The Nature of Kenya Vermiculite and Its Aluminum Hydroxide Complexes*

J. E. Brydon and R. C. Turner

Soil Research Institute, Canada Department of Agriculture, Ottawa, Ontario, Canada

* Contribution No. 370.

Abstract: A specimen of Kenya vermiculite contained no mica or chlorite layers either as separate phases or as components of an interstratified structure. Dehydroxylation occurred in two stages, at 550 ° and 850 ° C, with approximately equal amounts of hydroxyl liberated in each stage. Al-saturated Kenya vermiculite showed low temperature dehydration characteristics similar to those of the natural Mg-saturated specimen, but the DTA, TGA and oscillating-heating X-ray diffraction patterns showed that the three stage dehydration process was not as clear-cut with the Al-saturated specimen.

As with montmorillonite, when small amounts of aluminum were precipitated by the addition of $Ca(OH)_2$ in the presence of vermiculite, the $Al(OH)_x$ was taken up and held indefinitely by the clay, the ion product $(Al)(OH)^3$ in solution was maintained at $10^{-33 \cdot 0}$ and no gibbsite was formed with time. With large amounts, 800 and 1600 me $Al(OH)_x$ per 100g vermiculite, the hydroxide was held initially in the interlayer space, but gibbsite was eventually formed as $(Al)(OH)^3$ approached the solubility product of gibbsite. Unlike montmorillonite, the vermiculite specimens retained an appreciable amount of the interlayer hydroxide and did not regain the original C.E.C. values as gibbsite was formed.

Al-vermiculite which was repeatedly suspended in $AlCl_3$ with $(Al)(OH)^3$ maintained at a value less than $10^{-33 \cdot 6}$ liberated 435 me Mg, took up 208 me Al as an interlayer hydroxide and caused a reduction in C.E.C. from 130 to 28 me per 100g clay. With vermiculite an appreciable amount of the interlayer $Al(OH)_x$ was stable with respect to gibbsite whereas with montmorillonite it was not.

Clays and Clay Minerals; February 1972 v. 20; no. 1; p. 1-11; DOI: 10.1346/CCMN.1972.0200102
© 1972, The Clay Minerals Society
Clay Minerals Society (www.clays.org)