

CHROMATOGRAPHY

Nuvia™ Q Anion Exchange Resin

- Best-in-class binding capacity at fast flow rates
- Rapid mass transfer kinetics
- Efficient resolution of biomolecules from crude feedstreams
- Robust resin design providing competitive NaOH stability
- Full regulatory support

High Binding Capacity and Resolution Capabilities for Downstream Processes

Introduction

Nuvia Q is an ultra-high capacity, next-generation anion exchange resin built on the robust, industry-proven UNOsphere™ base matrix. Nuvia Q Resin delivers high binding capacity across a range of pH and flow rates, providing a wide experimental design space for process developers. This exceptional binding capacity makes it the anion exchanger of choice for biopharmaceuticals as upstream processes deliver higher concentrations of feed titers. Nuvia Q also delivers excellent performance for polishing applications. Nuvia Q can significantly improve productivity while contributing to reduced capital costs, space requirements, and cycle time for downstream biotherapeutic purification.

Nuvia Q is designed with proprietary surface extender technology on an optimized particle-size bead for improved flow and binding kinetics. The unique resin design gives Nuvia Q best-in-class dynamic binding capacity.

High Capacity at Fast Flow Rate

Nuvia Q Resin is designed to meet the demanding pressure-flow requirements of downstream processes. With strong mechanical properties and optimized bead size distribution, Nuvia Q consistently delivers high binding capacity at fast linear flow velocities (Figure 1), allowing users the advantage of increased productivity without compromising binding capacity.

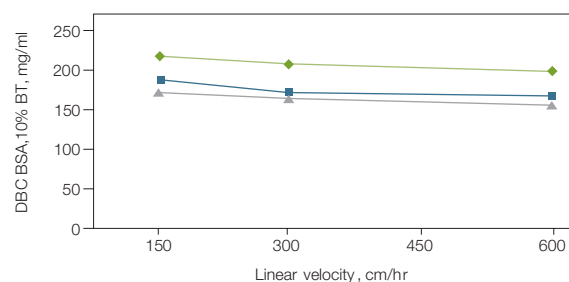


Fig 1. Dynamic binding capacity vs. flow velocity of Nuvia Q Resin. Each 1.1 cm column was packed to a 10.6 cm bed height with Nuvia Q (◆), agarose Q (■), or polymeric Q (▲) resin. Five mg/ml BSA in 20 mM Tris-HCl, pH 8.5, was loaded onto each column until 10% breakthrough was observed. BT, breakthrough; DBC BSA, dynamic binding capacity bovine serum albumin.

Purification of Whey Proteins

In addition to high dynamic binding capacity, Nuvia Q Resin also exhibits excellent baseline resolution of biomolecules with similar isoelectric points (pIs). Figure 2 shows the purification of α -lactalbumin (ALA) and β -lactoglobulin (BLG), the major proteins of whey, accounting for approximately 75% of the total mass of crude whey.

The two major peaks were resolved using a segmented NaCl gradient when whey was used as a feedstream. SDS-PAGE analysis (Figure 3) of the fractions showed two protein peaks, one containing ALA (Peak 1) and the other containing BLG (Peak 2), with pIs of 4.7–5.1 and 5.2, respectively. Purities of the two purified proteins were estimated by densitometry to be at least 85%.



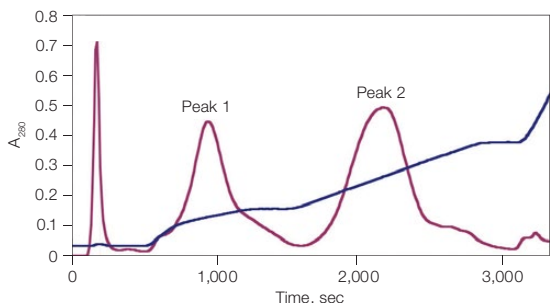


Fig. 2. Purification of whey protein on Nuvia Q Resin. Crude whey feed stock (8 mg) was loaded on a 7 x 27 mm column in 0.02 M sodium phosphate buffer, pH 6.0. The samples were eluted using a segmented gradient of 0–0.1 M NaCl, 0.1–0.3 M NaCl, and 0.3–0.9 M NaCl. Each fraction was 2 ml and analyzed by A_{280} ($\color{red}{-}$); conductivity ($\color{blue}{-}$).

