

Niobokupletskite**K₂NaMn₇(Nb, Ti)₂(Si₄O₁₂)₂O₂(OH)₄(O, F)**

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. Platy to tabular, epitaxial overgrowths on kupletskite, to 0.5 mm, compact fibrous overgrowths on kupletskite, and very fine-grained, sheaflike aggregates of acicular crystals.

Physical Properties: *Cleavage:* Perfect on {001}. *Tenacity:* Brittle. *Fracture:* Uneven to splintery. Hardness = 3-4 D(meas.) = >3.325 D(calc.) = 3.46 Nonfluorescent.

Optical Properties: Transparent. *Color:* Light beige to yellow, light yellow-brown, silvery brown. *Streak:* n.d. *Luster:* Vitreous. *Optical Class:* Biaxial (+). $\alpha = 1.718(1)$ $\beta = 1.733(1)$ $\gamma(\text{calc.}) = 1.750$ $2V(\text{meas.}) = 87(2)^\circ$ *Orientation:* $Z = c$, X and Y in the (001) plane. *Pleochroism:* $X \approx Y =$ light yellow-orange, $Z =$ red-brown.

Cell Data: *Space Group:* $P\bar{1}$. $a = 5.4303(9)$ $b = 11.924(2)$ $c = 11.747(2)$ $\alpha = 112.927(3)^\circ$ $\beta = 94.750(3)^\circ$ $\gamma = 103.175(3)^\circ$ $Z = 1$

X-ray Powder Pattern: Poudrette quarry, Mont Saint-Hilaire, Quebec, Canada. 10.707 (100), 3.536 (50), 2.793 (40), 2.587 (40), 2.677 (30), 4.405 (20), 3.294 (20)

Chemistry:	(1)		(2)
Na ₂ O	2.62	TiO ₂	1.34
K ₂ O	5.97	ZrO ₂	3.43
Rb ₂ O	0.82	Nb ₂ O ₅	12.13
Cs ₂ O	0.12	Ta ₂ O ₅	0.63
MgO	0.15	SiO ₂	31.85
MnO	26.37	F	0.14
FeO	2.64	H ₂ O	[2.48]
ZnO	4.08	- O = F	0.06
Al ₂ O ₃	1.14	Total	95.85

(1) Poudrette quarry, Mont Saint-Hilaire, Quebec, Canada; electron microprobe analysis supplemented by IR and Mössbauer spectroscopy, H₂O calculated; corresponds to (K_{1.84}Rb_{0.13}Cs_{0.01}) $\Sigma=1.98$ Na_{0.95}(Mn_{5.40}Zn_{0.73}Fe_{0.53}Na_{0.28}Mg_{0.05}) $\Sigma=6.99$ (Nb_{1.33}Zr_{0.40}Ti_{0.24}Ta_{0.04}) $\Sigma=2.01$ (Si_{7.71}Al_{0.32}) $\Sigma=8.03$ O₂₆(OH)_{4.00}(O_{0.89}F_{0.11}) $\Sigma=1.00$.

Mineral Group: Astrophyllite supergroup, kupletskite group.

Occurrence: A late-stage mineral in nepheline syenite pegmatite in an alkaline complex.

Association: Kupletskite, aegirine, albite, analcime, calicoancylite-(Ce), calcite, catapleite, epididymite, fluorite, genthelvite, microcline, natrolite, pyrochlore, rhodochrosite, wurtzite.

Distribution: At the Poudrette quarry, Mont Saint-Hilaire, Quebec, Canada.

Name: The prefix, *niobo*, indicates the niobium analog of *kupletskite*.

Type Material: Canadian Museum of Nature, Ottawa, Ontario, Canada (CMNMC 82924).

References: (1) Piilonen, P.C., A.E. Lalonde, A.M. McDonald, and R.A. Gault (2000) Niobokupletskite, a new astrophyllite-group mineral from Mont Saint-Hilaire, Quebec, Canada: description and crystal structure. *Can. Mineral.*, 38, 627-639. (2) (2001) *Amer. Mineral.*, 86, 198 (abs. ref. 1). (3) Sokolova, E., F. Cámara, F.C. Hawthorne, and M.E. Ciriotti (2017) The astrophyllite supergroup: nomenclature and classification. *Mineral. Mag.*, 81(1), 143-153.