Franconite $Na_2Nb_4O_{11}\cdot 9H_2O$

Crystal Data: Monoclinic. *Point Group:* n.d. In bladed to highly elongated crystals with curved faces; in globules composed of radiating crystals, to 2 mm; aggregated in groups.

Physical Properties: *Cleavage:* Basal, parting. Hardness = n.d. D(meas.) = 2.72(1) D(calc.) = 2.74–2.84 Dehydrates, reversibly; fluoresces pale yellow under LW UV, more intensely under SW UV.

Optical Properties: Transparent to opaque. *Color:* White, colorless, grayish blue. *Streak:* White. *Luster:* Vitreous to adamantine, silky on fractures. *Optical Class:* Biaxial (–). *Orientation:* $X \perp$ plane of blades; $Y \perp$ elongation; $Z \parallel$ elongation. $\alpha = 1.72(1)$ $\beta = [1.78(1)]$ $\gamma = 1.79(1)$ 2V(meas.) = 35(5)°

Cell Data: *Space Group:* n.d. $a = 22.22(1)$ $b = 12.857(5)$ $c = 6.359(4)$ $\beta = 92.24(6)°$ Z = 4

X-ray Powder Pattern: Francon quarry, Canada.
11.0 (10), 5.55 (7), 4.73 (6), 3.18 (6), 4.21 (5), 3.21 (5), 2.626 (5)

Chemistry:

	(1)	(2)	(3)
Nb_2O_5	75.4	76.2	70.35
SiO_2	0.5		
TiO_2	0.9	0.3	
Al_2O_3	0.0		
CaO	0.7	0.4	
SrO	0.0		
Na_2O	8.5	9.2	8.20
H_2O	[14.0]	13.8	21.45
Total	[100.0]	99.9	100.00

(1) Francon quarry, Canada; by electron microprobe, H_2O by difference, originally given as 13.0%; using H_2O 21%–22% as confirmed by mass spectrometry, corresponds to $(Na_{1.82}Ca_{0.08})_{\Sigma=1.90}(Nb_{3.76}Si_{0.17}Ti_{0.08})_{\Sigma=4.01}O_{11}\cdot 9H_2O$. (2) Vishnevogorsk complex, Russia; by electron microprobe, average of three analyses, H_2O taken as LOI; corresponds to $(Na_{2.03}Ca_{0.09})_{\Sigma=2.12}(Nb_{3.92}Si_{0.10})_{\Sigma=4.02}O_{11}\cdot 9.6H_2O$. (3) $Na_2Nb_4O_{11}\cdot 9H_2O$.

Occurrence: In vugs of a dawsonite-bearing sill in a limestone deposit (Francon quarry, Canada); in cavities in altered pegmatite dikes, hornfels, sodalite syenite, or miarolitic cavities, associated with an intrusive alkalic gabbro-syenite complex (Mont Saint-Hilaire, Canada).

Association: Hochelagaite, weloganite, calcite, quartz (Francon quarry, Canada); burbankite, muscovite, albite, microcline, chlorite, calcite, strontianite, natrolite (Vishnevogorsk complex, Russia).

Distribution: In the Francon quarry, Montreal Island, Montreal, at Mont Saint-Hilaire, and near Saint-Amable, Quebec, Canada. In the Vishnevogorsk alkalic complex, Vishnevy-Ilmen Mountains, Southern Ural Mountains, Russia.

Name: For the Francon quarry, Montreal, Canada, where it was first found.

Type Material: Geological Survey of Canada, Ottawa, 62094, 63748–63750; Royal Ontario Museum, Toronto, Canada, M39041.

References: (1) Jambor, J.L., A.P. Sabina, A.C. Roberts, M. Bonardi, R.A. Ramik, and B.D. Sturman (1984) Franconite, a new hydrated Na–Nb oxide mineral from Montreal Island, Quebec. Can. Mineral., 22, 239–243. (2) (1985) Amer. Mineral., 70, 436–437 (abs. ref. 1). (3) Jambor, J.L., A.P. Sabina, A.C. Roberts, M. Bonardi, D.R. Owens, and B.D. Sturman (1986) Hochelagaite, a new calcium-niobium oxide mineral from Montreal, Quebec. Can. Mineral., 24, 449–453. (4) Horváth, L. and R.A. Gault (1990) The mineralogy of Mont Saint-Hilaire, Quebec. Mineral. Record, 21, 284–359, esp. 310. (5) Nikandrov, S.N. (1990) Franconite, first find in the USSR. Doklady Acad. Nauk SSSR, 305, 700–703 (in Russian).