
Effect of Swelling on the Infrared Absorption Spectrum of Montmorillonite

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Abstract: The i.r. spectra of mixtures of different Na-montmorillonites were determined at several water contents between 2 and 22 g of water/g of montmorillonite. It was found that Si—O absorption is represented by four closely-spaced bands, one of which is pleochroic. The pleochroic band appeared only at higher water contents. All of these bands, excepting that with the highest wave number, shifted in frequency with increasing isomorphous substitution. None of them shifted in frequency with increasing water content.

The absorption coefficient for the principal Si—O absorption decreased with increasing isomorphous substitution but increased with increasing water content. Neither isomorphous substitution nor water content appeared to have any significant effect on absorption due to O—H stretching or H—O—H bending in the interlayer water.

At a critical water content for each montmorillonite, an abrupt change occurred in the absorption coefficient for the principal Si—O absorption. This change was ascribed to a sudden rearrangement of the particles.

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