Layer Charge Heterogeneity in Vermiculites

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Abstract: The broad charge heterogeneity typical of nearly all smectites is not necessarily characteristic of vermiculites. In addition to vermiculites with pronounced heterogeneity, minerals with no or only limited charge heterogeneities are known. Layer charge and charge heterogeneity of 25 vermiculites were determined by alkylammonium ion exchange. The comparison of experimental basal spacings with d_L/n-plots provided a simple determination of the average charge density. The spacings of high-charged vermiculites ($\geqslant$0.8 eq/$(Si,Al)_4O_{10}$) with paraffin-type interlayers follow a straight line in the d_L/n-plots. Lower-charged vermiculites were recognized by stepwise increasing spacings due to mono-, two-, or three-layer chain packings. Charge heterogeneity produced a superposition of the d_L/n-curves for different charges, and the basal reflections of some of the alkylammonium derivatives became nonintegral.

Key Words: Alkylammonium • Layer charge • Vermiculite • Weathering

Clays and Clay Minerals; June 1982 v. 30; no. 3; p. 215-222; DOI: 10.1346/CCMN.1982.0300308