

Oxyanion Surface Structures on Goethite. S.E. FENDORF*, Univ. of Idaho, P.R. GROSSL, D.L. SPARKS, Univ. of Delaware, and G.M. LAMBLE, Brookhaven National Laboratory.

Many heavy metals have a dramatic influence on agricultural productivity and environmental quality. Their retention on soil constituents has important consequences on their mobility, bioavailability, and hence their risk. The sorption mechanism, however, determines the strength of retention and thus the potential for release of the metal into the aqueous environment. In this study, x-ray absorption fine structure (XAFS) spectroscopy was employed to discern the local structure of the oxyanions Cr(VI) and As(V) sorbed on goethite. Both oxyanions formed inner-sphere complexes. The interatomic distances determined with XAFS indicated that the dominant As(V) species on goethite was a bidentate binuclear surface complex. Chromium to Fe distances resulting from Cr(VI) sorption also indicate a bidentate surface complex. The results of this structural investigation indicate that both As(V) and Cr(VI) form inner-sphere bidentate complexes on goethite. Therefore, both of these oxyanions form stable surface bound states.

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