

A Column Bioleaching Model for Chalcocite: An Investigation of Oxygen Limitation and Bacterial Inoculation on Leaching

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Abstract

A model for column bioleaching is investigated to identify and understand aspects of bacteria in bioleaching applications, which have implications in heap bioleaching operations. The model is used to simulate scenarios that would otherwise be time consuming to perform experimentally.

This study uses a model of bacterial transport and attachment/detachment to ore particles, with a bioleaching model for the depletion of a copper-sulphide, also accounting for liquid and gas flow and gas/liquid oxygen mass transfer. The model includes aspects such as oxygen and ferrous ion consumption, coupled with leaching of a copper-sulphide via the shrinking core model.

The model is used to investigate how the rate of leaching is affected by the bacterial concentration in the columns, by the bacterial regeneration of the leaching oxidant ferric ions. The model is also used to assess the impact of oxygen limitation and inoculation method on the copper leaching.

Some comparison of the model with experimental data will be shown.