Lovozerite $Na_3CaZrSi_6O_{15}(OH)_3$

Crystal Data: Hexagonal. *Point Group*: 3. As pseudododecahedral crystals, to 3 mm, and spherical aggregates. In irregular but optically continuous grains, to 3 cm. *Twinning*: Polysynthetic and penetration, common.

Physical Properties: *Cleavage*: Two directions, imperfect. *Fracture*: Uneven to conchoidal. *Tenacity*: Brittle. Hardness = 5 D(meas.) = 2.38-2.71 D(calc.) = 2.69

Optical Properties: Transparent to opaque. *Color*: Red-brown, dark brown, black; in thin section, yellowish pink, with altered regions dark brown. *Streak*: Brown. *Luster*: Vitreous, resinous to dull. *Optical Class*: Uniaxial (-) to biaxial (-). ω = 1.561 ε = 1.549 α = 1.545 β = 1.560 γ = 1.561 2V(meas.) = Small. *Pleochroism*: Weak, yellowish to pinkish.

Cell Data: *Space Group*: *R*3. a = 10.18(1) c = 13.13(2) Z = 3

X-ray Powder Pattern: Khibiny massif, Russia.
3.21 (100), 5.37 (80), 3.64 (70), 3.32 (70), 7.33 (50), 2.969 (50), 2.635 (50)

Chemistry:

	(1)		(1)
SiO_2	52.12	MgO	0.76
TiO_2	1.02	CaO	3.34
ZrO_2	16.54	SrO	0.06
Al_2O_3	0.40	Na_2O	3.74
Fe_2O_3	0.72	K_2O	1.90
Th_2O_3	0.56	H_2O^+	8.62
MnO	3.46	H_2O^-	6.41
		Total	99.65

(1) Lovozero massif, Russia; corresponds to $(Na_{0.87}Ca_{0.41}Mn_{0.33}K_{0.28}Mg_{0.13}Fe_{0.06})_{\Sigma=2.08}(Zr_{0.92}Ti_{0.09})_{\Sigma=1.01}(Si_{5.95}Al_{0.05})_{\Sigma=6.00}(O,OH)_{21.28}$.

Mineral Group: Lovozerite group, zirsinalite-lovozerite subgroup.

Occurrence: In nepheline syenites and associated pegmatites.

Association: Potassic feldspar, nepheline, aegirine, lamprophyllite, eudialyte, murmanite (Kola Peninsula, Russia).

Distribution: In the Lovozero and Khibiny massifs, Kola Peninsula, Russia. From the Ilímaussaq southern intrusion, Greenland. At Mont Saint-Hilaire, Quebec, Canada.

Name: For the occurrence in the *Lovozero* massif, Kola Peninsula, Russia.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 42701.

References: (1) Gerasimovskii, V.I. (1939) Lovozerite - a new mineral. Doklady Acad. Nauk SSSR, 25, 753-756 (in Russian). (2) (1940) Amer. Mineral., 25, 504 (abs. ref. 1). (3) Ilyukhin, V.V. and N.V. Belov (1960) Derivation of the structure of lovozerite from sections of the three-dimensional Patterson function. Kristallografiya (Sov. Phys. Crystal.), 5, 200-214 (in Russian). (4) Vlasov, K.A., M.V. Kuz'menko, and E.M. Es'kova (1966) The Lovozero alkali massif. Akad. Nauk SSSR, 308-312 (in English). (5) Kapustin, Y.L., A.V. Bykova, and Z.V. Poduvkina (1973) Mineralogy of the lovozerite group. Izvest. Akad. Nauk SSSR, Ser. Geol., 8, 106-112 (in Russian). (6) (1974) Amer. Mineral., 59, 633 (abs. ref. 5). (7) Mandarino, J.A. and V. Anderson (1989) Monteregian Treasures. Cambridge Univ. Press, 130. (8) Yamnova, N.A., Yu.K. Egorov-Tismenko, and I.V. Pekov (2001) Refined crystal structure of lovozerite $Na_2CaZr[Si_6O_{12}(OH,O)_6]\cdot H_2O$. Crystallogr. Reports, 46, 937-941. (9) (2003) Amer. Mineral., 88, 934-935 (abs. ref. 8). (10) Pekov, I.V., S.V. Krivovichev, A.A. Zolotarev, V.N. Yakovenchuk, T. Armbruster, and Y.A. Pakhomovsky (2009) Crystal chemistry and nomenclature of the lovozerite group. Eur. J. Mineral., 21(5), 1061-1071.