Product Data Sheet

AmberLite™ FPC12 H Ion Exchange Resin

Food-grade, Gel, Strong Acid Cation Exchange Resin

Description

AmberLite™ FPC12 H Ion Exchange Resin has been optimized for use as a catalyst for the inversion of sucrose. Its unique porosity imparts exceptional inversion rates due to a better diffusion rate of the sucrose and the invert sugar through the resin structure.

AmberLite™ FPC12 H could also be considered for other catalytic reactions for food processing or the production of food additives.

Applications

- Sucrose catalytic inversion

Typical Properties

Physical Properties	
Copolymer	Styrene-divinylbenzene
Matrix	Gel
Type	Strong acid cation
Functional Group	Sulfonate
Physical Form	Light gray, translucent, spherical beads
Chemical Properties	
Ionic Form as Shipped	H^+
Concentration of Acid Sites ‡	≥ 4.80 eq/kg ≥ 1.35 eq/L
Water Retention Capacity	63 – 67%
Particle Size §	
Particle Diameter	550 – 700 µm
< 425 µm	≤ 0.8%
Stability	
Whole Uncracked Beads	≥ 95%
Swelling	$Na^+ \rightarrow H^+$: 10%
Density	
Bulk Density as Shipped	770 g/L

‡ Total Exchange Capacity (on a water-wet basis) ≥ 1.35 eq/L; Dry Weight Capacity ≥ 4.80 eq/kg.

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

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Suggested Operating Conditions

Maximum Operating Temperature (H^+ form)	
Sugar Inversion	40°C (104°F)
Aqueous Solutions	80°C (176°F)
Bed Depth, min.	700 mm (2.3 ft)
Flowrates	
Service	1 – 4 BV*/h
Regeneration	2 – 4 BV/h
Slow Rinse	Regeneration flowrate for 2 BV
Fast Rinse (if applicable)	Service flowrate for 2 – 4 BV
Contact Time	
Regeneration	≥ 30 minutes
Total Rinse Requirement	2 – 5 BV
Regenerant	HCl
Concentration	4 – 10%
Level, 100% basis	45 – 150 kg/m^3 (2.8 – 9.4 lb/ft^3)

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

Hydraulic Characteristics

Bed expansion of AmberLite™ FPC12 H Ion Exchange Resin as a function of backwash flowrate and temperature is shown in Figure 1.

Pressure drop data for AmberLite™ FPC12 H 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 feed and a well-classified bed.

Figure 1: Backwash Expansion

Temperature = 10 – 90°C (50 – 194°F)

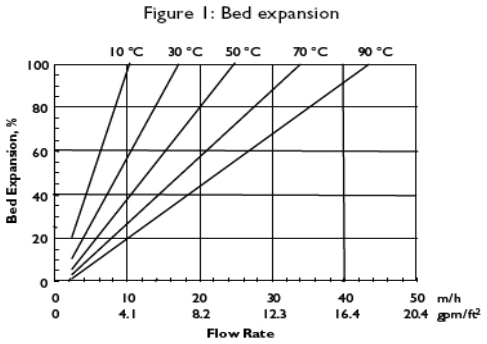
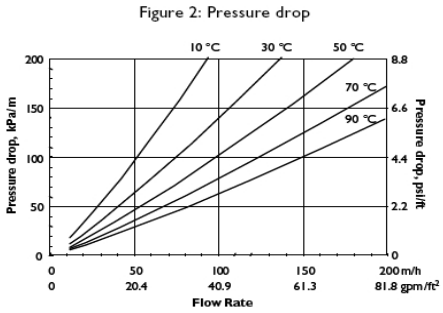


Figure 2: Pressure Drop

Temperature = 10 – 90°C (50 – 194°F)



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Application Information

The inversion of sucrose is its hydrolysis reaction in which its optical rotation sign changes from dextrorotatory (d) to laevorotatory (l). The inversion rate of sucrose is closely dependent on several factors, especially the flowrate, which can be adjusted according to the expected hydrolysis rate.

The effect of temperature on the flowrate necessary to achieve a high degree of inversion is illustrated in Figure 3. An undesirable reaction that can take place during the hydrolysis of sucrose is the formation of 5-(Hydroxymethyl)furfural (HMF), a color precursor. To avoid this phenomenon, the operating temperature should be maintained below 40°C, resulting in a low color formation during the process.

The percent inversion achievable at 40°C and 60°Brix as a function of flowrate is shown in Figure 4. Note that due to the low temperature and the high Brix, pressure drop is expected to be relatively high.

It is advisable to deash the feed syrup before the inversion process in order to avoid exhausting the inversion resin.

Figure 3: Flowrate vs. Temperature

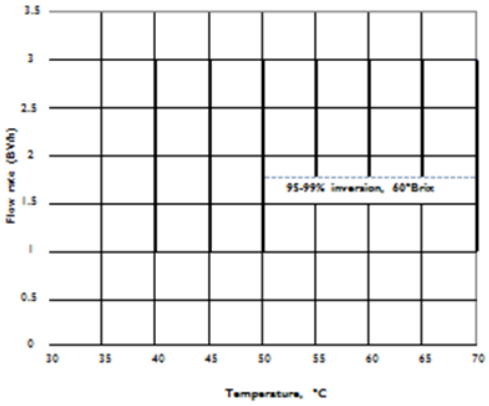
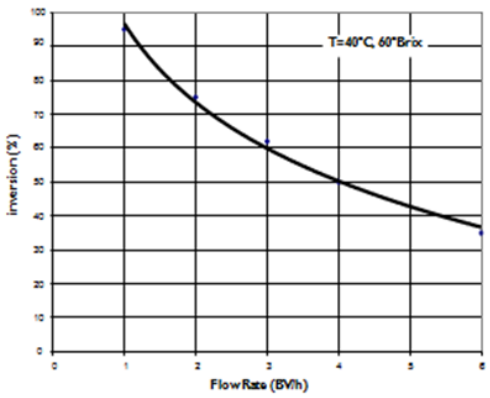


Figure 4: Inversion vs. Flowrate

Syrup @ 40° and 60°Brix



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Customer Notice

DuPont strongly encourages its customers to review both their manufacturing processes and their applications of DuPont products from the standpoint of human health and environmental quality to ensure that DuPont products are not used in ways for which they are not intended or tested. DuPont personnel are available to answer your questions and to provide reasonable technical support. DuPont product literature, including safety data sheets, should be consulted prior to use of DuPont products. Current safety data sheets are available from DuPont.

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.

Have a question? Contact us at:

www.dupont.com/water/contact-us

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