

Manganokukisvumite**Na₆MnTi₄Si₈O₂₈·4H₂O**

Crystal Data: Orthorhombic. *Point Group:* 2/m 2/m 2/m. As sword-shaped crystals, flattened on {100}, elongate on [001] to 0.5 mm, showing {100}, {010}, and a prism; as fan-shaped to radial groups.

Physical Properties: *Cleavage:* None. *Fracture:* Splintery. *Tenacity:* Sectile and slightly flexible. Hardness = 5.5-6 D(meas.) = 2.86(1) D(calc.) = 2.88

Optical Properties: Transparent. *Color:* Colorless. *Streak:* White. *Luster:* Vitreous. *Optical Class:* Biaxial (-). $\alpha(\text{calc.}) = 1.657$ $\beta = 1.744(3)$ $\gamma = 1.792(3)$ $2V(\text{meas.}) = 70^\circ$ *Dispersion:* None. *Orientation:* X = a; Y = b; Z = c.

Cell Data: *Space Group:* Pccn. $a = 29.05(2)$ $b = 8.612(6)$ $c = 5.220(4)$ $Z = 2$

X-ray Powder Pattern: Poudrette quarry, Mont Saint-Hilaire, Quebec, Canada. 14.47 (100), 3.025 (40), 6.43 (20), 2.881 (20), 4.83 (10), 3.743 (10), 2.591 (10)

Chemistry:	(1)		(1)
Na ₂ O	15.61	Al ₂ O ₃	0.16
K ₂ O	0.21	Ce ₂ O ₃	0.18
CaO	0.08	TiO ₂	26.90
MgO	0.26	SiO ₂	41.74
MnO	5.48	Nb ₂ O ₅	0.68
FeO	0.57	<u>H₂O</u>	<u>6.25</u>
ZnO	0.00	Total	98.12

(1) Poudrette quarry, Mont Saint-Hilaire, Quebec, Canada; average of 2 electron microprobe analyses, H₂O confirmed by IR and calculated; corresponding to (Na_{5.81}K_{0.05}Ca_{0.02}Ce_{0.01}) $\Sigma=5.89$ (Mn_{0.89}Fe_{0.09}Mg_{0.01}Al_{0.04}) $\Sigma=1.09$ (Ti_{3.88}Nb_{0.06}) $\Sigma=3.94$ Si_{8.01}O₂₈·4H₂O.

Occurrence: A late mineral formed by hydrothermal dissolution of titanium-bearing minerals in an albite-rich syenite breccia in an intrusive alkaline complex.

Association: Aegirine, microcline, albite, annite, pyrite, pyrrhotite, natrolite, calcite (Canada); kukisvumite (Russia).

Distribution: Poudrette quarry, Mont Saint-Hilaire, Rouville County, Quebec, Canada; from Mount Kukisvumchorr, Khibiny massif, Russia.

Name: As the manganese-dominant analogue of kukisvumite.

Type Material: Canadian Museum of Nature, Ottawa, Ontario, Canada; CMNMC 83392 and CMNMC 83393.

References: (1) Gault, R.A., T.S. Ercit, J.D. Grice, and J. Van Velthuisen (2004) Manganokukisvumite, a new mineral species from Mont Saint-Hilaire, Quebec. *Can. Mineral.*, 42, 781-785. (2) (2005) *Amer. Mineral.*, 90, 520 (abs. ref. 1).