A model for heap bioleaching of chalcocite with heat balance: bacterial temperature dependence

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Abstract

A 3-phase computational fluid dynamics (CFD) model for heap bioleaching of chalcocite is investigated to identify and understand the thermodynamic processes in a heap. The study uses an existing one-dimensional model of liquid flow, bacterial transport (including attachment/detachment of bacteria to ore particles), and the depletion of a copper-sulphide, coupled with a model of heat flow in the heap, with bacterial temperature dependence.

The model is used to investigate aspects of heat balance in regard to the bacterial temperature dependence and the temperatures reached in a typical heap. We find the heap is leached in a top-down manner, due to the ability of the incoming liquid to cool the heap at the top, and allow bacteria to be under optimal temperature conditions. As the top leaches, the temperature there drops and progressively cools the heap as a front moves down through to leach the whole bed.