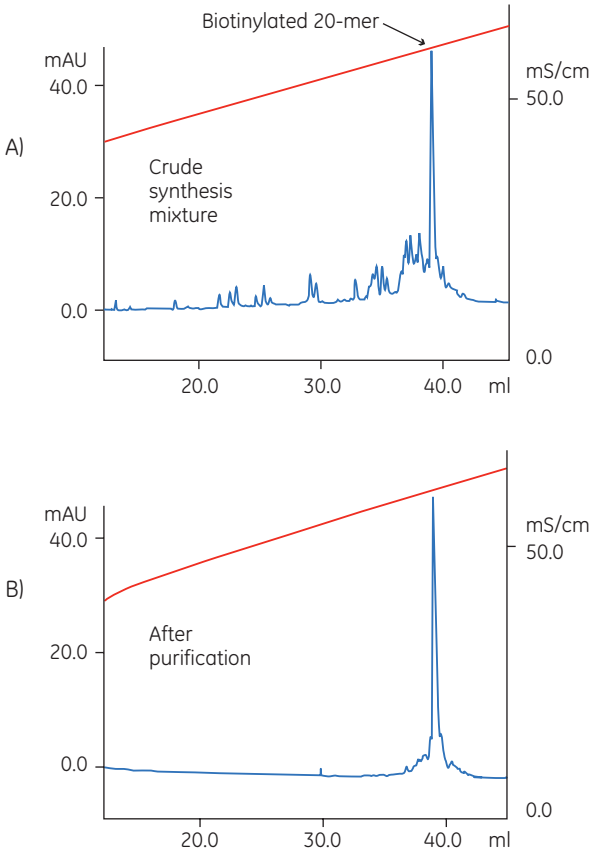

Fig 3. Purity check of a 5´-biotinylated synthetic oligonucleotide 20-mer on Mini Q. Purity checking was done before (A) and after (B) purification on a RESOURCE™ RPC column.

Separation of a protein mixture on Mini S 4.6/50 PE

Figure 4 shows high-resolution purification of a protein mixture on Mini S 4.6/50 PE (Tricorn).

Column:	Mini S 4.6/50 PE
Sample:	α-Chymotrypsinogen A (25 µg/ml) Ribonuclease A (75 µg/ml) Lysozyme (25 µg/ml)
Sample volume:	200 µl
Start buffer:	20 mM sodium acetate, pH 5.0
Elution buffer:	20 mM sodium acetate + 0.4 M NaCl, pH 5.0
Gradient:	0% to 100% elution buffer in 12 CV
Flow rate:	0.83 ml/min (room temperature)

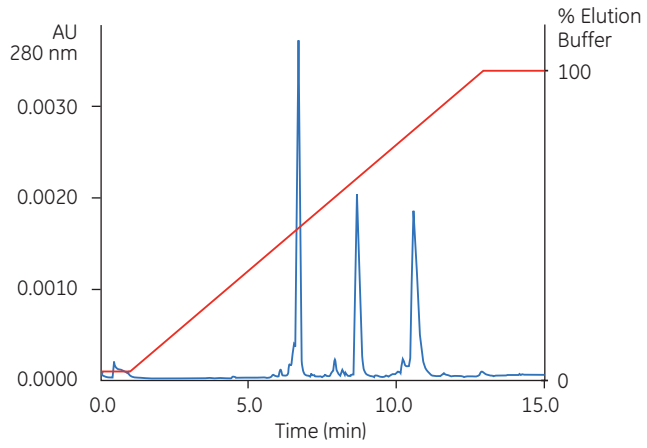

Fig 4. A high-resolution separation of a protein mixture on Mini S 4.6/50 PE (Tricorn).

Ordering information

Product	Code no.
Mini Q 4.6/50 PE	17-5177-01
Mini S 4.6/50 PE	17-5178-01
Mini Q PC 3.2/3	17-0686-01
Mini S PC 3.2/3	17-0687-01

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

Related product literature	Code no.
Ion Exchange Chromatography & Chromatofocusing, Principles and Methods	11-0004-21
Protein Purification, Handbook	18-1132-29
Ion exchange columns and media, Selection guide	18-1127-31

For local office contact information, visit
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