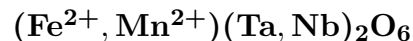


# Ferrotapiolite



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**Crystal Data:** Tetragonal. *Point Group:*  $4/m2/m2/m$ . Crystals usually well developed, short prismatic or equant, with several forms. *Twinning:* Common on  $\{013\}$ , then distorted along  $[0\bar{3}1]$ ; rarely on  $\{101\}$ .

**Physical Properties:** *Fracture:* Uneven to subconchoidal. Hardness = n.d. VHN = 885–974 (100 g load).  $D(\text{meas.}) = 7.90(5)$   $D(\text{calc.}) = 8.17\text{--}8.21$

**Optical Properties:** Opaque, transparent on thin edges. *Color:* Black, may be brownish black on the surface; yellowish to reddish brown in transmitted light. *Streak:* Brown to brownish black. *Luster:* Subadamantine to submetallic, brilliant.

*Optical Class:* Uniaxial (+). *Pleochroism:* Strong;  $O$  = pale yellowish or reddish brown.

$\omega = 2.27(1)$   $\epsilon = 2.42(1)$

$R_1\text{--}R_2$ : (400) 17.9–17.1, (420) 17.4–17.0, (440) 16.9–17.2, (460) 16.5–17.5, (480) 16.2–17.6, (500) 15.9–17.6, (520) 15.6–17.5, (540) 15.5–17.4, (560) 15.3–17.2, (580) 15.2–17.1, (600) 15.1–17.0

**Cell Data:** *Space Group:*  $P4/mnm$ .  $a = 4.75\text{--}4.76$   $c = 9.21\text{--}9.29$   $Z = 2$

**X-ray Powder Pattern:** Synthetic  $\text{FeTa}_2\text{O}_6$ . (ICDD 23–1124).

3.36 (100), 2.576 (90), 1.746 (70), 4.22 (30), 2.375 (30), 1.680 (25), 1.407 (25)

## Chemistry:

	(1)
Nb <sub>2</sub> O <sub>5</sub>	1.32
Ta <sub>2</sub> O <sub>5</sub>	85.21
TiO <sub>2</sub>	0.46
SnO <sub>2</sub>	0.02
FeO	9.67
MnO	4.17
Total	100.85

(1) Skogböle, Finland; by electron microprobe, total Fe as FeO, total Mn as MnO; corresponds to  $(\text{Fe}_{0.68}\text{Mn}_{0.30})_{\Sigma=0.98}(\text{Ta}_{1.94}\text{Nb}_{0.05}\text{Ti}_{0.02})_{\Sigma=2.01}\text{O}_6$ .

**Polymorphism & Series:** Forms a series with manganotapiolite.

**Mineral Group:** Ferrotapiolite group.

**Occurrence:** An accessory mineral in zoned granite pegmatites; detrital in placers.

**Association:** Albite, muscovite, tourmaline, beryl, spodumene, columbite–tantalite, wodginitite, cassiterite, triplite, triphylite.

**Distribution:** Well-characterized material from: in Finland, in the Eräjärvi area, Orivesi; at Sukula and Härkäsaari, Tammela; at Skogböle and the Rosendal pegmatite, Kemiö (Kimito) Island. From Maršikov, Czech Republic. At Olgiasca, Lombardy, Italy. In France, from Chanteloube, Haute-Vienne. Occurs at Angarf-Nord and elsewhere in the Anti-Atlas Mountains, Morocco. From Greenbushes, Strelley, and Tabba Tabba, Pilbara, Western Australia. In the USA, from Topsham, Sagadahoc Co. and Paris, Oxford Co., Maine; in the Old Mike mine, six km north-northwest of Custer, Custer Co., South Dakota; at Rockford, Coosa Co., Alabama.

**Name:** For its dominant FERROus iron content and for *Tapio*, ancient Finnish god of the forest, as the mineral was first found in Finland.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 775–778 [tapiolite and "mossite"]. (2) Clark, A.M. and E.E. Fejer (1978) Tapiolite, its chemistry and cell dimensions. *Mineral. Mag.*, 42, 477–480. (3) Lahti, S.I., B. Johanson, and M. Virkkunen (1983) Contributions to the chemistry of tapiolite – manganotapiolite, a new mineral [ferrotapiolite]. *Bull. Geol. Soc. Finland*, 55, 101–109. (4) Wise, M.A. and P. Černý (1996) The crystal chemistry of the tapiolite series. *Can. Mineral.*, 34, 631–647. (5) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 169.

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