

**Ca<sub>2</sub>(Mn<sup>2+</sup>, Mg)(Al, Mn<sup>3+</sup>, Fe)<sub>2</sub>  
(SiO<sub>4</sub>)(Si<sub>2</sub>O<sub>7</sub>)(OH)<sub>2</sub>•H<sub>2</sub>O**

**Pumpellyite-(Mn<sup>2+</sup>)**

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**Crystal Data:** Monoclinic. *Point Group:* 2/m. Platy crystals, to 0.1 mm, elongated along [010] and tabular on {001}; fine granular.

**Physical Properties:** *Cleavage:* One perfect, presumably {001}, seen in thin section. Hardness = ~5 in aggregate. D(meas.) = n.d. D(calc.) = 3.34

**Optical Properties:** Semitransparent. *Color:* Light grayish pink to brownish pink. *Streak:* Light grayish pink. *Luster:* Vitreous. *Optical Class:* Biaxial (-). *Pleochroism:* Strong; X = pale pink; Y = Z = brownish pink.  $\alpha = 1.752(2)$   $\beta = 1.795(5)$   $\gamma = 1.800(5)$   $2V(\text{meas.}) = \sim 40^\circ$

**Cell Data:** *Space Group:* A2/m.  $a = 8.923$   $b = 5.995$   $c = 19.156$   $\beta = 97^\circ 8'$   $Z = 4$

**X-ray Powder Pattern:** Ochiai mine, Japan. 2.930 (100), 2.725 (90), 4.75 (65), 3.844 (65), 2.654 (55), 2.533 (50), 2.205 (45)

Chemistry:	(1)
SiO <sub>2</sub>	35.66
TiO <sub>2</sub>	0.02
Al <sub>2</sub> O <sub>3</sub>	13.40
Fe <sub>2</sub> O <sub>3</sub>	2.43
Mn <sub>2</sub> O <sub>3</sub>	7.74
MnO	13.41
MgO	0.89
CaO	20.69
Na <sub>2</sub> O	0.01
H <sub>2</sub> O	[5.75]
Total	[100.00]

(1) Ochiai mine, Japan; by electron microprobe, H<sub>2</sub>O by difference; corresponds to (Ca<sub>1.89</sub>Mn<sub>0.08</sub><sup>2+</sup>)<sub>Σ=1.97</sub>(Mn<sub>0.89</sub><sup>2+</sup>Mg<sub>0.11</sub>)<sub>Σ=1.00</sub>(Al<sub>1.34</sub>Mn<sub>0.50</sub><sup>3+</sup>Fe<sub>0.16</sub><sup>3+</sup>)<sub>Σ=2.00</sub>Si<sub>3.03</sub>O<sub>11</sub>(OH)<sub>2</sub>•1.26H<sub>2</sub>O.

**Mineral Group:** Pumpellyite group.

**Occurrence:** In braunite ore in a syngenetic bedded manganese deposit developed in low-grade metamorphic rocks.

**Association:** Braunite, piemontite, clinozoisite, caryopilite, johannsenite, rhodochrosite, albite, quartz, calcite.

**Distribution:** In the Ochiai mine, 3.5 km west of Barazawa, Yamanashi Prefecture, Japan.

**Name:** For its membership in the *pumpellyite* group and dominant *manganous manganese* content.

**Type Material:** National Science Museum, Tokyo, Japan, M23125; National Museum of Natural History, Washington, D.C., USA, 147159, 147160.

**References:** (1) Kato, A., S. Matsubara, and R. Yamamoto (1981) Pumpellyite-(Mn<sup>2+</sup>) from the Ochiai mine, Yamanashi Prefecture, Japan. *Bull. Minéral.*, 104, 396–399. (2) (1983) *Amer. Mineral.*, 68, 1250 (abs. ref. 1).