

**Brandãoite****BeAl<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>2</sub>(H<sub>2</sub>O)<sub>4</sub>·H<sub>2</sub>O**

**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . As acicular pseudo-hexagonal prismatic crystals to 100  $\mu\text{m}$  in compact radiating spherical aggregates to 1.5 mm.

**Physical Properties:** *Cleavage:* None. *Tenacity:* Brittle. *Fracture:* Conchoidal. Hardness = 6 D(meas.) = n.d. D(calc.) = 2.353 Nonfluorescent.

**Optical Properties:** Transparent. *Color:* Colorless crystals, white aggregates. *Streak:* White. *Luster:* Vitreous.

*Optical Class:* Biaxial (+).  $\alpha = 1.544(2)$   $\beta = 1.552(2)$   $\gamma = 1.568(2)$   $2V(\text{meas.}) = 69.7(10)^\circ$   
 $2V(\text{calc.}) = 71.2^\circ$

<i>Orientation:</i>	<i>a</i>	<i>b</i>	<i>c</i>	No pleochroism.
X	87.6°	124.0°	31.2°	
Y	54.0°	136.4°	118.8°	
Z	143.9°	113.8°	101.1°	

**Cell Data:** *Space Group:*  $P\bar{1}$ .  $a = 6.100(4)$   $b = 8.616(4)$   $c = 10.261(5)$   $\alpha = 93.191(11)^\circ$   
 $\beta = 95.120(11)^\circ$   $\gamma = 96.863(11)^\circ$   $Z = 2$

**X-Ray Diffraction Pattern:** Calculated pattern.

4.268 (100), 5.243 (85), 6.772 (82), 2.712 (76), 4.982 (73), 2.789 (68), 3.091 (53)

<b>Chemistry:</b>	(1)	(2)
P <sub>2</sub> O <sub>5</sub>	28.42	37.65
Al <sub>2</sub> O <sub>3</sub>	20.15	27.04
BeO	4.85	6.63
H <sub>2</sub> O	21.47	28.67
Total	74.89	100.00

(1) João Firmino mine, Pomarolli farm region, Divino das Laranjeiras County, Minas Gerais State, Brazil; average electron microprobe and SIMS analyses supplemented by FTIR spectroscopy; corresponds to Be<sub>0.98</sub>Al<sub>1.99</sub>P<sub>2.02</sub>H<sub>12</sub>O<sub>15</sub>. (2) BeAl<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>2</sub>(H<sub>2</sub>O)<sub>4</sub>(H<sub>2</sub>O).

**Occurrence:** In an albite pocket in a tabular to lens-shaped granitic pegmatite with other secondary phosphates as products of montebrazite alteration.

**Association:** Beryllonite, atencioite, zanazziite.

**Distribution:** From the João Firmino mine, Pomarolli farm region, Divino das Laranjeiras County, Minas Gerais State, Brazil.

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**Type Material:** Department of Natural History (Mineralogy), Royal Ontario Museum, Toronto, Ontario, Canada (M57443).

**References:** (1) Menezes Filho, L.A.D., M.L.S.C. Chaves, M.A. Cooper, N.A. Ball, Y.A. Abdu, R. Sharpe, M.C. Day, and F.C. Hawthorne (2019) Brandãoite, [BeAl<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>2</sub>(H<sub>2</sub>O)<sub>4</sub>](H<sub>2</sub>O), a new Be-Al phosphate mineral from the João Firmino mine, Pomarolli farm region, Divino das Laranjeiras County, Minas Gerais State, Brazil: description and crystal structure. *Mineral. Mag.*, 83, 261-267.