

CHROMATOGRAPHY

UNOsphere™ Rapid S Media

- High binding capacity
- High linear velocities at low backpressure
- Rapid regeneration
- Robust polymer for repeated clean-in-place cycles
- Stable in 1 M NaOH transfer
- Fully supported for regulatory submissions
- Engineered for reproducibility
- Excellent scalability

Achieve High Productivity Using UNOsphere Rapid S Cation Exchange Media

UNOsphere Rapid S support is a strong cation exchange support for process chromatography. The support has been optimized to deliver speed and throughput in capture and intermediate purification steps. UNOsphere Rapid S support combines high binding capacity, fast mass transfer, excellent flow characteristics, and robust physical properties to make it an exceptional choice for process chromatography.

Chemical Stability

UNOsphere media are based on a unique polymerization process, which yields macroporous, hydrophilic beads that are ideal for biomolecule separations. Incorporation of the sulfonic acid ligand directly into the matrix during the polymerization process ensures consistent batch-to-batch reproducibility. The performance of UNOsphere Rapid S support is not compromised by exposure to NaOH in commonly used sanitization and clean-in-place protocols (see Figure 1).

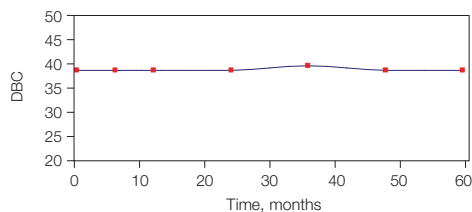


Fig. 1. Stability of UNOsphere Rapid S media. Results from an accelerated storage study (in 0.1 M NaOH) show no loss in dynamic binding capacity in an equivalent-to-5-year test. DBC, dynamic binding capacity.

Rapid Equilibration

Some polymer-based resins suffer from long equilibration cycles due to the titration of the carboxyl groups contained in the base matrix. UNOsphere Rapid S support is engineered to reduce the pH shift encountered during buffer changes, so as to save time, reduce buffer consumption, and enhance productivity.

High Flow at Low Backpressure

UNOsphere Rapid S support is intended for use in large-scale purification processes. The macroporous structure of the UNOsphere matrix affords the use of high flow rates while maintaining very low backpressures. With typical buffers and running conditions, it is possible to achieve linear velocities in excess of 1,000 cm/hr in full-scale columns with backpressures below 2 bar (see Figure 2). The use of high flow processes increases productivity, decreases cycle times, and reduces the degradation of proteins due to exposure to proteases.

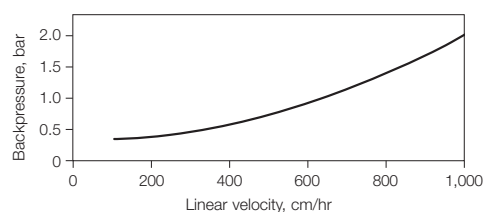


Fig. 2. UNOsphere Rapid S media performance. Pressure/flow performance for a 20 cm diameter x 20 cm bed height column packed to 17% axial compression.

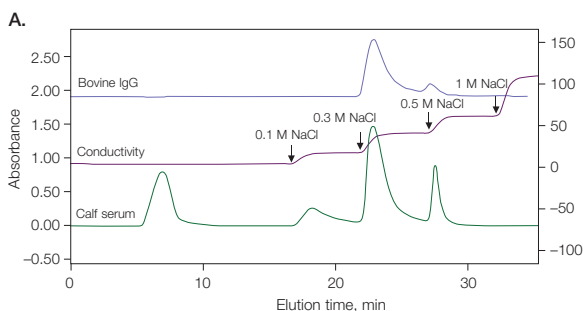
BIO-RAD

Solid Specifications

UNOsphere Rapid S support is designed for optimal performance and is produced in a validated manufacturing process to ensure batch-to-batch and run-to-run consistency. A dedicated applications and technical support team is available to answer questions and help with your process separation design.

Predictable Performance

UNOsphere Rapid S support delivers the results you expect from a cation exchanger. An example of separation is shown in Figure 3. IgG is captured from a calf serum sample using steps of increasing ionic strength. For comparison, the same steps are run using purified bovine IgG. The results are reproducible; the performance is predictable, which is the behavior you look for when choosing a process separation tool.



B.

Column	0.7 x 2.7 cm (1 ml) UNOsphere Rapid S media packed bed column
Load 1	5 ml of 0.25 mg/ml bovine IgG at conductivity of 3 mS/cm and pH 4.7
Load 2	5 ml of clarified calf serum adjusted to a conductivity of 3 mS/cm with water and adjusted to pH 4.7
Flow rate	300 cm/hr
Equilibration	20 mM citric acid, pH 4.7
Sequential elution	0.1 M NaCl, 0.3 M NaCl, 0.5 M NaCl, or 1 M NaCl added to equilibration buffer

Fig. 3. An example of separation. A, chromatogram of IgG purification from calf serum (green trace) and purified bovine IgG (blue trace) using the same binding and elution conditions. B, chromatography conditions.

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.

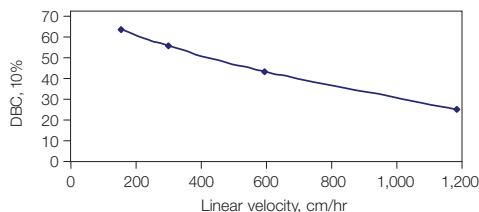


Fig. 4. Dynamic binding capacity (DBC) vs. flow velocity. A column 1.1 cm in diameter was packed to a 20 cm bed height with UNOsphere Rapid S media; 2 mg/ml human IgG in 50 mM sodium acetate was loaded until 10% breakthrough was observed.

Properties of UNOsphere Rapid S media

Type of ion exchanger	Strong cation
Functional group	-SO ₃ ⁻
Total ionic capacity	140 µeq/ml
Median particle size	100 µm
Dynamic binding capacity*	
150 cm/hr	60 mg IgG/ml
600 cm/hr	30 mg IgG/ml
Recommended linear flow rate range**	50–800 cm/hr
Chemical stability	
1 M NaOH (20°C)	800 hr
1 M HCl (20°C)	200 hr
pH stability	1–14 short term, 2–13 long term
Regeneration conditions	1–2 M NaCl
Storage conditions	20% ethanol or 0.1 N NaOH

* 10% breakthrough capacity determined with 4.5 mg/ml human IgG.

**UNOsphere Rapid S media packed in a column 20 cm in diameter with a 20 cm bed height and run at 1,000 cm/hr will generate less than 2 bar backpressure.

Ordering Information

Catalog #	Description
732-4400	Bio-Scale™ Mini UNOsphere™ Rapid S Cartridges, 5 x 1 ml
732-4401	Bio-Scale Mini UNOsphere Rapid S Cartridges, 1 x 5 ml
732-4402	Bio-Scale Mini UNOsphere Rapid S Cartridges, 5 x 5 ml
156-0211	UNOsphere Rapid S Media, 25 ml
156-0213	UNOsphere Rapid S Media, 100 ml
156-0215	UNOsphere Rapid S Media, 500 ml
156-0217	UNOsphere Rapid S Media, 10 L

Larger volumes are available on request.

For more information on Bio-Rad's complete line of process chromatography media, visit us on the Web at www.bio-rad.com/unosphere.



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