

Minyulite

$\text{KAl}_2(\text{PO}_4)_2(\text{OH}, \text{F}) \cdot 4\text{H}_2\text{O}$

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Crystal Data: Orthorhombic. *Point Group:* $mm2$. As radiating fibrous to prismatic crystals, elongated along [001] with {110} and {111} terminations; usually in subparallel growth or as spherules, to 15 cm.

Physical Properties: *Tenacity:* Brittle. Hardness = 3.5 $D(\text{meas.}) = 2.45$ $D(\text{calc.}) = 2.47$

Optical Properties: Transparent. *Color:* Colorless to white, greenish yellow; colorless in transmitted light. *Luster:* Vitreous, silky in aggregates.

Optical Class: Biaxial (+). *Orientation:* $X = c$; $Y = a$; $Z = b$. $\alpha = 1.531$ $\beta = 1.534$
 $\gamma = 1.538$ $2V(\text{meas.}) = \text{Large}$.

Cell Data: *Space Group:* $Pba2$. $a = 9.337(5)$ $b = 9.740(5)$ $c = 5.522(3)$ $Z = 2$

X-ray Powder Pattern: Dandarragan, Australia. (ICDD 37-467).
5.519 (100), 3.349 (55), 3.402 (45), 6.75 (35), 3.068 (35), 2.681 (25), 2.967 (23)

Chemistry:

	(1)	(2)
P_2O_5	35.58	38.00
Al_2O_3	29.98	27.79
Fe_2O_3	trace	0.80
MgO	0.00	0.08
CaO	0.00	0.76
Na_2O	0.45	0.24
K_2O	12.30	10.35
F	trace	2.7
H_2O^+	2.79	
H_2O^-	17.84	
H_2O		20.4
$-\text{O} = \text{F}_2$		1.1
Total	98.94	100.0

(1) Minyulo Well, Australia. (2) Wait's quarry, Noarlunga, Australia; corresponds to $(\text{K}_{0.82}\text{Ca}_{0.05}\text{Na}_{0.03})_{\Sigma=0.90}(\text{Al}_{2.04}\text{Fe}_{0.08})_{\Sigma=2.12}(\text{PO}_4)_{2.00}[\text{F}_{0.55}(\text{OH})_{0.45}]_{\Sigma=1.00} \cdot 4.00\text{H}_2\text{O}$.

Occurrence: In weathered glauconitic phosphatic ironstone (Australia).

Association: Dufrenite, apatite, fluellite, wavellite, variscite, leucophosphite.

Distribution: In Australia, from near Minyulo Well, Dandarragan, Western Australia; in Wait's quarry and Oliver's quarry, near Noarlunga, 32 km south of Adelaide; in the Moculta phosphate quarry, northeast of Angaston, and from the St. John's quarry, seven km southeast of Kapunda, Mount Lofty Ranges, South Australia; at Wolfdene, near Beenleigh, Queensland. On Elephant Island, South Shetland Islands, about 800 km southeast of Cape Horn, British Antarctic Territory, Antarctica. From the Pereta mine, Scansano, Tuscany, Italy. In Belgium, at Richelle, near Visé, and at Blaton, Hainaut. Large crystal aggregates from Pannecé, Loire-Atlantique, France. In the USA, found near Cockalorum Wash, Nye Co., and at the Willard mine, Willard district, Pershing Co., Nevada; in the Ross Hannibal mine, Lawrence Co., South Dakota; on Uthahlite Hill, eight km northwest of Lucin, Box Elder Co., Utah.

Name: For Minyulo Well, Western Australia, near the source of the first specimens.

Type Material: Western Australian Museum, Perth, Australia, M68.1991, CT S2034; The Natural History Museum, London, England, 1933.84; National Museum of Natural History, Washington, D.C., USA, 96769.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 970. (2) Spencer, L.J., F.A. Bannister, M.H. Hey, and H. Bennett (1943) Minyulite (hydrous K-Al fluophosphate) from South Australia. *Mineral. Mag.*, 26, 309-314. (3) Kampf, A.R. (1977) Minyulite: its atomic arrangement. *Amer. Mineral.*, 62, 256-262. (4) Menchetti, S. and C. Sabelli (1981) Minyulite, associated with fluellite, from Pereta, Tuscany, Italy. *Neues Jahrb. Mineral., Monatsh.*, 505-510.

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