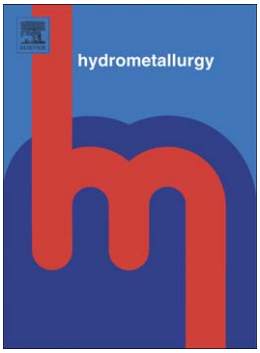

Modelling of multicomponent reactive transport in finite columns — Application to gold recovery using iodide ligands

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PII: S0304-386X(17)31009-5
DOI: doi:10.1016/j.hydromet.2018.03.020
Reference: HYDROM 4784

To appear in: *Hydrometallurgy*

Received date: 10 December 2017
Revised date: 16 March 2018
Accepted date: 23 March 2018

Please cite this article as: Karrech, A., Attar, M., Oraby, E., Eksteen, J., Elchalakani, M., Seibi, A.C., Modelling of multicomponent reactive transport in finite columns — Application to gold recovery using iodide ligands, *Hydrometallurgy* (2018), doi:10.1016/j.hydromet.2018.03.020

Modelling of multicomponent reactive transport in finite columns — Application to gold recovery using iodide ligands

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Abstract

Existing semi-analytical solutions to the problem of reactive transport in porous media are either restricted to single aqueous species, to decoupled processes or to infinite/semi-infinite domains. Our approach addresses the problem of multicomponent reactive transport in finite columns, where coupling feedbacks emanating from the non-equilibrium thermodynamics of chemical species are taken into account. The main purpose of this research work is to investigate the in-situ leaching of precious metals a technique that is expected to be relevant to the Earth s regolith consisting of fragmented and/or weathered rocks where permeability is su ciently high for reactive transport. Producing precious metals from such areas may be beneficial especially when the grade is too low for conventional mining techniques to be applicable.

The proposed solution method is validated experimentally using existing tests of column leaching using iodine-based lixiviants. The obtained results show good agreement with the experimental data. In addition, the results indicate that the rate of e uent gold concentration increases until its maximum when the ow velocity, concentration of iodine lixiviants, or specific surface increase. After the peak, the behaviour is more complex and the obtained results allow to optimise the amount of recovered gold.

Keywords: Thermodynamics; In-situ leaching; Reactive transport; Lixiviants;