

Modeling the Kinetics of Salt Removal from an Iron-Rich Industrial Coproduct. Y. SALINGAR\*, G.J. HENDRICKS, D.L. SPARKS, and J.D. PESEK, Univ. of Delaware.

The filter-cake material (FC) is an industrial Fe-oxide rich coproduct of a  $\text{TiO}_2$  manufacturing process. To determine the feasibility of potential agricultural uses and to assess possible environmental hazards, the FC was physicochemically characterized. Column and stirred-flow (SF) studies showed an instantaneous leaching of Cl, attributable to a volume-dependent process, and time-dependent removal of  $\text{SO}_4$ . Since salt removal rates from the columns were greatly influenced by water content, diffusion and physicochemical phenomena such as dispersion, the SF technique facilitated modeling of the chemical kinetics of Cl and  $\text{SO}_4$  removal by providing a uniformly mixed system, devoid of transport phenomena. The  $\text{SO}_4$  removal mechanism from the FC to the ambient solution, in the SF system, was a first-order oxidation-dissolution reaction of the Fe-sulfide present in the FC. The computed value of the rate constant was  $0.008 \text{ min}^{-1}$ . In the column studies, the newly dissolved  $\text{SO}_4$  was present in both the effluent and sorbed on the FC which caused a pH increase with time.