



Purolite Ion Exchange Resins for Metals Recovery Applications

Ion exchange (IX) resins are increasingly used in hydrometallurgical applications for the recovery or purification of metal solutions and effluent treatment. Purolite has supplied ion exchange resins to the hydrometallurgical industry for over 30 years for metals recovery applications involving precious metals and gold, uranium, base metals, and more. Such experience has provided us with knowledge and understanding of our clients' requirements, allowing us to custom configure our products to target specific elements of interest, as well as ensure optimum recovery of metals from clarified liquors, partially clarified liquors and leached pulp.

Gold

Gold mines in the Former Soviet Union countries mainly use IX resin for the recovery of gold, employing resin-in-pulp (RIP) technology, whereas the Western world tends to use activated carbon in carbon-in-pulp (CIP) or carbon-in-leach (CIL) processes. In recent years, however, there has been a move towards the use of IX resins. As the 'easy' ore-bodies are being depleted, the focus is turning to the more 'difficult' ore-bodies that were previously considered economically unattractive. These ores are often preg-robbing, refractory, or they contain high concentrations of 'contaminants' such as copper. The use of IX resins allows for the economic exploitation of these 'difficult' orebodies. Major advantages of ion exchange resins include their low energy requirements and superior selectivity for gold.

Energy Consumption

IX resins are eluted at mildly elevated temperatures (~60 °C), and no thermal regeneration is required. Activated carbon is eluted at temperatures of 110 – 150 °C and requires thermal regeneration at 700 – 800 °C. This results in considerable savings in both capital and operating expenditure when using resins, especially in remote areas, where mines often cannot rely on the power grid and fuel has to be trucked in for power generation.

Selectivity and Affinity for Gold

Due to the high affinity between the resin and the gold-cyanide complex, higher recoveries can be achieved with IX resins from preg-robbing ores (containing naturally occurring carbonaceous matter) than with activated carbon. Purolite has developed a resin, in addition to our standard gold-selective product, with exceptional selectivity for gold over copper. This allows for the economical exploitation of previously unexploited copper-gold orebodies.



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Purolite Ion Exchange Resins for Metals Recovery Applications (cont'd)

Uranium

The majority of uranium operations employ ion exchange to recover the metal from either acidic or alkaline liquors and pulps. Purolite's specially tailored resins ensure high uranium capacity, whilst also ensuring fast kinetics and ease of elution.

Due to the high cost of solid-liquid separation, it is common for uranium operations to do only partial clarification of the leached pulp, followed by recovery via ion exchange in a fluidised-bed design (e.g. NimCIX, moving bed). Purolite resins have been customised to ensure an optimum balance between fast volumetric throughput and maximum reaction kinetics (for a smaller plant) and minimal loss of resin during fluidisation.

Effluent treatment

Recycling and re-use of effluents is becoming more important, mainly due to the scarcity of good-quality clean water in remote areas and the prevention of discharge of environmentally unfriendly products into rivers and local water sources. Ion exchange resins can play a major role in this area because they have high selectivity for specific contaminants and are easy to use. The optimum resin and design depends on the details of the project. Each project is handled on a case-by-case basis.

The table below provides a sampling of metals and Purolite products that can be used in their recovery.

TARGET METAL	PUROLITE RESIN	APPLICATION
Gold	Purogold™ A194, Purogold™ S992	Cyanide liquors and pulps
Gold	Purolite® A500/2788	Thiosulphate leach
Gold	Purolite® S920, Purolite® S924	Acidic liquors or pulps
Uranium	Purolite® PPA800SO4, Purolite® PFA600/4740, Purolite® A500/2788	Acidic liquors or pulps
Uranium	Purolite® PPA800HCO3	Alkaline liquors
Platinum group metals	Purolite® S920, Purolite® S924, Purolite® S985	Acidic liquors or pulps
Rare earth elements	Selection of cation exchange resins	Acidic liquors or pulps
Antimony	Purolite® S957	Various liquors and waste waters
Bismuth	Purolite® S957	Various liquors and waste waters
Copper, nickel, cobalt, zinc	Purolite® S930Plus, Purolite® S930/4888	Acidic liquors or pulps
Iron	Purolite® S957	Copper and nickel electrolyte
Mercury	Purolite® S920, Purolite® S924	Various liquors and waste waters
Molybdenum	Purolite® A100Mo	Acidic liquors or pulps
Nickel	Purolite® S960	Acidic liquors or pulps
Rhenium	Purolite® A170/4675, Purolite® A172/4635	Acidic liquors or pulps
Tungsten	Purolite® A500/3612	Sodium carbonate liquor

Contact your nearest Purolite office for more details about these and other applications, or visit www.purolite.com for additional information. You can also send an enquiry through sales@purolite.com for a quick response from our experts.



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