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# Raman Spectroscopic Study of Kaolinite in Aqueous Suspension

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**Abstract:** The vibrational modes of clay minerals in aqueous suspension are uniquely accessible to Raman spectroscopy, but this potentially powerful approach has not been applied heretofore to study clays in aqueous samples. In this paper, Raman spectra in the 100- to 4000-cm<sup>-1</sup> region were obtained for kaolinite in aqueous suspension and in air-dry samples. Contact with water perturbed the low-wavenumber Raman spectrum (100 to 1000 cm<sup>-1</sup>) significantly with respect to relative band intensities and resulted in a pH dependence of the integrated intensity in the OH-stretching region. Comparison of the Raman and infrared (IR) spectra of air-dry kaolinite samples confirmed five Raman-active OH-stretching modes at 3621, 3652, 3668, 3688, and 3696 cm<sup>-1</sup>, in contrast to four IR-active modes at 3621, 3652, 3668, and 3695 cm<sup>-1</sup>. The Raman spectra of two kaolinites of different origin showed differences in band positions and intensities. These results suggest that Raman spectroscopy may provide a useful method to study clay mineral-water interactions, colloidal behavior in clay suspensions, and variations in clay mineral structure.

**Key Words:** Aqueous suspension • Infrared spectroscopy • Kaolinite • pH • Raman spectroscopy

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