

**Holtite****Al<sub>6</sub>(Al, Ta)(BO<sub>3</sub>)[(Si, Sb, As)O<sub>4</sub>]<sub>3</sub>(O, OH)<sub>3</sub>**

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**Crystal Data:** Orthorhombic. *Point Group:* 2/m 2/m 2/m. In blocky crystals, to 2 cm; as pseudohexagonal needles, elongated along [100], typically S-shaped; finely crystalline. *Twinning:* Multiple on {011}.

**Physical Properties:** *Cleavage:* Good on {001}, may be parting. *Hardness* = 8.5  
D(meas.) = 3.60–3.90 D(calc.) = [3.92] *Fluoresces* dull orange under SW UV and bright yellow under LW UV.

**Optical Properties:** *Semitransparent.* *Color:* Light buff to cream-buff or deep olive-buff, brown, russet. *Streak:* Light buff. *Luster:* Resinous, vitreous, dull when weathered. *Optical Class:* Biaxial (-). *Pleochroism:* Various shades of yellow to colorless. *Orientation:* X = a. *Dispersion:* r < v. α = 1.705–1.746 β = 1.728–1.759 γ = 1.730–1.761  
2V(meas.) = 20°–55°

**Cell Data:** *Space Group:* Pnma. a = 4.6914(5) b = 11.896(2) c = 20.383(4) Z = 4

**X-ray Powder Pattern:** Greenbushes, Western Australia.  
10.28 (100), 2.94 (40), 5.89 (34), 5.93 (32), 5.08 (32), 2.338 (26), 5.12 (24)

<b>Chemistry:</b>	(1)	(2)	(1)	(2)
SiO <sub>2</sub>	20.30	26.74	BeO	0.05
TiO <sub>2</sub>	0.09		MgO	0.10
B <sub>2</sub> O <sub>3</sub>	1.82	4.67	CaO	0.10
Al <sub>2</sub> O <sub>3</sub>	46.43	43.44	Li <sub>2</sub> O	0.59
Fe <sub>2</sub> O <sub>3</sub>	0.27	0.20	Na <sub>2</sub> O	0.35
Sb <sub>2</sub> O <sub>3</sub>	13.89		K <sub>2</sub> O	0.45
Sb <sub>2</sub> O <sub>5</sub>	4.61	6.49	Rb <sub>2</sub> O	0.11
As <sub>2</sub> O <sub>5</sub>		2.92	Cs <sub>2</sub> O	0.57
Nb <sub>2</sub> O <sub>5</sub>	0.76	0.15	H <sub>2</sub> O <sup>+</sup>	0.38
Ta <sub>2</sub> O <sub>5</sub>	11.24	11.70	H <sub>2</sub> O <sup>-</sup>	0.08
MnO	0.05		<hr/>	
			Total	99.97 99.71

(1) Greenbushes, Western Australia; B<sub>2</sub>O<sub>3</sub> thought to be low; corresponding to Al<sub>24.50</sub>Ta<sub>1.36</sub>Nb<sub>0.16</sub>Fe<sub>0.10</sub><sup>3+</sup>Be<sub>0.05</sub>Ti<sub>0.03</sub>Mn<sub>0.02</sub>B<sub>1.40</sub>Si<sub>9.09</sub>Sb<sub>2.56</sub><sup>3+</sup>Sb<sub>0.76</sub><sup>5+</sup>O<sub>66.62</sub>(OH)<sub>1.13</sub>. (2) Kola Peninsula, Russia; corresponding to Al<sub>23.23</sub>Ta<sub>1.49</sub>Nb<sub>0.03</sub>Fe<sub>0.09</sub>Mg<sub>0.06</sub>Ca<sub>0.06</sub>Ti<sub>0.03</sub>B<sub>3.84</sub>Si<sub>10.64</sub>Sb<sub>1.15</sub><sup>5+</sup>As<sub>0.72</sub><sup>5+</sup>O<sub>69.57</sub>(OH)<sub>2.09</sub>.

**Occurrence:** As coatings on stibiotantalite and replacing tantalite in a pegmatite (Greenbushes, Western Australia); in pegmatites cutting amphibolites (Voron'i massif, Russia).

**Association:** Stibiotantalite, tantalite, tourmaline, microlite, quartz (Greenbushes, Western Australia); stibiotantalite, microlite, tantite (Voron'i massif, Russia).

**Distribution:** At Bunbury Gully, Greenbushes, Western Australia. From the Voron'i massif, Kola Peninsula, Russia.

**Name:** For Harold Edward Holt (1908–1967), Prime Minister of Australia (1966–1967).

**Type Material:** Government Chemical Laboratories, Perth, Australia, MDC550.

**References:** (1) Pryce, M.W. (1971) Holtite: a new mineral allied to dumortierite. *Mineral. Mag.*, 38, 21–25. (2) (1972) *Amer. Mineral.*, 57, 1556 (abs. ref. 1). (3) Voloshin, A.V., V.V. Gordienko, E.M. Gel'man, M.L. Zorina, N.A. Elina, E.A. Kul'chitskaya, Y.P. Men'shikov, L.I. Polezhaeva, R.I. Ryzhova, P.B. Sokolov, and G.I. Utochkina (1977) Holtite (first find in the USSR) and its interaction with other tantalum minerals in rare metal pegmatites. *Zap. Vses. Mineral. Obshch.*, 106, 337–347 (in Russian). (4) Hoskins, B.F., W.G. Mumme, and M.W. Pryce (1989) Holtite, (Si<sub>2.25</sub>Sb<sub>0.75</sub>)B[Al<sub>6</sub>(Al<sub>0.43</sub>Ta<sub>0.27</sub>□<sub>0.30</sub>)O<sub>15</sub>(O, OH)<sub>2.25</sub>]: crystal structure and crystal chemistry. *Mineral. Mag.*, 53, 457–463.

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