


2010 AGU Fall Meeting

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Location: Poster Hall (Moscone South)

Time of Presentation: Dec 17 8:00 AM - 12:20 PM

The benefits of competition: Rapid-scan FTIR reveals that goethite enhances initial As oxidation via Mn-oxides (*Invited*)

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Arsenite (As(III)) oxidation catalyzed by Mn-oxides is an important process for arsenic (As) cycling and for developing *in situ* strategies for remediation of As-contaminated waters. Previous studies demonstrate rapid oxidation of As(III), catalyzed by Mn-oxides, producing the less toxic and less mobile arsenate (AsV) species. To date the effects of competing ions, biomolecules, bacteria, organic matter, and other mineral surfaces have been largely ignored. In this study, the effect of competing ions, biomolecules, and, in particular, goethite (α -FeOOH) on As(III) oxidation by a hydrous Mn-oxide (δ -MnO₂) is presented. Rapid scan attenuated total reflectance (ATR) Fourier transform infrared (FTIR) spectroscopy data for As(III) reacted with δ -MnO₂, reveals rapid chemically-controlled oxidation followed by binding of AsV to δ -MnO₂ and passivation of the mineral phase. The presence of α -FeOOH (and phosphate) during oxidation via Mn-oxides reduces the extent of As(III) oxidation, but generally does not influence the initial reaction rate ($t_{1/2}$ = 0.16 to 0.28 min). Although increased concentrations of α -FeOOH do not reduce the initial oxidation rate, increased concentrations of α -FeOOH result in an increase of the extent of As(III) oxidation, presumably through As(V) sorption to α -FeOOH and reduced δ -MnO₂ passivation.

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