Fluorkyuygenite $Ca_{12}Al_{14}O_{32}[(H_2O)_4F_2]$

Crystal Data: Isometric. *Point Group*: $\bar{4}$ 3m. As rounded grains to 20 μm.

Physical Properties: *Cleavage*: None. *Fracture*: Irregular. *Tenacity*: n.d.
Hardness = 5-5.5 VHN = 712 (50 g load). D(meas.) = n.d. D(calc.) = 2.873

Optical Properties: Transparent. *Color*: Colorless, rarely with greenish to yellowish tint.
Streak: White. *Luster*: Vitreous.
Optical Class: Isotropic. n = 1.610(3)

Cell Data: *Space Group*: $I\bar{4}$ 3*d*. a = 11.966(2) Z = 2

X-ray Powder Pattern: Hatrurim Basin, Negev Desert, Israel.
2.676 (100), 2.992 (61), 3.1981 (46), 2.4426 (45), 4.885 (41), 2.189 (32), 1.6594 (27)

Chemistry:	(1)		(1)
SiO_2	0.89	SO_3	< 0.03
Al_2O_3	45.00	P_2O_5	< 0.03
Fe_2O_3	2.10	Cl	< 0.02
MgO	< 0.02	F	2.38
CaO	44.64	H_2O	[4.72]
Na_2O	< 0.02	$-O = (F + Cl)_2$	1.00
		Total	98.72

(1) Hatrurim Basin, Negev Desert, Israel; average electron microprobe analysis supplemented by Raman spectroscopy, H_2O calculated for charge balance; corresponding to $Ca_{12.03}(Al_{13.34}Fe^{3+}_{0.40}Si_{0.22})_{\Sigma=13.97}O_{32}[(H_2O)_{3.81}F_{1.89}(OH)_{0.30}]_{\Sigma=6}$.

Mineral Group: Mayenite group.

Occurrence: Major constituent of larnite pyrometamorphic rocks of the Hatrurim Complex (Mottled Zone). Crystallized initially as fluormayenite and was altered by vapor-enriched gases during a combustion event.

Association: Larnite, shulamitite, Cr-containing spinel-magnesioferrite series, ye'elimite, fluorapatite-fluorellestadite, periclase, brownmillerite, oldhamite, portlandite, hematite, hillebrandite, afwillite, foshagite, ettringite, katoite, hydrocalumite.

Distribution: From the Hatrurim Basin, Negev Desert, Israel.

Name: *Kyuygenite* is for the locality, Kyuygen-Kaya Mountain and the prefix indicates the essential fluorine in the species.

Type Material: In Russia at the Mineralogical Museum, St. Petersburg State University, St. Petersburg (1/19465) and the Central Siberian Geological Museum, V.S. Sobolev Institute of Geology and Mineralogy, Novosibirsk (VII-87/1).

References: (1) Galuskin, E.V., F. Gfeller, I.O. Galuskina, T. Armbruster, R. Bailau, and V.V. Sharygin (2015) Mayenite supergroup, part I: Recommended nomenclature. Eur. J. Mineral., 27, 99-111. (2) Galuskin, E.V., F. Gfeller, T. Armbruster, I.O. Galuskina, Y. Vapnik, M. Dulski, M. Murashko, P. Dzierżanowski, V.V. Sharygin, S.V. Krivovichev, and R. Wirth (2015) Mayenite supergroup, part III: Fluormayenite, $Ca_{12}Al_{14}O_{32}[\square_4F_2]$, and fluorkyuygenite, $Ca_{12}Al_{14}O_{32}[(H_2O)_4F_2]$, two new minerals from pyrometamorphic rocks of the Hatrurim Complex, South Levant. Eur. J. Mineral., 27, 123-136. (3) (2016) Amer. Mineral., 101, 1709-1710 (abs. refs. 1 & 2).