

Mechanism of arsenic sorption onto laterite iron concretions from Prestea, Ghana.

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Arsenic adsorption was investigated on laterite iron concretions as a function of solution pH, ionic strength and temperature. Electrophoretic mobility (EM) measurements, including point of zero charge (PZC), and surface complexation modeling were used to delineate adsorption mechanism of arsenic onto laterite iron concretions.

Both arsenite and arsenate were found to adsorb well over a pH range of natural waters (4-9) with maximum sorption at neutral pH. Equilibrium adsorption capacity for both arsenite and arsenate increased with temperature, from 0.666 to 1.428 mg/g for arsenate and from 0.833 to 1.000 mg/g for arsenite when the temperature was increased from 25 to 35°C. Increase in adsorption capacity of the laterite iron concretion with temperature may be due to change in surface properties of the adsorbent.

Iron and aluminum oxides were identified as major adsorption phases in the laterite iron concretions. Thus, we modeled the surface complexation of laterite iron concretion using component additivity approach, which assumes that total adsorption on laterite is the summation of adsorption on iron and aluminum oxides. The modeled sorption results fitted well with experimental data. Preliminary results indicate both arsenate and arsenite forms inner-sphere complexes on laterite iron concretions.