

AmberSep™ IRC748 UPS Chelating Resin

Industrial-grade, Uniform Particle Size, Chelant for Chemical Processing

Description

AmberSep™ IRC748 UPS Chelating Resin is a uniform particle size resin of macroporous structure. Its polystyrenic matrix, crosslinked with divinylbenzene, contains iminodiacetic groups. The chemical nature of these groups is such that they form complexes with metal ions. The narrow particle size distribution affords an exceptional pressure drop profile. It is highly resistant to osmotic shock and has excellent physical stability.

AmberSep™ IRC748 UPS features very high operating capacity for calcium and is especially useful when treating brines that have a high strontium content. Under these conditions, the resin offers an improved cycle time, displaying also very good removal efficiency for strontium with very low metal leakage.

AmberSep™ IRC748 UPS is also used for metal recovery in hydrometallurgical applications because it also exhibits high selectivity for heavy metal cations over alkali metal ions found in various process and waste streams.

Applications

- Chlor-alkali (brine purification)
- Electronics (printed wiring boards)
- Electroplating
- Process streams (trace metal removal)
- Hydrometallurgy (recovery of heavy metals from leach streams)

Typical Properties

Physical Properties	
Copolymer	Styrene-divinylbenzene
Matrix	Macroporous
Type	Chelant
Functional Group	Iminodiacetic acid
Physical Form	Beige, hard, opaque, spherical beads
Chemical Properties	
Ionic Form as Shipped	Na ⁺
Total Exchange Capacity	1.35 eq/L
Dry Weight Capacity	≥ 4.45 eq/kg
Water Retention Capacity	60 – 69%
Particle Size §	
Particle Diameter	575 ± 75 µm
Uniformity Coefficient	≤ 1.2
< 300 µm	≤ 1.0%
> 1000 µm	≤ 5.0%
Stability	
Swelling	H ⁺ → Na ⁺ : 30%
Density	
Shipping Weight	750 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

Maximum Operating Temperature	90°C (194°F)	
Operating pH Range	1.5 – 14 (depends on the application)	
Flowrates		
Service	6 – 32 BV*/h (0.75 – 4 gpm/ft ³)	
Regeneration	2 – 4 BV/h (0.25 – 0.50 gpm/ft ³)	
Regenerant	HCl	H ₂ SO ₄
Concentration	5 – 10%	5 – 10%
Conversion to Na ⁺ form	1 – 4% NaOH at flowrate of 2 – 4 BV/h	

* 1 BV (Bed Volume) = 1 m³ solution per m³ resin or 7.5 gal per ft³ resin

Hydraulic Characteristics

Bed expansion of AmberSep™ IRC748 UPS Chelating Resin as a function of backwash flowrate at 20°C (68°F) is shown in Figure 1. The flowrate necessary to achieve a desired bed expansion for other water temperatures can be calculated with the provided equations.

Pressure drop data for AmberSep™ IRC748 UPS as a function of service flowrate at 20°C and 60°C (68°F and 140°F) is shown in Figure 2. Pressure drop data are valid at the start of the service run with clean water.

Figure 1: Backwash Expansion

Temperature = 20°C (68°F)

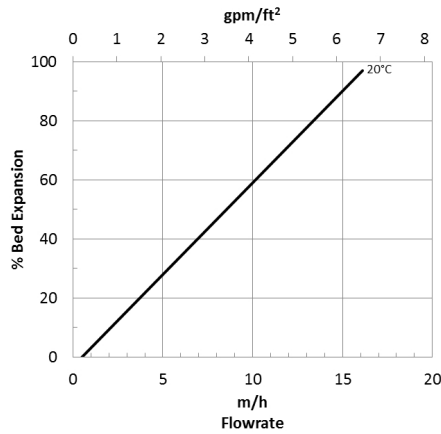
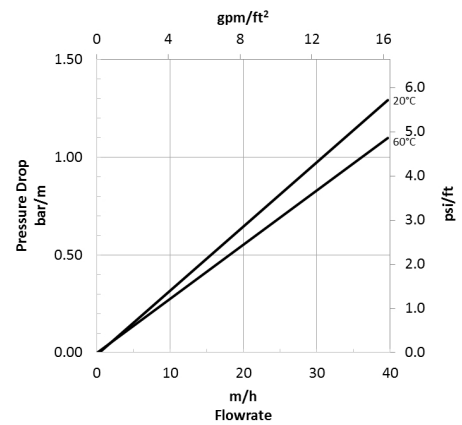


Figure 2: Pressure Drop

Temperature = 20 – 60°C (68 – 140°F)



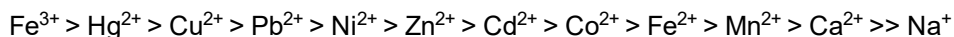
For other temperatures use:

$$F_T = F_{25^\circ\text{C}} [1 + 0.008 (1.8T_{\text{C}} - 45)], \text{ where } F \equiv \text{m/h}$$

$$F_T = F_{77^\circ\text{F}} [1 + 0.008 (T_{\text{F}} - 77)], \text{ where } F \equiv \text{gpm/ft}^2$$

Application Information

The apparent selectivity of any ion exchange resin for a given metal depends upon concentration, the presence of other species, and pH. This makes absolute selectivities very difficult to determine, especially for waste treatment applications. Because of this, laboratory testing is essential when a resin is required to selectively remove one or more types of metal ions. In general, the selectivity for AmberSep™ IRC748 UPS Chelating Resin follows the following order:



The affinity for H⁺ at pH 4 is situated between Cu²⁺ and Pb²⁺. Consequently, for the metals with selectivities less than Cu²⁺, the resin should be in the salt form (for example, in the Na⁺ form) to minimize metal leakage. At pH 2, the resin will be extensively in the H⁺ form and will only efficiently remove Fe³⁺, Hg²⁺, and Cu²⁺. Selectivity at various pH conditions for AmberSep™ IRC748 UPS are given below:

The resin can operate in a neutral, acidic, or alkaline medium, but since its capacity depends on the pH, the following minimum pH values are recommended for various cations:

pH = 2		pH = 4		pH = 9 [‡]	
Metal Ion	K (M/Ca)	Metal Ion	K (M/Ca)	Metal Ion	K (M/Ca)
Fe ³⁺	325 000	Hg ²⁺	2 800	Ni ²⁺	30
Cu ²⁺	130 000	Cu ²⁺	2 300	Cd ²⁺	14
Hg ²⁺	> 43 000	Pb ²⁺	1 200	Cu ²⁺	10
		Ni ²⁺	57	Zn ²⁺	3
		Zn ²⁺	17	Ca ²⁺	1.0
		Cd ²⁺	15		
		Co ²⁺	6.7		
		Fe ²⁺	4.0		
		Mn ²⁺	1.2		
		Ca ²⁺	1.0		

[‡] Very high ammonium background, 200 g/L (NH₄)₂SO₄

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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.

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