
Effect of Ionic Strength and Ion Pair Formation on the Adsorption of Nickel by Kaolinite

Shas V. Mattigod, A. S. Gibali¹ and A. L. Page

Department of Soil and Environmental Sciences University of California, Riverside, California 92521

¹ Current address: Alfateh University, Libya.

Abstract: Adsorption of Ni(II) by Ca- and Na-saturated kaolinites was studied in equilibrating solutions with total Ni concentrations ranging from 118 to 946 μ /liter. Background electrolytes used in these experiments were 0.005, 0.01, 0.025, and 0.5 M $\text{Ca}(\text{NO}_3)_2$, 0.002 and 0.005 M CaSO_4 , 0.01 and 0.1 M NaNO_3 , and 0.005 and 0.05 M Na_2SO_4 . Ion speciation in equilibrium solutions was calculated by the computer program GEOCHEM. Computed Ni^{2+} concentrations and activities at equilibrium were correlated with total Ni adsorbed by kaolinite. Increasing ionic strength resulted in decreasing Ni adsorption. Adsorption of Ni was greater from solutions when NO_3 was the dominant anion. Based on adsorption data in SO_4 medium, the standard free energy of adsorption of Ni^{2+} ion on kaolinite was computed to be -27 kJ/mole.

Key Words: Ion speciation • Ionic strength • Ion pair • Kaolinite • Nickel adsorption

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