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# Study on Bioleaching Using Seawater: Influencing Factors of Pyrite Leaching by Acidophiles

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## ABSTRACT

Bioleaching technology (biohydrometallurgy), with its sustainability, low energy consumption, and environmental friendliness, provides an innovative pathway for tailings recycling and low-grade ore processing, making it a research focus in interdisciplinary fields of mining engineering and environmental science. The critical challenge in seawater biohydrometallurgy lies in obtaining highly chloride-tolerant microbial strains and consortia to dissolve valuable metals from solid sulfides, tailings, or electronic waste into the liquid phase for subsequent extraction. This study focuses on seawater-based bioleaching technology, A salt-tolerant acclimated culture system of *Acidithiobacillus thiooxidans* was established to systematically investigate the coupled effects of pH gradients (3~7) and chloride ion concentrations (0, 2.5, 5, 10, 24 g/L NaCl) on pyrite bioleaching. Additionally, the roles of different sulfur substrates (tetrathionate, thiosulfate, and elemental sulfur) in the system were compared. The results indicated that 10 g/L of NaCl promoted the pyrite bioleaching and tetrathionate was the best substrate. This study demonstrates a possibility for bioleaching practice using seawater.

**Keywords:** seawater bioleaching, *Acidithiobacillus thiooxidans*, pyrite, pH, $Cl^-$ concentration, sulfur metabolic substrates

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