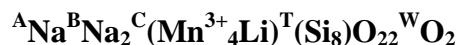


**Oxo-mangani-leakeite**

**Crystal Data:** Monoclinic. *Point Group:* 2/m. Crystals prismatic.

**Physical Properties:** *Cleavage:* Perfect on {110}. *Fracture:* n.d. *Tenacity:* Brittle.  
Hardness = [6] D(meas.) = n.d. D(calc.) = 3.25

**Optical Properties:** Transparent. *Color:* Red-orange. *Streak:* n.d. *Luster:* Vitreous.  
*Optical Class:* Biaxial (-).  $\alpha = 1.681(2)$   $\beta = 1.712(2)$   $\gamma = 1.738(2)$   $2V(\text{meas.}) = 81.0(4)^\circ$   
 $2V(\text{calc.}) = 83.5^\circ$  *Orientation:*  $X \wedge c = 51.5^\circ$  ( $\beta$  acute),  $Z \parallel b$ ,  $Y \wedge a = 66.3^\circ$  ( $\beta$  obtuse).  
*Pleochroism:*  $X = \text{red-brown}$ ,  $Y = Z = \text{orange-red}$ . *Absorption:*  $X > Z = Y$ .

**Cell Data:** *Space Group:* C2/m.  $a = 9.875(5)$   $b = 17.873(9)$   $c = 5.295(2)$   $\beta = 104.74(3)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Hoskins Mine, New South Wales, Australia.  
8.423 (100), 3.377 (46), 4.461 (40), 4.451 (40), 3.134 (37), 2.694 (37), 2.282 (27)

Chemistry:	(1)	(2)
SiO <sub>2</sub>	53.53	53.15
TiO <sub>2</sub>	0.28	
Al <sub>2</sub> O <sub>3</sub>	0.29	
Fe <sub>2</sub> O <sub>3</sub>	[3.91]	
Mn <sub>2</sub> O <sub>3</sub>	[20.46]	34.91
MgO	7.20	
ZnO	0.13	
NiO	0.06	
Li <sub>2</sub> O	0.96	1.66
CaO	0.36	
Na <sub>2</sub> O	8.96	10.28
K <sub>2</sub> O	1.90	
H <sub>2</sub> O	[0.64]	
Total	98.68	100.00

(1) Hoskins Mine, New South Wales, Australia; average microprobe analysis, H<sub>2</sub>O, Fe<sub>2</sub>O<sub>3</sub> and Mn<sub>2</sub>O<sub>3</sub> calculated from structure, Li<sub>2</sub>O (by SIMS); corresponding to  ${}^A(\text{Na}_{0.65}\text{K}_{0.36})_{\Sigma=1.01}$   ${}^B(\text{Na}_{1.94}\text{Ca}_{0.06})_{\Sigma=2.00}$   ${}^C(\text{Mg}_{1.60}\text{Zn}_{0.01}\text{Mn}^{3+}_{2.32}\text{Fe}^{3+}_{0.44}\text{Al}_{0.03}\text{Ti}^{4+}_{0.03}\text{Li}_{0.58})_{\Sigma=5.01}$   ${}^T(\text{Si}_{7.98}\text{Al}_{0.02})_{\Sigma=8.00}\text{O}_{22}$   ${}^W[\text{O}_{1.34}(\text{OH})_{0.66}]_{\Sigma=2.00}$ . (2)  ${}^A\text{Na}{}^B\text{Na}_2{}^C(\text{Mn}^{3+}{}_4\text{Li}){}^T\text{Si}_8\text{O}_{22}{}^W\text{O}_2$ .

**Mineral Group:** Amphibole group, oxo-amphibole subgroup.

**Occurrence:** In the oxidized portions of a manganese deposit, most likely a metamorphosed (upper middle to middle greenschist facies) submarine exhalative deposit.

**Association:** Namansilite, aegirine, manganoan pectolite-serandite, braunite, norrishite, calcium and barium carbonates, quartz, albite, potassium feldspar, Mn-bearing sugilite, barite.

**Distribution:** From the Hoskins Mine, ~ 3 km west of Grenfell, New South Wales, Australia.

**Name:** Signifies an amphibole in the compositional range of *leakeite* with dominant manganese in the C structural site and dominant oxygen in the W site.

**Type Material:** Canadian Museum of Nature, Ottawa, Ontario, Canada (CMNMC 86895).

**References:** (1) Oberti, R., M. Boiocchi, F.C. Hawthorne, N.A. Ball, and P.M. Ashley (2016) Oxo-mangani-leakeite from the Hoskins mine, New South Wales, Australia: occurrence and mineral description. *Mineral. Mag.*, 80(6), 1013-1021. (2) (2017) *Amer. Mineral.*, 102, 697 (abs. ref. 1).