Structural Influences of Green Rusts on the Kinetics of Chromate Reduction. (S02-bond172657-Oral)

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Abstract:

Due to the environmental significance of chromium and the kinetic favorability of its reduction by ferrous iron bearing compounds, reaction with mixed valence iron oxides, green rusts, was examined. The formation of green rusts from ferrous sulfate, chloride and carbonate solutions was studied at ambient temperature with pH and oxygen flow controlled and the products fully characterized. Each green rust was then reacted with chromate in a series of concentrations to determine the kinetics of reduction. Green rust chloride is the most effective reductant of Cr (VI) followed by GRCO3 and GRSO4; first-order rate coefficients (kobs) with respect to Cr(VI) concentration range from 1.22 x 10-3 to 3.7 x 10-2 s-1. Reduction rates are proposed to be controlled by the concentration of ferrous iron and structure/chemical bonding of the green rust layers. The nature of the oxidation products was independent of the anionic class of GR. Chromium(III)-bearing iron oxyhydroxides of magnetite and lepidocrocite were identified as the major oxidation products.

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