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# A NOVEL TREATMENT APPROACH FOR COPPER ORES BASED ON GLUTAMATE LEACHING

By

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## ABSTRACT

Nowadays, copper ore mining is facing several challenges, such as the depletion of high-grade ore deposits containing easily extractable copper, as is the case with ores in the oxide zone. Therefore, in many mining operations, copper ore mining is in the transition zone and the secondary sulfide enrichment zone. In the transition zone, it is possible to find a mixture of oxide and sulfide minerals, which generate difficulties in conventional treatment, because it is possible to find these copper minerals associated with other oxide minerals and carbonates with high calcium and magnesium content as gangue materials, which when interacting with acid can solubilize a variety of metallic cations, generating an excessive increase in acid consumption and potentially causing severe operational problems in the solvent extraction circuits.

Additionally, in the case of sulfides, low leaching kinetics are present. For this reason, the traditional treatment of sulfide metals is made by concentration using flotation and pyrometallurgy. This is associated with a series of problems, such as the generation of flotation tailings, generation of gases such as $SO_2$ and arsenic, difficult management of by-products, and high water and energy consumption. This work aims to propose a sustainable hydrometallurgy process to recover copper from tenorite, covellite, and chalcocite minerals using a non-toxic amino acid. The procedure involves two main stages: (i) leaching with aqueous alkaline monosodium glutamate solutions at pH 9.4 varied temperature, glutamate concentration, and dissolved oxygen concentration, and (ii) PLS treatment by sulfide precipitation of copper, using NaHS addition. As a result, overall copper extraction around 90% in the integrated whole process has been obtained.

*Keywords:* mineral processing, copper dissolution, metal sulfide precipitation, amino acids, and monosodium glutamate.