
Flocculation of Illite/Kaolinite and Illite/Montmorillonite Mixtures as Affected by Sodium Adsorption Ratio and pH

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Abstract: The effect of electrolyte concentration, exchangeable sodium percentage (ESP), sodium adsorption ratio (SAR), and pH on the flocculation-dispersion behavior of 50/50 mixtures of reference illite with reference kaolinite or reference montmorillonite was investigated. The clays were Na- or Ca-saturated and freeze-dried before use. Critical coagulation concentrations (CCCs) were investigated in the range of pH 5.9 to 9.6, percent Na-clay 0, 10, 20, 40, 60, 80, and 100 and SAR 0, 10, 20, 40, 60, 80, and co. CCC values increased with increasing ESP, increasing SAR, and increasing pH. The pH dependence of illite/kaolinite was greater than that of illite/montmorillonite especially at high ESP and SAR. The presence of illite did not play a dominant role in determining flocculation-dispersion behavior of the 50/50 clay mixtures. The CCCs of illite/kaolinite resembled reference illite more than reference kaolinite for SAR 0 to SAR 60. Illite/montmorillonite exhibited CCCs more similar to reference illite than reference montmorillonite at SAR 40 and SAR 60. At the agriculturally desirable ESP and SAR values of 0 to 15, all the 2:1 clays and 2:1 clay mixtures demonstrated similar CCC values.

Key Words: Flocculation value • Critical coagulation concentration • Dispersion • Aggregation

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