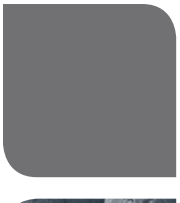

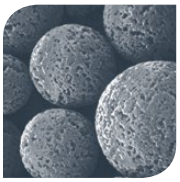

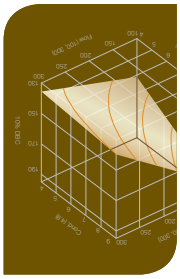

CHROMATOGRAPHY

UNOsphere™ S Cation Exchange Resin

- Efficient capture of biopharmaceutical molecules from crude feedstreams
- Ultrahigh binding capacities at fast linear velocities
- Hydrophilic polymeric resin engineered for high mechanical stability and low backpressures
- Robust polymer designed to withstand repetitive clean-in-place cycles
- Large open pore structure for fast mass transfer
- Compatible with separation of proteins, nucleic acids, viruses, plasmids, and other biomolecules
- Biopharmaceutical manufacturing quantities available
- Fully supported for regulatory submission

Achieve High Productivity Using UNOsphere S Cation 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 resins used in the capture step to have very high binding capacities at fast linear velocities while maintaining low column backpressure.

UNOsphere is a patented* next-generation polymeric resin based on a single-step polymerization process that delivers high productivity in the capture step.

UNOsphere Polymer Technology

The genesis of UNOsphere Resin is based on the single-step polymerization process used to prepare UNO® Continuous Bed Columns. Incorporation of the sulfonic acid 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 (Table 1). Careful selection of monomers and crosslinkers provides unrivaled base stability and resin rigidity.

* U.S. patent 6,423,666 B1.

Properties of UNOsphere S Resin

Most production chromatography systems have maximum pressure limits of 3 bar. The median particle size of UNOsphere S Resin is 80 µm, which generates a backpressure less than 1.5 bar at 1,200 cm/hr (Figure 1). The highly macroporous nature of UNOsphere S Resin provides high binding capacities that range from 40 to 60 mg IgG/ml resin in the linear velocity range of 150–600 cm/hr (Figure 1).

Harsh conditions, such as clean-in-place and corrosive buffer systems, may affect the long-term stability of chromatographic resins. The robustness of UNOsphere S Resin allows it to survive these conditions with minimal loss of performance (Table 1).

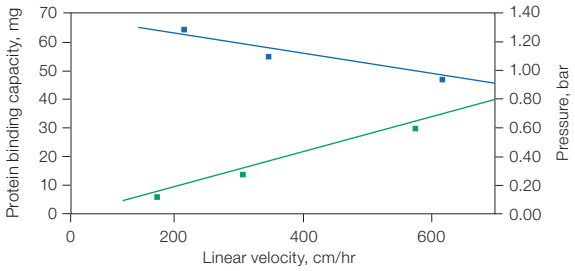

Fig. 1. Binding and backpressure properties of UNOsphere S Resin. Column size, 1.1 × 20 cm; sample, 2 mg/ml hIgG; buffer, 50 mM sodium acetate, pH 5.0. Backpressure (—); 10% breakthrough (BT) capacity (—).

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Table 1. Properties of UNOsphere S Resin.

Property	Description
Type of ion exchanger	Strong cation
Functional group	$-SO_3^-$
Particle size	80 µm
Total ionic capacity	269 ± 50 meq/ml
Dynamic binding capacity	60 mg IgG/ml at 150 cm/hr 10% BT capacity determined with 4.5 mg/ml hIgG in 1.1 x 10 cm column
Recommended linear flow rate	50–300 cm/hr
Pressure vs. flow performance	Under 2.0 bar at flow rate of 1,200 cm/hr (20 x 20 cm packed bed, 1.17 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 N NaOH
Chemical stability	
1.0 M NaOH (20°C)	Up to 2,000 hr
1.0 M HCl (20°C)	Up to 200 hr*
Shelf life	5 years

* Data derived under accelerated conditions at 60°C.

Capture Performance

UNOsphere S Resin is designed for high-efficiency capture of monoclonal antibodies from crude feedstreams. Murine IgG_1 (6.6 mg) was captured and eluted from a 2 ml UNOsphere S Column (Figures 2 and 3); assays of the load and eluate demonstrated a recovery of 97%. No antibody was detected in the flowthrough (Figure 3, lane 2). The 10% breakthrough capacity for this murine IgG_1 antibody is 12.8 mg/ml (at 600 cm/hr) from conditioned medium.

