# Distribution Coefficient and Enthalpy of Adsorption Determinations of Explosives on Clays and Clay Mineral Colloids

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Transport of explosives and related nitrogen heterocycles in aquatic systems is controlled by various physical properties including solubility and the interaction of these compounds with dissolved organic matter, suspended sediments, and colloids. Traditional fate models employing octanol-water partition values have not adequately described the observed transport behavior. Clay minerals and mineral colloids are potential transport media; however, the ability to measure binding interactions and enthalpy of adsorption between submicron particles and colloids is difficult. A solution-based approach is described that is capable of making these determinations. The technique is based on capillary hydrodynamic chromatography principles and exploits diffusion coefficient differences between the explosives and the clay colloids. Using Laponite-RD as a model, binding isotherms of various explosive-clay colloid systems are determined, thus facilitating distribution constant ($K_D$) determinations. By controlling the temperature of capillary system, $K_D$ values for the compounds are made at various temperatures enabling the calculation of enthalpy of adsorption ($\Delta H_{Ads}$) values for the systems. Impacts of saturating the surface of the clay colloids with various cations are present for both $K_D$ and $\Delta H_{Sol}$ values.