Effect of microbial siderophore DFOB on mobility and transport of Cu: Column experiment and reactive transport modelling

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Abstract
We focus on the transport behaviour of Cu under conditions related to a biohydrometallurgical leaching approach using neutrophilic microorganisms in neutral to slightly alkaline solutions. The effect of the microbial siderophore desferrioxamineB (DFOB) as a model leaching organic ligand on mobility and transport of Cu in the presence of kaolinite was investigated in column experiments. A geochemical transport model was established to describe the results. It was found that DFOB strongly enhances Cu mobility. The reactive transport model (including a surface complexation model) shows good agreement with the experimental data and is suitable to predict the transport behaviour of Cu in dependence on geochemical conditions.

The results of modeling revealed that in the absence of the ligand, a pH increase from 6.5 to 8.5 significantly retarded Cu breakthrough, whereas in the presence of DFOB, Cu breakthrough curves were nearly insensitive to pH changes and close to the breakthrough curve of a non-reactive tracer.

Keywords
Reactive transport modeling, Cu mobility, Microbial siderophore DFOB

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