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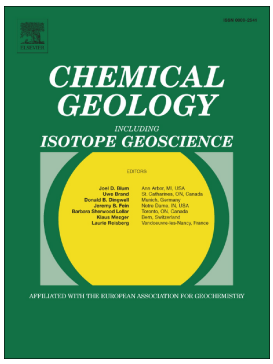

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Testing biostimulated sulfate reduction as a strategy of arsenic remediation in iron-rich aquifers

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Abstract

Biostimulated sulfate reduction is a promising strategy for remediating groundwater arsenic contamination. But biostimulation often induces pH changes alongside biogeochemical transformations of iron, sulfur, and arsenic, which all affect arsenic mobility and the efficacy of arsenic sequestration. This study tests whether ethanol-based biostimulation is a viable solution to arsenic contamination in iron-rich freshwater aquifers. We incubated the sediments from a volcaniclastic aquifer in laboratory microcosms and stimulated microbial sulfate reduction by adding ethanol and sulfate. The ethanol amendment also enhanced syntrophic ethanol oxidation, microbial iron reduction, and acetoclastic methanogenesis. These microbial processes changed pH, generated sulfide, ferrous iron, and bicarbonate, and removed arsenic – but only temporarily. Specifically, during the first 13 days of the experiments, pH fell by 2 units and, at the same time,