Sorption of Arsenite and Arsenate on a High Affinity Oxide: Macroscopic and Microscopic Studies. (S02-impellitteri091255-Oral)

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Abstract:

Sorption of arsenate and arsenite was examined on a Ru compound using macroscopic and microscopic techniques. Isotherms were constructed from batch studies at pH 4 through 8. Solution As was measured by ICAP. Samples of the Ru compound were equilibrated with arsenite and arsenate at pH 7 and either dried or left in an oxygen free environment for different time periods. The samples were then analyzed for solid phase oxidation state of As and bonding characteristics by XANES and EXAFS. The results show that the Ru compound has a high affinity for both As species. Sorption capacity decreases with increasing pH. Speciation of the seasing pH. Speciation of the supernatants indicates that the Ru compound rapidly oxidizes arsenite to arsenate. This result is supported by the spectroscopic studies. XANES data indicate that the solid phase oxidation state of As is 5 in all of the samples regardless of the initial oxidation state of As. It is probable that a two-step reaction occurs for arsenite where the Ru compound oxidizes the arsenite to arsenate followed by sorption. EXAFS data suggest that the sorption reaction results in a tightly bound innersphere complex between As(V) and the Ru compound.

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