Magnesiobermanite $MgMn^{3+}_2(PO_4)_2(OH)_2{\cdot}4H_2O$

Crystal Data: Monoclinic. *Point Group*: 2. As aggregates to 1.2 mm of twinned, bladed to tabular on {010} crystals to 0.3 mm. *Twinning*: Noted but not described.

Physical Properties: *Cleavage*: Good on {100}. *Tenacity*: Brittle. *Fracture*: Splintery and conchoidal mentioned. Hardness = 3.5 D(meas.) = 2.75(3) D(calc.) = 2.73 Nonfluorescent.

Optical Properties: Translucent. *Color*: Orange-red to brownish red. *Streak*: Salmon-pink. *Luster*: Vitreous.
Optical Class: Biaxial (-). $\alpha = 1.690(2)$ $\beta = 1.719(2)$ $\gamma = 1.734(2)$ 2V(calc.) = 70.4°
Pleochroism: Strong; *X* = pale orange-red, *Y* = pale yellow, *Z* = dark orange-red.
Absorption: *Z* > *X* > *Y*.

Cell Data: *Space Group: P*2_1. $a = 5.421(1)$ $b = 19.072(4)$ $c = 5.389(1)$ $\beta = 110.21(3)°$ Z = 2

X-Ray Diffraction Pattern: White Rock No. 2 quarry, Bimbowrie Conservation Park, South Australia, Australia.
9.533 (100), 4.772 (21), 5.089 (8), 2.892 (6), 4.878 (3), 3.634 (3), 3.246 (3)

Chemistry:

	(1)	(2)
MgO	9.59	9.37
Mn_2O_3	27.41	36.70
Fe_2O_3	8.84	
Al_2O_3	0.18	
P_2O_5	33.27	32.99
H_2O	[20.94]	20.94
Total	100.23	100.00

(1) White Rock No. 2 quarry, Bimbowrie Conservation Park, South Australia, Australia; average electron microprobe and FTIR spectroscopic analyses, H_2O calculated; corresponding to $Mg_{1.02}(Mn^{3+}_{1.49}Fe^{3+}_{0.47}Al_{0.02})_{\Sigma=1.98}(PO_4)_{2.01}(OH)_{1.95}{\cdot}4.01H_2O$. (2) $MgMn^{3+}_2(PO_4)_2(OH)_2{\cdot}4H_2O$.

Occurrence: In zoned granitic pegmatite. Formed from secondary phosphate minerals, that had been formed by metasomatic alteration of magmatic fluorapatite, by hydrothermal alteration and weathering in an oxidizing, low-temperature, and low-pH environment.

Association: Fluorapatite, leucophosphite, jahnsite-(NaFeMg), ushkovite, laueite, perloffite, mitridatite.

Distribution: From the White Rock No. 2 quarry, Bimbowrie Conservation Park, 24 km north of Olary, South Australia, Australia.

Name: The prefix identifies the Mg-analogue of *bermanite*.

Type Material: South Australian Museum, Adelaide, South Australia, Australia (G34762).

References: (1) Elliot, P. (2022) Magnesiobermanite, $MgMn^{3+}_2(PO_4)_2(OH)_2{\cdot}4H_2O$, the Mg analogue of bermanite: Description and crystal structure. Mineral. Mag., 86, 127-133.