



## Product Data Sheet

### **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 <sup>-</sup>	Cl <sup>-</sup>
Total Exchange Capacity	≥ 1.4 eq/L	≥ 1.2 eq/L
Water Retention Capacity	50 – 60%	50 – 58%
Particle Size <sup>§</sup>		
Particle Diameter	575 ± 50 µm	800 – 1300 µm
Uniformity Coefficient	≤ 1.1	
< 840 µm		≤ 10%
< 710 µm		≤ 2%
Stability		
Whole Uncracked Beads	≥ 95%	≥ 90%
Swelling	Cl <sup>-</sup> → OH <sup>-</sup> : 18 – 20%	Cl <sup>-</sup> → OH <sup>-</sup> : 20%
Density		
Particle Density	1.08 g/mL	1.08 g/mL
Shipping Weight	670 g/L	690 g/L

<sup>§</sup> For additional particle size information, please refer to the [Particle Size Distribution Cross Reference Chart](#) (Form No. 45-D00954-en).

## Suggested Operating Conditions

Maximum Operating Temperature		
OH <sup>-</sup> form	60°C (140°F)	
Cl <sup>-</sup> form	100°C (212°F)	
pH Range	0 – 14	
Bed Depth, min.	800 mm (2.6 ft)	
Organic Loading	≤ 3 g KMnO <sub>4</sub> /L resin	
Flowrates		
Service	5 – 60 m/h (2 – 24 gpm/ft <sup>2</sup> )	5 – 50 m/h (2 – 20 gpm/ft <sup>2</sup> )
Backwash	See Figure 1	See Figure 1
Regeneration		
Chemical Injection		
Co-current	1 – 10 m/h (0.4 – 4 gpm/ft <sup>2</sup> )	1 – 10 m/h (0.4 – 4 gpm/ft <sup>2</sup> )
Counter-current	5 – 20 m/h (2 – 8 gpm/ft <sup>2</sup> )	
Displacement Rinse		
Co-current	1 – 10 m/h (0.4 – 4 gpm/ft <sup>2</sup> )	1 – 10 m/h (0.4 – 4 gpm/ft <sup>2</sup> )
Counter-current	5 – 20 m/h (2 – 8 gpm/ft <sup>2</sup> )	
Fast Rinse	5 – 60 m/h (2 – 24 gpm/ft <sup>2</sup> )	5 – 50 m/h (2 – 20 gpm/ft <sup>2</sup> )
Total Rinse Requirement	3 – 6 BV*	3 – 6 BV*
Regenerant	NaCl, Na <sub>2</sub> CO <sub>3</sub> , NaOH	
Temperature	Ambient or up to 50°C (122°F) for silica removal	

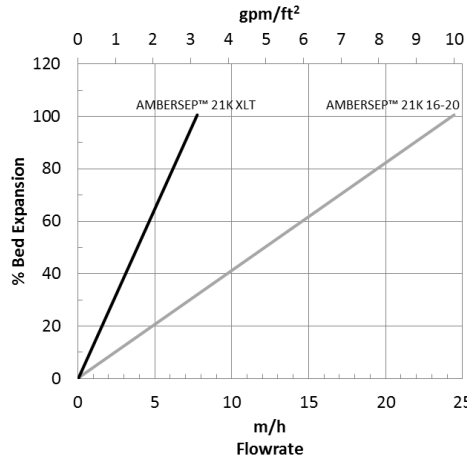
\* 1 BV (Bed Volume) = 1 m<sup>3</sup> solution per m<sup>3</sup> resin or 7.5 gal per ft<sup>3</sup> resin

## Hydraulic Characteristics

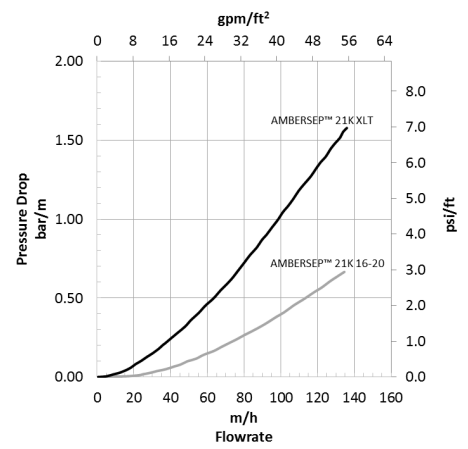
Bed expansion of AmberSep™ 21K XLT and AmberSep™ 21K 16-20 Ion Exchange Resins as a function of backwash flowrate at 25°C (77°F) is shown in Figure 1.

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.

**Figure 1: Backwash Expansion**  
Temperature = 25°C (77°F)



**Figure 2: Pressure Drop**  
Temperature = 25°C (77°F)



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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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