



## Immobilization of arsenic compounds by bog iron ores

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### ABSTRACT

Bog iron ores are known for their sorption properties regarding heavy metals. However, they have not been commonly used as sorbents of arsenic compounds. The aim of this study was to investigate As(III) and As(V) immobilization by bog iron. The tests included varying initial As concentrations (0.01–20 mM), and initial pH values (2–12), and also sorption experiments to evaluate the competition between both As(III) and As(V) and heavy metal cations. The results showed that As removal by bog iron ores depends on the oxidation state of As—the removal of As(V) is lower than the removal of As(III). Immobilization of As was the most effective at medium initial concentrations of As (0.25–1 mM) in a slightly acidic or neutral pH environment. Competitive sorption experiments revealed that the occurrence of several ions in the solution significantly affects the sorption effectiveness. The bonding strength of As with a bog iron ore surface was estimated on the basis of three-step desorption experiments. Desorption of As resulted in the extraction of less than 50% of adsorbed As(III) and As(V). This study shows that bog iron ores constitute an appropriate adsorption material for arsenic especially at concentration range 0.25–5 mM, pH 5–10 for As(III) and 0.25–0.5 mM, pH 2–5 for As(V). However, there are no simple correlations between mineralogy and sorption capacity.

*Keywords:* As(III); As(V); Competitive sorption; pH; Desorption; Iron oxyhydroxides

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