Rate and Mechanism of Cr(VI) Reduction on Magnetite. (S02-nico172044-Oral)

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Abstract:

The mobility and toxicity, and therefore the environmental hazard of Cr, are much greater when Cr is present in the oxidized Cr(VI), CrO42-, form. For this reason effective modeling and remediation of Cr requires a detailed understanding of Cr oxidation and reduction rates. Magnetite, Fe3O4, is a naturally abundant reduced iron phase with the potential to reduced Cr(VI), CrO42-, to Cr(III). We have investigated the dependence of the Cr(VI) reduction rate on magnetite suspension density, Cr(VI) concentration, and pH. At pH 7, the initial rate for reaction of 50 microM Cr(VI) with 15 g/L magnetite is, 1.6 x 10-6 mol L-1 min-1. As previously observed, the reaction appears to passivate the magnetite surface because only partial Cr(VI) reduction is observed even in the presence of excess magnetite. We have also compared rate of Cr(VI) reduction by acid washed commercial magnetite with the reduction rates by freshly synthesized and biogenic magnetite.

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