
Estimation of Heavy Atom Content and Distribution in Chlorite Using Corrected X-Ray Powder Diffraction Intensities

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Abstract: The heavy atom content and distribution in chlorite were estimated using the relative intensities of basal X-ray powder diffraction (XRD) peaks. For these peaks to be meaningful, however, corrections had to be made for the effects of sample thickness, sample length, and preferred orientation of the mineral grains, all of which are 2θ dependent. The effects of sample thickness were corrected for by a simple formula. The effects of sample length were accounted for by using rectangular samples and by ensuring that the sample intersected the X-ray beam through the range of diffraction angles of interest. Preferred orientation of mineral grains were either measured directly or estimated. Estimated values were quicker and easier to obtain and were within 5% of measured values. A comparison of the compositional parameters of chlorite estimated before correcting for these sample effects with those estimated after the corrections had been applied indicate that the uncorrected values differed from the corrected values by as much as 55% of the latter values. Mounts of a single sample prepared by different filter-membrane peel and porous-plate techniques yielded widely different compositions until the measurements were corrected for sample effects. Analyses in triplicate indicated that the XRD intensity ratio 003/001 is preferred for calculating heavy atom distributions and abundances in chlorite because of the relative strength of the 001 peak.

Key Words: Chlorite • Heavy atoms • Intensity measurements • Sample preparation • X-ray powder diffraction

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