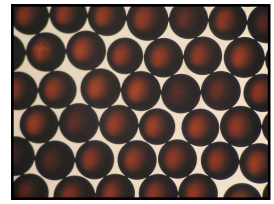
Product Data Sheet

AmberLite™ IRN99 H Ion Exchange Resin

Nuclear-grade, Uniform Particle Size, Gel, Strong Acid Cation Exchange Resin for Water Treatment Applications in the Nuclear Power Industry

Description



AmberLite™ IRN99 H 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™ IRN99 H is recognized as the premier cation resin in nuclear power applications due to its exceptionally high capacity and outstanding physical and oxidative stability, all resulting from its very high level of DVB crosslinker. The very high total cation exchange capacity can produce a 15 – 30% increase in operating throughput in the intended applications. Since the nuclear-grade resins from 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 often exceed resin purchase cost, so high resin capacity directly translates into savings in these non-regenerable nuclear applications. Furthermore, longer bed life means fewer bed change-outs, less work, less resin handling, and less chance for radiation exposure.

In BWR condensate polishing, AmberLite™ IRN99 H can help to achieve the lowest possible reactor water sulfate levels. The exceptionally high 16% DVB crosslinker level gives it the best oxidative stability of any gel cation resin available, thus minimizing the release of sulfonic acid leachables.

It is sold in the fully regenerated hydrogen form and intended for use in non-regenerable single bed or mixed bed nuclear systems which demand the ultimate in effluent purity, operating capacity, and resin life. The particle size of AmberLite™ IRN99 H is specifically designed to give an optimized balance of pressure drop, exchange kinetics, and resistance to separation from the anion exchange resin, AmberLite™ IRN78 OH Ion Exchange Resin, when used in a mixed bed.

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Applications

- Primary water treatment:
  - Primary coolant purification
  - Treatment of primary coolant blowdown
  - Control of reactor coolant chemistry by removing excess ^{7}Li, potassium, or ammonium
- Fuel pool purification in single bed VVER systems in highly oxidative conditions
- Rad waste treatment and decontamination:
  - Removal of radioactive cations such as ^{137}Cs and cobalt isotopes
  - 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™ IRN99 H Ion Exchange Resin has previously been sold as AmberLite™ IRN99 Ion Exchange Resin.

Typical Properties

Physical Properties	
Copolymer	Styrene-divinylbenzene
Matrix	Gel
Type	Strong acid cation
Functional Group	Sulfonic acid
Physical Form	Amber, translucent, spherical beads
Chemical Properties	
Ionic Form as Shipped	H^+
Total Exchange Capacity	≥ 2.50 eq/L (H^+ form)
Water Retention Capacity	37.0 – 43.0% (H^+ form)
Ionic Conversion	
H^+	≥ 99%
Particle Size §	
Particle Diameter	525 ± 25 µm
Uniformity Coefficient	≤ 1.20
< 300 µm	≤ 0.1%
> 850 µm	≤ 0.5%
Purity	
Metals, dry basis:	
Na	≤ 20 mg/kg
K	≤ 20 mg/kg
Fe	≤ 20 mg/kg
Cu	≤ 5 mg/kg
Co	≤ 5 mg/kg
Ca	≤ 10 mg/kg
Mg	≤ 10 mg/kg
Al	≤ 10 mg/kg
Hg	≤ 20 mg/kg
Heavy Metals (as Pb)	≤ 10 mg/kg
Stability	
Whole Uncracked Beads	≥ 95%
Friability:	
Average	≥ 600 g/bead
> 200 g/bead	≥ 95%
Solubility in Water	≤ 0.10%
Density	
Shipping Weight	840 g/L

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

Suggested Operating Conditions

Temperature Range (H^+ form)	5 – 150°C (41 – 302°F)
pH Range (Stable)	0 – 14

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 bed expansion of AmberLite™ IRN99 H Ion Exchange Resin as a function of backwash flowrate and temperature is shown in Figure 1.

Estimated pressure drop for AmberLite™ IRN99 H as a function of service flowrate and temperature is shown in Figure 2. These pressure drop expectations are valid at the start of the service run with clean water.

Figure 1: Backwash Expansion

Temperature = 10 – 60°C (50 – 140°F)

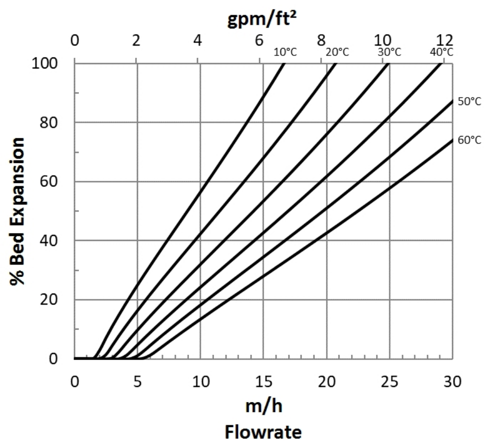
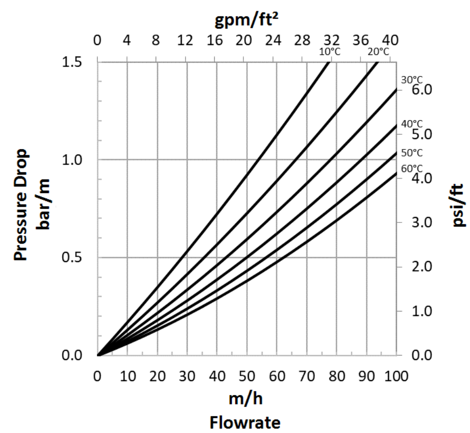


Figure 2: Pressure Drop

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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