

**Aldex CSR Series** • Manufactured in Canada using no chlorinated solvents • Lowest TOC

# Chromatographic Separation Resins

Aldex CSR Series resins (CSR-1, CSR-2 and CSR-3) are **gel-type, strong acid cation resins supplied in the Calcium ion (Ca<sup>2+</sup>) form**. They are specially designed as a **universal media for the physical separation of ingredients for the food and beverage industry** and are primarily used in simulated moving bed (SMB) chromatographic systems for the **recovery and purification high fructose corn syrup (HFCS) and high-purity fructose**.

## Physical Chemical Properties

Resin Composition:	Gel styrene / divinylbenzene copolymer
Functional Group:	Sulfonic acid
Ionic Form as Shipped:	Calcium ion
Physical Form:	Amber, translucent, spherical beads
Total Capacity (H <sup>+</sup> form):	≥ 1.4 eq/L
Moisture Content (H <sup>+</sup> form):	60 to 64%
Particle Density:	1.27g/ml

## Recommended Operating Conditions

Syrup Temperature (Ca <sup>2+</sup> form):	140 to 160°F
Syrup pH:	4 to 7
Dissolved Oxygen Concentration:*	
Recommended:	<0.1 ppm
Maximum:	.25 ppm
Simulated Moving Bed Operation:	Annually with optimized tuning

\*Removing oxygen from both the feed streams and the elution water that goes into the chromatographic separation resin is strongly advised as the process of limiting the oxygen concentrations will maximize the resin service life.

## Safety Information

A material safety data sheet is available for Aldex CSR Series resin. Copies can be obtained from Aldex Chemical Co., LTD. Aldex CSR Series resin is not a hazardous product and is not WHMIS controlled.

Caution: Acidic and basic regenerant solutions are corrosive and should be handled in a manner that will prevent eye and skin contact. Before using strong oxidizing agents in contact with ion exchange resin, consult sources knowledgeable in the handling of these materials.

## Aldex CSR Features

### Highest Recovery and Purity

Aldex CSR Series resins provide the highest recovery and purity for starch based sweeteners as well as the purification of polyols.

### Uniform Particle Size

Aldex CSR Series resins are strong acid cation resins manufactured in a process that produces an extremely uniform particle size.

### Efficiency

The consistency of Aldex CSR Series resins with their rapid kinetic properties provide improved efficiency in sweetener separations over that of standard-grade resins.

### Very low color/taste/odor

Aldex CSR Series resins meet the requirements for paragraph 173.25 of the Food Additive Regulation of the U.S. Food and Drug Administration.

### Superior Physical Stability

The swift kinetics and highly uniform particle size provide resistance against bead breakage with ≥ 97% whole uncracked beads.

### Long Life

Strong and durable beads ensure long service life.



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## Aldex CSR Properties

Index Name	CSR-1	CSR-2	CSR-3
Mass Capacity	4.5 mmol/g	4.5 mmol/g	4.5 mmol/g
Moisture Content	45 to 55%	45 to 55%	45 to 55%
Bulk density	0.77 to 0.87 g/ml	0.77 to 0.87 g/ml	0.77 to 0.87 g/ml
Particle Size	0.20mm to 0.25mm, 95%	0.25mm to 0.30mm, 95%	0.30mm to 0.35mm, 95%
Uniformity Coefficient	1.1	1.1	1.1

## Common Bead Size Distribution Ca<sup>2+</sup>

Light Obscuration Instrument Particle Size

Particle Diameter:	305± 15 µm	—
Broad Range:	280 to 343 µm	≥80%
Narrow Range:	294 to 329 µm	≥60%
Fine Beads:	<275 µm	≤8%
Coarse Beads:	>375 µm	≤8%

## Backwash Characteristics

Estimated bed expansion of Aldex CSR-1 as a function of backwash flowrate at 77°F (25°C) is represented in Fig. 1. Additional data is provided for comparison against CSR-2 and CSR-3. To find the flow rate necessary for a desired bed expansion at other water temperatures, this equation can be used:

