
Relation between Structural Disorder and Other Characteristics of Kaolinites and Dickites

G. W. Brindley[°], Chih-Chun Kao¹, J. L. Harrison, M. Lipsicas and R. Raythatha

Mineral Sciences Building, The Pennsylvania State University, University Park, Pennsylvania 16802
Georgia Kaolin Research, Springfield, New Jersey 07081
Schlumberger-Doll Research, Ridgefield, Connecticut 06877

[°] Deceased October 23, 1983.

¹ Present address: Department of Materials Engineering, Tatung Institute of Technology, Taipei, Taiwan, Republic of China.

Abstract: A suite of Georgia kaolinites, ranging from well-ordered to very poorly ordered samples, were studied to explore correlations between degree of structural disorder, geological environment, Fe³⁺ content, Fe³⁺ electron paramagnetic resonance (EPR) spectrum, and infrared (IR) hydroxyl-stretching band frequencies and bandwidths. Samples from different localities showed a wide range of disorder which appears to be related to differences in their geological environments. High iron content correlated strongly with low degree of order. The areas of both the I and E components of the EPR spectrum and the fractional I area correlated inversely with degree of order. Fourier-transform IR studies of kaolinites and dickites showed that (1) interlayer hydrogen bonding is weaker in dickite than in kaolinite; (2) frequency of the ν_1 stretching band of the inner-surface hydroxyls increases sequentially from well-ordered kaolinite through the disordered structures to well-ordered dickite, which is consistent with a model for disorder based on vacancy displacement; and (3) the character and temperature dependence of the inner hydroxyl-stretching band is not compatible with the crystal structures of kaolinite and dickite as refined by Suitch and Young.

Key Words: Crystallinity • Dickite • Disorder • Electron paramagnetic resonance • Fourier-transform infrared spectroscopy • Kaolinite

Clays and Clay Minerals; June 1986 v. 34; no. 3; p. 239-249; DOI: [10.1346/CCMN.1986.0340303](https://doi.org/10.1346/CCMN.1986.0340303)

© 1986, The Clay Minerals Society

Clay Minerals Society (www.clays.org)
