



DOWEX MONOSPHERE™ 99/280 Chromatography Resin

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

Description

DOWEX MONOSPHERE™ 99/280 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) chromatography systems for demanding, difficult separations.



DOWEX MONOSPHERE 99/280 is specifically designed with the combination of particle size and rapid kinetics to maximize performance and minimize product dilution, while keeping pressure drop acceptable for many existing separation systems utilizing 310- or 320- μm beads. The extra 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.

DOWEX MONOSPHERE 99/280 is available in two ionic forms:

DOWEX MONOSPHERE™ 99 Ca/280 Chromatography Resin is used for high purity 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).

DOWEX MONOSPHERE™ 99 K/280 Chromatography 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.

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	Ca²⁺	K⁺
Whole Uncracked Beads	≥ 97%	≥ 97%
Particle Density	1.29 g/mL	1.29 g/mL
Bulk Density, as Shipped	805 g/L	836 g/L

Typical Bead Size Distribution** (Light Obscuration Instrument Particle Size)

	Ca ²⁺		K ⁺	
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. 177-01775).

Suggested Operating Conditions**

	Fructose or HFCS (Ca ²⁺), Polyols	Betaine (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™ 99/280 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 320- and 310-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 99/280 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 320- and 310-µm chromatography resins are also provided for comparison.

Figure 1: Backwash Expansion

Temperature = 25°C (77°F)

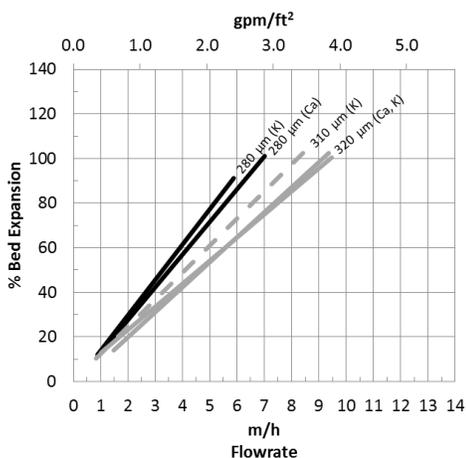
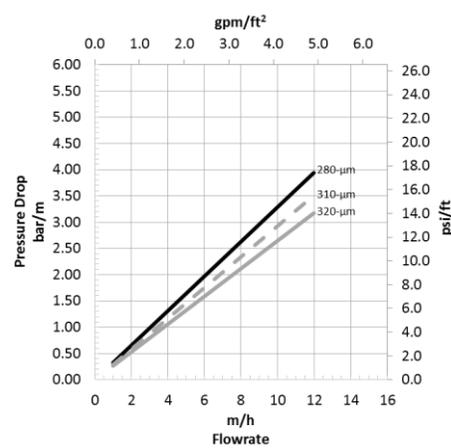


Figure 2: Pressure Drop

Viscosity = 4 cP



For other temperatures use:

$$F_T = F_{25^\circ\text{C}} [1 + 0.008 (1.8T_{\text{°C}} - 45)], \text{ where } F \equiv \text{m/h}$$

$$F_T = F_{77^\circ\text{F}} [1 + 0.008 (T_{\text{°F}} - 77)], \text{ where } F \equiv \text{gpm/ft}^2$$

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 DIRECTORSM 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.

For more information, contact our Customer Information Group:

Asia Pacific	+86 21 3851 4988
Europe, Middle East, Africa	+31 115 672626
Latin America	+55 11 5184 8722
North America	1-800-447-4369

www.dowwaterandprocess.com

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.

NOTICE: No freedom from infringement of any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other government enactments. The product shown in this literature may not be available for sale and/or available in all geographies where Dow is represented. The claims made may not have been approved for use in all countries. Dow assumes no obligation or liability for the information in this document. References to "Dow" or the "Company" mean the Dow legal entity selling the products to Customer unless otherwise expressly noted. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

"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.

