Evaluation of the Alkylammonium Method of Determining Layer Charge[1]

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Abstract: The layer charge of five smectites, one vermiculitic material, and five reduced-charge clays was determined by the alkylammonium and structural formula methods. The two sets of results were found to be linearly correlated (r =.961); however, the values that were determined by the alkylammonium method were 20 to 30% lower than those determined by the structural formula method, and the regression slope for their linear relationship was 1.67. The fact that the structural formula method includes the effects of cations on the lateral edges of the clay particles probably accounted for some of the differences in the magnitude of the results but should not have caused the regression slope to deviate substantially from 1.00. Therefore, inaccurate estimates of the packing density of alkylammonium cations in the interlayer space of 2:1 phyllosilicates were deemed responsible for the systematic divergence of the results of the two methods. To satisfy the need for a relationship between the two methods of determining layer charge, an empirical means of adjusting the alkylammonium values has been proposed and shown to yield values of layer charge that are comparable to those determined by the structural formula method.

Key Words: Alkylammonium • Layer charge • Reduced charge • Smectite • Structural formula

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