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Impact of dry and wet grinding on flotation performance of low-grade copper ore with PAX and SIBX

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ABSTRACT

Water scarcity, especially in arid regions, requires minimizing water usage in ore processing plants. With the decline in ore grades, larger volumes of ore must be processed to extract the same amount of metal, leading to higher throughput rates and increased water consumption. This study investigates flotation on a complex Australian low-grade copper ore, comparing the effects of wet and dry grinding on copper recovery and upgrading. As copper deposits with diminishing grades and diverse mineral associations become more common, optimizing flotation conditions, particularly collector type and pulp chemistry (pH), is crucial. Flotation experiments using potassium amyl xanthate (PAX) and sodium isobutyl xanthate (SIBX) as collectors, along with Methyl Isobutyl Carbinol (MIBC) frother, were conducted to identify the optimal process conditions. The study also examines the impact of pulp chemistry (pH, collector type, and dosage) on copper recovery and grade for the two grinding methods. The findings highlight the importance of pulp chemistry, collector type, and dosage in optimizing flotation, providing valuable insights to enhance copper ore beneficiation efficiency.

KEY WORDS

Dry grinding, flotation, beneficiation, complex low-grade ores

BIOGRAPHY

Theophilus' research aims at improving the understanding of comminution strategy on downstream process performance. A key focus is on dry comminution with links to downstream flotation and hydrometallurgical processes, unravelling opportunities for low-grades ores and wastes processing.

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