

# Kinetics of Zinc/ Arsenate Co-Sorption at the Goethite-Water Interface. (5827)

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## Abstract:

Little information is available in the literature about reaction processes of co-sorbing metals and arsenate (As(V)) and/ or factors influencing these reactions, however, arsenic and metal contamination are a common co-occurrence in many contaminated environments. In this study we investigated the co-sorption kinetics of 250  $\mu$ M As(V) and Zn(II) in 10, 100, and 1000 mg goethite L-1 solutions at pH 7, collected complimentary As and Zn K-edge EXAFS data after various aging times, and performed a replenishment dissolution study at pH 4 and 5.5 after 6 months of aging time. Arsenate and zinc formed adamite-like and koettigite-like surface precipitates on goethite in 100 and 10 ppm goethite suspensions, respectively, while in 1000 ppm goethite suspensions, dominantly surface adsorption reactions took place as indicated by As and Zn K-edge EXAFS spectroscopy. Replenishment desorption studies showed that the precipitates and surface adsorbed complexes on goethite were susceptible to proton-promoted dissolution often resulting in more than 80 percent loss of Zn and ~ 60 to 70 percent loss of arsenate. The molar Zn:As dissolution ratio was dependent on the structure of the precipitate and was cyclic for the adamite and koettigite-like surface precipitates reflecting the concentric and plane-layered structures of adamite and koettigite, respectively.

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