

## POTASSIUM-CALCIUM EXCHANGE KINETICS ON CLAY MINERALS

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### **Abstract**

A knowledge of ion exchange kinetics is fundamental to model soil chemical reactions. One major limitation in studying exchange kinetics has been the lack of appropriate methods. Recently a stirred-flow technique was developed that eliminates many problems encountered with other kinetic methods. However, data analyses and the ability to distinguish between time-dependent reactions and instantaneous equilibrium have been questioned.

A mathematical approach was previously developed to analyze kinetic data obtained from the stirred-flow method. Experimental tests that distinguish between instantaneous equilibrium and kinetic models also were developed. Using published data, it was found that both instantaneous and kinetic models described K adsorption on kaolinite well.

In this study, we evaluated the effectiveness of these experimental tests in distinguishing between instantaneous and kinetic models. Potassium adsorption kinetics were investigated on a Llano vermiculite and an Arizona montmorillonite using the stirred-flow method. Potassium adsorption was too rapid to be measured on the Arizona montmorillonite. In contrast, K adsorption was measurable on the Llano vermiculite and was dependent on solution concentration. It is also likely that K adsorption kinetics can be measured on other micaceous minerals using the stirred-flow method.