AMBERSEP™ 21K Ion Exchange Resins
Industrial-grade, Strong Base Anion Exchange Resins for Mineral Processing Applications

Description
AMBERSEP™ 21K Ion Exchange Resins are Type I strong base anion resins with excellent kinetics and regeneration efficiency, along with outstanding physical stability. Both are especially suited for mineral processing and groundwater remediation applications due to their enhanced-porosity gel bead matrix made by a special process giving fast equilibrium rates and improved resistance to organics.

AMBERSEP™ 21K XLT Ion Exchange Resin, with its high capacity and uniform particle size, represents the state-of-the-art solution for mineral processing, giving enhanced performance for packed bed systems.

AMBERSEP™ 21K 16-20 Ion Exchange Resin, with its screened particle size from 16 – 20 U.S. Mesh, is a high-efficiency, large-bead resin suitable for fluidized-bed and Resin-In-Pulp (RIP) applications.

Applications
- Mineral Processing (Zn, Mn, etc.)
- Precious metal recovery (Au, Ag, Pt, Pd, Rh)
- Uranium recovery
Typical Properties

Physical Properties
- Copolymer: Styrene-divinylbenzene
- Matrix: Gel
- Type: Strong base anion, Type I
- Functional Group: Quaternary amine
- Physical Form: White to tan, translucent, spherical beads

Chemical Properties
- Ionic Form as Shipped: Cl\(^-\)\(\rightarrow\)OH\(^-\)
- Total Exchange Capacity: ≥ 1.4 eq/L AMBERSEP™ 21K XLT, ≥ 1.2 eq/L AMBERSEP™ 21K 16-20
- Water Retention Capacity: 50 – 60% AMBERSEP™ 21K XLT, 50 – 58% AMBERSEP™ 21K 16-20
- Particle Diameter: 575 ± 50 µm AMBERSEP™ 21K XLT, 800 – 1300 µm AMBERSEP™ 21K 16-20
- Uniformity Coefficient: ≤ 1.1 AMBERSEP™ 21K XLT, ≤ 10% AMBERSEP™ 21K 16-20
- Stability: Whole Uncracked Beads ≥ 95% AMBERSEP™ 21K XLT, ≥ 90% AMBERSEP™ 21K 16-20

Suggested Operating Conditions

Maximum Operating Temperature
- OH\(^-\) form: 60°C (140°F) AMBERSEP™ 21K XLT, 100°C (212°F) AMBERSEP™ 21K 16-20
- pH Range: 0 – 14
- Bed Depth, min.: 800 mm (2.6 ft)
- Organic Loading: ≤ 3 g KMnO\(_4\)/L resin

Flowrates
- Service: 5 – 60 m/h (2 – 24 gpm/ft\(^2\)) AMBERSEP™ 21K XLT, 5 – 50 m/h (2 – 20 gpm/ft\(^2\)) AMBERSEP™ 21K 16-20
- Backwash: See Figure 1 AMBERSEP™ 21K XLT, See Figure 1 AMBERSEP™ 21K 16-20
- Regeneration Chemical Injection
  - Co-current: 1 – 10 m/h (0.4 – 4 gpm/ft\(^2\)) AMBERSEP™ 21K XLT, 1 – 10 m/h (0.4 – 4 gpm/ft\(^2\)) AMBERSEP™ 21K 16-20
  - Counter-current: 5 – 20 m/h (2 – 8 gpm/ft\(^2\)) AMBERSEP™ 21K XLT, 5 – 20 m/h (2 – 8 gpm/ft\(^2\)) AMBERSEP™ 21K 16-20
- Displacement Rinse
  - Co-current: 1 – 10 m/h (0.4 – 4 gpm/ft\(^2\)) AMBERSEP™ 21K XLT, 1 – 10 m/h (0.4 – 4 gpm/ft\(^2\)) AMBERSEP™ 21K 16-20
  - Counter-current: 5 – 20 m/h (2 – 8 gpm/ft\(^2\)) AMBERSEP™ 21K XLT, 5 – 20 m/h (2 – 8 gpm/ft\(^2\)) AMBERSEP™ 21K 16-20
- Fast Rinse: 5 – 60 m/h (2 – 24 gpm/ft\(^2\)) AMBERSEP™ 21K XLT, 5 – 50 m/h (2 – 20 gpm/ft\(^2\)) AMBERSEP™ 21K 16-20
- Total Rinse Requirement: 3 – 6 BV* AMBERSEP™ 21K XLT, 3 – 6 BV* AMBERSEP™ 21K 16-20

Regenerant
- NaCl, Na\(_2\)CO\(_3\), NaOH

Temperature
- Ambient or up to 50°C (122°F) for silica removal

* 1 BV (Bed Volume) = 1 m\(^3\) solution per m\(^3\) resin or 7.5 gal per ft\(^3\) resin
**Hydraulic Characteristics**

Bed expansion of AMBERSEP™ 21K XLT and AMBERSEP™ 21K 16-20 Ion Exchange Resins as a function of backwash flowrate at 25°C (77°F) is shown in Figure 1.

Pressure drop data for AMBERSEP™ 21K XLT and AMBERSEP™ 21K 16-20 as a function of service flowrate at 25°C (77°F) is shown in Figure 2. Pressure drop data are valid at the start of the service run with clean water.

**Product Stewardship**

DuPont has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with DuPont products—from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

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Please be aware of the following:

- **WARNING:** Oxidizing agents such as nitric acid attack organic ion exchange resins under certain conditions. This could lead to anything from slight resin degradation to a violent exothermic reaction (explosion). Before using strong oxidizing agents, consult sources knowledgeable in handling such materials.
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