Sorption of Lead on a High Affinity Oxide: Macroscopic and Microscopic Studies. (S02-scheckel104810-Oral)

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Abstract:

Sorption of lead (Pb) was investigated on an innovative metal oxide compound using macroscopic and microscopic techniques. The objective of this study was to elucidate the sorption mechanism of Pb on the high-affinity engineered oxide with time at pH 6 employing batch methods and X-ray absorption fine structure (XAFS) and X-ray diffraction (XRD) spectroscopies. For the spectroscopic studies, Pb sorbed oxide samples were analyzed in-situ via XAFS to determine the coordination environment and as a freeze-dried powder for XRD to detect changes in the crystal structure of the metal oxide. The results of the kinetic batch experiments show that Pb sorption is extremely rapid with greater than 90% removal from a 0.4M Pb(NO3)2 solution within one hour. The oxide phase possesses a sorption capacity nearing 1,000,000 mg Pb per kg of solid, which far exceeds the sorption capacity of Fe, Mn, and Al oxides. XAFS data indicate that the Pb is sorbed as tightly bound complexes. XRD studies show that the high coverage of Pb diminishes the characteristic peaks for the ruthenium compound through the sorption mechanism on the solid surface. The metal oxide compound has great promise as a treatment option for removal of metals and oxoanions from solution.

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Presentation Information:

Presentation Date: Wednesday, November 13, 2002
Presentation Time: 4:15 pm

Keywords:

Lead (Pb), Kinetics, XAFS, Remediation