

**Tobelite****(NH<sub>4</sub>, K)Al<sub>2</sub>(Si<sub>3</sub>Al)O<sub>10</sub>(OH)<sub>2</sub>**

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**Crystal Data:** Monoclinic. *Point Group:* 2/m (probable). As aggregates of crystals and flakes, up to 0.1 mm.

**Physical Properties:** *Cleavage:* Perfect on {001}. *Tenacity:* Clayey. *Hardness* = n.d.  
D(meas.) = 2.58–2.62 D(calc.) = 2.617

**Optical Properties:** Semitransparent. *Color:* White to yellowish green; nearly colorless in thin section. *Luster:* Silky.

*Optical Class:* Biaxial (-).  $\alpha = 1.555\text{--}1.560$   $\beta = 1.575\text{--}1.587$   $\gamma = 1.581\text{--}1.595$   
2V(meas.) = 28° 2V(calc.) = 28°–30°

**Cell Data:** *Space Group:* C2/m (probable).  $a = 5.219(4)$   $b = 8.986(3)$   $c = 10.447(2)$   
 $\beta = 101.31(1)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Tobe, Japan; 1M.

10.24 (100), 5.12 (70), 4.486 (70), 3.408 (60), 2.566 (45), 3.103 (35), 4.360 (30)

**Chemistry:**

	(1)	(2)
SiO <sub>2</sub>	48.40	48.34
TiO <sub>2</sub>	0.02	0.30
Al <sub>2</sub> O <sub>3</sub>	36.27	37.87
Fe <sub>2</sub> O <sub>3</sub>	0.57	1.02
MgO	0.52	0.11
CaO	0.00	0.00
Na <sub>2</sub> O	0.04	-0.01
K <sub>2</sub> O	2.30	3.25
(NH <sub>4</sub> ) <sub>2</sub> O	3.51	3.85
H <sub>2</sub> O <sup>+</sup>	6.40	4.96
H <sub>2</sub> O <sup>-</sup>	1.97	0.31
Total	[100.00]	[100.00]

(1) Tobe, Japan; recalculated to 100.00% after deduction of 0.25% quartz; corresponds to [(NH<sub>4</sub>)<sub>0.53</sub>K<sub>0.19</sub>Na<sub>0.01</sub>]<sub>Σ=0.73</sub>(Al<sub>1.97</sub>Mg<sub>0.05</sub>Fe<sub>0.03</sub><sup>3+</sup>)<sub>Σ=2.05</sub>(Si<sub>3.17</sub>Al<sub>0.83</sub>)<sub>Σ=4.00</sub>O<sub>10</sub>(OH)<sub>2</sub>. (2) Horo, Japan; recalculated after deduction of 1% quartz and 20% ammonium-rich mica, analyzed separately, the “negative” Na<sub>2</sub>O a result of this correction; corresponds to [(NH<sub>4</sub>)<sub>0.57</sub>K<sub>0.27</sub>]<sub>Σ=0.84</sub>(Al<sub>1.95</sub>Fe<sub>0.05</sub><sup>3+</sup>Ti<sub>0.01</sub>Mg<sub>0.01</sub>)<sub>Σ=2.02</sub>(Si<sub>3.09</sub>Al<sub>0.91</sub>)<sub>Σ=4.00</sub>O<sub>10</sub>(OH)<sub>2</sub>.

**Polymorphism & Series:** 1M, 2M<sub>2</sub> polytypes.

**Mineral Group:** Mica group.

**Occurrence:** A hydrothermal alteration product of a biotite andesite dike (Tobe, Japan); in a hydrothermally altered rhyolite tuff (Horo, Japan).

**Association:** Quartz (Tobe, Japan); quartz, ammonium-rich mica, pyrophyllite, diaspore, kaolinite, corundum, andalusite (Horo, Japan).

**Distribution:** In the Ohgidani pottery stone deposit, Tobe, Ehime Prefecture, and in the Horo pyrophyllite deposit, Toyosaka, Hiroshima Prefecture, Japan.

**Name:** For the occurrence at Tobe, Japan.

**Type Material:** National Science Museum, Tokyo, Japan, M23773.

**References:** (1) Higashi, S. (1982) Tobelite, a new ammonium dioctahedral mica. *Mineral. J. (Japan)*, 11, 138–146. (2) (1983) *Amer. Mineral.*, 68, 850 (abs. ref. 1).

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