
A Nuclear Magnetic Resonance (NMR) and Fourier-Transform Infrared (FTIR) Study of Glycine Speciation on a Cd-Rich Montmorillonite

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Abstract: As a consequence of treatments with glycine solutions, glycine molecules enter the interlayer of both Ca- and Cd-rich montmorillonite. Measurements of d value suggest that at low glycine concentration (0.01 and 0.1 M glycine solutions) a "flat" arrangement of the glycine molecules occurs in the interlayer. In contrast, intercalation of more than one monolayer of glycine molecules occurs for the montmorillonite treated with a higher concentration of glycine (1 M glycine solution).

Interlayer complexation of glycine occurs only for the Cd-rich form of montmorillonite, whereas no complexation is observed for Ca-rich montmorillonite. Both nuclear magnetic resonance (NMR) and Fourier-transform infrared (FTIR) results suggest that the adsorbed glycine, which fully protonates in the interlayer of montmorillonite to give the GlyH_2^+ species, interacts with the interlayer Cd^{2+} to form the CdGly_x complex mainly through the carboxylate group. The interlayer cadmium, present as both Cd^{2+} and CdCl^+ , is complexed by the ligand glycine. In contrast, the cadmium adsorbed on the external surfaces of montmorillonite does not interact with the ligand. Complexation of CdCl^+ only occurs for large amounts of adsorption of glycine (*e.g.*, for samples treated with 1 M glycine solution).

Key Words: Adsorption • Amino Acids • Cadmium • Glycine • Montmorillonite • Speciation

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