351-3 Effects of Dissolved Fe(II) On As(III) Oxidation and As(V) Sequestration by Hydrous Manganese Oxide.

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Yun Wu *and Donald Sparks, Plant & Soil Sciences, University of Delaware, Newark, DE*

Presentations
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The oxidation of arsenite (As^{III}) by manganese (Mn) oxides is an important process in the natural cycling of arsenic (As) in the environment. Previous studies have demonstrated rapid oxidation of As^{III} by Mn oxides which produces the less toxic and less mobile arsenate (As^{V}) that can be sorbed on mineral surfaces. Under natural conditions, the presence of other ions (i.e., Fe^{II}) can influence the behavior of As^{III} on Mn oxides. However, very few studies have focused on the effects of Fe^{II} on the redox and sorption processes. In this study, As^{III} oxidation by hydrous manganese oxide (HMO) in the presence and absence of dissolved Fe^{II} was investigated using stirred-flow experiments. Chemically synthetic HMO was reacted with three influent solutions, containing the same As^{III} concentrations but different Fe^{II} concentrations, at pH 4 for 24 hours. The results show an initially rapid As^{III} oxidation by HMO, which is followed by an appreciably slow reaction after 4 hours. In the presence of Fe^{II}, As^{III} oxidation is slightly decreased by 10%. This is due to Fe^{II} reacting with the HMO surface, decreasing HMO reactivity. Evidence for this was an increase in dissolved Mn^{II} concentrations as well as a decrease in dissolved Fe^{II} concentrations in the effluent solutions when Fe^{II} was present. However, when As^{III} is oxidized to As^{V}, the retention of As^{V} increases greatly in the presence of Fe^{II} and also increases with increasing Fe^{II} influent concentrations. This could be attributed to the formation of Fe^{III} hydroxides on the HMO surface after Fe^{II} is oxidized, which could provide additional sorption sites for As^{V}. This study suggests that the oxidative precipitation of Fe^{III} compounds on HMO surface may play a very important role in As^{III} oxidation and As^{V} sequestration. Molecular scale studies are in progress to address the reaction mechanisms.
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