ROHM AND HAAS | Ion Exchange Resins

PRELIMINARY PRODUCT DATA SHEET

# AMBERLITE™ IRN317

## $Li^7$ / OH form Nuclear Grade Mixed Bed

AMBERLITE IRN317 resin is a stoichiometric equivalent mixed bed of gel strong acid cation resin in the $Li^7$ form and gel strong base anion resin in the OH form. Amberlite IRN317 resin is specifically designed for enhanced performance and long resin life in the Chemical and Volume Control System (CVCS) of Pressurized Water Reactors (PWR).

The cation resin used for this mixed bed is derived from Amberlite IRN99 resin, which is a uniform particle size, highly cross-linked gel cation exchanger. The anion exchange resin in this mixed bed is Amberlite IRN78 resin, which has a long established record of performance and reliability in nuclear applications.

The new highly crosslinked gel cation resin component of this mixed bed delivers the highest total capacity (typically 2.5 eq/L) and the best chemical and oxidative stability of any available nuclear grade resin. The enhanced oxidative stability significantly lowers the release of organic sulfonates thus reducing sulfate levels in the reactor coolant. The high level of crosslinking also provides substantially increased selectivity for removal of $Cs^{137}$ and other radioactive species.

For additional information on the component resins used in Amberlite IRN317 resin, see the data sheets for Amberlite IRN78 and Amberlite IRN99 resins.

## PROPERTIES

| | | |
|---|---|---|
| Physical Form | Mixture of dark and light amber translucent spherical beads | |
| Matrix | Polystyrene divinylbenzene copolymer | |
| Chemical Form | 1 to 1 equivalent mixture of $Li^7$ and $OH^-$ form resins | |
| Shipping Weight | 45 lbs/ft$^3$ (720 g/L) | |
| | **Cation Resin** | **Anion Resin** |
| Functional Group | Sulfonic acid | Quaternary ammonium |
| Total Exchange Capacity | ≥ 2.4 meq/ml (Li form) | ≥ 1.2 meq/ml (OH form |
| Moisture Content | 33 - 40 % (Li form) | 54 - 64 % (OH form) |
| % Regenerated Sites | 99% $Li^7$, minimum | 95% OH, minimum |
| % Cl form sites | — | 0.1 % maximum |
| Particle Size | | |
| Retained on 20 mesh (0.850 mm) | 5 % maximum | |
| Through 40 mesh (0.425 mm) | 5 % maximum | |
| Through 50 mesh (0.300 mm) | 0.1% maximum | |
| Na | 50 mg/kg dry, maximum | |
| Fe | 100 mg/kg dry, maximum | |
| Cu | 50 mg/kg dry, maximum | |
| Al | 50 mg/kg dry, maximum | |
| Pb | 50 mg/kg dry, maximum | |

## SUGGESTED OPERATING CONDITIONS

| | |
|---|---|
| Maximum Operating Temperature | 140 °F (60 °C) |
| Minimum Bed Depth | 36 inches |
| Service Flow Rate (Linear Velocity) | 10 to 30 gpm/ft$^2$ |

## APPLICATION

AMBERLITE IRN317 resin is specifically designed for the purification of primary reactor coolant in PWR plants. This application requires the removal of $Cs^{137}$, $Co^{58}$, $I^{131}$, other radioisotopes, and chemical contaminants such as chloride and sulfate which may appear in the reactor coolant. Since the reactor coolant contains high background levels of boric acid buffered with $Li^7OH$, the mixed bed resins will operate in the borate and $Li^7$ form.

The cation resin component of Amberlite IRN317 resin is supplied in the $Li^7$ form in order to minimize fluctuations in the concentration of $Li^7$ in the reactor coolant when the mixed bed is first placed into service. Amberlite IRN317 resin is made using only certified isotopically pure $Li^7OH$ in order to minimize the undesirable reaction:

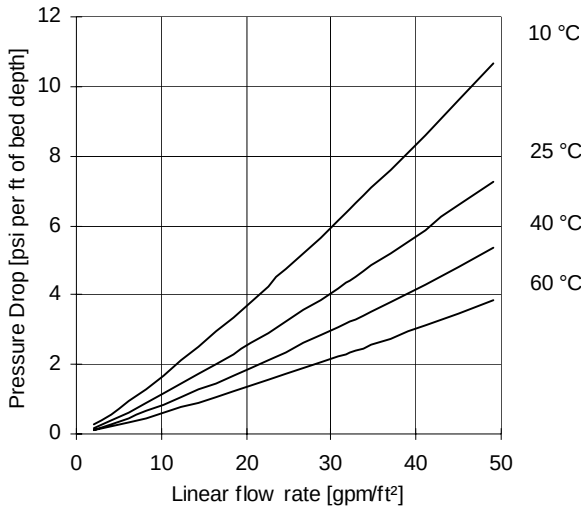
$$Li^6 + n \rightarrow H^3 + \alpha.$$

The anion resin component of Amberlite IRN317 resin is very highly regenerated to the OH form to insure that less than 0.1% of exchange sites are present in the chloride form or the sulfate form. Therefore Amberlite IRN317 resin can effectively control chloride and sulfate impurities even while operating at high background concentrations of lithium and borate.

## HYDRAULIC CHARACTERISTICS

The approximate pressure drop of Amberlite IRN317 resin in normal downflow operation is shown in the figure below as a function of service flow rate and water temperature. Pressure drop data are for clean beds which have not accumulated solids during the service run. If the bed accumulates solids, the pressure drop will increase.

**Figure 1 Pressure Drop**




All our products are manufactured in ISO 9001 certified facilities.

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