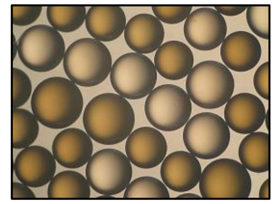
Product Data Sheet

AMBERLITE™ IRN360 H/OH Ion Exchange Resin

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

Description



AMBERLITE™ IRN360 H/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 IRN360 H/OH is a mixture of AMBERLITE™ IRN97 H Ion Exchange Resin and AMBERLITE™ IRN78 OH Ion Exchange Resin in a 2:1 cation-to-anion ratio by volume. It is designed for use in PWR primary coolant lithium control and secondary circuit condensate polishing and steam generation blowdown applications in alkaline streams requiring higher cation capacity. The high cation volume provides 50 – 70% more operating capacity than conventional 1:1 mixed beds, and is a way to reduce rad waste in special nuclear circuits. For most users, rad waste disposal cost will exceed resin purchase cost, so higher resin capacity directly translates into lower costs in these non-regenerable nuclear applications. Longer bed life also brings significant operational benefits such as fewer bed change-outs, less resin handling, and fewer chances for radiation exposure. As a pre-mixed resin, it also allows for faster change-out and initial rinse-up prior to service, which minimizes start-up time and rinse wastewater volume.

Applications

- Start-up condensate polishing
- Primary water treatment:
  - Treatment of primary coolant blowdown
  - Control of reactor coolant chemistry by removing excess ^{7}Li, potassium, or ammonium
  - Pre-outage cleanup
- Rad waste treatment and decontamination:
  - Removal of radioactive cations such as ^{137}Cs and cobalt isotopes
  - Removal of silver
- PWR steam generation blowdown (APG)

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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™ IRN360 H/OH Ion Exchange Resin has previously been sold as AMBERLITE™ IRN360 Ion Exchange Resin.

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Typical Physical and Chemical Properties**

	AMBERLITE™ IRN97 H Cation Resin	AMBERLITE™ IRN78 OH Anion Resin
Physical Properties		
Copolymer	Styrene-divinylbenzene	Styrene-divinylbenzene
Matrix	Gel	Gel
Type	Strong acid cation	Strong base anion
Functional Group	Sulfonic acid	Trimethylammonium
Physical Form	Amber, translucent, spherical beads	Amber, translucent, spherical beads
Volume Ratio	63 – 69%	37 – 31%
Chemical Properties		
Ionic Form as Shipped	H^+	OH^-
Total Exchange Capacity	≥ 2.10 eq/L (H^+ form)	≥ 1.20 eq/L (OH^- form)
Water Retention Capacity	45.0 – 51.0% (H^+ form)	54.0 – 60.0% (OH^- form)
Ionic Conversion		
H^+	≥ 99%	
OH^-		≥ 95%
CO_3^{2-}		≤ 5%
Cl^-		≤ 0.05%
SO_4^{2-}		≤ 0.1%
Particle Size		
Particle Diameter §	525 ± 50 µm	630 ± 50 µm
Uniformity Coefficient	≤ 1.20	≤ 1.10
< 300 µm	≤ 0.2%	≤ 0.2%
< 425 µm		≤ 0.5%
> 850 µm	≤ 5.0%	
> 1180 µm		≤ 2.0%
Purity		
Metals, dry basis:		
Na	≤ 40 mg/kg	≤ 20 mg/kg
K	≤ 20 mg/kg	≤ 20 mg/kg
Fe	≤ 20 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	≤ 10 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	≥ 95%	≥ 95%
Friability:		
Average	≥ 400 g/bead	≥ 600 g/bead
> 200 g/bead	≥ 95%	≥ 95%
Solubility in Water	≤ 0.10%	≤ 0.10%
Density		
Shipping Weight	770 g/L (AMBERLITE™ IRN360 H/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 (H^+/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.

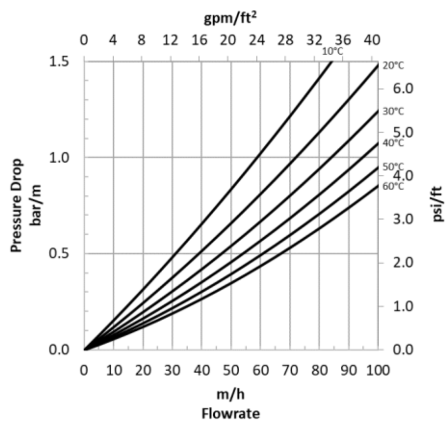
For additional information regarding recommended minimum bed depth, operating conditions, and regeneration conditions for mixed beds (Form No. 177-03705) or separate beds (Form No. 177-03729) in water treatment, please refer to our Tech Facts.

Hydraulic Characteristics

Estimated pressure drop for AMBERLITE™ IRN360 H/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.

Figure 1: Pressure Drop

Temperature = 10 – 60°C (50 – 140°F)



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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.

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