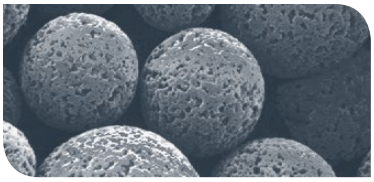

CHROMATOGRAPHY

UNOsphere™ Q Anion Exchange Resin

- Hydrophilic polymeric resin engineered for high mechanical stability and low backpressures
- Efficient capture of biopharmaceutical molecules from crude feedstreams
- Ultrahigh binding capacities at fast linear velocities
- Robust polymer designed to withstand repeated clean-in-place cycles
- Biopharmaceutical manufacturing quantities available
- Fully supported for regulatory submission

Achieve High Productivity Using UNOsphere Q Anion Exchange Resin

Be Productive

In the bioprocess industry, the isolation of biomolecules from crude feedstock is one of the most demanding chromatographic steps in the downstream process. Biopharmaceutical manufacturers are under increasing economic pressure to reduce drug production costs. These factors require the resin used in the capture step to have very high binding capacities at fast linear velocities while maintaining low column backpressure.

Based on a single-step polymerization process, UNOsphere is a new-generation polymeric resin that delivers high productivity in the capture step.

UNOsphere Polymer Technology

UNOsphere Resin is based on the single-step polymerization process used to prepare continuous-bed matrix UNO® Ion Exchange Columns. Incorporation of a quaternary amine ligand into the matrix during polymerization leads to consistent batch-to-batch reproducibility. UNOsphere Resin is macroporous (>2,000 Å), leading to fast binding kinetics and high binding capacities. Careful selection of monomers and crosslinkers provides unrivaled base stability and resin rigidity.

Properties of UNOsphere Q Resin

Most production chromatography systems have maximum pressure limits of 3 bar. The median particle size of UNOsphere Q Resin is 120 µm, which generates a backpressure of less than 1 bar at 1,200 cm/hr (Figure 1). For other properties of UNOsphere Q Resin, see Table 1.

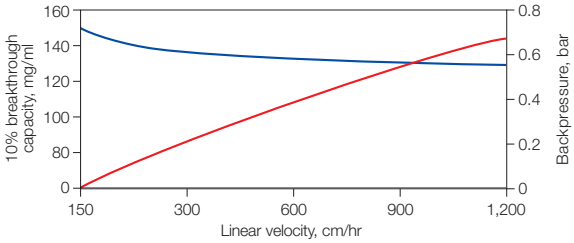

Fig. 1. Binding and backpressure properties of UNOsphere Q Resin. A 5 mg/ml sample of bovine serum albumin (BSA) in 10 mM Tris, pH 8.5, was loaded onto a 1.1 x 20 cm column. Backpressure (—); 10% breakthrough (BT) capacity (—).

Table 1. Properties of UNOsphere Q Resin.

Property	Description
Type of ion exchanger	Strong anion
Functional group	$-N^{+}(CH_3)_3$
Particle size	120 µm
Total ionic capacity	120 µeq/ml
Dynamic binding capacity	≥180 mg/ml at 150 cm/hr ≥125 mg/ml at 600 cm/hr 10% BT capacity determined with 2.0 mg/ml BSA in 1.1 x 10 cm column
Recommended linear flow rate	50–300 cm/hr
Pressure vs. flow performance	Under 2 bar at flow rate of 1,200 cm/hr (20 x 20 cm packed bed, 1.20 compression factor)
Compression factor (settled bed volume/ packed bed volume)	1.15 –1.20
pH stability	1–14
Shipping solution	20% ethanol or 0.1 M NaCl
Regeneration	1–2 M NaCl
Sanitization	0.5–1.0 N NaOH
Storage conditions	20% ethanol or 0.1 M NaOH
Chemical stability	
1.0 M NaOH (20°C)	Up to 10,000 hr
1.0 M HCl (20°C)	Up to 200 hr
Shelf life	5 years

BIO-RAD

UNOsphere Q contains a low-density resin phase within a matrix of denser polymer aggregates, which provides high binding capacities that range from 125 to 180 mg BSA per ml of resin in the linear velocity range of 150–1,200 cm/hr.

Harsh conditions, such as clean-in-place and corrosive solutions, may affect the long-term stability of chromatographic resins. The robustness of UNOsphere Q Resin allows it to withstand these conditions with minimal loss of performance.

Plasmid Capture Performance

UNOsphere Q Resin is designed for high-efficiency capture of biomolecules from crude feedstreams. Figure 2 shows the capture of 0.61 mg of plasmid DNA (5.9 kb, derived from pUC19) from clarified bacterial lysate using UNOsphere Q Resin. Most of the RNA was removed in this capture step (Figure 3), and the eluted plasmid could be digested by EcoRI restriction enzyme (Figure 4). Residual contaminants, such as RNA, cDNA, endotoxins, and host cell proteins, may be removed using CHT™ Ceramic Hydroxyapatite to produce gene therapy–grade plasmid.

Technical Assistance

Regulatory support files are available upon request. Bio-Rad Laboratories is an ISO 9001 registered corporation. For additional information and technical assistance, contact your local Bio-Rad office. In the USA and Canada, call 1-800-424-6723.

Visit **bio-rad.com/web/UNOsphereQ** for more information about Bio-Rad's UNOsphere Q Resin and to request a free sample.

For more information about UNO Ion Exchange Columns, request bulletin 2118. For more information about the chromatographic performance of UNOsphere Resin, refer to the bibliography (note that the authors refer to UNOsphere Resin as BRX).

