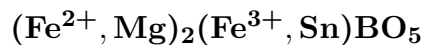


## Hulsite



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**Crystal Data:** Monoclinic. *Point Group:*  $2/m$ . As rough rectangular tabular crystals, showing {100}, {010}, {001}, {110}, to 1 cm; in aggregates of parallel prismatic individuals. *Twinning:* Simple twins by  $120^\circ$  rotation.

**Physical Properties:** *Cleavage:* On {110}, good. Hardness =  $\sim 3$  D(meas.) = 4.28–4.57 D(calc.) = 4.62

**Optical Properties:** Opaque. *Color:* Black with greenish, brownish, or reddish tinge. *Streak:* Black. *Luster:* Submetallic to vitreous. *Optical Class:* [Biaxial.]  $\alpha = \text{n.d.}$   $\beta = \text{n.d.}$   $\gamma = \text{n.d.}$   $2V(\text{meas.}) = \text{n.d.}$

**Cell Data:** *Space Group:*  $P2/m$ .  $a = 10.695(4)$   $b = 3.102(1)$   $c = 5.431(1)$   
 $\beta = 94.21(3)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Brooks Mountain, Alaska, USA.  
2.664 (100), 5.35 (70), 2.585 (70), 2.039 (50), 4.99 (35), 2.491 (35), 2.370 (20)

Chemistry:	(1)
B <sub>2</sub> O <sub>3</sub>	12.98
TiO <sub>2</sub>	0.30
SnO <sub>2</sub>	12.03
Al <sub>2</sub> O <sub>3</sub>	1.27
Fe <sub>2</sub> O <sub>3</sub>	20.02
FeO	42.21
MnO	0.74
MgO	10.45
Total	100.00

(1) Brooks Mountain, Alaska, USA; corresponds to  $(\text{Fe}_{1.43}^{2+}\text{Mg}_{0.63}\text{Mn}_{0.03})_{\Sigma=2.09}(\text{Fe}_{0.61}^{3+}\text{Sn}_{0.19}\text{Al}_{0.06}\text{Ti}_{0.01})_{\Sigma=0.87}\text{BO}_5$ .

**Mineral Group:** Ludwigite group.

**Occurrence:** Very rare, in a contact-metamorphosed limestone, close by an intrusive granite.

**Association:** Calcite, vesuvianite, magnetite, garnet, fluorite, diopside.

**Distribution:** From a prospect pit on the northwest flank of Brooks Mountain, Seward Peninsula, Alaska, USA.

**Name:** Honors Alfred Hulse Brooks (1871–1924), geologist in charge of the Division of Alaskan Mineral Resources, U.S. Geological Survey.

**Type Material:** Natural History Museum, Paris, France, 110240; The Natural History Museum, London, England, 1912,612; Harvard University, Cambridge, Massachusetts, 96246, 96247; National Museum of Natural History, Washington, D.C., USA, 86791, 86989.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 326. (2) Clark, J.R. (1965) Crystallographic data for the iron borate mineral, hulsite. *Amer. Mineral.*, 50, 249–254. (3) Konnert, J.A., D.A. Appleman, J.R. Clark, L.W. Finger, T. Kato, and Y. Miura (1976) Crystal structure and cation distribution of hulsite, a tin-iron borate. *Amer. Mineral.*, 61, 116–122. (4) Yamnova, N.A., M.A. Simonov, and N.V. Belov (1975) Crystal structure of the Fe,Mg borate hulsite  $(\text{Fe}^{2+}, \text{Mg}, \text{Fe}^{3+}, \text{Sn})_3\text{BO}_3\text{O}_2$ . *Kristallografiya (Sov. Phys. Crystal.)*, 20, 156–159 (in Russian). (5) Knopf, A. and W.T. Schaller (1908) Two new boron minerals of contact-metamorphic origin. *Amer. J. Sci.*, 25, 323–331.

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