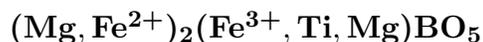


## Azoproite



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**Crystal Data:** Orthorhombic. *Point Group:*  $2/m\ 2/m\ 2/m$ . As prismatic crystals, often striated and skeletal, to 2 cm, typically poorly terminated, with a diamond-shaped outline on {001}.

**Physical Properties:** *Cleavage:* On {010}, good, may be a parting; on {001}, distinct. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness =  $\sim 5.5$  D(meas.) = 3.63(2) D(calc.) = [3.63] Paramagnetic.

**Optical Properties:** Translucent to nearly opaque; transparent in thin section. *Color:* Black. *Luster:* Adamantine. *Optical Class:* Biaxial (+). *Pleochroism:* Strong; X = pale bluish green; Y = dark green; Z = brownish red. *Absorption:*  $Z > Y > X$ .  $\alpha = 1.799(2)$   $\beta = 1.822(3)$   $\gamma = 1.855(5)$   $2V(\text{meas.}) = > 70^\circ$   $2V(\text{calc.}) = 80^\circ$

**Cell Data:** *Space Group:*  $Pbam$ .  $a = 9.26(1)$   $b = 12.25(1)$   $c = 3.01(1)$   $Z = 4$

**X-ray Powder Pattern:** Tazheran massif, Russia. 2.52 (10d), 5.07 (8), 2.16 (6), 2.02 (6), 2.77 (5b), 2.11 (5), 1.900 (5)

Chemistry:	(1)
TiO <sub>2</sub>	15.40
B <sub>2</sub> O <sub>3</sub>	19.07
Fe <sub>2</sub> O <sub>3</sub>	16.01
FeO	5.16
MnO	0.11
MgO	45.01
Na <sub>2</sub> O	trace
Total	100.76

(1) Tazheran massif, Russia; after deduction of calcite, spinel, forsterite, corresponds to  $(\text{Mg}_{1.82}\text{Fe}_{0.13}^{2+})_{\Sigma=1.95}(\text{Fe}_{0.37}^{3+}\text{Ti}_{0.36}\text{Mg}_{0.25})_{\Sigma=0.98}\text{B}_{1.02}\text{O}_{5.00}$ .

**Mineral Group:** Ludwigite group.

**Occurrence:** An uncommon late-stage mineral in the border zone in magnesian contact-metamorphic rocks associated with syenites; the deposit is estimated to contain 350 kT B<sub>2</sub>O<sub>3</sub>.

**Association:** Calcite, ludwigite, brucite, clinohumite, baddeleyite, tazheranite, perovskite, geikielite, forsterite.

**Distribution:** From the Tazheran alkalic massif, west of Lake Baikal, eastern Siberia, Russia.

**Name:** A Russian acronym honoring the Study of Deep Zones of the Earth's Crust (AZOPRO in Russian) sponsored in 1969 by the International Geological Association.

**Type Material:** Mining Institute, St. Petersburg, 1481/1–1481/3; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 72890–72892; Natural History Museum, Paris; National School of Mines, Paris, France, V16383.

**References:** (1) Konev, A.A., V.S. Lebedeva, A.A. Kashayev and Z.F. Ushchapovskaya (1970) Azoprote, a new mineral of the ludwigite group. Zap. Vses. Mineral. Obshch., 99, 225–231 (in Russian). (2) (1971) Amer. Mineral., 56, 360 (abs. ref. 1).