

**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . Crystals bladed and tabular on {100}, elongated || to [001], to 0.5 m; typically bent or twisted. *Twinning:* Lamellar on {100}, twin axis  $\perp$  {100} or || [010] or [001], common.

**Physical Properties:** *Cleavage:* Perfect on {100}, good on {010}, (100)  $\wedge$  (010) = 79°; parting on {001}. *Fracture:* Splintery. Hardness = 5.5 || [001], 7 || [100]. D(meas.) = 3.53–3.65 D(calc.) = [3.67]

**Optical Properties:** Transparent to translucent. *Color:* Blue, white, rarely green, gray, yellow, pink, black, can be zoned; colorless to pale blue in thin section. *Luster:* Vitreous to pearly. *Optical Class:* Biaxial (-). *Pleochroism:* Weak; in thick sections, X = colorless; Y = violet-blue; Z = cobalt blue. *Orientation:* X  $\simeq$   $\perp$  {100} on {100}; X'  $\wedge$  a = 0°–25° on {001}; Z'  $\wedge$  c = 27°–32° on {100}; Z'  $\wedge$  c = 5°–8° on {010}. *Dispersion:* r > v, weak.  $\alpha$  = 1.710–1.718  $\beta$  = 1.719–1.724  $\gamma$  = 1.724–1.734 2V(meas.) = 78°–83°

**Cell Data:** *Space Group:*  $P\bar{1}$ . a = 7.1262(12) b = 7.8520(10) c = 5.5724(10)  $\alpha$  = 89.99(2)°  $\beta$  = 101.11(2)°  $\gamma$  = 106.03(1)° Z = 4

**X-ray Powder Pattern:** Zillertal, Austria. (ICDD 11-46). 3.18 (100), 1.377 (75), 3.35 (65), 1.962 (55), 1.935 (50), 1.930 (50), 2.520 (30)

Chemistry:	(1)	(2)	(1)	(2)
SiO <sub>2</sub>	36.68	37.08	MnO	0.00
TiO <sub>2</sub>	0.00		MgO	0.02
Al <sub>2</sub> O <sub>3</sub>	63.28	62.92	CaO	0.01
Cr <sub>2</sub> O <sub>3</sub>	0.06		Na <sub>2</sub> O	0.00
FeO	0.37		K <sub>2</sub> O	0.01
			Total	100.43 100.00

(1) Elovyi, Karelia; by electron microprobe. (2) Al<sub>2</sub>SiO<sub>5</sub>.

**Polymorphism & Series:** Trimorphous with andalusite and sillimanite.

**Occurrence:** In gneisses, schists, included pegmatites, and quartz veins, from moderately high-pressure regional metamorphism of principally pelitic rocks; detrital in sedimentary rocks.

**Association:** Staurolite, andalusite, sillimanite, talc, “hornblende,” gedrite, mullite, corundum.

**Distribution:** Widely distributed, even in good crystals. From Mt. Greiner, Zillertal, Tirol, Austria. At Alpe Sponda, Pizzo Forno, and at Alpe Campolungo, Tessin, Switzerland. In the Pfitschtal, Trentino-Alto Adige, Italy. From Røros, Norway. Around Yekaterinburg (Sverdlovsk), Ural Mountains, Russia. At Elovyi, Klavoloke, Karelia. From Sultan Hamud, Machakos district, Kenya. Large crystals from a number of localities in Minas Gerais, Brazil, as at Barro Prêto, São José do Jacuri. In the USA, at Lyme, Grafton Co., New Hampshire; at Judd’s Bridge, Litchfield Co., Connecticut; at Darby, Delaware Co., Pennsylvania; from near Bakersville, Mitchell Co., and near Burnsville, Yancy Co., North Carolina; on Willis Mountain, Buckingham Co., Virginia.

**Name:** From the Greek for *blue*, in allusion to its common dark blue color.

**Type Material:** Mining Academy, Freiberg, Germany, 22491.

**References:** (1) Dana, E.S. (1892) Dana’s system of mineralogy, (6th edition), 500–501 [cyanite]. (2) Deer, W.A., R.A. Howie, and J. Zussman (1982) Rock-forming minerals, (2nd edition), v. 1A, orthosilicates, 780–800. (3) Parkin, K.M., B.M. Loeffler, and R.G. Burns (1977) Mössbauer spectra of kyanite, aquamarine, and cordierite showing intervalence charge transfer. Phys. Chem. Minerals, 1, 301–311. (4) Winter, J.K. and S. Ghose (1979) Thermal expansion and high-temperature crystal chemistry of the Al<sub>2</sub>SiO<sub>5</sub> polymorphs. Amer. Mineral., 64, 573–586.

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