

The true structure of wonesite, an interlayer-deficient trioctahedral sodium mica

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ABSTRACT

Wonesite, an interlayer-deficient trioctahedral sodium mica, has been investigated mainly by high-resolution transmission electron microscopy (HRTEM) and X-ray diffraction (XRD) using a Gandolfi camera. The true structure of wonesite is triclinic with a large layer offset, i.e., displacement between the two tetrahedral sheets across the interlayer region, which is partially occupied by sodium ions. The direction and amount of the layer offset is approximately $[1\bar{1}0]$ and 1.25 Å respectively, with unit-cell dimensions of $a = 5.31$, $b = 9.18$, and $c = 9.75$ Å, $\alpha = 96.2$, $\beta = 96.5$, $\gamma = 89.9^\circ$. This interlayer structure, which is similar to that in talc, explains well the exsolution lamellae of talc in wonesite with continuous 2:1 layers. The volume ratio of wonesite and exsolved talc is estimated to be 4:1 to 5:1 from the XRD patterns. Disorder in the directions of the layer offset is occasionally observed in TEM. The interlayer in sodium micas (preiswerkite, paragonite, aspidolite, wonesite, etc.) possesses various amounts of layer offset, depending on the cavity space in the tetrahedral sheet that is primarily determined by the ditrigonal rotation angle.