
Acidity of Montmorillonite-(Ce or Zr) Phosphate Cross-linked Compounds

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Abstract: The nature and number of acid sites per unit weight on a series of materials obtained by interaction of a montmorillonite with zirconium or cerium hydrogenphosphates precipitated *in situ* by reaction between their precursors have been investigated.

The quantitative determination of the surface acidity has been carried out by three different methods: titration with triethanolamine in aqueous media; TG analysis of the samples after n-butylamine treatment and vacuum desorption; and chemisorption of NH_3 at 239.8 K. Additional information about the nature of the surface acid sites has been obtained from the IR spectra of the samples with bases adsorbed.

Results show that the acid site density on the montmorillonite-cerium or zirconium phosphate cross-linked compounds is greater than on the parent montmorillonite and increases as the content in tetravalent metal phosphate rises throughout the different series. Also the number of acid sites for the cerium phosphate-montmorillonite materials is lower than for zirconium ones and the characteristics obtained depend on the bases used for their evaluation.

The presence of two IR adsorption bands at 1400 and 3145 cm^{-1} , assigned to the NH_4^+ ion, and the absence of the 1170–1361 cm^{-1} bands, characteristic of the NH_3 adsorbed on a Lewis site, strongly suggest the Brønsted character of the acidity of these compounds.

Key Words: Layered phosphates • Montmorillonite • Surface acidity

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