Niocalite $Ca_7Nb(Si_2O_7)_2O_3F$

Crystal Data: Monoclinic. *Point Group:* m. Crystals prismatic, to 1 cm, with square cross sections and curved faces; larger crystals are tapered at both ends. *Twinning:* Finely twinned with {001} as composition plane.

Physical Properties: *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 6
D(meas.) = 3.32 D(calc.) = 3.29

Optical Properties: Transparent. *Color:* Lemon-yellow; colorless in thin section.
Luster: Vitreous.
Optical Class: Biaxial (–). *Orientation:* $X = b$; $Z \wedge c = 12°$. $\alpha = 1.701$ $\beta = 1.714$ $\gamma = 1.720$
2V(meas.) = 56°

Cell Data: *Space Group:* Pa. $a = 10.863(3)$ $b = 10.431(3)$ $c = 7.370(2)$ $\beta = 110.1(1)°$
Z = 2

X-ray Powder Pattern: Oka, Canada.
3.012 (10), 2.891 (6), 2.852 (6), 3.240 (5), 1.844 (4), 7.31 (3), 2.557 (3)

Chemistry:

	(1)	(2)		(1)	(2)
SiO_2	29.70	29.48	MgO	0.28	0.32
TiO_2	0.22	0.11	CaO	47.50	46.58
ZrO_2		0.27	Na_2O	0.78	0.57
Al_2O_3	1.31		K_2O	0.02	
Y_2O_3		0.00	F	1.7	2.14
Fe_2O_3	0.54	0.48	H_2O	0.16	
Nb_2O_5	16.56	15.19	P_2O_5	0.60	
Ta_2O_5		[3.5]	$-O = F_2$	0.71	0.90
MnO	1.28	0.93	Total	99.94	[98.67]

(1) Oka, Canada; CaO includes some SrO, Nb_2O_5 includes some Ta_2O_5, Al_2O_3 includes some RE and Zr; corresponds to $(Ca_{6.54}Na_{0.16})_{\Sigma=6.70}(Nb_{1.06}Mg_{0.12}Mn_{0.12}Fe_{0.06}Ti_{0.02})_{\Sigma=1.38}(Si_{3.88}Al_{0.08})_{\Sigma=3.96}O_{14}[O_{3.16}F_{0.70}(OH)_{0.08}]_{\Sigma=3.94}$. (2) Do.; by electron microprobe, partial analysis; corresponds to $(Ca_{6.77}Na_{0.15})_{\Sigma=6.92}(Nb_{0.93}Mn_{0.10}Mg_{0.06}Fe_{0.05}Zr_{0.02}Ti_{0.01})_{\Sigma=1.17}Si_4O_{14}[O_{3.02}F_{0.92}]_{\Sigma=3.94}$.

Occurrence: In coarse-grained strontian carbonatite.

Association: Calcite, magnetite, apatite, diopside, biotite, pyrochlore, niobian perovskite.

Distribution: At Oka, Quebec, Canada.

Name: For NIObium and CALcium in the composition.

Type Material: n.d.

References: (1) Nickel, E.H. (1956) Niocalite–a new calcium niobium silicate mineral. Amer. Mineral., 41, 785–786. (2) Nickel, E.H., J.F. Rowland, and J.A. Maxwell (1958) The composition and crystallography of niocalite. Can. Mineral., 6, 264–272. (3) Mellini, M. (1982) Niocalite revised: twinning and crystal structure. Tschermaks Mineral. Petrog. Mitt., 30, 249–266.