

Keckite - a Special Member of the Jahnsite Group with Trivalent Iron on the B-site

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Keckite (first described by Mücke 1979) is considered to be a member of the jahnsite group though the given formula does not fit into the general formula of minerals of the jahnsite group. In this study different members of the jahnsite group including keckite from the type locality have been investigated. Keckite itself is a special member of the group because it contains trivalent iron not only on the C-site but also on the B-site as proven by moessbauer spectroscopy.

Mücke 1979 gives as an idealized formula for his keckite $(Ca,Mg)(Mn,Zn)_2Fe_3^{3+}[(OH)_3-(PO_4)_4] \cdot 2 H_2O$, which does not fit into the generalized formula for jahnsite group minerals $XAB_2C_2(OH)_2(H_2O)_8[PO_4]_4$. Apart from the different allocation of the cations there is a severe difference in the water content of the mineral. However Mücke does not claim in his article to have analyzed the water content of his keckite. The exact analytical sum of 100.00 shows that the denoted water content of 10.60 weight% which leads to 5 OH/H₂O is only calculated by difference. While the analytical data of the cations and phosphorus of our mineral fit very well with Mückes data (though being a little bit lower) our analyzed water content (measured by loss on ignition) is markedly (17.4 weight%) higher, fitting much better to the water content required for a jahnsite group mineral.

Mücke claims a negative correlation of Ca and Mg, which could not be verified by our analysis of our keckite and many other jahnsite group minerals. This is consistent with the structure determination of jahnsite-(CaMnMg) (Moore and Araki, 1974) which shows Mg confined to the B places. The Zn-content of both Hagendorf keckites analyzed in this study is markedly lower than the 2.24 weight% ZnO given by Mücke 1979. This points to the fact that Zn is not a necessary constituent of keckite as often claimed.

Due to these investigations we can verify that keckite is indeed a member of the jahnsite group and a new generalized formula for keckite is proposed: $(Ca,Mn)Mn(Fe^{3+},Mn)_2Fe^{3+}_2(OH)_3(H_2O)_7[PO_4]_4$.

References

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