

Product Data Sheet

AmberLite[™] CR99 Ca/280 and K/280 Chromatographic Separation Resins

Separation Resin Primarily Used for Crystalline Fructose, Sugar Alcohols, and Novel Separations

Description

AmberLite[™] CR99 Chromatographic Separation Resins are strong acid cation resins manufactured in a process that produces an extremely uniform particle size. This family of resins was specifically developed for use in simulated moving bed (SMB) chromatographic systems for the recovery and purification of sweeteners.



The 280-µm members of the AmberLite™ CR99 family are

specifically designed with the combination of particle size and rapid kinetics to maximize SMB performance and minimize product dilution, while keeping pressure drop acceptable for many existing separation systems that utilize 310- or 320- μ m beads. The enhanced performance helps to minimize water evaporation costs and is especially valuable in difficult sweetener separations such as high-purity dextrose, crystalline fructose, specialty sugars, and polyols/sugar alcohols.

AmberLite[™] CR99 Ca/280 Chromatographic Separation Resin is used for highpurity fructose and polyols/sugar alcohols, and could be considered in some systems for the separation of glucose and fructose in the production of high fructose corn syrup (HFCS).

AmberLite[™] CR99 K/280 Chromatographic Separation Resin is used in chromatography for high-purity dextrose production, the separation of polyols/sugar alcohols, and betaine purification.

Either ionic form can be used in other specialty separations, depending on the binary pair of constituents. ‡

Applications

- High-purity fructose production
- High-purity dextrose production
- Polyols/sugar alcohols separation
- Betaine purification
- High fructose corn syrup (HFCS) production
- Specialty separations [‡]

‡ Refer to the <u>DuPont Separability Advisor™ Bubble Chart</u> (Form No. 45-D01069-en) as a guide regarding the feasibility to separate various binary combinations of sugars and sugar alcohols. Plus, lab testing is available through System Optimization Services[™] (SOS) to help identify the best product to meet your needs.

Typical Properties

Physical Properties					
Copolymer	Styrene-	divinylbenzene			
Matrix	Gel				
Туре	Strong a	cid cation			
Functional Group	Sulfonic acid Amber, translucent, spher				
Physical Form			ical beads		
Chemical Properties					
Ionic Form as Shipped	Ca ²⁺		K ⁺		
Total Exchange Capacity	≥ 1.5 eq/L (H⁺ form)		≥ 1.5 eq/L (H	≥ 1.5 eq/L (H⁺ form)	
Water Retention Capacity	57 – 61% (H ⁺ form)		57 – 61% (H	57–61% (H+ form)	
Stability					
Whole Uncracked Beads	≥97%		≥97%		
Density					
Particle Density	1.29 g/mL		1.28 g/mL		
	Co ²⁺		K+		
Destiste Dissession			N		
Particle Diameter	275 ± 15 µm		275 ± 15 µm		
Broad Range	243 – 309 µm	≥80%	243 – 309 µm	≥80%	
Narrow Range	256 – 293 µm	≥60%	256 – 293 µm	≥60%	
Fine Beads	< 242 µm	≤8%	< 242 µm	≤8%	
Coarse Beads	> 335 µm	≤8%	> 335 µm	≤8%	

§ For additional particle size information, please refer to the Particle Size Distribution Cross Reference Chart (Form No. 45-D00954-en).

	Fructose or HFCS (Ca ²⁺ form)	Polyols (Ca ²⁺ or K ⁺ form)	Betaine (K ⁺ form)
Syrup Temperature	60-71°C (140-160°F)	60-71°C (140-160°F)	80–85°C (176–185°F)
Syrup pH	4-7	4 – 7	7 – 12
Dissolved Oxygen			
Concentration			
Recommended	< 0.1 ppm	< 0.1 ppm	< 0.1 ppm
Maximum	0.25 ppm	0.25 ppm	0.25 ppm
Simulated Moving Bed	With optimized tuning	With optimized tuning	With optimized tuning
Operation	(annually)	(annually)	(annually)

It is strongly advised to remove oxygen from feed streams and elution water going into the chromatographic separation resin. Limiting the oxygen concentration to less than 0.1 ppm (0.25 ppm maximum) will help maximize resin life.

(Light Obscuration Instrument Particle Size)

Typical Bead Size Distribution §

Suggested Operating Conditions

Hydraulic Characteristics

Estimated bed expansion of the 280-µm size of AmberLite [™] CR99 Chromatographic Separation Resin as a function of backwash flowrate at 25°C (77°F) is shown in Figure 1. Data for DuPont's 320- and 310-µm chromatographic separation resins is also provided for comparison. The flowrate necessary to achieve a desired bed expansion for other water temperatures can be calculated with the provided equations.

Estimated pressure drop data for the 280-µm size of AmberLite[™] CR99 as a function of service flowrate and concentration of 42% HFCS (50% D.S. and 30% D.S.) is shown in Figure 2. Data for DuPont's 320- and 310-µm chromatographic separation resins is also provided for comparison.

Thermal expansion of the 280-µm size of AmberLite™ CR99 as a function of temperature and ionic form is shown in Figure 3.





m/h

Flowrate

0

2 4 6 8 10 12

310

رية. 8.0 jsd

6.0

4.0

2.0

0.0

14 16

Figure 2: Pressure Drop

For other temperatures use: $F_T = F_{25^{\circ}C} [1 + 0.008 (1.8T_{\circ C} - 45)]$, where $F \equiv m/h$ $F_T = F_{77^{\circ}F} [1 + 0.008 (T_{\circ F} - 77)]$, where $F \equiv gpm/ft^2$

Figure 3: Thermal Expansion



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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

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a violent exothermic reaction (explosion). Before using strong oxidizing agents,

consult sources knowledgeable in handling such materials.

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