

Fluellite

$\text{Al}_2(\text{PO}_4)\text{F}_2(\text{OH}) \cdot 7\text{H}_2\text{O}$

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Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Dipyramidal crystals, dominant {111}, with {001}, {011}, to 7 mm, commonly in aggregates; powdery, massive.

Physical Properties: *Cleavage:* On {001} and {111}, both indistinct. Hardness = 3
D(meas.) = 2.14–2.18 D(calc.) = 2.16 May fluoresce creamy white under LW UV.

Optical Properties: Transparent. *Color:* Colorless to white, may be pale yellow; colorless in transmitted light. *Luster:* Vitreous.

Optical Class: Biaxial (+). *Orientation:* $X = b$; $Y = a$; $Z = c$. *Dispersion:* $r > v$, perceptible to strong. $\alpha = 1.473\text{--}1.490$ $\beta = 1.490\text{--}1.496$ $\gamma = 1.509\text{--}1.511$ 2V(meas.) = Very large.

Cell Data: *Space Group:* $Fddd$. $a = 8.546(8)$ $b = 11.222(5)$ $c = 21.158(5)$ $Z = 8$

X-ray Powder Pattern: Stenna Gwynn mine, Cornwall, England. (ICDD 19-38).
6.48 (100), 3.24 (70), 3.09 (60), 2.667 (60), 4.96 (50), 2.868 (50), 2.763 (50)

Chemistry:

	(1)	(2)
PO_4	28.70	28.78
Al	16.94	16.35
F	14.71	11.51
OH	[3.46]	5.15
H_2O	35.62	38.21
rem.	0.55	
Total	[99.98]	100.00

(1) Kazakhstan; average of two analyses, $(\text{OH})^{1-}$ calculated for charge balance.

(2) $\text{Al}_2(\text{PO}_4)\text{F}_2(\text{OH}) \cdot 7\text{H}_2\text{O}$.

Occurrence: A rare secondary mineral, formed by weathering of earlier phosphates in some complex granite pegmatites.

Association: Fluorapatite, wavellite, phosphosiderite, strengite, aldermanite, cacoxenite, variscite, turquoise, fluorite, quartz.

Distribution: In England, in Cornwall, from the Stenna Gwynn mine, St. Stephen-in-Brannel, and at the Goonvean china clay pit, St. Austell. In Germany, in Bavaria, on the Kreuzberg, Pleystein, and as large crystals at Hagendorf. At Lázně Kynžvart, near Mariánské Lázně (Königswart, near Marienbad), Czech Republic. From Argenteau, Visé, Belgium. At the Pereta mine, Scansano, Tuscany, Italy. In the USA, from the Carolina pyrophyllite mine, Staley, Randolph Co., North Carolina; in the Gold Quarry mine, near Carlin, Maggie Creek district, Eureka Co., and at the Silver Coin mine, near Valmy, Iron Point district, Humboldt Co., Nevada; from the Tuscarora mine, near Randolph, Rich Co., Utah. At the El Criollo pegmatite, Cerro Blanco, Tanti district, 45 km west of Córdoba, Córdoba Province, Argentina. In Australia, from Woldene, near Beenleigh, Queensland; at Phosphate Hill, near Mansfield, Victoria; in South Australia, in the Moculta phosphate quarry, northeast of Angaston, and from St. John's and Tom's quarries, near Kapunda. At an undefined locality in Kazakhstan. A few other localities are now known.

Name: From the Latin *fluat alumine*, for its *fluorine* and *aluminum* content, phosphorus having been overlooked in early analyses.

Type Material: National Museum of Natural History, Washington, D.C., USA, C1028.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 124–125 [described as $\text{AlF}_3 \cdot \text{H}_2\text{O}$]. (2) Guy, B.B. and G.A. Jeffrey (1966) The crystal structure of fluellite, $\text{Al}_2\text{PO}_4\text{F}_2(\text{OH}) \cdot 7\text{H}_2\text{O}$. Amer. Mineral., 51, 1579–1592. (3) Guy, B.B., G.A. Jeffrey, and R. Van Tassel (1967) The crystal structure of fluellite: a correction. Amer. Mineral., 52, 1576–1577.

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