

Ferrisicklerite**Li(Fe³⁺, Mn²⁺)PO₄**

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Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Rare crystals, to 1 mm, in spherical or radial aggregates; usually massive, may be monocrystalline, in nodules, and as rims around crystals and masses of triphylite-lithiophilite.

Physical Properties: *Cleavage:* {010}, perfect; {100}, good. *Hardness* = ~ 4
D(meas.) = 3.2–3.4 D(calc.) = 3.257

Optical Properties: Subtranslucent to opaque. *Color:* Colorless, yellowish brown to dark chocolate-brown. *Streak:* Pale yellowish brown, brown, reddish brown.

Optical Class: Biaxial (-). *Orientation:* $X = c$; $Y = a$; $Z = b$. *Pleochroism:* Faint; X = golden yellow to yellow-orange; Z = pale yellow to golden yellow. $\alpha = 1.790(5)$ $\beta = 1.805(5)$
 $\gamma = 1.820(5)$ $2V(\text{meas.}) = \sim 85^\circ$

Cell Data: *Space Group:* $Pmn\bar{b}$. $a = 5.918(3)$ $b = 10.037(6)$ $c = 4.799(3)$ $Z = 4$

X-ray Powder Pattern: Sidi Bou Othmane, Morocco.

2.959 (100), 5.01 (70), 4.33 (40), 2.49 (35), 3.49 (30), 3.82 (20), 2.444 (15)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
P ₂ O ₅	44.80	43.73	47.03	CaO	1.36	0.62	0.10
SiO ₂		0.12	0.16	Li ₂ O	3.72	3.95	[1.20]
Fe ₂ O ₃	27.20	32.22	44.76	Na ₂ O	0.81	0.40	0.01
Mn ₂ O ₃	0.00			H ₂ O ⁺	0.51	1.48	n.d.
FeO	0.59	0.34		H ₂ O ⁻	0.51	0.63	
MnO	19.13	15.66	1.97	insol.	1.66		
MgO	0.11	0.96	3.57	Total	100.40	100.11	[98.80]

(1) Varuträsk, Sweden. (2) Sidi Bou Othmane, Morocco; corresponds to (Li_{0.40}Na_{0.02}Fe_{0.01})_{Σ=0.43}(Fe_{0.61}³⁺Mn_{0.34}²⁺Mg_{0.04}Ca_{0.01})_{Σ=1.00}[(PO₄)_{0.94}(OH)_{0.06}]_{Σ=1.00}. (3) Angarf-Sud pegmatite, Morocco; by electron microprobe, Li₂O calculated for charge balance; corresponds to Li_{0.12}(Fe_{0.84}³⁺Mg_{0.13}²⁺)_{Σ=1.01}(PO₄).

Polymorphism & Series: Forms a series with sicklerite.

Occurrence: Formed by late hydrothermal alteration or weathering of triphylite-lithiophilite in complex zoned granite pegmatites.

Association: Triphylite-lithiophilite, heterosite, alluaudite, phosphosiderite, cyrilovite.

Distribution: In Sweden, from the Varuträsk pegmatite, 15 km northwest of Skellefteå, Västerbotten; at the Norrö pegmatite, on Rånö Island, and on Utö Island. At Tammela, Finland. From Hühnerkobel, near Zwiesel, and crystallized from Hagendorf, Bavaria, Germany. From pegmatites around Sidi Bou Othmane, Jebilet, and the Angarf-Sud pegmatite, Tazenakht Plain, Anti-Atlas Mountains, Morocco. At the Souchon pegmatite, Lamativi, and Portree mine, Odzi, Zimbabwe. In the Buranga pegmatite, Gatumba district, Rwanda. From the Tsaobismund pegmatite, 60 km south of Karibib, Namibia. In the USA, from Strafford and Rochester, Strafford Co., and in the Palermo #1 mine, near North Groton, Grafton Co., New Hampshire; from Newry and Paris, Oxford Co., Maine; in the Tip Top mine, 8.5 km southwest of Custer, Custer Co., South Dakota; from the Foote mine, near Kings Mountain, Cleveland Co., North Carolina. Probably present at many other pegmatites.

Name: For its dominant *ferric* iron content and relation to *sicklerite*.

Type Material: n.d.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 672–673. (2) Fontan, F., P. Huvelin, M. Orliac, and F. Permingeat (1976) La ferrisicklerite des pegmatites de Sidi Bou Othmane (Jebilet, Maroc) et le groupe des minéraux à structure de triphylite. Bull. Soc. fr. Minéral., 99, 274–286 (in French with English abs.). (3) Alberti, A. (1976) The crystal structure of ferrisicklerite, Li_{<1}(Fe³⁺, Mn²⁺)PO₄. Acta Cryst., 32, 2761–2764.

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