
Far-Infrared Study of Potassium in Micas

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Abstract: The characterization of cations associated with clay materials has generally been approached by the sequential use of specific chemical reagents. To avoid the disturbing effect of the chemical reagents on the state and location of compensating cations of clays and to get information *in situ*, far-infrared spectroscopy was used. The far-infrared vibrational spectra of the potassium cation in muscovite, phlogopite, and biotite were recorded before and after heating at the dehydroxylation temperature. The vibrational frequency of K in micas before dehydroxylation was found to be a function of the di- or trioctahedral character and of the Fe content. After dehydroxylation or deprotonation, shifts of the K absorption band to lower frequencies were observed for the heated muscovite, in which K exchangeability increased, and to higher frequencies for the heated biotite, in which K exchangeability decreased. These results suggest that the vibrational frequency of potassium is characteristic of the state of K in these minerals and of its ability to be exchanged.

Key Words: Biotite • Dehydroxylation • Far-infrared spectroscopy • Muscovite • Phlogopite • Potassium

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