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AMBERLITE™ IRN77

Nuclear Grade Strong Acid Cation Resin

Introduction

AMBERLITE IRN77 resin is a uniform particle size strongly acidic gel type polystyrene cation exchanger supplied in the hydrogen form. This resin is Nuclear Grade and processed to the highest purity standards to meet the most stringent requirements of the nuclear power industry. AMBERLITE IRN77 resin contains a minimum of 99 % of its exchange sites in the hydrogen form.

The uniform particle size and the absence of fine resin beads results in a lower pressure drop compared to conventional resins.

Properties

Physical form	Spherical amber beads
Matrix	Styrene divinylbenzene copolymer
Functional group	Sulfonic acid
Ionic form as shipped	H ⁺
Total exchange capacity	≥ 1.90 eq/L (H ⁺ form)
Moisture holding capacity	49 to 55 % (H ⁺ form)
Shipping weight	800 g/L
Particle size	
Uniformity coefficient	≤ 1.2
Harmonic mean size	0.600 to 0.700mm < 0.300 mm 0.2 % max
Whole beads	≥ 350 g/bead
Breaking weight (average)	≥ 95 % > 200 g/bead
Ionic conversion	≥ 99 % H ⁺

Suggested Operating Conditions

Maximum operating temperature	120 °C
Minimum bed depth	800 mm
Service flow rate	8 to 50 BV*/h
Service velocity	60 m/h maximum

Purity

The manufacturing process for this resin is controlled to keep inorganic impurities at the lowest possible level. Special treatment procedures are also used to remove traces of soluble organic compounds. 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.

Purity	mg/kg dry resin
Al	≤ 50
Ca	≤ 50
Co	≤ 30
Cu	≤ 10
Fe	≤ 50
Hg	≤ 20
K	≤ 40
Mg	≤ 50
Na	≤ 50
Pb	≤ 10

Applications

AMBERLITE IRN77 resin has proved highly effective in the following applications:

Primary water treatment:

Removal of fission products, activated corrosion products, and suspended matter. It is also used to control the pH of the reactor coolant stream by removing the excess 7Lithium.

Radwaste treatment:

Removal of radioactive cations such as ¹³⁷Cesium from waste streams.

Decontamination:

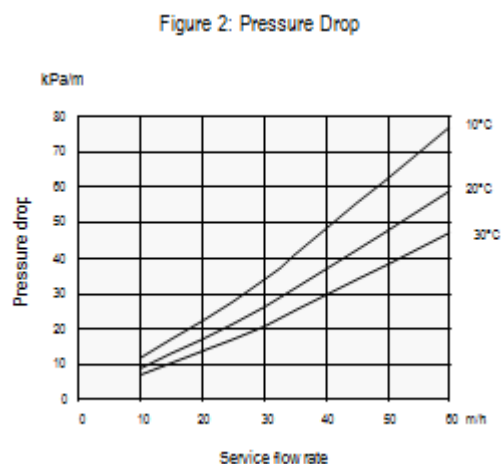
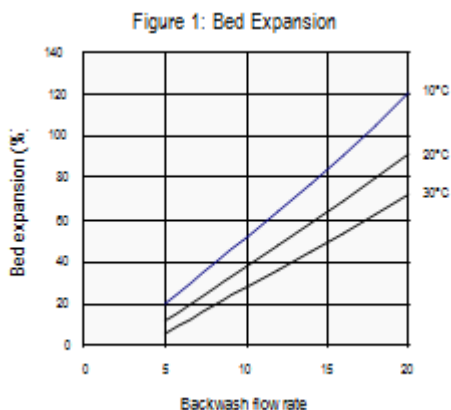
Removal of cationic radioactive material from spent decontaminating solutions.

Hydraulic Characteristics

Resin handling

To maintain the high purity of nuclear grade resins, deionised water should be used for all resin handling. If the resin requires backwashing, the bed should be expanded a minimum of 50%. See figure 1.

Figure 2 shows the approximate pressure drop for each meter of bed depth of AMBERLITE IRN77 resin in normal downflow operation at various temperatures and flow rates. Pressure drop data are valid at the start of the service run with clear water.



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