United States Resin Company

2625 Redwing Road, Suite 226
Fort Collins, CO 80526

A-S1MN Cl

STRONG BASE ANION NITRATE SELECTIVE ION EXCHANGE RESIN

(Designed for use in highly selective nitrate removal applications)

Product Description

US Resin's A-S1MN Cl resin is Type I highly nitrate-selective due to its unique trialkylamine functional group. In fact, it has higher affinity for monovalent anions (e.g., nitrate) than for di– or tri-valent anions. This is the opposite of the standard Type I and Type II anion resins such as US Resin's A-S1 and A-S2. In many water treatment applications, A-S1MN is less selective for sulfate than nitrate and nitrate dumping is eliminated. Certain chemical and wastewater treatment processes require a high capacity for monovalent anions than for divalent o trivalent anions. Because of its unique nature, US Resin's A-S1MN reverses the electro-selectivity of standard anion resins, and offers preferential removal of anions of lower valence.

Particularly, the product can be highly effective in the removal of nitrate in water and wastewater treatment applications even with the presence of high sulfates.

Typical Physical, Chemical & Operating Characteristics

Polymer Structure	Polystyrene cross-linked with Divinylbenzene
Physical Form and Appearance	Tough spherical beads
Whole Bead Count	90% Min.
Functional Groups	$R—N—R_3^+ X^-$
Ionic Form (as shipped)	Cl^-
Shipping Weight, approx.	675 g/l (42 lb./ft.^{3})
Mesh Size (US Std.)	16-50
Moisture retention, CL form	50 - 65%
Total Exchange Capacity	1.0 meq/mL
pH Range	0–14

CHEMICAL AND THERMAL STABILITY

US Resin's A-S1MN resin is insoluble in dilute or moderately concentrated acids, alkalies, and in all common solvents. However, exposure to significant amounts of free chlorine, "hypochlorite" ions, or other strong oxidizing agents over long periods of time will eventually break down the cross-linking. This will tend to increase the moisture retention of the resin, decreasing its mechanical strength, as well as generating small amounts of extractable breakdown products. It is thermally stable to higher than 75 ^oC (170 ^oF) in the chloride form.

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The operation capacity of A-S1MN for nitrate removal at various regeneration levels when treating an influent with a concentration of 500 ppm, as $CaCO_3$, is shown in the following table:

Pounds of NaCl/cu.ft.	Capacity Kilograins/cu.ft. 500ppm as $CaCO_3$ Water Analyses: Cl^-/HCO_3 =1:1 NO_3 =100ppm as $CaCO_3$ Percent sulfate			
	0	25	50	75
5	8.2	7.0	6.6	6.5
10	10.0	8.5	8.1	7.9
15	10.8	9.2	8.7	8.6
20	11.3	9.6	9.1	8.9

SUGGESTED OPERATING CONDITIONS

Maximum Temperature Salt form	60C
Minimum Bed Depth	600 mm
Backwash Rate	50 to 75% Bed Expansion
Regenerant Concentration	5 to 8 percent
Regenerant Flow Rate	3-m/h
Regenerant Contact Time	At least 30 Minutes
Regenerant Level	80 to 140 gNaCl/g-resin.
Displacement Rinse Rate	Same as Regenerant Flow Rate
Displacement Rinse Volume	Approximatety 2 BV.
Fast Rinse Rate	Same as Service Flow Rate
Fast Rinse Volume	5 to 8 BV.
Service Flow Rate	30 to 60 BV.

*1 BV: (Bed Voume)=1m^3soultion per m^3resin.