Intercalation of Al_{13}-Polyethyleneoxide Complexes into Montmorillonite Clay

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Abstract: Novel promising modified days adsorbents were synthesized by intercalating hydroxy-Al polymer associated with poly(ethyleneoxide) in the interlayer of montmorillonite. Two different PEOs of low molecular weight (600) and high molecular weight (100,000) were used. In both cases, the resulting materials are hydrolyticaUy stable and display a slightly better crystallinity than the materials prepared in the absence of PEO. Thermal analysis and infrared spectroscopy indicate changes in the PEO molecular conformation after intercalation revealing interactions between the polycations and the organic molecules. The chain length of the polymer has a strong influence on the surface area of the pillared materials obtained after calcination at 500 ° C. The use of the high molecular weight polymer leads to products with a higher specific surface area (about 400 m^2/g) whereas the lower molecular weight compound does not modify significantly the surface areas. This behavior can be explained by the different nature of the species intercalated in the interlayer. PEO(600) leads to isolated organometallic species whereas PEO(100,000) seems to lead to a network of complexed polycations linked by ethylene oxide units. In the case of the PEO (100,000), high amounts of polymer in the pillaring solution provoke a partial dissolution of the octahedral layer of the clay.

Key Words: Al_{13} • Intercalation • Microporous • Montmorillonite • Polyethyleneoxide

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