Voronkovite $Na_{15}(Na, Ca, Ce)_3(Mn, Ca)_3Fe_3Zr_3Si_{26}O_{72}[(OH),O]_4Cl\cdot H_2O$

Crystal Data: Hexagonal. *Point Group*: 3. As rounded, poorly faced crystals to 5 mm.

Physical Properties: *Cleavage*: None. *Tenacity*: Brittle. *Fracture*: Conchoidal.
Hardness = 5 D(meas.) = 2.97(2) D(calc.) = 2.95

Optical Properties: Transparent. *Color*: Light brown. *Streak*: White. *Luster*: Vitreous.
Optical Class: Uniaxial (+). ω = 1.610(2) ε = 1.619(2) *Pleochroism*: *O* = lemon yellow, *E* = brownish pink.

Cell Data: *Space Group*: *R*3. a = 14.205(7) c = 30.265(15) Z = 3

X-Ray Diffraction Pattern: Shkatulka pegmatite, Mt. Alluaiv, Kola Peninsula, Russia.
2.970 (100), 4.316 (85), 2.84 (84), 3.221 (43), 3.536 (41), 3.039 (41), 3.166 (37)

Chemistry:

	(1)		(1)
Na_2O	15.84	CaO	3.08
K_2O	0.28	FeO	3.53
TiO_2	0.33	MnO	4.65
ZrO_2	14.11	Al_2O_3	0.15
HfO_2	0.23	SiO_2	49.48
La_2O_3	0.93	F	0.21
Ce_2O_3	1.36	Cl	0.44
Nd_2O_3	0.68	H_2O	1.56
Nb_2O_5	0.91	-O = Cl + F	0.19
SrO	1.76	Total	99.34

(1) Shkatulka pegmatite, Mt. Alluaiv, Kola Peninsula, Russia; average electron microprobe analysis supplemented by IR spectroscopy; corresponding to $(Na_{13.96}Sr_{0.54}K_{0.19})_{\Sigma=14.69}(Na_{1.64}Ca_{0.92}Ce_{0.26}La_{0.18})_{\Sigma=3.00}(Mn_{2.06}Ca_{0.81}Nd_{0.13})_{\Sigma=3.00}(Fe_{1.54}Zr_{0.60}Na_{0.48}Nb_{0.21}Ti_{0.13}Hf_{0.04})_{\Sigma=3.00}Zr_{3.00}(Si_{1.91}Al_{0.09})_{\Sigma=2.00}(Si_{24}O_{72})[(OH)_{2.98}O_{1.02}]_{\Sigma=4}(Cl_{0.39}F_{0.35})_{\Sigma=0.74}\cdot 1.23H_2O$.

Mineral Group: Eudialyte group, oneillite subgroup.

Occurrence: In a lenticular zoned pegmatite hosted by poikilitic nepheline-sodalite syenite in the middle part of a differentiated alkaline complex.

Association: Microcline, sodalite, nepheline, aegirine, terskite, lomonosovite, vuonnemite, shkatulkalite, manganoneptunite, sphalerite.

Distribution: In the Shkatulka hyperalkaline pegmatite, Mt. Alluaiv, Lovozero alkaline massif, Kola Peninsula, Russia.

Name: Honors Russian crystallographer Alexander Alexandrovich *Voronkov* (1928-1982).

Type Material: A.E. Fersman Mineralogical Museum, RAS, Moscow, Russia (3620/1-4).

References: (1) Khomyakov, A.P., G.N. Nechelyustov, and R.K. Rastsvetaeva (2009) Voronkovite, $Na_{15}(Na,Ca,Ce)_3(Mn,Ca)_3Fe_3Zr_3Si_{26}O_{72}(OH,O)_4Cl\cdot H_2O$, a new mineral species of the eudialyte group from the Lovozero Alkaline Pluton, Kola Peninsula, Russia. Geology of Ore Deposits, 51, 750-756. (2) Rastsvetaeva, R.K. and N.V. Chukanov (2012) Classification of eudialyte-group minerals. Geology of Ore Deposits, 54, 487-497.