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/UNOsphereS** for more information about Bio-Rad's UNOsphere S Resin and to request a free sample.

For more technical information, request bulletins 2678, 2774, 2780, 2849, and 6713. For more information about the chromatographic performance of UNOsphere Resin, refer to the bibliography (note that the authors refer to UNOsphere Resin as BRX).

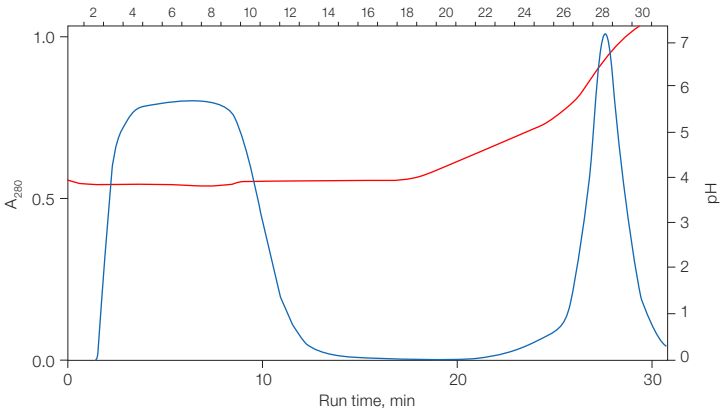

Fig. 2. Purification of murine IgG_1 on UNOsphere S Column. Column size, 0.5 × 10 cm (2 ml); sample, 15 ml (6.6 mg) of murine IgG_1–conditioned medium. The sample was loaded onto the column in 20 mM citrate-phosphate buffer, pH 4.0, washed, and eluted in a linear gradient of 0–100% 20 mM citrate-phosphate, pH 8.0, in 10 column volumes at a flow rate of 2.0 ml/min (600 cm/hr). Each fraction was 2.0 ml. A_{280} (—); buffer pH (—). A, absorbance.

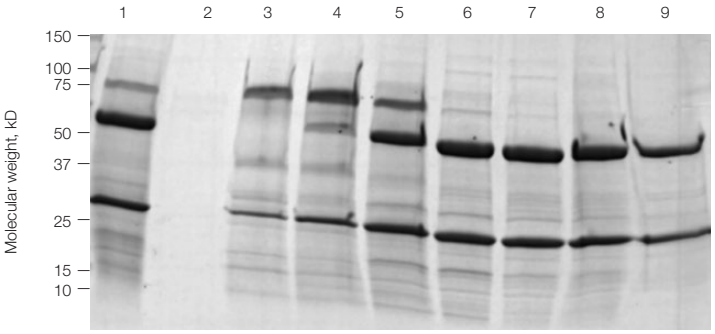

Fig. 3. SDS-PAGE gel of UNOsphere-purified murine IgG_1. Fractions from the chromatography run shown in Figure 2 were separated on a 4–20% precast gel. On left, reference standards; lane 1, conditioned medium; lane 2, flowthrough; lanes 3–8, fractions 25, 26, 27, 28, 29, and 30; lane 9, Protein A–purified murine IgG_1 from culture medium.

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Ordering Information

Catalog #	Description
Prepacked Screening Tools	
7324710	**Foresight™ UNOsphere S Plates**, 2 x 96-well, 20 µl
7324813	**Foresight UNOsphere S RoboColumn Unit**, 200 µl
7324814	**Foresight UNOsphere S RoboColumn Unit**, 600 µl
7324730	**Foresight UNOsphere S Column**, 1 x 1 ml
7324750	**Foresight UNOsphere S Column**, 1 x 5 ml
Bulk Resin	
1560111	**UNOsphere S Support**, 25 ml
1560113	**UNOsphere S Support**, 100 ml
1560115	**UNOsphere S Support**, 500 ml
156-0117	**UNOsphere S 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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Singapore *65 6415 3188* ***South Africa*** *27 (0) 861 246 723* ***Spain*** *34 91 590 5200* ***Sweden*** *46 08 555 12700* ***Switzerland*** *41 026 674 55 05*
Taiwan *886 2 2578 7189* ***Thailand*** *66 662 651 8311* ***United Arab Emirates*** *971 4 8187300* ***United Kingdom*** *44 020 8328 2000*

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