

Kinetics of Adsorption of Selenate and Selenite at the  
Goethite/Water Interface. P.C. ZHANG\* and D.L. SPARKS,  
Univ. of Delaware.

Mechanisms and kinetics of  $\text{SeO}_4$  and  $\text{SeO}_3$  at the goethite/water interface were studied using pressure-jump relaxation with conductivity detection at 298 K under constant ionic strength. A modified triple layer model (TLM) was used to describe the adsorption and calculate parameters such as surface electric potentials and intrinsic equilibrium constants based on the assumption that the mechanism of  $\text{SeO}_4$  adsorption was electrostatic attraction and  $\text{SeO}_3$  adsorption was ligand exchange. A single relaxation was observed for  $\text{SeO}_4$  adsorption. The intrinsic rate constant for adsorption ( $\log k_{\text{ads}} = -8.55$ ) was much larger than that for desorption ( $\log k_{\text{des}} = -0.52$ ). Double relaxations were observed for selenite adsorption and attributed to two reaction steps. In the first step, outer-sphere surface complexes were formed through electrostatic attraction. In the second step, the adsorbed selenite ion replaced a  $\text{H}_2\text{O}$  from the protonated surface hydroxyl group and formed an inner-sphere surface complex. The intrinsic equilibrium constants obtained from the equilibrium modeling and kinetic studies agreed very well which further verified the hypothesized reaction mechanisms.