Fluorchegemite $Ca_7(SiO_4)_3F_2$

Crystal Data: Orthorhombic. *Point Group*: 2/*m* 2/*m* 2/*m*. As acicular crystals to 0.2 mm. *Twinning*: Observed.

Physical Properties: *Cleavage*: Imperfect on {010}. *Fracture*: Irregular. *Tenacity*: n.d. Hardness = 5.5-6 VHN = 499 (50 g load). D(meas.) = n.d. D(calc.) = 2.91

Optical Properties: Transparent. *Color*: Colorless. *Streak*: White. *Luster*: n.d. *Optical Class*: Biaxial (-). $\alpha = 1.610(2)$ $\beta = 1.6150(2)$ $\gamma = 1.619(2)$ 2V(meas.) = 80(8)° 2V(calc.) = 84° *Orientation*: $X = a$, $Y = b$, $Z = c$. *Dispersion*: Weak, $r > v$.

Cell Data: *Space Group*: *Pbnm*. $a = 5.0620(1)$ $b = 11.3917(2)$ $c = 23.5180(3)$ Z = 4

X-ray Powder Pattern: Upper Chegem Caldera, Northern Caucasus, Kabardino-Balkaria, Russia. 2.531 (100), 1.905 (90), 2.718 (63), 3.013 (57), 2.991 (56), 3.636 (52), 2.832 (51)

Chemistry:	(1)	(2)
TiO_2	0.17	0.06
SiO_2	29.91	29.83
CaO	65.65	65.44
MgO	0.04	< 0.02
Cl	< 0.06	0.08
F	4.43	6.14
H_2O	0.90	0.08
$-O = F_2$	1.88	2.60
Total	99.22	99.60

(1) Upper Chegem Caldera, Northern Caucasus, Russia; average of 10 electron microprobe analyses supplemented by FTIR spectroscopy; corresponds to $(Ca_{7.01}Mg_{0.01})_{\Sigma=7.02}(Si_{2.98}Ti^{4+}_{0.01})_{\Sigma=2.99}O_{12}[F_{1.40}(OH)_{0.60}]_{\Sigma=2.00}$. (2) Shadil-Khokh volcano, Southern Ossetia, Georgia; average of 12 electron microprobe analyses supplemented by FTIR spectroscopy; corresponding to $Ca_{7.02}(Si_{2.98}Ti^{4+}_{0.01})_{\Sigma=2.99}O_{12}[F_{1.94}\ Cl_{0.01}(OH)_{0.05}]_{\Sigma=2.00}$.

Polymorphism & Series: Forms a series with chegemite.

Occurrence: Formed in the edgrewite-bearing zone of endoskarn (sanidinite facies) at the edge of an altered calciferous xenolith within ignimbrite.

Association: Larnite, edgrewite, wadalite, eltyubyuite, rondorfite, lakargiite, Th-kerimasite, bultfonteinite, killalaite, hillebrandite, afwillite, trabzonite, jennite (Upper Chegem Caldera); spurrite, larnite, gehlenite, merwinite, bredigite, rondorfite, srebrodolskite (Shadil-Khokh volcano).

Distribution: From the Upper Chegem Caldera, Northern Caucasus, Kabardino-Balkaria, Russian, and the Shadil-Khokh volcano, Southern Ossetia, Shida Kartli Region, Georgia.

Name: Indicates the fluorine-dominant analog of *chegemite*.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (4163/1).

References: (1) Galuskina, I.O., B. Krüger, E.V. Galuskin, T. Armbruster, V.M. Gazeev, R. Włodyka, M. Dulski, and P. Dzierżanowski (2015) Fluorchegemite, $Ca_7(SiO_4)_3F_2$, a new mineral from the edgrewite-bearing endoskarn zone of an altered xenolith in ignimbrites from Upper Chegem caldera, Northern Caucasus, Kabardino-Balkaria, Russia: Occurrence, crystal structure, and new data on the mineral assemblages. Can. Mineral., 53, 325-344. (2) (2016) Amer. Mineral., 101, 1714 (abs. ref. 1).