

Triphylite

Li(Fe²⁺, Mn²⁺)PO₄

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Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Crystals rare, typically prismatic, with large {011}, {100}, {010}, {021}, {120}, several other forms. Commonly subhedral, to 6.5 m, cleavable, compact, massive.

Physical Properties: *Cleavage:* {100}, perfect; {010}, imperfect; {011}, interrupted. *Fracture:* Uneven to subconchoidal. Hardness = 4–5 D(meas.) = 3.50–3.58 D(calc.) = 3.562

Optical Properties: Transparent to translucent. *Color:* Bluish gray to greenish gray; brownish to black where altered. *Streak:* White to grayish white. *Luster:* Vitreous to subresinous. *Optical Class:* Biaxial (+). *Orientation:* $X = a$ or c ; $Y = c$ or b ; $Z = b$ or a . *Dispersion:* $r < v$, strong. $\alpha = 1.675$ – 1.694 $\beta = 1.684$ – 1.695 $\gamma = 1.685$ – 1.700 $2V(\text{meas.}) = 0^\circ$ – 55°

Cell Data: *Space Group:* $Pmnb$. $a = 6.0285(6)$ $b = 10.3586(9)$ $c = 4.7031(3)$ $Z = 4$

X-ray Powder Pattern: Palermo #1 mine, New Hampshire, USA.
3.008 (100), 2.525 (81), 4.277 (76), 3.487 (70), 5.175 (34), 2.781 (34), 3.923 (26)

Chemistry:

| | (1) | (2) |
|--------------------------------|-------|--------|
| P ₂ O ₅ | 44.76 | 45.11 |
| Fe ₂ O ₃ | 1.07 | |
| FeO | 30.05 | 22.84 |
| MnO | 12.40 | 22.55 |
| MgO | 0.72 | |
| CaO | 0.34 | |
| Li ₂ O | 8.33 | 9.50 |
| H ₂ O | 0.25 | |
| insol. | 1.55 | |
| Total | 99.47 | 100.00 |

(1) “Central Asia”, Russia. (2) Li(Fe, Mn)PO₄ with Mn:Fe = 1:1.

Mineral Group: Forms a series with lithiophilite.

Occurrence: The most abundant primary phosphate in complex zoned granite pegmatites.

Association: Ferrisicklerite, heterosite, alluaudite, many other Fe–Mn phosphates and oxides.

Distribution: Occurs at numerous localities; in Germany, from Hühnerkobel, near Zwiesel, and Hagendorf, Bavaria. At Sukula and Tammela, Finland. From Varuträsk, Norrö, and Skruppetorp, Sweden. In the La Vilate quarry, near Chanteloube, and at Huréaux, Haute-Vienne, France. From Dolni Borí, near Velké Meziříčí, Czech Republic. At the Sapucaia pegmatite mine, about 50 km east-southeast of Governador Valadares, Minas Gerais, Brazil. In the USA, large crystals from the G.E. Smith quarry, Newport, Sullivan Co., the Palermo #1 mine, near North Groton, Grafton Co., and elsewhere in New Hampshire; at Newry, Oxford Co. and other places in Maine; from the Dan Patch, Big Chief, and Hesnard mines, near Keystone, Pennington Co., and at the Bull Moose and Tip Top mines, near Custer, Custer Co., South Dakota; in the White Picacho district, Maricopa and Yavapai Cos., Arizona. At Point de Bois, Manitoba, Canada.

Name: From the Greek for *threefold* and *family*, as it contains three cations.

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