

# Londonite

# (Cs, K, Rb)Al<sub>4</sub>Be<sub>4</sub>(B, Be)<sub>12</sub>O<sub>28</sub>

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**Crystal Data:** Cubic. *Point Group:*  $\bar{4}3m$  (by analogy to rhodizite). As portions of Cs-rich material heterogeneously distributed throughout crystals, patchy, exsolutionlike, and in veinlets; crystals may show dominant {110}, modified by {111}, {221}, {211}, rare {100}, to 7 cm.

**Physical Properties:** *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 8  
D(meas.) = 3.34 D(calc.) = 3.42 [Strongly piezoelectric and pyroelectric.]

**Optical Properties:** Transparent to translucent. *Color:* Colorless, white, sulfur-yellow, pale yellow, pale yellow-green. *Streak:* White. *Luster:* Vitreous.

*Optical Class:* Isotropic.  $n = 1.693$

**Cell Data:** *Space Group:*  $P\bar{4}3m$ .  $a = 7.3205(3)$   $Z = 1$

**X-ray Powder Pattern:** Antandrokomby, Madagascar (very similar to rhodizite).  
2.9898 (100), 2.1132 (70), 2.4410 (50), 1.7759 (40), 3.276 (35), 1.9568 (35), 2.2076 (30)

<b>Chemistry:</b>	(1)	(2)	(1)	(2)	
SiO <sub>2</sub>	0.07	0.45	Na <sub>2</sub> O	0.11	0.12
B <sub>2</sub> O <sub>3</sub>	[47.39]	46.82	K <sub>2</sub> O	2.21	1.79
Al <sub>2</sub> O <sub>3</sub>	25.10	24.41	Rb <sub>2</sub> O	1.04	1.83
Fe <sub>2</sub> O <sub>3</sub>	0.06	0.12	Cs <sub>2</sub> O	8.37	7.54
BeO	[15.49]	12.20	H <sub>2</sub> O <sup>+</sup>		4.10
MnO	0.05		H <sub>2</sub> O <sup>-</sup>		0.53
CaO	0.14				
Li <sub>2</sub> O	0.04	0.00	Total	[100.07]	[99.91]

(1) Antandrokomby, Madagascar; by electron microprobe, average of five analyses, B<sub>2</sub>O<sub>3</sub> and BeO calculated for stoichiometry; corresponds to (Cs<sub>0.48</sub>K<sub>0.38</sub>Rb<sub>0.09</sub>Na<sub>0.03</sub>Ca<sub>0.02</sub>Mn<sub>0.01</sub>)<sub>Σ=1.01</sub>(Al<sub>3.98</sub>Li<sub>0.02</sub>Fe<sub>0.01</sub>)<sub>Σ=4.01</sub>Be<sub>4.00</sub>(B<sub>10.99</sub>Si<sub>0.01</sub>Be<sub>1.00</sub>)<sub>Σ=12.00</sub>O<sub>28.00</sub>. (2) Manjaka, Madagascar; original total given as 99.92%, neglecting impurities and H<sub>2</sub>O, corresponds to (Cs<sub>0.45</sub>K<sub>0.32</sub>Rb<sub>0.16</sub>Na<sub>0.03</sub>)<sub>Σ=0.96</sub>Al<sub>4.08</sub>Be<sub>4.00</sub>(B<sub>11.48</sub>Be<sub>0.15</sub>)<sub>Σ=11.63</sub>O<sub>28.00</sub>.

**Occurrence:** An uncommon component of granite pegmatites, in the central zones and in miarolitic cavities.

**Association:** Rhodizite, danburite, elbaite–liddicoatite–schorl, Cs-rich beryl, spodumene, Mn-rich apatite, hambergite, microlite, manganocolumbite, manganotantalite, béhierite, hafnian zircon, albite, microcline, quartz.

**Distribution:** In Madagascar, from Antandrokomby, near Mt. Bity, Manandona Valley, Antsirabe district; at Antsongombato and Ampanivana, south of Mahaiza, and from Manjaka, Betafo region.

**Name:** To honor Dr. David London (1953–), Professor of Geology and Geophysics, University of Oklahoma, Norman, Oklahoma, USA, for his contributions to the understanding of granite pegmatites.

**Type Material:** Museum of Natural History, Milan, Italy, M31115; Department of Geology and Geophysics, New Orleans, USA.

**References:** (1) Simmons, W.B., F. Pezzotta, A.U. Falster, and K.L. Webber (2001) Londonite, a new mineral species: the Cs-dominant analogue of rhodizite from the Antandrokomby granitic pegmatite, Madagascar. *Can. Mineral.*, 39, 747–755. (2) Frondel, C. and J. Ito (1965) Composition of rhodizite. *Tschermaks Mineral. Petrog. Mitt.*, 10, 409–412.