
Surface Conductance and Electrokinetic Properties of Kaolinite Beds

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Abstract: A technique was developed for forming clay beds of uniform porosity between 48 and 62 per cent. The surface conductance and streaming potential of sodium kaolinite were determined over a range of values. Zeta potential as calculated from the classical formula was about -30 mV at neutral pH and changed sign at pH 4. The surface conductivity of the sodium clay at various pH values was directly proportional to the zeta potential and from 12 to more than 30 times as large as the calculated electrokinetic surface conductivity. Similar measurements were made on kaolinite in the acid (hydrogen-aluminum) and calcium forms. The acid clay fitted the experimental correlation found for the sodium series, but the calcium clay, with less than one-tenth of the zeta potential of the sodium clay at neutral pH, had half its surface conductance. The results are interpreted as showing that exchangeable ions on kaolinite are mostly in a condensed layer on the surface where the mobility determines surface conductance. The surface mobilities for Na, Ca and H-Al are 20, 8 and 0 per cent of normal, respectively. Apparently hydrogen ion from the solution is very effective in replacing sodium, which exhibits its electrokinetic and conductive properties in proportion to its concentration on the surface.

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