
Clay-Organic Complexes as Adsorbents for Phenol and Chlorophenols¹

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Abstract: Several clay-organic complexes were synthesized by placing quaternary ammonium cations on smectite by cation exchange. They were then examined for their ability to adsorb phenol and several of its chlorinated congeners. The organic cations used were: hexadecylpyridinium (HDPY⁺), hexadecyltrimethyl ammonium (HDTMA⁺), trimethylphenyl ammonium (TMPA⁺), and tetramethylammonium (TMA⁺). The complexes containing long-chain alkyl (hexadecyl) groups were the most hydrophobic and adsorbed the phenols from water in proportion to their hydrophobicities, which increase with chlorine addition (phenol < chlorophenol < dichlorophenol < trichlorophenol). With n-hexane as the solvent, different adsorption was found which depended on the type and degree of solvent interactions with the compound and the clay-organic complex. Thus, the amount of adsorption of these phenols on clay-organic complexes was dependent on the relative energies of adsorbent-adsorbate and adsorbate-solvent interactions.

Key Words: Adsorption • Chlorophenols • Hydrophobicity • Organo clays • Phenol • Smectite

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