
Measurement of the Specific Surface Area of Clays by Internal Reflectance Spectroscopy¹

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Abstract: The specific surface area, S , of a clay is commonly measured by the adsorption of ethylene glycol monoethyl ether (EGME); however, this method can be tedious and time consuming, especially if the clay is saturated with a monovalent, highly hydrated cation. An alternative method for measuring S was developed involving infrared internal reflectance spectroscopy. This method is based on the discovery that the ratio of R_1 , the reflectance of a clay-HOD mixture at the frequency of O-D stretching, to R_2 , the reflectance of the mixture at the frequency of H-O-D bending, is linearly related to S . The correlation coefficient between R_1/R_2 and S , as measured by the adsorption of EGME, was 0.995. Consequently, a calibration curve of R_1/R_2 versus S was constructed, and the measured values of R_1/R_2 for any clay-HOD mixture were referred to it for the determination of S . Results were obtained in triplicate in about an hour; hence, this method of determining S is more rapid and convenient than that involving the adsorption of EGME. Moreover, it applies to clays in a natural condition, i.e., swollen in water.

Key Words: Ethylene glycol monoethyl ether • Infrared spectroscopy • Internal reflectance spectroscopy • Molar absorptivity • Montmorillonite • Surface area

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