



Purolite Ion Exchange Resins for Metals Recovery Applications

Ion exchange is increasingly used in hydrometallurgical applications for the recovery or purification of metal solutions and pulps, as well as for effluent treatment. Various hydrometallurgical processes are often used in the same flowsheet, such as combining ion exchange and solvent extraction for the recovery and purification of uranium.

The use of IX resins often has technical and economical advantages over alternative processes, such as precipitation and solvent extraction. Additional advantages are the low toxicity of most IX resins, as well as the negligible risk of fire and explosions, making resin inherently safe to use.

A wide variety of process streams benefit from the application of ion exchange resins, as shown in Table 1.

TABLE 1 – APPLICATIONS OF ION EXCHANGE IN HYDROMETALLURGY

ORIGIN OF STREAM TO BE TREATED	ION EXCHANGE APPLICATION
Ore, after heap or agitated leach	Primary recovery of metal(s) of interest, e.g. gold, uranium
Volatile compounds captured in off-gases from smelters and roasters	Recovery of rhenium from off-gases produced by roasting of molybdenite and smelting of copper concentrates
Slags and calcines from roasting and smelting operations	Recovery of various metal(s) of interest, after leaching
Electrolyte	Removal of copper and zinc impurities from cobalt and nickel advance electrolytes to ensure higher metal purity
Tailings treatment	Recovery of copper, cobalt, gold, etc. from historical mine tailings, as well as current arisings
Acid mine drainage	Treatment of process water to enable recycling to the plant or safe disposal

An important factor that determines the design of the ion exchange contactor is the solids content of the pregnant liquor or pulp, as summarized in Table 2. We produce a range of products that are used for the recovery of metals from clarified liquors, partially clarified liquors and pulps.

TABLE 2 – CHOICE OF IX CONTACTOR BASED ON SOLIDS CONTENT OF FEED

SOLIDS CONTENT	ION EXCHANGE CONTACTOR
Clear liquid, <1 ppm solids	Fixed bed column
Liquid with low solids content, <1000 ppm solids	Fluidized bed column, e.g. NIMCIX
Pulp, 10 – 50% solids	Resin-in-pulp (RIP), air-agitated pachuca or mechanically agitated vessel

Purolite has supplied IX resins to the hydrometallurgical industry for over 30 years for use in the recovery of previous metals and gold, uranium, base metals and more. Such experience has provided us with the knowledge and understanding of client needs, allowing us to custom configure our products to target specific elements of interest. Table 3 provides a list of specific metals and the Purolite products that can be used in their recovery.

TABLE 3 – SUGGESTED PUROLITE RESINS FOR HYDROMETALLURGICAL APPLICATIONS

TARGET METAL	PUROLITE RESIN(S)	DETAIL
Antimony	Puromet™ MTS9500, Puromet™ MTS9570	Electrolyte purification
Bismuth	Puromet™ MTS9500, Puromet™ MTS9570	Electrolyte purification
Cobalt	Puromet™ MTX8010 bis-(2,4,4-trimethylpentyl) phosphinic acid impregnated	Acidic liquors and pulps
Copper, nickel, cobalt, zinc	Puromet™ MTS9300, Puromet™ MTS9301, Puromet™ MTS9600	Acidic liquors or pulps
Copper & zinc impurity removal	Puromet™ MTS9500	Concentrated sulphuric liquors, e.g. cobalt and nickel electrolyte
Gold	Purogold™ MTA1930, Purogold™ MTA9920	Cyanide liquors and pulps
Gold	Purogold™ MTA5011, Purogold™ MTA5013	Thiosulfate leach
Gold	Puromet™ MTS9140, Puromet™ MTS9200, Puromet™ MTS9240	Acidic liquors or pulps
Iron	Puromet™ MTS9500, Puromet™ MTS9570	Electrolyte purification
Mercury	Puromet™ MTS9140, Puromet™ MTS9200, Puromet™ MTS9240	Various liquors and waste waters
Molybdenum	Puromet™ MTA1011	Acidic liquors or pulps
Nickel	Puromet™ MTS9300, Puromet™ MTS9301, Puromet™ MTS9600	Acidic liquors or pulps
Precious metals	Puromet™ MTS9100, Puromet™ MTS9200, Puromet™ MTS9240, Puromet™ MTS9850	Acidic liquors or pulps
Rare earth elements	Selection of cation exchange resins	Acidic liquors or pulps
Rhenium	Puromet™ MTA1701, Puromet™ MTA1702	Acidic liquors or pulps
Uranium	Puromet™ MTA8000, Puromet™ MTA4601PF, Puromet™ MTA5012, Puromet™ MTA5081, Puromet™ MTA6001, Puromet™ MTA6002PF, Puromet™ MTA6601	Acidic liquors or pulps
Uranium	Puromet™ MTA8000, Puromet™ MTA5081	Alkaline liquors or pulps
Zinc	Puromet™ MTX7010 di (2-ethylhexyl) phosphoric acid impregnated	Concentrated liquors e.g. nickel and cobalt electrolyte

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.