

Structural treatment in sulphide mine wastes through an inhibitory approach in bioleaching-based technique

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The mobility of toxic elements sourced from sulphide tailings causes an undeniable environmental issue for the ecosystem. Acidophilic bacteria generate sulfuric acid as an essential factor for toxic metals leaching. The passivation treatment of mine wastes by acidophilic bacteria can result in a structural amendment on the ore's surface, generating an insoluble and protective layer against the transfer of trace elements into the aquatic environment. In this work, the structural change in waste soil through bioleaching-based treatment was studied on a laboratory scale. The effect of main parameters on soil bio-treatment was investigated, including pH, Fe³⁺, elemental sulfur and pulp density. Among them, the ferric ion can provide a strong oxidizing condition for the leaching of sulphide minerals and also jarosite generation as a secondary sulphate mineral. The results of bacteria experiments showed the ore surface passivation

occurred by the contact mechanisms of bioleaching of pyrite and chalcopyrite. The kinetic of sulphides leaching in the presence of *A. ferrooxidans* was higher than that of *A. thiooxidans*. Also, the changes in the structure of sulphide tailings during the surface passivation detected on the macro, micro and nanoscale demonstrated the success of bacterial treatment.

Keywords: Jarosite; Ferric ions; Mine wastes; Structural treatment; Surface passivation.

Biography

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