## Keilite $(Fe^{2+}, Mg)S$

**Crystal Data**: Cubic. *Point Group*: 4/*m* $\bar{3}$ 2/*m*. Granular, to 0.5 mm.

**Physical Properties**: Cleavage: Good on (001), (010), and (100). *Tenacity*: Brittle.
Hardness = ~4 D(meas.) = n.d. D(calc.) = 3.59-3.958

**Optical Properties**: Opaque. *Color*: Bluish gray in reflected light. *Luster*: Metallic.
*Optical Class*: Isotropic.
R: (400) 27.0, (420) 27.1, (440) 27.6, (460) 27.2, (480) 27.1, (500) 26.6, (520) 26.6, (540) 26.6, (560) 26.5, (580) 26.7, (600) 25.9, (620) 26.2, (640) 26.1, (660) 25.9, (680) 26.0, (700) 25.9

**Cell Data**: *Space Group*: *Fm*3*m* (by analogy to synthetic MgS). $a$ = 5.17-5.18 Z = 4

**X-ray Powder Pattern**: Zakłodzie enstatite achondrite meteorite.
2.5859 (100), 1.8285 (35), 1.4929 (18), 1.2929 (12), 2.9859 (11), 1.1564 (8), 1.0557 (6)

**Chemistry**:

| | (1) | (2) | (3) |
|---|---|---|---|
| Fe | 40.14 | 29.52 | 38.71 |
| Mg | 10.05 | 4.71 | 16.84 |
| Mn | 3.37 | 23.68 | |
| Ca | 1.98 | 0.84 | |
| Cr | 1.91 | 1.17 | |
| Zn | 0.24 | 0.10 | |
| Ti | 0.06 | | |
| Ni | 0.01 | | |
| S | 41.39 | 39.11 | 44.45 |
| Total | 99.15 | 99.12 | 100.00 |

(1) Abee meteorite; by electron microprobe; corresponds to $(Fe_{0.56}Mg_{0.32}Mn_{0.05}Ca_{0.04}Cr_{0.03})_{\Sigma=1.00}S_{1.00}$. (2) Zakłodzie enstatite achondrite; average electron microprobe analysis; corresponds to $(Fe_{0.437}Mn_{0.356}Mg_{0.160}Cr_{0.019}Ca_{0.017}Zn_{0.001})_{\Sigma=0.990}S_{1.008}$. (3) (Fe,Mg)S with Fe:Mg = 1:1.

**Polymorphism & Series**: Forms series with niningerite and alabandite.

**Mineral Group**: Galena group.

**Occurrence**: An accessory mineral in enstatite chondrite and achondrite meteorites.

**Association**: Niningerite, enstatite, kamacite, troilite; troilite (or pyrrhotite), Fe-Ni metal, an (Fe,Zn,Mn)S phase, enstatite (with relict forsterite cores), plagioclase, schreibersite, oldhamite, graphite, sinoite, an $SiO_2$ polymorph (Zakłodzie).

**Distribution**: From the Abee [TL], Adhi-Kot, Saint-Sauveur, LEW 88180, RKP A80259, LEW 87119, LEW 88714, Y-791790, Y-791811, Y-86760, and Y8404 chondrite meteorites. From the Zakłodzie enstatite achondrite.

**Name**: Honors Dr. Klaus *Keil* (b. 1934), Hawaii Institute of Geophysics and Planetology, University of Hawaii, Honolulu, Hawaii, USA, for his research on chondritic meteorites.

**Type Material**: University of Hawaii, Honolulu, Hawaii, USA (UH 13).

**References**: (1) Shimizu, M., H. Yoshida, and J.A. Mandarino (2002) The new mineral species keilite, (Fe, Mg)S, the iron-dominant analog of niningerite. Can. Mineral., 40, 1687-1692. (2) (2003) Amer. Mineral., 88, 1626 (abs. ref. 1). (3) Karwowski, Ł., R. Kryza, and T.A. Przylibski (2007) New chemical and physical data on keilite from the Zakłodzie enstatite achondrite. Amer. Mineral., 92, 204-249.