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Footprints in the Landscape: Sustainability through Plant and Soil Sciences

Microbe and Mineral Mediated Arsenic Transformations in the Soil Environment.

*Tuesday, November 3, 2009: 3:15 PM
Convention Center, Room 330, Third Floor*

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Macroscopic and molecular techniques were employed to study the reactions of As(III) with Mn-oxides and bacteria, two primary constituents in soils that drive redox reactions of contaminants such as As. Stirred-flow and batch methods were used to better understand the kinetics of reaction processes over short and long time periods combined with XAS analysis of the Mn-oxide at selected time points. In the case of Mn-oxides, As was initially oxidized rapidly followed by a period of decrease in the rate of oxidation, indicating that the Mn-oxide surface had become somewhat passivated. XAS experiments revealed an increased amount of reduced Mn species in the solid phase with time, which could be responsible for passivation of the Mn-oxide surface. Stirred-flow experiments investigating the desorption behavior of As revealed that both calcium and phosphate were able to effectively desorb As from the Mn-oxide surface. Experiments measuring As(III) oxidation by three species of bacteria revealed that the bacteria are also capable of rapid As oxidation for long time periods. While the bacteria studied were able to oxidize As(III), none exhibited any ability to retain As and remove it from solution. Overall, these results show that the fate and mobility of As in soils can be dependent on both biotic and abiotic processes and can vary with time.

See more of: [Chemical and Biological Controls On Arsenic Bioavailability: I](#)