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

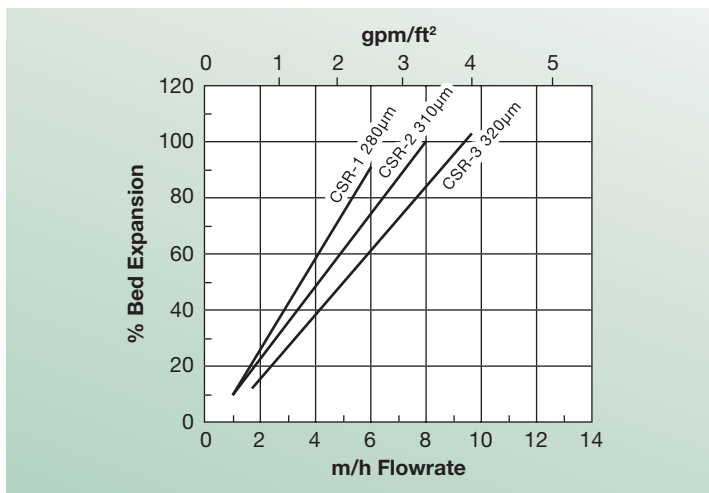


Fig. 1 Bed Expansion vs. Backwash Flow Rate at 77°F

## Pressure Drop

Estimated pressure drop of Aldex CSR-1 as a function of service flowrate and concentration of 42% HFCS (50% and 30% D.S.) is represented in Fig. 2. Additional data is provided for comparison against CSR-2 and CSR-3.

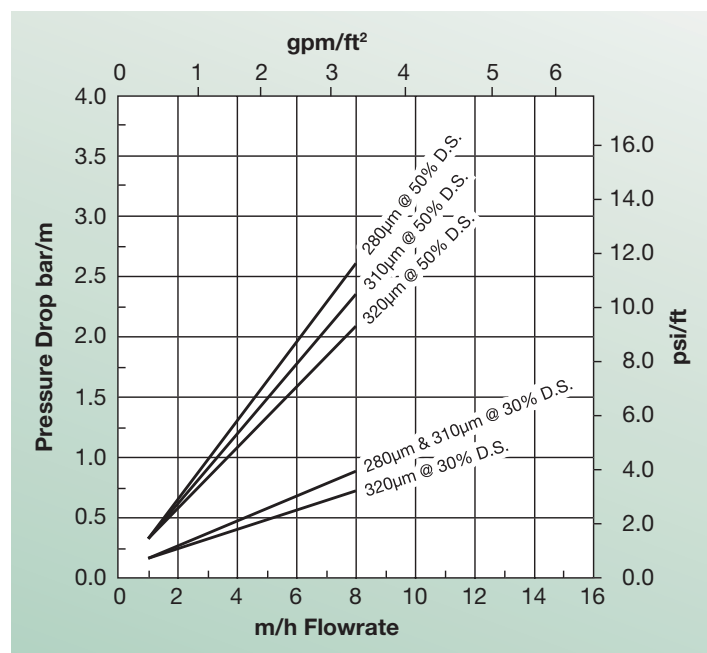


Fig. 2 Pressure Drop vs Flow Rate at various degrees Fahrenheit (F°) for Syrup (42% HFCS) Concentration equals 30% D.S., 50% D.S.



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# Chromatographic Separation Resins

## Thermal Expansion

Thermal expansion of Aldex CSR-1 as a function of temperature and ionic form is represented in Fig. 3.

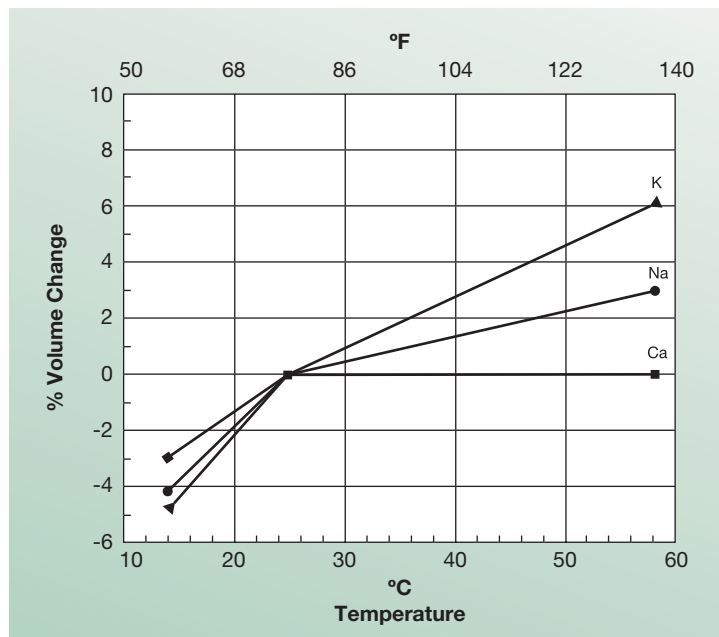


Fig. 3 Percent Volume Change vs Temperature

## Applications

In addition to recovery and purification of sweeteners, this resin, or the available resins in K-form or Na-form, can be used in other specialty separations such as production of high fructose com syrup (HFCS) and high-purity fructose and the separation of polyols.

