Thermodynamic Considerations of Nitroaromatics Adsorption by Smectite Clays. (S09-li104525-Poster)

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Abstract:

Nitroaromatic compounds are widely utilized as pesticides, explosives, solvents, and raw materials in the manufacturing of dyes, vanishes and perfumes. Recent studies indicate that such compounds are strongly retained by smectites, especially K-smectites. In this study, the adsorption isotherms of 1,3-dinitrobenzene, 1,4-dinitrobenzene, and 1,3,5-trinitrobenzene from aqueous solution by K- and Ca-saturated smectites were measured at several temperatures between 4 C and 37 C to determine the molar differential adsorption enthalpies. Adsorption was found to increase with decreasing temperature implying an exothermic process. The adsorption process involves solute condensation from aqueous phase and interaction with clay surfaces. The enthalpy of solute condensation from solution can be calculated using solubility data obtained at various temperatures (4 - 37 C). The enthalpy of nitroaromatics interacting with clay surfaces was then obtained from adsorption enthalpy by subtracting the enthalpy of solute condensation from solution. The enthalpy of solute-clay interaction will be analyzed in the context of a proposed sorption mechanism involving the complexation of K by -NO2 groups.

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