

**Crystal Data:** Hexagonal. *Point Group:* 6/m 2/m 2/m. Crystals prismatic to tabular, with {10 $\bar{1}$ 0}, {0001}, and {11 $\bar{2}$ 0}; may be complexly terminated by pyramids, to 18 m and 180 t. Also radial, trapiche, columnar; granular to compact. *Twinning:* On { $h\bar{k}l$ } forms, rarely.

**Physical Properties:** *Cleavage:* Imperfect on {0001}. *Fracture:* Conchoidal to uneven. *Tenacity:* Brittle. Hardness = 7.5–8 VHN = 1190–1450, 1300 average. D(meas.) = 2.63–2.97 increasing with alkali content; 2.7 average. D(calc.) = 2.640

**Optical Properties:** Transparent to translucent. *Color:* Colorless, white, pale blue to sky-blue, bluish green through green to greenish yellow or yellow, rose to peach, deep pink to raspberry-red; may be zoned; commonly colorless in thin section. *Streak:* White. *Luster:* Vitreous, resinous. *Optical Class:* Uniaxial (-). *Pleochroism:* Weak to distinct; *O* = colorless, yellowish green, light blue, yellowish red; *E* = sea-green, blue, purplish red.  $\omega$  = 1.567–1.610  $\epsilon$  = 1.565–1.599; increasing with alkali content.

**Cell Data:** *Space Group:* P6/mcc.  $a$  = 9.205–9.274  $c$  = 9.187–9.249  $Z$  = 2

**X-ray Powder Pattern:** Royalston, Massachusetts, USA.  
2.867 (100), 3.254 (95), 7.98 (90), 4.60 (50), 3.99 (45), 3.015 (35), 2.523 (30)

<b>Chemistry:</b>	(1)	(2)	(3)		(1)	(2)	(3)
SiO <sub>2</sub>	65.59	63.29	67.07	Na <sub>2</sub> O	0.26	1.23	
Al <sub>2</sub> O <sub>3</sub>	18.25	17.76	18.97	Cs <sub>2</sub> O		3.79	
FeO	1.16			Rb <sub>2</sub> O		0.05	
BeO	13.46	10.79	13.96	LOI	0.70	1.10	
Li <sub>2</sub> O		1.30		Total	99.42	99.31	100.00

(1) Mursinka, Russia; by electron microprobe. (2) Nuristan district, Laghman Province, Afghanistan; by electron microprobe. (3) Be<sub>3</sub>Al<sub>2</sub>Si<sub>6</sub>O<sub>18</sub>.

**Occurrence:** In granites and granite pegmatites, rarely in nepheline syenites. Also in mafic metamorphic rocks, low- to high-temperature hydrothermal veins and in vugs in rhyolite.

**Association:** Quartz, feldspar, muscovite, lepidolite, spodumene, amblygonite, tourmaline, topaz, cassiterite, columbite, tantalite.

**Distribution:** Prominent localities for fine specimens include: in Russia, in the Mursinka-Alabashka area, near Yekaterinburg (Sverdlovsk), Ural Mountains, and from Nerchinsk south to Borzaya, Adun-Chilon Mountains, Siberia. At Volhynia, Ukraine. In the Muiâne pegmatite, Alto Ligonha district, Mozambique. From Madagascar, especially around Mt. Bity, south of Antsirabe, with giant crystals from the Malakialina district. In the Rafin-Gabas Hills, near Jos, Nigeria. In the Sandawana-Belingwe area, Mweza Range, Zimbabwe. Exceptional green crystals from the Muzo and Chivor districts, Boyacá Province, Colombia. In Brazil, from Minas Gerais, in large districts around Teófilo Otoni, Governador Valadares, Conselheiro Pena, and Itabira. Around Mingora, Swat district; from Dassu and the Skardu district; at Kunar and Nagar, near Karimabad, Hunza district, Pakistan. In Afghanistan, around Khenj, Panjshir Valley. In the USA, from the Pala and Rincon districts, San Diego Co., California; at Hiddenite, Alexander Co., North Carolina; fine red crystals in the Wah Wah Mountains, Beaver Co., Utah; on Mt. Antero, Chaffee Co., Colorado; and in the Sawtooth Mountains area, Idaho.

**Name:** From the Greek *beryllos*, original significance unknown.

**References:** (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 405–409. (2) Deer, W.A., R.A. Howie, and J. Zussman (1986) Rock-forming minerals, (2nd edition), v. 1B, disilicates and ring silicates, 372–409. (3) Sinkankas, J. (1981) Emeralds and other beryls. Chilton, Radnor, Pennsylvania, USA, 665 pp. (4) Aurisicchio, C., G. Fioravanti, O. Grubessi, and P.F. Zanazzi (1988) Reappraisal of the crystal chemistry of beryl. *Amer. Mineral.*, 73, 826–837.

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