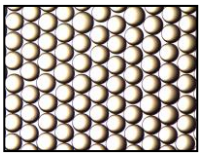
Product Data Sheet

DOWEX MONOSPHERE™ 99/320 Chromatography Resin

Separation Resin Primarily Used for High Fructose Corn Syrup (HFCS), Purification of Sugar from Beet Molasses, and Dextrose Purification

Description



DOWEX MONOSPHERE™ 99/320 Chromatography Resin is a strong acid cation resin manufactured in a process that produces an extremely uniform particle size. This resin was specifically developed for use in simulated moving bed (SMB) chromatographic systems for the recovery and purification of sweeteners.

DOWEX MONOSPHERE 99/320 is specifically designed with the combination of particle size and rapid kinetics for excellent separator performance. It has been the workhorse product for decades, with demonstrated reliability in sweetener separations for the production of high fructose corn syrup (HFCS), beet sugar, and high purity dextrose.

DOWEX MONOSPHERE 99/320 is available in two ionic forms:

DOWEX MONOSPHERE™ 99 Ca/320 Chromatography Resin is used for the separation of glucose and fructose in the production of high fructose corn syrup (HFCS) and high purity fructose.

DOWEX MONOSPHERE™ 99 K/320 Chromatography Resin is used in chromatography for beet molasses desugarization and high purity dextrose production.

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

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Typical Physical and Chemical Properties**

Matrix	Styrene-divinylbenzene, gel	
Type	Strong acid cation	
Functional Groups	Sulfonate	
Physical Form	Amber, translucent, spherical beads	
Total Exchange Capacity	≥ 1.5 eq/L (H^+ form)	
Water Retention Capacity	57 – 61% (H^+ form)	
Ionic Form as Shipped	**Ca^{2+}**	**K^+**
Whole Uncracked Beads	≥ 98%	≥ 98%
Particle Density	1.28 g/mL	1.28 g/mL
Bulk Density, as Shipped	803 g/L	833 g/L

Typical Bead Size Distribution**

(Light Obscuration Instrument Particle Size)

	Ca^{2+}		**K^+**	
Particle Diameter §	318 ± 15 µm		318 ± 15 µm	
Broad Range	285 – 350 µm	≥ 90%	285 – 350 µm	≥ 90%
Narrow Range	300 – 335 µm	≥ 75%	300 – 335 µm	≥ 75%
Fine Beads	< 282 µm	≤ 4%	< 282 µm	≤ 4%
Coarse Beads	> 380 µm	≤ 4%	> 380 µm	≤ 4%

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

Suggested Operating Conditions**

	HFCS (Ca^{2+}), Dextrose (K^+)	**Beet Molasses (K^+)**
Syrup Temperature	60 – 71°C (140 – 160°F)	80 – 85°C (176 – 185°F)
Syrup pH	4 – 7	7 – 12
Dissolved Oxygen Concentration, recommended	< 0.1 ppm	< 0.1 ppm
Dissolved Oxygen Concentration, maximum	0.25 ppm	0.25 ppm
Simulated Moving Bed Operation	With optimized tuning (annually)	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 maximize resin life.

Hydraulic Characteristics

Bed expansion of DOWEX MONOSPHERE™ 99/320 Chromatography Resin as a function of backwash flowrate at 25°C (77°F) and ionic form is shown in Figure 1. Data for Dow's 310- and 280-µm chromatography resins are also provided for comparison. The flowrate necessary to achieve a desired bed expansion for other water temperatures can be calculated with the provided equations.

Pressure drop data for DOWEX MONOSPHERE 99/320 as a function of service flowrate with a fluid that has a viscosity of 4 cP is shown in Figure 2. Data for Dow's 310- and 280-µm chromatography resins are also provided for comparison.

Figure 1: Backwash Expansion

Temperature = 25°C (77°F)

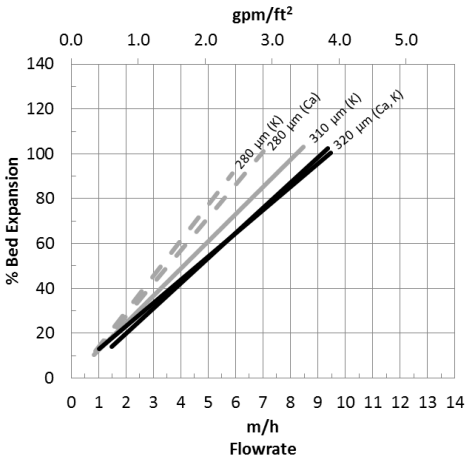
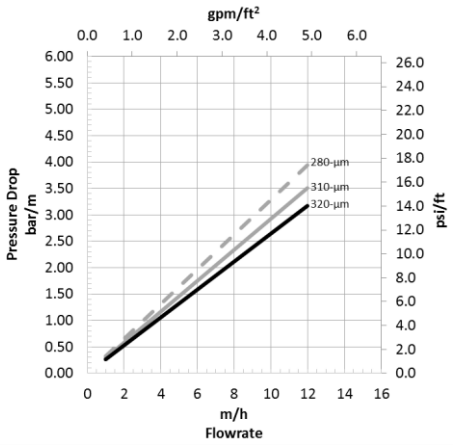


Figure 2: Pressure Drop

Viscosity = 4 cP



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/ft²

Application Information

Refer to the Dow Separability Advisor™ Bubble Chart (Form No. 177-03658) as a guide regarding the feasibility to separate various binary combinations of sugars and sugar alcohols. Plus, lab testing is available through DIRECTOR℠ Services to help identify the best product to meet your needs.

Product Stewardship

Dow 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 Dow products—from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

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

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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.

**All information set forth herein is for informational purposes only. This information is general information and may differ from that based on actual conditions. Please note that physical properties may vary depending on certain conditions and while operating conditions stated in this document are intended to lengthen product lifespan and/or improve product performance, it will ultimately depend on actual circumstances and is in no event a guarantee of achieving any specific results. Nothing in this document should be treated as a warranty by Dow.

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