
Thermodynamics of the Exchange of *n*-Alkylammonium Ions on Na-Montmorillonite

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Abstract: A thermodynamic study has been made of the ion exchange equilibria of the *n*-alkylammonium ions in sodium montmorillonite. Exchange isotherms of ammonium, methylammonium, ethylammonium, propylammonium and butylammonium with sodium montmorillonite were determined at 4° , 25° , and 55° C. From these data the changes in free energy, enthalpy and entropy for the exchange reactions were calculated. In the temperature region used in this work, no enthalpy change was observed. Thus the exchange was only controlled by entropy effects. The thermodynamic excess functions were calculated from the surface activity coefficients. The affinity of the organic ions for the clay increases with chain length. It is shown that this increase can not be ascribed to van der Waals forces, but must be due to the combined effect of variations in electrostatic interactions with the clay lattice and of the hydration state.

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