Product Data Sheet

AMBERLITE™ IRN9687 Li/OH Ion Exchange Resin

Mixture of Nuclear-grade, Macroporous Strong Acid Cation and Gel Strong Base Anion Exchange Resins for Water Treatment Applications in the Nuclear Power Industry

Description

AMBERLITE™ IRN9687 Li/OH Ion Exchange Resin is designed specifically for use in nuclear loops where highest resin purity and stability are required, and where the "as supplied" resin must have a minimum of ionic and non-ionic contamination. These high standards of resin purity enable plants to achieve reliable and safe production whilst reducing the need for equipment maintenance and minimizing the impact of unscheduled outages.

AMBERLITE IRN9687 Li/OH is composed of macroporous AMBERLITE™ IRN9652 H Ion Exchange Resin converted to the ^{7}Li form at ≥ 99.9% isotopic purity and AMBERLITE™ IRN78 OH Ion Exchange Resin, supplied together on a 1:1 equivalent basis.

AMBERLITE IRN9687 Li/OH is characterized by a strong affinity for ^{137}Cs and designed to be used for boron and lithium purification in PWR nuclear power operation.

Pre-mixed resin also allows for faster change-out and initial rinse-up prior to service, which minimizes start-up time and rinse wastewater volume.

Applications

- Primary water treatment:
  - Primary coolant purification

Purity

AMBERLITE™ IRN Ion Exchange Resins are manufactured as nuclear-grade using specific procedures throughout the manufacturing process to keep the inorganic impurities at the lowest possible level. Special treatment procedures are also utilized to remove traces of soluble organic compounds to meet the rigorous demands of the nuclear industry. These high standards of resin purity will help keep nuclear systems free of contaminants and deposits, and prevent increases in radioactivity levels due to activation of impurities in the reactor core. IRN resins are recommended in both non-regenerable and regenerable single bed or mixed bed applications where reliable production of the highest quality water is required and where the "as supplied" resin must have an absolute minimum of ionic and non-ionic contamination.

Historical Reference

AMBERLITE™ IRN9687 Li/OH Ion Exchange Resin has previously been sold as AMBERLITE™ IRN9687 Ion Exchange Resin.

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Typical Physical and Chemical Properties**

	AMBERLITE™ IRN9652 H (→ ^{7}Li) Cation Resin	AMBERLITE™ IRN78 OH Anion Resin
Physical Properties		
Copolymer	Styrene-divinylbenzene	Styrene-divinylbenzene
Matrix	Macroporous	Gel
Type	Strong acid cation	Strong base anion
Functional Group	Sulfonic acid	Trimethylammonium
Physical Form	Gray, opaque, spherical beads	Amber, translucent, spherical beads
Ionic Ratio	1:1	1:1
Chemical Properties		
Ionic Form as Shipped	$^{7}Li^{+}$	OH^{-}
Total Exchange Capacity	≥ 1.95 eq/L (H^{+} form)	≥ 1.20 eq/L (OH^{-} form)
Water Retention Capacity	51.0 – 57.0% (H^{+} form)	54.0 – 60.0% (OH^{-} form)
Ionic Conversion		
Li^{+}	≥ 99%	
OH^{-}		≥ 95%
CO_3^{2-}		≤ 5%
Cl^{-}		≤ 0.05%
SO_4^{2-}		≤ 0.1%
Particle Size		
Particle Diameter §	600 – 800 µm	630 ± 50 µm
Uniformity Coefficient	≤ 1.70	≤ 1.10
< 300 µm	≤ 0.2%	≤ 0.2%
< 425 µm		≤ 0.5%
> 1180 µm	≤ 3.0%	≤ 2.0%
Purity		
Metals, dry basis:		
Na	≤ 60 mg/kg	≤ 20 mg/kg
K	≤ 20 mg/kg	≤ 20 mg/kg
Fe	≤ 100 mg/kg	≤ 20 mg/kg
Cu	≤ 5 mg/kg	≤ 5 mg/kg
Co	≤ 5 mg/kg	≤ 5 mg/kg
Ca	≤ 10 mg/kg	≤ 10 mg/kg
Mg	≤ 10 mg/kg	≤ 10 mg/kg
Al	≤ 50 mg/kg	≤ 10 mg/kg
Hg	≤ 20 mg/kg	≤ 20 mg/kg
Heavy Metals (as Pb)	≤ 10 mg/kg	≤ 10 mg/kg
Other, dry basis:		
Cl		≤ 250 mg/kg
SiO_2		≤ 10 mg/kg
Stability		
Whole Uncracked Beads	≥ 97%	≥ 95%
Friability:		
Average		≥ 800 g/bead
> 200 g/bead		≥ 95%
Solubility in Water		≤ 0.10%
Density		
Shipping Weight	710 g/L (AMBERLITE™ IRN9687 Li/OH)	

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

Suggested Operating Conditions**

Temperature Range (Li^+/OH^- form) ‡	5 – 100°C (41 – 212°F)
pH Range (Stable)	0 – 14

‡ Operating mixed beds at elevated temperatures, for example above 60 – 70°C (140 – 158°F), may impact the purity of the loop and resin life. Contact our technical representative for details.

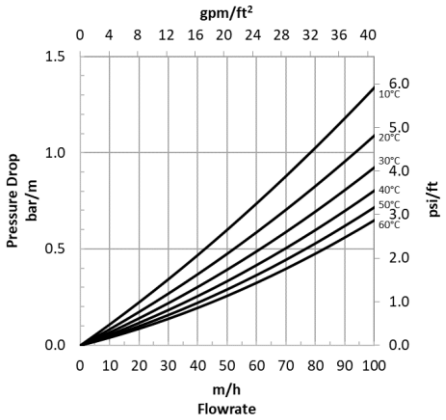
For additional information regarding recommended minimum bed depth, operating conditions, and regeneration conditions for mixed beds (Form No. 177-03705) or separate beds (Form No. 177-03729) in water treatment, please refer to our Tech Facts.

Hydraulic Characteristics

Estimated pressure drop for AMBERLITE™ IRN9687 Li/OH Ion Exchange Resin as a function of service flowrate and temperature is shown in Figure 1. These pressure drop expectations are valid at the start of the service run with clean water and a well-classified bed.

Figure 1: Pressure Drop

Temperature = 10 – 60°C (50 – 140°F)



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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.

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