

**Pumpellyite-(Al)**

**Crystal Data:** Monoclinic. *Point Group:* 2/m. As radial aggregates of acicular prismatic crystals to 5 mm.

**Physical Properties:** *Cleavage:* Perfect on {100}. *Tenacity:* Brittle. *Fracture:* n.d.  
Hardness = 5.5 D(meas.) = n.d. D(calc.) = 3.41 Non-fluorescent.

**Optical Properties:** Transparent to translucent. *Color:* Emerald-green to white, sometimes with bluish tinges; colorless in thin section. *Streak:* Colorless. *Luster:* Vitreous.  
*Optical Class:* Biaxial (+).  $\alpha = 1.678(2)$   $\beta = 1.680(2)$   $\gamma = 1.691(1)$   $2V(\text{calc.}) = 46^\circ$   
*Orientation:*  $Y = b$ .

**Cell Data:** *Space Group:*  $A2/m$ .  $a = 8.818(2)$   $b = 5.898(2)$   $c = 19.126(6)$   $\beta = 97.26(3)^\circ$   $Z = 4$

**X-Ray Diffraction Pattern:** Bertrix, Ardennes mountains, Belgium.  
2.895 (100), 2.912 (95), 3.787 (80), 3.040 (70), 4.371 (65), 2.191 (45), 2.731 (40)

| Chemistry:                     | (1)   | (2)   | (1)               | (2)    |
|--------------------------------|-------|-------|-------------------|--------|
| SiO <sub>2</sub>               | 37.52 | 38.16 | BaO               | 0.01   |
| Al <sub>2</sub> O <sub>3</sub> | 25.63 | 32.38 | Na <sub>2</sub> O | 0.03   |
| MgO                            | 1.99  |       | K <sub>2</sub> O  | 0.02   |
| FeO                            | 4.97  |       | H <sub>2</sub> O  | [6.71] |
| MnO                            | 0.11  |       | Total             | 100.20 |
| CaO                            | 23.21 | 23.74 |                   | 100.00 |

(1) Bertrix, Ardennes mountains, Belgium; average electron microprobe analysis, H<sub>2</sub>O and OH<sup>-</sup> calculated for charge balance; corresponding to  $(\text{Ca}_{1.99}\text{Na}_{0.01})_{\Sigma=2.00}(\text{Al}_{0.42}\text{Fe}^{2+}_{0.33}\text{Mg}_{0.24}\text{Mn}_{0.01})_{\Sigma=1.00}\text{Al}_{2.00}(\text{SiO}_4)(\text{Si}_2\text{O}_7)(\text{OH})_{2.42} \cdot 0.58\text{H}_2\text{O}$ . (2)  $\text{Ca}_2\text{AlAl}_2(\text{SiO}_4)(\text{Si}_2\text{O}_7)(\text{OH})_3$ .

**Mineral Group:** Pumpellyite group.

**Occurrence:** In veins cutting retrograde metamorphosed sedimentary rocks.

**Association:** Calcite, K-feldspar, chlorite.

**Distribution:** From “Carrière de la Flèche” quarry, 3 km northwest of Bertrix, Ardennes mountains, Belgium.

**Name:** The suffix indicates a member of the *pumpellyite* group with aluminum dominant in the *M1* and *M2* sites. Honors Raphael *Pumpelly* (1837-1923), pioneer student of the paragenesis of copper-deposit minerals of the Keweenaw Peninsula, Michigan, USA.

**Type Material:** Laboratory of Mineralogy, University of Liège, Belgium (20327).

**References:** (1) Hatert, F., M. Pasero, N. Perchiazzi, and T. Theye (2007) Pumpellyite-(Al), a new mineral from Bertrix, Belgian Ardennes. *Eur. J. Mineral.*, 19, 247-253. (2) Passaglia, E. and G. Gottardi (1973) Crystal chemistry and nomenclature of pumpellyites and julgoldites. *Can. Mineral.*, 12, 219-223. (3) Nagashima, M., T. Armbruster, and E. Libowitzky (2010) The hydrogen-bond system in pumpellyite. *Eur. J. Mineral.*, 22, 333-342.