

Cianciulliite**Mn²⁺(Mg, Mn²⁺)₂Zn₂(OH)₁₀•2–4H₂O**

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Crystal Data: Monoclinic. *Point Group:* 2/m. As crystals, lathlike, tabular on {100}, many faces curved, to 0.6 mm.

Physical Properties: *Cleavage:* Perfect on {100}. *Tenacity:* Laminae flexible, not elastic. Hardness = ~2 D(meas.) = n.d. D(calc.) = 2.87 for 2H₂O; 3.15 for 4H₂O.

Optical Properties: Opaque in all but one direction, ⊥ {100}, then transparent only in thinnest fragments. *Color:* Dark brown to reddish brown; dark red-brown in transmitted light; gray in reflected light, with red-orange internal reflections. *Luster:* Adamantine to vitreous; dull to pearly on cleavage.

Optical Class: Biaxial. *n* = 1.76–1.92 *Anisotropism:* Very weak. *Bireflectance:* Very weak.

R₁–R₂: (400) 9.52–9.72, (420) 9.13–9.30, (440) 8.85–8.97, (460) 8.65–8.74, (480) 8.44–8.56, (500) 8.34–8.44, (520) 8.23–8.35, (540) 8.09–8.25, (560) 8.06–8.21, (580) 8.01–8.20, (600) 7.98–8.18, (620) 7.96–8.18, (640) 7.98–8.18, (660) 7.98–8.18, (680) 7.93–8.15, (700) 7.90–8.14

Cell Data: *Space Group:* C2/m. *a* = 15.405(3) *b* = 6.344(1) *c* = 5.562(2)
β = 101.23(2)° *Z* = 2

X-ray Powder Pattern: Franklin, New Jersey, USA.

7.61 (10), 2.745 (6), 3.96 (5), 2.997 (4), 3.45 (3), 2.673 (3), 5.47 (2)

Chemistry:

	(1)	(2)	(3)
MnO	27.8	29.70	27.56
ZnO	31.1	33.36	30.97
MgO	9.2	9.86	9.15
H ₂ O	[31.9]	27.08	32.32
Total	[100.0]	[100.00]	[100.00]

(1) Franklin, New Jersey, USA; by electron microprobe, Mn²⁺ from crystal-structure analysis, H₂O by difference. (2) Do.; metal ratios from (1), calculated for 2H₂O. (3) Do.; metal ratios from (1), calculated for 4H₂O.

Occurrence: A very rare mineral on a museum specimen, typical of material from secondary veins in a metamorphosed stratiform zinc orebody.

Association: Willemite, zincite, cahnite.

Distribution: From Franklin, Sussex Co., New Jersey, USA.

Name: In honor of John Cianciulli, of Sussex, New Jersey, USA, for his assistance to mineralogists studying Franklin-Sterling Hill minerals.

Type Material: Canadian Museum of Nature, Ottawa, Canada, 56469; National Museum of Natural History, Washington, D.C., USA, M03074.

References: (1) Dunn, P.J., J.D. Grice, A. Criddle, and C. Stanley (1991) Cianciulliite, a new magnesium manganese zinc hydroxide from Franklin, New Jersey. *Amer. Mineral.*, 76, 1708–1710. (2) Grice, J.D. and P.J. Dunn (1991) The crystal structure of cianciulliite, Mn(Mg, Mn)₂Zn₂(OH)₁₀•2–4H₂O. *Amer. Mineral.*, 76, 1711–1714.