
Adsorption of Alkylphosphoric Acid on Kaolinite and Smectite in Water-Decane

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Abstract: Bis-ethyl 2-hexylphosphoric acid (di-2 EHPA) dissolved in decane is chemisorbed on kaolinite and montmorillonite dispersed in an acidic aqueous solution. The adsorption results in the formation of complexes with the surface cations of the clays. The adsorption isotherms are of the Langmuir type and reveal a limiting value of adsorption on H⁺-kaolinite of 12.2 mg/g, comparable to that measured in the absence of water. For H⁺-montmorillonite, however, the limiting value in the presence of acid is somewhat less (20.6 mg/g vs. 23.8 mg/g). Di-2 EHPA does not react with the magnesium cations available at the surface. The isotherm is "stepped" and suggests the presence of adsorption sites with distinctly differentiated energies. The sites of di-2 EHPA adsorption can be masked by treating the two clay minerals with polyphosphate anions. Thus, with pyro- and tripolyphosphate anions, di-2 EHPA uptake in acidic medium is very low. Adsorbed di-2 EHPA can be recovered by treating the clays with fluoride, hydroxyl, and dihydrogenphosphate anions. Dihydrogenphosphate anions lead, however, to a state of equilibrium between the organic and inorganic phosphate anions adsorbed.

Key Words: Adsorption • Alkylphosphoric acid • Kaolinite • Montmorillonite • Phosphate polyanions • Smectite

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