

Tokkoite**K₂Ca₄Si₇O₁₇(O, OH, F)₄**

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Crystal Data: Triclinic. *Point Group:* $\bar{1}$. As compact aggregates of columnar or radiating crystals, up to several cm long.

Physical Properties: *Cleavage:* Perfect on {010}, less perfect on {110}. *Fracture:* Splintery. Hardness = 4–5 D(meas.) = 2.761 D(calc.) = 2.77

Optical Properties: Transparent. *Color:* Light brown to pale yellow; colorless in transmitted light. *Luster:* Vitreous.

Optical Class: Biaxial (+). *Orientation:* $Z \wedge c = 0^\circ\text{--}15^\circ$. *Dispersion:* $r < v$, weak.

$\alpha = 1.570(2)$ $\beta = \text{n.d.}$ $\gamma = 1.577(2)$ $2V(\text{meas.}) = 38(5)^\circ$

Cell Data: *Space Group:* $P\bar{1}$. $a = 10.438(3)$ $b = 12.511(3)$ $c = 7.112(2)$ $\alpha = 89.92(2)^\circ$ $\beta = 99.75(2)^\circ$ $\gamma = 92.89(2)^\circ$ $Z = 2$

X-ray Powder Pattern: Murun massif, Russia.

3.15 (100), 3.044 (91b), 3.32 (85), 3.125 (85), 3.075 (62), 3.34 (55), 3.26 (49)

Chemistry:

	(1)	(2)
SiO ₂	55.65	54.17
TiO ₂	1.42	1.18
Fe ₂ O ₃	1.58	1.57
MnO	0.70	0.54
MgO	0.30	0.98
CaO	25.10	24.15
Na ₂ O	0.60	0.41
K ₂ O	11.33	12.95
F	1.50	1.50
H ₂ O	2.40	2.40
–O = F ₂	0.63	0.63
Total	99.95	99.22

(1) Murun massif, Russia; corresponds to K_{1.85}(Ca_{3.45}Fe_{0.15}Na_{0.15}Ti_{0.13}Mn_{0.08}Mg_{0.06}) $\Sigma=4.02$ Si_{7.13}O₁₇[(OH)_{2.02}O_{1.63}F_{0.61}] $\Sigma=4.26$. (2) Do.; by electron microprobe, average of two analyses; corresponds to K_{2.09}(Ca_{3.32}Mg_{0.19}Fe_{0.15}Na_{0.13}Ti_{0.11}Mn_{0.06}) $\Sigma=3.96$ Si_{6.95}O₁₇ [(OH)_{2.05}O_{1.39}F_{0.61}] $\Sigma=4.05$.

Occurrence: In nearly monomineralic segregations in an alkalic massif.

Association: Charoite, tinaksite, miserite, aegirine, potassic feldspar.

Distribution: From the Magistral'nyi area, right bank of the Davan Stream, between the Chara and Tokko Rivers, in the Murun massif, southwest of Olekminsk, Yakutia, Russia.

Name: For the Tokko River, nearby the type locality in Russia.

Type Material: Institute of Geology and Geophysics, Siberian Division, Academy of Sciences, Novosibirsk; Geological Museum, Yakutsk Scientific Center, Academy of Sciences, Yakutsk, Russia.

References: (1) Lazebnik, K.A., L.V. Nikishova, and Y.D. Lazebnik (1986) Tokkoite – a new mineral of charoitites. *Mineral. Zhurnal*, 8(3), 85–89 (in Russian). (2) (1988) *Amer. Mineral.*, 73, 196 (abs. ref. 1). (3) Rozhdestvenskaya, I.V. (1989) The crystal structure of tokkoite and its relation to the structure of tinaksite. *Zeits. Krist.*, 189, 195–204.