Differentiation of commercial vermiculite based on statistical analysis of bulk chemical data: Fingerprinting vermiculite from Libby, Montana U.S.A.

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ABSTRACT

Major-, minor-, and trace-element compositions, as determined by X-ray fluorescence (XRF) analysis, were obtained on 34 samples of vermiculite to ascertain whether chemical differences exist to the extent of determining the source of commercial products. The sample set included ores from four deposits, seven commercially available garden products, and insulation from four attics. The trace-element distributions of Ba, Cr, and V can be used to distinguish the Libby vermiculite samples from the garden products. In general, the overall composition of the Libby and South Carolina deposits appeared similar, but differed from the South Africa and China deposits based on simple statistical methods. Cluster analysis provided a good distinction of the four ore types, grouped the four attic samples with the Libby ore, and, with less certainty, grouped the garden samples with the South Africa ore.