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New chemical and physical data on keilite from the Zakłodzie enstatite achondrite

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Abstract

Keilite, (Fe,Mn,Mg,Ca,Cr)S, from the Zakłodzie enstatite achondrite is described. Forming xenomorphic grains up to 0.5 mm in diameter, the keilite is associated with troilite (or pyrrhotite), Fe-Ni metal, an (Fe,Zn,Mn)S phase, enstatite (with relict forsterite in cores), plagioclase and accessory schreibersite, oldhamite, graphite, sinoite, and an SiO_2 polymorph. It is brittle and possesses a good cleavage similar to that of galena, parallel to (001), (010), and (100). X-ray diffraction structural data reveal the following: cubic space group *Fm3m*, $\alpha = \beta = \gamma = 90°$, $a = 5.1717$ (18) Å, unit-cell volume $V = 138.32$ (8) Å^3; $D = 3.958$ g/cm^3; $Z = 4$. The chemical formula based on 63 electron microprobe point analyses is: $(Fe_{0.437}, Mn_{0.356}, Mg_{0.160}, Ca_{0.017}, Cr_{0.019}, Zn_{0.001})S_{1.008}$. Compared with previously described keilites from enstatite chondrites, the Zakłodzie keilite is richer in (Mn,Ca,Cr)S and poorer in the Fe- and Mg-end-members and, consequently, it is nearer to alabandite and oldhamite. This is the first detailed description of keilite from a meteorite that is not an enstatite chondrite.

Keywords: Meteorite, keilite, sulfide, XRD data, chemical data, enstatite achondrite, Zakłodzie