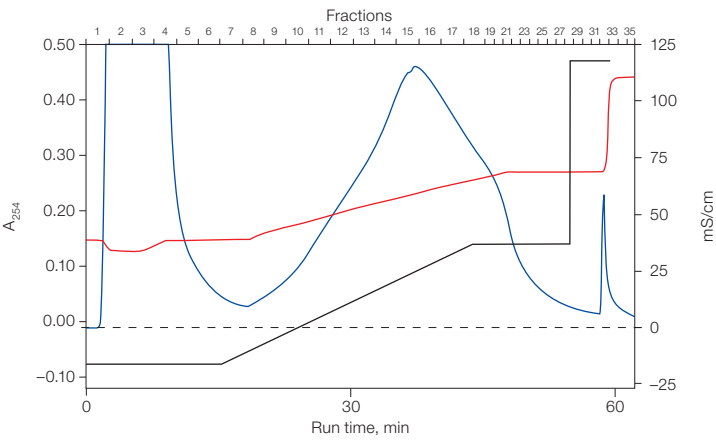

Fig. 2. Purification of plasmid DNA on a UNOsphere Q Column. Clarified bacterial lysate (10 ml, adjusted to pH 8.0) was loaded onto a 0.5 x 11 cm column (2.1 ml) in buffer A (10 mM sodium phosphate, 0.3 M NaCl, 1 mM EDTA, pH 8.0). The sample was eluted with a 0–40% gradient of buffer B (10 mM sodium phosphate, 1.0 M NaCl, 1 mM EDTA, pH 8.0) at a flow rate of 2 ml/min (600 cm/hr). The column was washed with 10 column volumes (CV) of 40% buffer B, followed by 100% buffer B for 5 CV. The effluent was monitored at 254 nm. Each fraction was 5 ml. A_{254} (—); conductivity (—); theoretical gradient (—). A, absorbance.

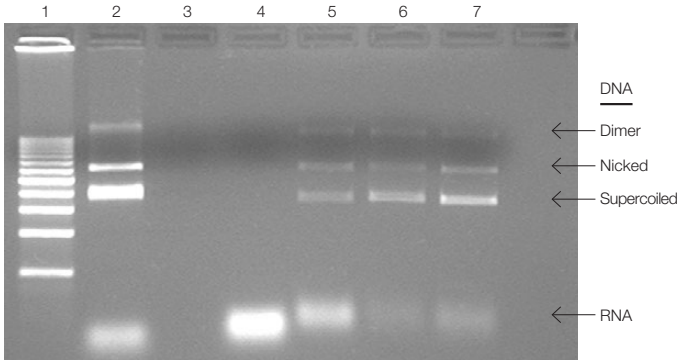

Fig. 3. Analysis of plasmid DNA purified on UNOsphere Q Resin. Fractions from the chromatography run shown in Figure 2 were separated on a 0.8% agarose gel. Lane 1, 1 kb marker (catalog #1708204); lane 2, crude lysate; lane 3, flowthrough (fractions 2–6); lane 4, fractions 9–18; lane 5, fractions 19–30; lane 6, fractions 31–35; lane 7, fraction 36.

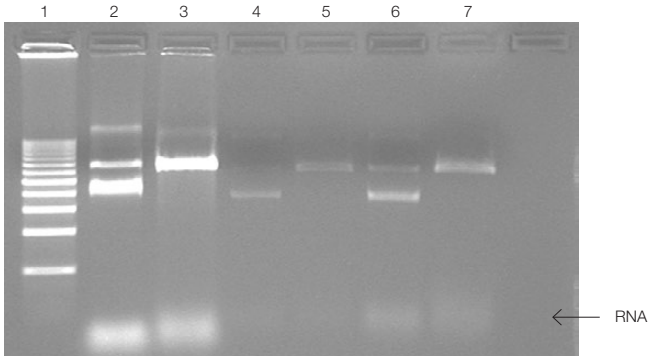

Fig. 4. Restriction enzyme analysis of plasmid DNA purified on UNOsphere Q Resin. Lane 1, 1 kb marker; lane 2, undigested clarified lysate; lane 3, EcoRI-digested clarified lysate; lane 4, undigested fractions 31–35; lane 5, digested fractions 31–35; lane 6, undigested fraction 36; lane 7, digested fraction 36.

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Ordering Information

Catalog #	Description
Prepacked Screening Tools	
7324714	**Foresight™ UNOsphere Q Plates**, 20 µl
7324819	**Foresight UNOsphere Q RoboColumn Unit**, 200 µl
7324820	**Foresight UNOsphere Q RoboColumn Unit**, 600 µl
7324732	**Foresight UNOsphere Q Column**, 1 ml
7324752	**Foresight UNOsphere Q Column**, 5 ml
Bulk Resin	
1560101	**UNOsphere Q Support**, 25 ml
1560103	**UNOsphere Q Support**, 100 ml
1560105	**UNOsphere Q Support**, 500 ml
156-0107	**UNOsphere Q Support**, 10 L

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France *33 01 47 95 69 65* ***Germany*** *49 89 31 884 0* ***Hong Kong*** *852 2789 3300* ***Hungary*** *36 1 459 6100* ***India*** *91 124 4029300*
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New Zealand *64 9 415 2280* ***Norway*** *47 23 38 41 30* ***Poland*** *48 22 331 99 99* ***Portugal*** *351 21 472 7700* ***Russia*** *7 495 721 14 04*
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