

LOOP HYDROMETALLURGY: COPPER MADE GREEN

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ABSTRACT

Halide hydrometallurgy is widely recognised as offering superior economic and environmental outcomes for the leaching of a wide range of mineral concentrates: copper, nickel, rare earths, lead, zinc, silver, gold, PGMs and more.

Halide leaching is significantly faster than sulphate. Extremely high extraction can be achieved without the need for high pressures, high temperatures, or complicated bacterial processes. The smaller, faster, more efficient leach processes therefore offer capital and operating costs that are only a fraction of conventional sulphate leaching or smelting.

With significantly stronger chelating power, halides can effectively leach a broader range of (more refractory) minerals. Halides can be used for direct extraction of gold, PGMs and other valuable by-products. They are also ideally suited to polymetallic or low-grade concentrates, as well as those that are contaminated with elements such as arsenic.

Metso-Outotec, Technicas Reunidas, Nippon Mining & Metals and Intec have collectively spent over \$100 million demonstrating fast and effective halide leaching processes for copper and other minerals. It can be fairly described as established technology.

However, halide leaching has until now been limited to very niche commercial applications because of difficulties in the direct recovery of the target metals via electrowinning. Unlike sulphate systems, halide electrolytes produce dendritic copper crystals rather than flat plates, and this has hampered E/W cell designs. Accordingly, most proponents of halide leaching have sought to use solvent extraction to allow conventional sulphate electrowinning, but the significant compromises required to make that possible have impeded commercialisation.

Loop Hydrometallurgy has developed a revolutionary new electrowinning cell design that makes practical the direct production of high purity copper from purified halide leachate. Starting from the Cu(I) state and operating at over 1,000A/m², this cell uses less than half the power required for conventional E/W. The anolyte is then fully recycled to the leach, which aids in the direct extraction of gold and PGMs.

Leveraging the extensive prior demonstration of halide leaching and more than 50 years of combined experience in the field, Loop Hydrometallurgy's E/W cell is now poised to bring to market the first commercially viable complete cyclic process for the production of high-grade copper from concentrates: at the bottom decile of the industry cost curve; at site; at atmospheric pressure, <100°C; with no noxious gas emissions or liquid effluents, and producing an environmentally stable hematite residue for on-site disposal.

This presentation will discuss breakthrough technology for copper processing, and the opportunities to unlock value from Australian and international resources.

Keywords: Copper electrowinning, halide leaching, copper process, hydrometallurgy