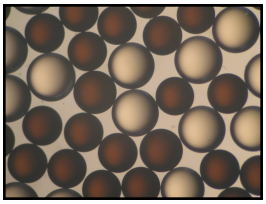
Product Data Sheet

AmberLite™ IRN170 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™ IRN170 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™ IRN170 H/OH is designed for the ultimate performance in non-regenerable nuclear applications, and it is the resin of choice for applications which demand the highest effluent purity, highest operating capacity, and longest resin life. AmberLite™ IRN170 H/OH is a stoichiometric equivalent mixture of AmberLite™ IRN99 H Ion Exchange Resin and AmberLite™ IRN78 OH Ion Exchange Resins on a 1:1 equivalent basis. Both the cation and anion components are recognized as the premier resins in the nuclear power industry. The cation component, AmberLite™ IRN99 H, has exceptionally high capacity and outstanding physical and oxidative stability and the anion component, AmberLite™ IRN78 OH, has exceptional total exchange capacity and purity.

AmberLite™ IRN170 H/OH was originally developed for use in BWR condensate polishers to help achieve the lowest possible sulfate levels in reactor water. This is accomplished through a combination of the extraordinary oxidative stability of the cation resin, and a particle size balance between the cation and anion resins, which minimizes the formation of a re-separated cation resin layer on the bottom of the service vessels. 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

The exceptionally high total capacity of AmberLite™ IRN170 H/OH delivers an important benefit for many other nuclear applications including PWR steam generator blowdown treatment, PWR primary system CVCS resin beds, fuel pool demineralizers, and radioactive waste treatment. Since the nuclear-grade resins from all these applications are generally disposed of as rad waste, high capacity and long resin bed life are critical to minimizing rad waste disposal cost and volume. 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.

Form No. 45-D01209-en, Rev. 2
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Applications

- Primary water treatment:
  - Treatment of primary coolant blowdown
  - Pre-outage cleanup
- Fuel pool purification
- Rad waste treatment and decontamination:
  - Removal of radioactive cations such as ^{137}Cs and cobalt isotopes
  - Removal of anionic radioactive material
  - Removal of silver
- PWR steam generation blowdown (APG)
- BWR condensate polishing

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™ IRN170 H/OH Ion Exchange Resin has previously been sold as AmberLite™ IRN170 Ion Exchange Resin.

Typical Properties

	AmberLite™ IRN99 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	Dark brown, translucent, spherical beads	Amber, translucent, spherical beads
Ionic Ratio	1:1	1:1
Chemical Properties		
Ionic Form as Shipped	H^+	OH^-
Total Exchange Capacity	≥ 2.50 eq/L (H^+ form)	≥ 1.20 eq/L (OH^- form)
Water Retention Capacity	37.0 – 43.0% (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 ± 25 µm	630 ± 50 µm
Uniformity Coefficient	≤ 1.20	≤ 1.10
< 300 µm	≤ 0.1%	≤ 0.2%
< 425 µm		≤ 0.5%
> 850 µm	≤ 0.5%	
> 1180 µm		≤ 2.0%
Purity		
Metals, dry basis:		
Na	≤ 20 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	≥ 600 g/bead	≥ 600 g/bead
> 200 g/bead	≥ 95%	≥ 95%
Solubility in Water	≤ 0.10%	≤ 0.10%
Density		
Shipping Weight	720 g/L (AmberLite™ IRN170 H/OH)	

[§] For additional particle size information, please refer to the Particle Size Distribution Cross Reference Chart (Form No. 45-D00954-en).

Form No. 45-D01209-en, Rev. 2
November 2019

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.

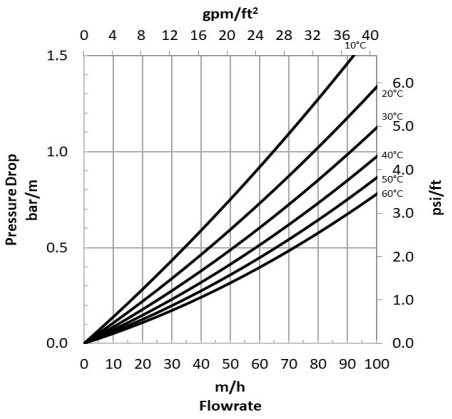
For additional information regarding recommended minimum bed depth, operating conditions, and regeneration conditions for mixed beds (Form No. 45-D01127-en) or separate beds (Form No. 45-D01131-en) in water treatment, please refer to our Tech Facts.

Hydraulic Characteristics

Estimated pressure drop for AmberLite™ IRN170 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)



Product Stewardship

DuPont 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 DuPont products—from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

DuPont strongly encourages its customers to review both their manufacturing processes and their applications of DuPont products from the standpoint of human health and environmental quality to ensure that DuPont products are not used in ways for which they are not intended or tested. DuPont personnel are available to answer your questions and to provide reasonable technical support. DuPont product literature, including safety data sheets, should be consulted prior to use of DuPont products. Current safety data sheets are available from DuPont.

Please be aware of the following:

- **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.

Have a question? Contact us at:

www.dupont.com/water/contact-us

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