## Fluormayenite $Ca_{12}Al_{14}O_{32}[\square_4F_2]$

**Crystal Data**: Isometric. *Point Group*: $\bar{4}$ 3*m*. As rounded grains to 100 $\mu$m, or as tetrahedral crystals to 20 $\mu$m. As inclusions in ye'elimite.

**Physical Properties**: *Cleavage*: None. *Fracture*: Irregular. *Tenacity*: n.d.
Hardness = 5.5-6 VHN = 771 (50 g load). D(meas.) = n.d. D(calc.) = 2.745

**Optical Properties**: Transparent. *Color*: Colorless, rarely with greenish to yellowish tint.
*Streak*: White. *Luster*: Vitreous.
*Optical Class*: Isotropic. $n$ = 1.612(3)

**Cell Data**: *Space Group*: $I\bar{4}$ 3*d*. $a$ = 11.9894(2) Z = 2

**X-ray Powder Pattern**: Jabel Harmun, Palestinian Autonomy, Israel.
2.681 (100), 4.895 (92), 2.997 (47), 2.447 (43), 2.189 (41), 1.6022 (37), 1.663 (33)

| **Chemistry**: | (1) | | (1) |
|---|---|---|---|
| $SiO_2$ | 0.04 | $SO_3$ | 0.08 |
| $Al_2O_3$ | 48.85 | $P_2O_5$ | 0.03 |
| $Fe_2O_3$ | 1.51 | Cl | 0.11 |
| MgO | 0.11 | F | 1.83 |
| CaO | 46.96 | $H_2O$ | [1.09] |
| $Na_2O$ | 0.08 | $-O = (F + Cl)_2$ | 0.80 |
| | | Total | 99.88 |

(1) Jabel Harmun, Palestinian Autonomy, Israel; average electron microprobe analysis supplemented by Raman spectroscopy, $H_2O$ calculated for charge balance; corresponding to $(Ca_{11.95}Na_{0.04})_{\Sigma=11.99}(Al_{13.68}Fe^{3+}_{0.27}Mg_{0.04}Si_{0.01}P_{0.01}S^{6+}_{0.01})_{\Sigma=14.02}O_{31.42}(OH)_{1.73}[\square_{4.58}F_{1.38}Cl_{0.04}]_{\Sigma=6}$.

**Mineral Group**: Mayenite group.

**Occurrence**: Major constituent of larnite-bearing pyrometamorphic rocks.

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

**Distribution**: From Jabel Harmun, near the Palestinian village of Nabi Musa, Judean Desert, Judean Mountains, West Bank, Palestinian Autonomy, Israel.

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

**Type Material**: Museum of Natural History, Bern, Switzerland (NMBE-42094).

**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).