
Mineralogy and Cation Exchange Properties of Libby Vermiculite Separates as Affected by Particle-Size Reduction*

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Abstract: A vermiculite (Libby, Montana) sample obtained from the Zonolite company contained mostly coarse-grained separates with only 8· 7 per cent clay. The 2– 50 µm fraction was used for particle-size reduction studies by wet and dry grinding, and size-fractionated into < 2, 2– 5, 5– 20 and 20– 50 µm sizes. About 18 per cent of the sample was attrited to clay after 64 hr of wet grinding, but as much as 59 per cent of the sample was attrited to clay after only 10 min of dry grinding. There was no evidence of damage to the crystal structure of derived clays or silts except for the 20– 50 µm fraction from dry grinding.

The observed CEC values of all the fractions decreased as grinding progressed, except for the 2– 5 µm fraction from wet grinding where the CEC increased. The decrease in CEC was attributed to an accumulation of biotite, either as a discrete mineral and/or a mixed-layer assemblage of biotite and vermiculite attrited to the clay fraction. In contrast, the fraction showing an increase in CEC was due to an increased concentration of higher charge-density (CEC)vermiculite. Biotite-free CEC data for vermiculite suggested that, in general, the coarser vermiculite separates had a higher CEC than the finer ones.

The susceptibility of minerals in the Libby vermiculite to cleavage by grinding was: vermiculite > hydrobiotite > biotite.

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