

Kinetics of Arsenate Adsorption/Desorption on Goethite. P.R. GROSSL*,
D.L. SPARKS and C.C. AINSWORTH, *University of Delaware
and Battelle Pacific Northwest Laboratories.*

The kinetics of arsenate adsorption/desorption at the goethite/aqueous interface was investigated using a pressure-jump relaxation technique. This technique, based on the fact that chemical equilibria are dependent on pressure, provides a description of elementary reactions occurring on millisecond time scales. A pressure perturbation causes a shift in chemical equilibrium and consequently, the system must relax to the state defined by the new equilibrium. The relaxation is controlled by the rates of all elementary reactions and is monitored by conductivity detection. Relaxation times (τ) are used to evaluate mechanisms and determine rate constants for adsorption and desorption reactions. For these studies, a goethite (surface area = $50 \text{ m}^2\text{g}^{-1}$) suspension concentration equal to 10 gL^{-1} was treated with initial As solution concentrations ranging from 1 to 10 mM , pHs ranging from 6.0 to 9.0, and background electrolyte concentrations from 1 to 20 mM NaNO_3 . Adsorption reactions were equilibrated for 24 h prior to conducting each p-jump experiment. Evaluation of p-jump experiments along with equilibrium adsorption studies provides information regarding the type (inner- vs. outer-sphere) and strength of the surface complex arsenate forms with goethite and will help to elucidate its' fate in soil environments.