Angastonite $CaMgAl_2(PO_4)_2(OH)_4 \cdot 7H_2O$

Crystal Data: Triclinic. *Point Group*: $\bar{1}$. As crusts of platy crystals to 100 μm with {010} prominent.

Physical Properties: *Cleavage*: One on {010}. *Fracture*: n.d. *Tenacity*: n.d. Hardness = 2 D(meas.) = 2.47 D(calc.) = 2.332

Optical Properties: Transparent to translucent. *Color*: Snow-white. *Streak*: White. *Luster*: Pearly.
Optical Class: Biaxial (+). α = 1.566(2) β = 1.572(2) γ = 1.584(2) 2V(meas.) = 70(2)° 2V(calc.) = 71° *Orientation*: $X \approx a$, $Y \approx b$, $Z \approx c$. *Pleochroism*: Very weak, $X = Z$ = colorless, Y = colorless to pale yellow. *Absorption*: $r = v$. Parallel extinction and no axial dispersion.

Cell Data: *Space Group*: $P\bar{1}$. a = 13.303(1) b = 27.020(2) c = 6.1070(7) α = 89.64(1)° β = 83.44(1)° γ = 80.444(8)° Z = 6

X-ray Powder Pattern: Penrice marble quarry, ~2 km north of Angaston, South Australia.
13.38 (100), 11.05 (25), 5.73 (23), 8.01 (21), 2.888 (19), 2.856 (17), 10.22 (13)

Chemistry:

	(1)	(2)
K_2O	0.09	
CaO	9.87	11.16
MgO	8.17	8.02
Al_2O_3	18.02	20.29
P_2O_5	26.11	28.25
H_2O	31.41	32.28
Total	93.67	100.00

(1) Penrice marble quarry, near Angaston, South Australia; average electron microprobe analysis supplemented by Raman spectroscopy; corresponds to $(Ca_{0.96}K_{0.01})_{\Sigma=0.97}Mg_{1.10}Al_{1.92}P_{2.00}O_{7.95}(OH)_{4.00} \cdot 7.47H_2O$. (2) $CaMgAl_2(PO_4)_2(OH)_4 \cdot 7H_2O$.

Occurrence: In phosphate mineralization in a gossanous weathered zone above recrystallized limestone (now marble).

Association: Minyulite, perhamite, crandallite, apatite-(CaF).

Distribution: From the Penrice marble quarry, ~2 km north of Angaston, South Australia [TL].

Name: For the town of *Angaston*, Australia, named for George Fife Angas (1789-1879), businessman and Member of Parliament of South Australia, who settled in the area in the 1850s.

Type Material: Museum Victoria, Melbourne, Victoria, Australia (M45575 and M50494).

References: (1) Mills, S.J., L.A. Groat, S.A. Wilson, W.D. Birch, P.S. Whitfield, and M. Raudsepp (2008) Angastonite, $CaMgAl_2(PO_4)_2(OH)_4 \cdot 7H_2O$: a new phosphate mineral from Angaston, South Australia. Mineral. Mag., 72, 1011-1020.