
Analysis of Iron in Layer Silicates by Mossbauer Spectroscopy

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Abstract: Analysis of Mossbauer effect in layer silicates provides a spectroscopic method for determining valences and coordination of iron. In this study Mossbauer spectra were obtained for amesite, cronstedtite, nontronite, two glauconites, biotite, lepidomelane, chlorite, minnesotaite, vermiculite, stilpnomelane, and chloritoid.

Trivalent iron was detected in tetrahedral coordination. Abundant trivalent iron in octahedral coordination apparently causes quadrupole splitting values of divalent iron in the same mineral to decrease. This phenomenon was noted in cronstedtite and glauconite. In cases where divalent iron predominates in the mineral, the quadrupole splitting is larger. It is generally accepted that ferrous iron is largely in octahedral coordination. This suggests that the octahedral sites may be more distorted when ferric iron is present in the octahedral sheet. In biotite, quadrupole splitting of divalent iron is decreased when trivalent iron is present in tetrahedral sheets. This suggests that there is also more distortion in the octahedral sheet because of iron in tetrahedral positions.

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