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# Interaction between Organic and Inorganic Pollutants in the Clay Interlayer

Darsa P. Siantar, Benjamin A. Feinberg and José J. Fripiat

Department of Chemistry and Laboratory for Surface Studies University of Wisconsin-Milwaukee, P.O. Box 413, Milwaukee, Wisconsin 53201

**Abstract:** A synergistic mechanism for the retention of organic and inorganic pollutants in clays is discussed in this paper. The mechanism of adsorption of cis- or trans-1,2-dichloroethylene vapor (CDE or TDE, respectively) by hydrated smectite clay (hectorite) exchanged with  $\text{Pb}^{2+}$ ,  $\text{Hg}^{2+}$ ,  $\text{Cd}^{2+}$ ,  $\text{Ca}^{2+}$ ,  $\text{Ag}^+$ , or  $\text{Na}^+$  has been investigated by simultaneously measuring chlorohydrocarbon uptake and water desorption isotherm and by recording the infrared (IR) spectrum of the adsorbed phase. Hydrated hectorite saturated with divalent cations adsorbs about 55% more CDE or 35% more TDE than those saturated with monovalent cations. The quantity of chlorohydrocarbon adsorbed is also a function of the hydration of the clay interlayer space. When dehydrated, hectorite does not adsorb CDE or TDE. Upon long outgassing at room temperature or even at 100° C, the characteristic IR bands of clays with adsorbed chlorohydrocarbon, although much weakened, are still observable. The ratio of the amount of water desorbed to the amount of chlorohydrocarbon adsorbed varied from about 0.22 to 0.34. A shift of the center of gravity of the hydration water OH stretching frequency towards a higher wavenumber and of the asymmetric CC1 stretching vibration toward a lower frequency suggest that the formation of hydrogen bonds between CDE or TDE and water is the driving force for adsorption and that the cation-dipole interaction does not play a major role.

**Key Words:** BET • Chloroethenes • Chlorohydrocarbons • Contaminants • Dichloroethylenes • FTIR • Halohydrocarbons • Heavy metals • Hectorite • Isotherm • Pollutants • Smectite • Sorption • Toxicants

*Clays and Clay Minerals*; April 1994 v. 42; no. 2; p. 187-196; DOI: [10.1346/CCMN.1994.0420209](https://doi.org/10.1346/CCMN.1994.0420209)

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