

Hydrometallurgy Applications:

Puromet™ Resins For Metals Removal, Recovery and Separation



This Application Guide presents Purolite Puromet ion exchange technology for the primary recovery of metal or the removal of impurities to increase the value and purity of the final product.



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About Purrolite

Purrolite is a leading manufacturer of ion exchange, catalyst, adsorbent and specialty resins. With global headquarters in the United States of America, Purrolite is the only company that focuses 100% of its resources on the development and production of resin technology.

Responding to our customers' needs, Purrolite has the widest variety of products and the industry's largest technical sales force. Globally, we have strategically located research and development centers and application laboratories. Our ISO 9001 certified manufacturing facilities in the USA, United Kingdom, Romania and China combined with more than 40 sales offices in 30 countries ensure complete worldwide coverage.

Purrolite has been part of Ecolab since 2021. A trusted partner at nearly three million commercial customer locations, Ecolab (ECL) is the global leader in water, hygiene and infection prevention solutions and services. Ecolab delivers comprehensive solutions, data-driven insights and personalized service to advance food safety, maintain clean and safe environments, optimize water and energy use, and improve operational efficiencies and sustainability for customers in the food, healthcare, hospitality and industrial markets in more than 170 countries around the world.



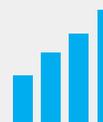
PREMIER PRODUCTS

The quality and consistency of our products is fundamental to our performance. Throughout all Purrolite plants, production is carefully controlled to ensure that our products meet the most stringent criteria, regardless of where they are produced.



RELIABLE SERVICE

We are technical experts and problem solvers. Reliable and well trained, we understand the urgency required to keep businesses operating smoothly. Purrolite employs the largest technical sales team in the industry.



INNOVATIVE SOLUTIONS

Our continued investment in research and development means we are always perfecting and discovering innovative uses for ion exchange resins and adsorbents. We strive to make the impossible possible.

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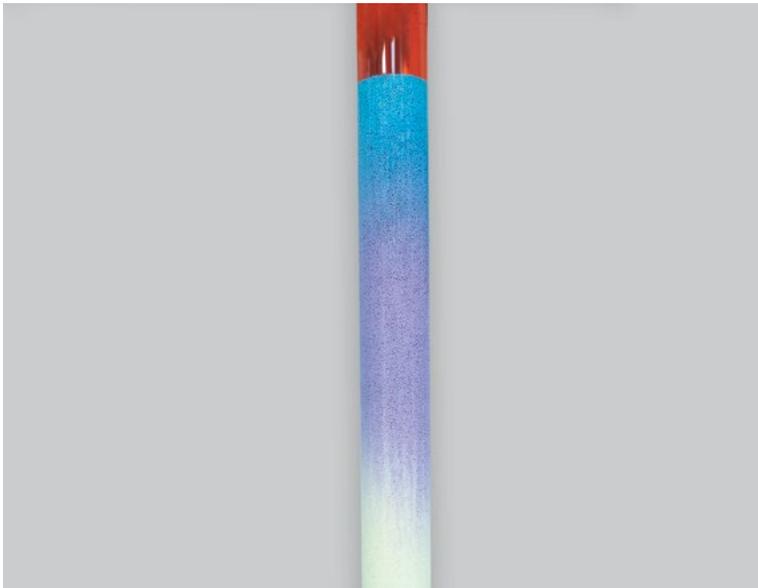
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Purolite Ion Exchange Resins for Metals Recovery

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.



Puromet MTS9500 being used to separate copper and cobalt from a solution containing 4 g/L cobalt and 200 mg/L copper. A difference in selectivity, due to the special functionality of the resin, causes the two metals to separate into two separate bands, blue copper and pink cobalt. The beige section of resin is as yet unloaded with any metals.

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.

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 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

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

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

TABLE 3 Suggested Purolite Resins for Hydrometallurgical Applications

Target Metal	Detail	Puromet Resin(s)
Antimony & Bismuth	Various liquors and waste waters	MTS9500 MTS9510PF MTS9570
Cobalt, Copper, Nickel, Zinc	Acidic liquors or pulps	MTS9300 MTS9301 MTS9600
Copper & Zinc Impurity Removal	Cobalt and nickel electrolyte	MTS9500
Gold	Acidic liquors or pulps	MTS9140 MTS9200#
Iron	Electrolyte purification	MTS9500 MTS9570
Mercury	Various liquors and waste waters	MTS9140 MTS9200
Molybdenum	Acidic liquors or pulps	MTA1011
Precious Metals	Acidic liquors or pulps	MTS9100 MTS9140 MTS9200 MTS9850
Rare Earth Elements	Acidic liquors or pulps	Selection of cation exchange and complexing resins
Rhenium	Acidic liquors or pulps	MTA1701 MTA1721
Uranium	Liquors or pulps	MTA4601PF MTA4801PF MTA5012 MTA5014 MTA5601 MTA6001 MTA6002PF MTA6601 MTA8000PP

Note: All anion and cation resins may be converted to specific ionic form.

#Puromet MTS9200 can only be used in acidic conditions, as it is not stable in alkaline conditions.



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Purolite, the leading manufacturer of quality ion exchange, catalyst, adsorbent and specialty high-performance resins, is the only company that focuses 100% of its resources on the development and production of resin technology.

We're ready to solve your process challenges. For further information on Purolite products and services, visit www.purolite.com or contact your nearest Technical Sales Office.



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