



Product Data Sheet

AMBERLYST™ A21 Ion Exchange Resin

Industrial-grade, Weakly Basic Polymeric Resin

Description

AMBERLYST™ A21 Ion Exchange Resin is a bead-form, weak base anion exchange resin developed for the removal of acidic materials from product streams. AMBERLYST™ A21 is supplied in the water-moist, free base (FB) form. After proper solvent conditioning, it can be used directly to remove acidic materials from any organic streams where the pK_a value is > 4.75 .

AMBERLYST™ A21 is also used in adsorption of SO_2 from gas streams.

Applications

- Deacidification
- Phenol removal from benzene
- Inhibitor removal from monomers (hydroquinone (HQ), hydroquinone monomethyl ether (MEHQ), tertiary butyl catechol (TBC))
- Base-catalyzed reactions

Typical Properties

Physical Properties	
Copolymer	Styrene-divinylbenzene
Matrix	Macroporous
Type	Weak base anion
Functional Group	Tertiary amine
Physical Form	Beige, opaque, spherical beads
Nitrogen BET	
Surface Area	35 m ² /g
Total Pore Volume	0.10 cc/g
Average Pore Diameter	110 Å
Chemical Properties	
Ionic Form as Shipped	Free base (FB)
Concentration of Base Sites †	≥ 4.60 eq/kg ≥ 1.30 eq/L
Water Retention Capacity	56 – 62%
Particle Size §	
Particle Diameter	490 – 690 µm
Uniformity Coefficient	≤ 1.80
< 300 µm	≤ 1.0%
> 1180 µm	≤ 2.0%
Swelling (in solvent)	
Phenol	77%
Density	
Shipping Weight	660 g/L

† Dry Weight Capacity ≥ 4.60 eq/kg; Total Exchange Capacity (on a water-wet basis) ≥ 1.30 eq/L

§ For additional particle size information, please refer to the [Particle Size Distribution Cross Reference Chart](#) (Form No. 177-01775).

Suggested Operating Conditions

Maximum Operating Temperature	100°C (210°F)		
Bed Depth, min.	600 mm (2.0 ft)		
Pressure Drop, max.	1 bar (15 psig) across the bed		
Flowrates			
Operating	1 – 5 BV/h (0.125 – 0.625 gpm/ft ³)		
Linear Hourly Space Velocity (LHSV)	0.5 – 5 h ⁻¹		
Backwash	See Figure 1		
Regeneration	2 – 8 BV/h (0.25 – 1 gpm/ft ³)		
NaOH	4 – 8 BV/h (0.5 – 1.0 gpm/ft ³)		
NH ₄ OH	4 – 8 BV/h (0.5 – 1.0 gpm/ft ³)		
Na ₂ CO ₃	4 – 8 BV/h (0.5 – 1.0 gpm/ft ³)		
Slow Rinse	Regeneration flowrate for 2 BV (15 gal/ft ³)		
Fast Rinse	Operating flowrate for 2 – 4 BV (15 – 30 gal/ft ³)		
Contact Time			
Regeneration	≥ 30 minutes		
Regenerant	NaOH	NH ₄ OH	Na ₂ CO ₃
Concentration	2 – 4%	2 – 4%	4 – 8%
Level	120% of ionic load	120% of ionic load	120% of ionic load

* 1 BV (Bed Volume) = 1 m³ solution per m³ resin or 7.5 gal per ft³ resin

Hydraulic Characteristics

Estimated bed expansion of AMBERLYST™ A21 Ion Exchange Resin as a function of backwash flowrate and temperature is shown in Figure 1.

Estimated pressure drop for AMBERLYST™ A21 as a function of service flowrate and temperature is shown in Figure 2. These pressure drop expectations are valid at the start of the service run with clean water and a well-classified bed.

Figure 1: Backwash Expansion

Temperature = 10 – 90°C (50 – 194°F)

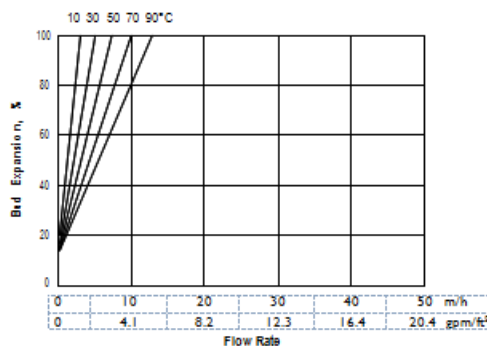
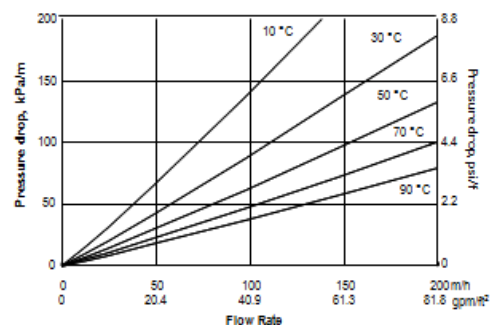


Figure 2: Pressure Drop

Temperature = 10 – 90°C (50 – 194°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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