Brianite $Na_2CaMg(PO_4)_2$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As anhedral grains, to 0.2 mm. *Twinning:* Polysynthetic on {100}, showing a lamellar structure in polarized light.

Physical Properties: Hardness = 4.5 D(meas.) = 3.0–3.3 D(calc.) = [3.13]

Optical Properties: Transparent. *Color:* Colorless.
Optical Class: Biaxial (–). *Orientation:* Extinction ∧ lamellae ≈2°–3°. $\alpha = 1.598(1)$ $\beta = 1.605(1)$ $\gamma = 1.608(1)$ 2V(meas.) = 63°–65° 2V(calc.) = 66°

Cell Data: *Space Group:* $P2_1/a$. $a = 13.36(5)$ $b = 5.23(2)$ $c = 9.13(3)$ $\beta = 91.2(2)°$ Z = 4

X-ray Powder Pattern: Dayton meteorite.
2.625 (10), 3.734 (9), 2.679 (9), 1.875 (9), 2.718 (8), 3.344 (7), 2.230 (7)

Chemistry:

	(1)	(2)
P_2O_5	46.9	47.27
FeO	0.5	
MgO	12.6	13.42
CaO	18.8	18.67
Na_2O	22.1	20.64
Total	100.9	100.00

(1) Dayton meteorite; by electron microprobe, average of six grains, total Fe as FeO; corresponds to $Na_{2.16}Ca_{1.01}Mg_{0.95}Fe^{2+}_{0.02}(PO_4)_2$. (2) $Na_2CaMg(PO_4)_2$.

Occurrence: A very rare component in phosphate nodules in an iron meteorite.

Association: Panethite, whitlockite, albite, enstatite, schreibersite, kamacite, taenite, graphite, sphalerite, troilite.

Distribution: In the Dayton finest (very fine-grained) octahedrite meteorite.

Name: In honor of Dr. Brian Harold Mason (1917–), U.S. National Museum, Washington, D.C., USA, for his contributions to the study of meteorites.

Type Material: National Museum of Natural History, Washington, D.C., USA, 1506.

References: (1) Fuchs, L.H., E. Olsen, and E.P. Henderson (1967) On the occurrence of brianite and panethite, two new phosphate minerals from the Dayton meteorite. Geochim. Cosmochim. Acta, 31, 1711–1719. (2) (1968) Amer. Mineral., 53, 508–509 (abs. ref. 1). (3) Moore, P.B. (1975) Brianite, $Na_2CaMg[PO_4]_2$: a phosphate analog of merwinite, $Ca_2CaMg[SiO_4]_2$. Amer. Mineral., 60, 717–718.