## Manganotantalite $(Mn^{2+}, Fe^{2+})(Ta, Nb)_2O_6$



**Crystal Data:** Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. [Crystals short prismatic or equant, also tabular; in groups of parallel or subparallel crystals; massive] (by analogy to ferrocolumbite). *Twinning:* [On {021} and {023}, may produce pseudohexagonal trillings.]

**Physical Properties:** *Cleavage:* [{100}, distinct; {010}, less distinct.]
*Fracture:* [Subconchoidal to uneven.] *Tenacity:* [Brittle.] Hardness = [6] VHN = 488–681 (100 g load). D(meas.) = 6.65–8.00 D(calc.) = 8.01

**Optical Properties:** Opaque, transparent in thin edges. *Color:* Pink to nearly colorless, or reddish brown to black; colorless, reddish brown to red in transmitted light. *Streak:* Red, scarlet to black. *Luster:* Submetallic to vitreous.
*Optical Class:* Biaxial (+). *Pleochroism:* Strong; red, red-brown, and orange. *Orientation:* $X = a$; $Y = b$; $Z = c$. *Dispersion:* $r < v$. *Absorption:* Strong; $Z > X$. $\alpha = 2.14$ $\beta = 2.15$ $\gamma = 2.22$ 2V(meas.) = n.d.
$R_1$–$R_2$: (400) 15.5–16.4, (420) 15.1–16.0, (440) 14.8–15.7, (460) 14.6–15.4, (480) 14.3–15.2, (500) 14.1–15.0, (520) 13.9–14.8, (540) 13.8–14.7, (560) 13.6–14.5, (580) 13.6–14.4, (600) 13.5–14.4, (620) 13.5–14.3, (640) 13.4–14.3, (660) 13.4–14.3, (680) 13.3–14.2, (700) 13.3–14.2

**Cell Data:** *Space Group: Pbcn* (synthetic). $a = 14.440(2)$ $b = 5.7661(8)$ $c = 5.0930(9)$ Z = 4

**X-ray Powder Pattern:** Salinas, Brazil.
2.99 (10), 3.69 (9), 2.41 (7), 1.738 (7), 1.483 (7), 7.25 (5), 3.61 (5)

| **Chemistry:** | (1) | (2) | (3) | | (1) | (2) | (3) |
|---|---|---|---|---|---|---|---|
| $Nb_2O_5$ | 4.47 | 0.29 | | MnO | 13.88 | 13.8 | 13.83 |
| $Ta_2O_5$ | 79.81 | 85.8 | 86.17 | CaO | 0.17 | | |
| $SnO_2 + WO_3$ | 0.67 | 0.03 | | LOI | 0.16 | | |
| FeO | 1.17 | 0.04 | | Total | 100.33 | 99.96 | 100.00 |

(1) Sanarka, Russia. (2) Morrua mine, Zambesia, Mozambique; by electron microprobe, corresponds to $Mn_{1.00}(Ta_{1.99}Nb_{0.01})_{\Sigma=2.00}O_6$. (3) $MnTa_2O_6$.

**Polymorphism & Series:** Dimorphous with manganotapiolite; forms two series, with manganocolumbite, and with ferrotantalite.

**Occurrence:** As an accessory and primary constituent of granite pegmatites; detrital in placers.

**Association:** [Albite, microcline, beryl, lepidolite, muscovite, tourmaline, spodumene, lithiophilite, triphylite, amblygonite, triplite, samarskite, apatite, microlite, cassiterite.]

**Distribution:** Found on the Island of Utö, Sweden. At Glenbuchat, Aberdeenshire, Scotland. From Facciatoia, Elba, Italy. In the Zambesia, Tete, and Alto Ligonha districts, Mozambique. From Bikita, Zimbabwe. At the Steinkopf, Namaqualand, South Africa. In Brazil, from Salinas, Minas Gerais, and the Alto do Giz pegmatite, near Parelhas, Rio Grande do Norte. At Stak Nala, Gilgit district, Pakistan. From Wodgina, Greenbushes, and on Mt. Holland, Western Australia. In the USA, large crystals from Amelia, Amelia Co., Virginia; at Pala, San Diego Co., California. From the Tanco pegmatite, Bernic Lake, Manitoba, Canada. A few other less-well-defined localities are known.

**Name:** For its dominant MANGANese content, and the Greek mythical *Tantalus*, for the difficulty in bringing the mineral into solution.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 780–787. (2) Sahama, T.G. (1980) Minerals of the tantalite-niobite series from Mozambique. Bull. Minéral., 103, 190–197. (3) Wise, M.A., A.C. Turnock, and P. Černý (1985) Improved unit cell dimensions for ordered columbite-tantalite end members. Neues Jahrb. Mineral., Monatsh., 372–378.