Nicksobolevite $Cu_7(SeO_3)_2O_2Cl_6$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As aggregates of needle-like crystals to 0.4 mm, elongated along [001] and displaying {100}, {120}, {101}, and {$\bar{1}$ 01.

Physical Properties: *Cleavage*: Perfect on {010} and {$\bar{1}$ 01}, good on {120}. *Fracture*: n.d. *Tenacity*: Very brittle. Hardness = 2-2.5 VHN = 33 (5 g load). D(meas.) = n.d. D(calc.) = 4.18

Optical Properties: Transparent. *Color*: Dark red. *Streak*: Orange-red. *Luster*: Vitreous. *Optical Class*: Biaxial (+). $\alpha = 2.00(1)$ $\beta = 2.01(1)$ $\gamma = 2.08(1)$ 2V(calc.) = 43° *Orientation*: $X = b$, $Z \wedge c = 36°$ (in obtuse β). *Pleochroism*: $X = Y$ = red, Z = brownish red.

Cell Data: *Space Group*: $P2_1/c$. $a = 10.906(4)$ $b = 14.442(5)$ $c = 10.395(4)$ $\beta = 113.559(8)°$ $Z = 4$

X-ray Powder Pattern: Tolbachik volcano, Kamchatka Peninsula, Russia.
5.877 (100), 3.257 (95), 8.25 (77), 2.715 (50), 2.278 (40), 3.619 (37), 4.239 (26)

Chemistry:	(1)	(2)
CuO	56.17	59.02
ZnO	2.34	
SeO_2	23.29	23.52
Cl	22.69	22.54
$-O = Cl_2$	5.12	5.09
Total	99.37	99.99

(1) Tolbachik volcano, Kamchatka Peninsula, Russia; electron microprobe analysis; corresponding to $(Cu_{6.71}Zn_{0.27})_{\Sigma=6.98}Se_{1.99}O_{7.92}Cl_{6.08}$. (2) $Cu_7(SeO_3)_2O_2Cl_6$.

Occurrence: In crusts deposited from gases escaping an active fumarole on a basaltic volcano.

Association: Chloromenite, prewittite, melanothallite, sophiite, ralstonite, ponomarevite, gold.

Distribution: At the second cinder cone of the North Breach, Great Fissure eruption, Tolbachik volcano, Kamchatka Peninsula, Russia.

Name: Honors Academician Nikolay (Nick) Vladimirovich Sobolev (b. 1935), for his contributions to mineralogy and petrology.

Type Material: Mineralogical Museum, St. Petersburg State University, St. Petersburg, Russia (1/19599).

References: (1) Vergasova, L.P., T.F. Semenova, S.V. Krivovichev, S.K. Filatov, A.A. Zolotarev Jr., and V.V. Ananiev (2014) Nicksobolevite, $Cu_7(SeO_3)_2O_2Cl_6$, a new complex copper oxoselenite chloride from Tolbachik fumaroles, Kamchatka peninsula, Russia. Eur. J. Mineral., 26, 439-449. (2) (2016) Amer. Mineral., 101, 750-751 (abs. ref. 1).