

Influence of Natural Organic Acids on Lead(II) Adsorption on Hematite

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The fate and transport of lead in subsurface systems is partially dependent on adsorption to mobile colloid particles. It is well established that the presence of organic acids will alter the surface reactivity of such particles impacting the conditions under which lead will adsorb to the particle surface. Using batch adsorption experiments, combined with X-ray spectroscopy, we examined the effect that several organic acids have on the adsorption of lead to the hematite surface and explored the potential structures of the lead-acid surface complex.

The lead-acid surface structure was studied on both hematite particle surfaces and single crystal surfaces. Organic acids enhanced the adsorption of lead at lower pH values though the surface structures they form vary with acid. Lead is seen adsorbed directly to the hematite surface in both the particle and specific surface experiments. In addition to this surface structure, in the presence of citric acid and fulvic acid, lead is present in a film at all distances away from the (001) surface. The addition of phthalic or humic acid does not result in the formation of the same film. Data will also be presented on the (110) and (012) surfaces. The combination of single crystal and particle experiments provides a more complete picture of lead adsorption at the iron oxide – water interface.