
Potassium Selectivity of Clays as Affected by the State of Oxidation of Their Crystal Structure Iron

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Abstract: The Ca-K exchange isotherms were determined at two temperatures for two highly montmorillonitic iron-rich soil clays in their oxidized and reduced states. The thermodynamic parameters K , ΔG_0 , ΔH_0 and δS_0 were calculated for the exchange reactions.

It was found that the formation of K-clay from C-clay in both the oxidized and reduced state was accompanied by negative free energy, enthalpy and entropy changes. The results indicate that K is more strongly bound than Ca by the clay and the Ca-preference shown by the isotherms may be due to entropy changes in solution.

The oxidation of crystal structure iron resulted in an increase in K selectivity of the clay and a decrease in the free energy, enthalpy and entropy changes of the Ca-K exchange reaction. It was concluded that K is more strongly held by the oxidized clay than the reduced one, which is possibly due to a more nearly dioctahedral character in the oxidized than in the reduced state.

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