
Adsorption Of Ethylenediamine (EDA) On Montmorillonite Saturated with Different Cations—V. Ammonium- and Triethylammonium-Montmorillonite: Ion-Exchange, Protonation and Hydrogen-Bonding

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Abstract: On NH_4^- as well as on $(\text{C}_2\text{H}_5)_3\text{NH}$ -montmorillonite EDA was adsorbed in protonated form. The extent of protonation depended on the relative basicities and concentrations of the interacting compounds. In the systems exposed to EDA vapor a proton transfer process took place. A similar mechanism, involving probably a water molecule which remained associated with the EDAH^+ ion, occurred on air-drying $(\text{C}_2\text{H}_5)_3\text{NH}$ -montmorillonite treated with aqueous EDA, whereas no adsorption was observed when the suspension was washed. On the contrary EDA added, in quantities not exceeding the CEC, to a suspension of NH_4^- -montmorillonite was adsorbed almost exclusively as EDAH_2^{2+} ion. This is explained in terms of ion-exchange between NH_4^+ and EDAH^+ present in aqueous medium and protonation of the second amine function through the dissociation of water molecules near the clay surface.

Hydrogen-bonding between protonated and neutral EDA was observed when the extent of adsorption was higher than the extent of protonation.

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