
Biotites Intermediate Between Dioctahedral and Trioctahedral Micas

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Abstract: Orange-yellow detrital flakes of biotite are common carriers of potassium and trace elements in soils and clays. Because the flakes differ in degree of alteration and may be derived from different sources, it is difficult to obtain homogeneous material for studies of their physical and chemical properties that may be compared with the original mica. A similar orange-yellow altered biotite occurs with fresh biotites in alkaline rocks of a nepheline deposit. The fresh and altered biotites were separated for chemical and mineralogical studies of the effects of weathering on biotite in its parent rock.

The common iron-rich biotites with octahedral occupancy between 5.5 and 5.8 alter to bright orange-yellow biotites with octahedral occupancy approaching five. These biotites, intermediate between the trioctahedral and dioctahedral micas, form as a result of oxidation during the process of their alteration to chlorite-vermiculite.

Biotites with octahedral occupancy approaching five were prepared experimentally by heating a natural biotite that contained high ferrous iron. The main differences between the natural and laboratory oxidized biotites are: the naturally oxidized micas lose 30% of the original potassium, adsorb about 2 wt.% water, and apparently gain about 25% hydroxyl, whereas laboratory oxidized micas retain potassium and lose hydroxyl and argon. The oxidized micas retain the crystal structure of the original mica.

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