Tsepinite-Ca $(Ca, K, Na)_{2-x}(Ti, Nb)_2(Si_4O_{12})(OH, O)_2 \cdot 4H_2O$

Crystal Data: Monoclinic. *Point Group*: 2/*m.* As prismatic to acicular, poorly terminated crystals, to 5 mm; commonly in open-work aggregates or sheaf-like clusters to 1 cm or 6 mm, respectively.

Physical Properties: *Cleavage:* None. *Fracture*: Uneven. *Tenacity*: Brittle. Hardness = 5
D(meas.) = 2.73 D(calc.) = 2.72

Optical Properties: Transparent. *Color*: Colorless to white and pale brown. *Streak*: White. *Luster*: Vitreous.
Optical Class: Biaxial (+). α = 1.666(2) β = 1.676(2) γ = 1.780(4) 2V(meas.) = 30(10)°
2V(calc.) = 36° *Dispersion*: Weak, $r < v$. *Orientation*: $b = Y$.

Cell Data: *Space Group*: *C*2/*m.* a = 14.484(4) b = 14.191(4) c = 7.907(2) β = 117.26(2)° Z = 4

X-ray Powder Pattern: Lovchorrite mine, Mt. Yukspor, Khibiny massif, Kola Peninsula, Russia. 3.16 (100), 2.51 (85), 7.02 (60), 1.718 (50), 3.53 (45), 2.62 (45), 6.38 (40)

Chemistry:

	(1)
Na_2O	1.32
K_2O	2.23
CaO	5.29
SrO	3.01
BaO	3.52
MnO	0.16
FeO	0.04
ZnO	0.12
Al_2O_3	0.04
SiO_2	41.06
TiO_2	21.95
Nb_2O_5	9.08
H_2O	13.30
Total	101.12

(1) Lovchorrite mine, Mt. Yukspor, Khibiny massif, Kola Peninsula, Russia; average of 10 electron microprobe analyses, H_2O by TGA; corresponding to $(Ca_{1.12}K_{0.56}Na_{0.51}Sr_{0.34}Ba_{0.27}Mn_{0.03}Zn_{0.02}Fe_{0.01})_{\Sigma=2.86}(Ti_{3.21}Nb_{0.80})_{\Sigma=4.01}(Si_{8.14}Al_{0.01})_{\Sigma=8.15}O_{24.42}[(OH)_{2.45}O_{1.55}]_{\Sigma=4.00} \cdot 7.57H_2O$.

Mineral Group: Labuntsovite group, vuoriyarvite subgroup.

Occurrence: In cavities formed by hydrothermal leaching of rinkite in a pegmatite that cuts nepheline syenite.

Association: Microcline, aegirine, natrolite, kentbrooksite, kupletskite, Mn-rich lamprophyllite, fluorapatite, catapleiite, ancylite-(Ce), ancylite-(La), fluorapophyllite, leucophanite, chabazite-Ca.

Distribution: From the Lovchorrite mine, HackmanValley, Mount Yukspor, Khibiny alkaline massif, Kola Peninsula, Russia.

Name: Suffix indicates the Ca-dominant analog of *tsepinite*-Na and *tsepinite*-K.

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

References: (1) Pekov, I.V., N.V. Chukanov, G. Ferraris, A. Gula, D.Yu. Pushcharovsky, and A.E. Zadov (2003) Tsepinite-Ca, $(Ca,K,Na,\square)_2(Ti,Nb)_2(Si_4O_{12})(OH,O)_2 \cdot 4H_2O$, a new mineral of the labuntsovite group from the Khibiny alkaline massif, Kola Peninsula - Novel disordered sites in the vuoriyarvite-type structure. Neues Jahrb. Mineral. Mon., 461-480. (2) (2004) Amer. Mineral., 89(5-6), 895 (abs. ref. 1). (3) Chukanov, N.V., I.V. Pekov, and A.P. Khomyakov (2002) Recommended nomenclature for labuntsovite group minerals. Eur. J. Mineral., 14, 165-173.