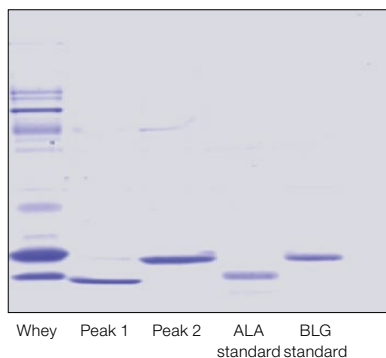


Fig. 3. Analysis of whey purified on Nuvia Q Resin. Fractions collected from the chromatography run shown in Figure 2 were separated by SDS-PAGE.

Robust Performance

Nuvia Q Resin is produced by a validated manufacturing process to ensure strict batch-to-batch reproducibility. The chemical stability of Nuvia Q allows the resin to perform consistently with minimal change to dynamic binding capacity or recovery even after prolonged exposure to NaOH (Figure 4).

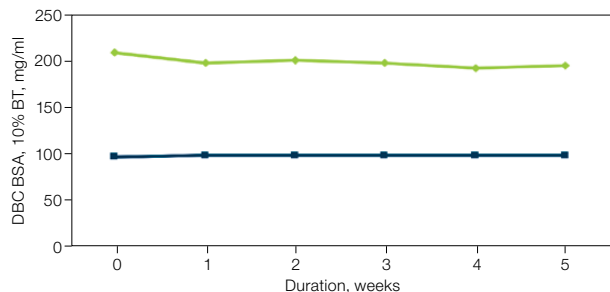


Fig. 4. Stability of Nuvia Q Resin. Results from base storage studies (in 1.0 N NaOH) show no loss in dynamic binding capacity and recovery. BSA binding capacity at 10% breakthrough ($\color{green}{\blacklozenge}$); recovery percentage ($\color{blue}{\blacksquare}$). BT, breakthrough; DBC BSA, dynamic binding capacity bovine serum albumin.

Properties of Nuvia Q Resin.

Property	Description
Type of ion exchanger	Strong anion
Functional group	$\text{-N}^+(\text{CH}_3)_3$
Total ionic capacity	100–170 $\mu\text{eq/ml}$
Dynamic binding capacity*	>170 mg/ml at 300 cm/hr
Shipping counterion	Cl^-
Particle size	$85 \pm 15 \mu\text{m}$
Recommended linear flow rate	50–600 cm/hr
Chemical stability	
1.0 N NaOH (20°C)	Up to 1 week
0.01 N NaOH (20°C)	Up to 5 years
Compression factor (settled bed volume/packed bed volume)	1.10–1.15
pH stability	
Short-term	2–14
Long-term	4–12
Shipping solution	20% ethanol + 1 M NaCl
Regeneration	1–2 M NaCl
Sanitization	0.5–1.0 N NaOH
Storage conditions	20% ethanol or 0.01 N NaOH

* 10% breakthrough capacity determined with 5 mg/ml BSA in 20 mM Tris-HCl, pH 8.5.

Technical Assistance

We have a dedicated applications team with extensive experience in process development that is available to answer questions and provide assistance in laboratory to scale-up design.

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.

Visit bio-rad.com/web/NuviaQ for more information about Bio-Rad's complete line of process chromatography resins.

Ordering Information

Catalog #	Description
1560411	Nuvia Q Resin , 25 ml
1560413	Nuvia Q Resin , 100 ml
156-0415	Nuvia Q Resin , 500 ml
156-0417	Nuvia Q Resin , 10 L
732-4721	Foresight™ Nuvia Q Column , 1 ml
732-4741	Foresight Nuvia Q Column , 5 ml
732-4804	Foresight Nuvia Q RoboColumn Unit , 200 μl
732-4805	Foresight Nuvia Q RoboColumn Unit , 600 μl
732-4703	Foresight Nuvia Q Plates , 2 x 96-well, 20 μl

Larger volumes are available on request.

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