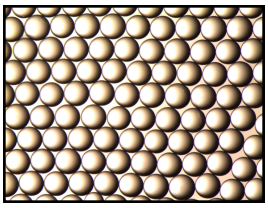
Product Data Sheet

AmberLite™ CR99 Ca/310 Chromatographic Separation Resin

Separation Resin Primarily Used for High-Purity Fructose

Description



AmberLite™ CR99 Chromatographic Separation Resins are gel, 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.

AmberLite™ CR99 Ca/310 Chromatographic Separation Resin is specifically designed with the combination of particle size and rapid kinetics to improve SMB performance and minimize product dilution. The improved separator performance helps to minimize water evaporation costs and is especially valuable in sweetener separations such as high-purity fructose and polyols/sugar alcohols.

This resin, or the available K-form or Na-form 310-µm chromatographic separation resins, can be used in other specialty separations, depending on the binary pair of constituents. ‡

Applications

- High-purity fructose production
- Polyols/sugar alcohols separation
- High fructose corn syrup (HFCS) production
- Specialty separations ‡

‡ Refer to the DuPont Separability Advisor™ Bubble Chart (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.

Form No. 45-D00715-en, Rev. 0
November 2019

Typical Properties

Physical Properties	
Copolymer	Styrene-divinylbenzene
Matrix	Gel
Type	Strong acid cation
Functional Group	Sulfonic acid
Physical Form	Amber, translucent, spherical beads
Chemical Properties	
Ionic Form as Shipped	**Ca^{2+}**
Total Exchange Capacity	≥ 1.4 eq/L (H^+ form)
Water Retention Capacity	60 – 64% (H^+ form)
Stability	
Whole Uncracked Beads	≥ 97%
Density	
Particle Density	1.27 g/mL

Typical Bead Size Distribution [§] (Light Obscuration Instrument Particle Size)

	Ca^{2+}	
Particle Diameter	305 ± 15 µm	
Broad Range	280 – 343 µm	≥ 80%
Narrow Range	294 – 329 µm	≥ 60%
Fine Beads	< 275 µm	≤ 8%
Coarse Beads	> 375 µm	≤ 8%

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

Suggested Operating Conditions

	HFCS (Ca^{2+} form)
Syrup Temperature	60 – 71°C (140 – 160°F)
Syrup pH	4 – 7
Dissolved Oxygen Concentration	
Recommended	< 0.1 ppm
Maximum	0.25 ppm
Simulated Moving Bed Operation	With optimized tuning (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.

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Hydraulic Characteristics

Estimated bed expansion of the 310-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 280-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 310-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 280-µm chromatographic separation resins is also provided for comparison.

Thermal expansion of the 310-µm size of AmberLite™ CR99 as a function of temperature and ionic form is shown in Figure 3.

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

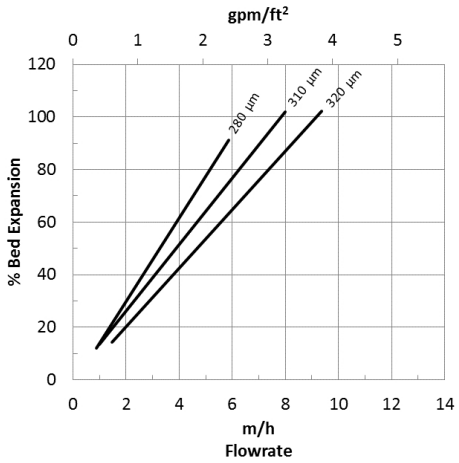
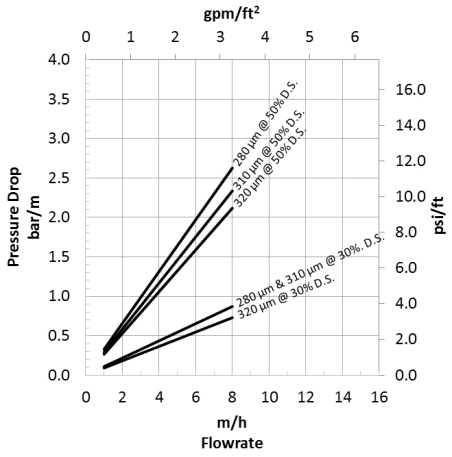
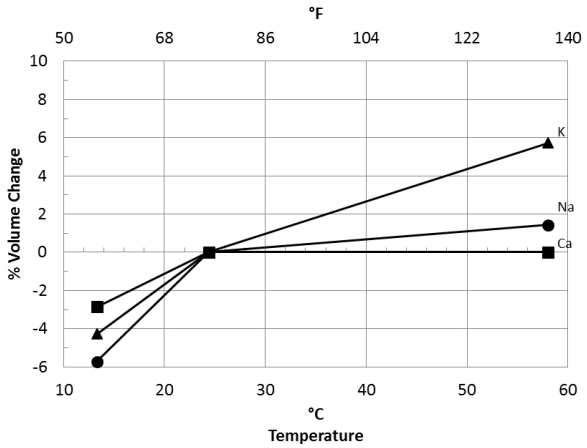


Figure 2: Pressure Drop
Syrup (42% HFCS) Concentration = 30% D.S., 50% D.S.



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

Figure 3: Thermal Expansion



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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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