

Callaghanite

$\text{Cu}_2\text{Mg}_2(\text{CO}_3)(\text{OH})_6 \cdot 2\text{H}_2\text{O}$

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Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals are pseudo-octahedral to dipyramidal, dominated by $\{111\}$ and $\{11\bar{1}\}$, modified by $\{122\}$ and $\{12\bar{2}\}$, to 3 mm; as incrustations and massive in veinlets.

Physical Properties: *Cleavage:* On $\{111\}$ and $\{11\bar{1}\}$, perfect. *Fracture:* Irregular. *Tenacity:* Brittle. Hardness = 3–3.5 $D(\text{meas.}) = 2.71$ $D(\text{calc.}) = 2.65$

Optical Properties: Transparent to translucent. *Color:* Azure-blue. *Streak:* White. *Luster:* Vitreous.

Optical Class: Biaxial (-). *Pleochroism:* In shades of blue. *Orientation:* $Z \wedge a = 18^\circ$. *Dispersion:* $r > v$, strong. *Absorption:* $Z > Y > X$. $\alpha = 1.559$ $\beta = 1.653$ $\gamma = 1.680$
 $2V(\text{meas.}) = 55^\circ$

Cell Data: *Space Group:* $C2/c$. $a = 10.0060(7)$ $b = 11.7520(8)$ $c = 8.2132(7)$
 $\beta = 107^\circ 23'$ $Z = 4$

X-ray Powder Pattern: Gabbs, Nevada, USA.

7.45 (10), 6.17 (10), 3.87 (9), 3.18 (9), 2.30 (7), 4.80 (6), 3.72 (6)

Chemistry:

| | (1) | (2) |
|------------------|-------|--------|
| CO ₂ | 11.46 | 11.77 |
| CuO | 38.27 | 42.56 |
| MgO | 20.86 | 21.57 |
| CaO | 8.89 | |
| H ₂ O | 20.51 | 24.10 |
| Total | 99.99 | 100.00 |

(1) Gabbs, Nevada, USA; after deduction of calcite impurity, with $(\text{OH})^{1-}$ calculated for charge balance, corresponds to $\text{Cu}_{1.93}\text{Mg}_{2.07}(\text{CO}_3)_{0.82}(\text{OH})_{6.36} \cdot 2\text{H}_2\text{O}$. (2) $\text{Cu}_2\text{Mg}_2(\text{CO}_3)(\text{OH})_6 \cdot 2\text{H}_2\text{O}$.

Occurrence: Disseminated in the contact zone between diorite and serpentized dolostone.

Association: Magnesite, dolomite, serpentine, brucite, forsterite.

Distribution: From near Gabbs, Gabbs district, Nye Co., Nevada, USA.

Name: Honors Dr. