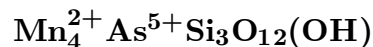


# Tiragalloite



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**Crystal Data:** Monoclinic. *Point Group:*  $2/m$ . As grains, which may be elongated, to 1.5 mm; also as aggregates. *Twinning:* On {100}.

**Physical Properties:** *Cleavage:* Good on {100}; a distinct parting, normal to elongation. Hardness = n.d.  $D(\text{meas.}) = 3.84(6)$   $D(\text{calc.}) = 3.829$

**Optical Properties:** Transparent to translucent. *Color:* Orange, brownish orange; orange to yellow in thin section. *Luster:* Subadamantine.

*Optical Class:* Biaxial (+). *Orientation:*  $X \simeq a$ ;  $Y = b$ ;  $Z \simeq c$ . *Dispersion:* Inclined.  $\alpha = 1.745(5)$   $\beta = 1.751(3)$   $\gamma = 1.760(5)$   $2V(\text{meas.}) = 38^\circ\text{--}46^\circ$

**Cell Data:** *Space Group:*  $P2_1/n$ .  $a = 6.66(1)$   $b = 19.92(2)$   $c = 7.67(1)$   $\beta = 95.7(1)^\circ$   
 $Z = 4$

**X-ray Powder Pattern:** Molinello mine, Italy.

3.258 (100), 3.151 (73), 3.034 (72), 3.003 (72), 2.608 (65), 2.489 (58), 2.736 (54)

## Chemistry:

	(1)	(2)
SiO <sub>2</sub>	32.38	31.91
TiO <sub>2</sub>		0.02
Al <sub>2</sub> O <sub>3</sub>		0.02
As <sub>2</sub> O <sub>5</sub>	16.07	18.35
V <sub>2</sub> O <sub>5</sub>	1.67	
FeO	0.17	0.56
MnO	48.34	46.02
MgO		0.00
CaO	0.75	0.75
Na <sub>2</sub> O		0.03
K <sub>2</sub> O		< 0.01
Total	99.38	97.67

(1) Molinello mine, Italy; by electron microprobe, average of 28 analyses; corresponds to  $(\text{Mn}_{3.91}^{2+} \text{Ca}_{0.08} \text{Fe}_{0.01})_{\Sigma=4.00} (\text{As}_{0.84}^{5+} \text{V}_{0.12}^{5+})_{\Sigma=0.96} \text{Si}_3 \text{O}_{12}(\text{OH})$ . (2) Ködnitz Valley, Austria; by electron microprobe, average of 15 analyses; corresponds to  $(\text{Mn}_{3.66}^{2+} \text{Ca}_{0.08} \text{Fe}_{0.04} \text{Na}_{0.01})_{\Sigma=3.79} \text{As}_{0.90}^{5+} \text{Si}_{3.00} \text{O}_{12}(\text{OH})$ .

**Occurrence:** In veinlets cutting massive aggregates of braunite and quartz (Molinello mine, Italy); in manganese-rich lenses in quartzitic chlorite schists probably derived from marine sediments (Ködnitz Valley, Austria).

**Association:** Quartz, manganoan calcite, parsettensite, albite, medaite (Molinello mine, Italy); tephroite, pyroxmangite, rhodonite, spessartine, rhodochrosite (Ködnitz Valley, Austria).

**Distribution:** From the Molinello manganese mine, Val Graveglia, near Chiavari, Liguria, Italy. In the Ködnitz Valley, Tirol, Austria.

**Name:** For Paolo Tiragallo (1905– ), amateur mineralogist of Liguria, Italy.

**Type Material:** University of Rome, Rome, 24314; Municipal Museum of Natural History, Milan, Italy; University of Oslo, Oslo, Norway.

**References:** (1) Gramaccioli, C.M., W.L. Griffin, and A. Mottana (1980) Tiragalloite,  $\text{Mn}_4[\text{AsSi}_3\text{O}_{12}(\text{OH})]$ , a new mineral and the first example of arsenatotrisilicate. *Amer. Mineral.*, 65, 947–952. (2) Gramaccioli, C.M., T. Pilati, and G. Liborio (1979) Structure of a manganese(II) arsenatotrisilicate,  $\text{Mn}_4[\text{AsSi}_3\text{O}_{12}(\text{OH})]$ : the presence of a new tetrapolyphosphate-like anion. *Acta Cryst.*, 35, 2287–2291. (3) Albrecht, J. (1990) An As-rich manganese mineral assemblage from the Ködnitz Valley (Eastern Alps, Austria): geology, mineralogy, genetic considerations, and implications for metamorphic Mn deposits. *Neues Jahrb. Mineral., Monatsh.*, 363–375.

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