
Characterization and Assignment of Far Infrared Absorption Bands of K⁺ in Muscovite

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Abstract: To assign far infrared (FIR) absorption bands of K⁺ in muscovite, dichroic experiments were performed. For a muscovite crystal rotated about a crystallographic axis, c^* , a , or b , two bands corresponding to vibration modes of K⁺ appear, respectively, at 107 and 110 cm⁻¹ (rotation about c^*), 107 and 143 cm⁻¹ (rotation about a), and 110 and 143 cm⁻¹ (rotation about b). Two in-plane modes at 107 and 110 cm⁻¹ and one out-of-plane mode at 143 cm⁻¹ are identified for the vibrations of K⁺ in muscovite. Each of these transition moments are near the crystallographic axes b , a , and c , respectively. These observations match well predictions based on the approximate C_{3i} symmetric environment of K⁺, although the site symmetry in the space group of muscovite is only C₂.

Key Words: Dichroism • Far Infrared • Muscovite • Potassium • Transition Moment • Vibration Mode

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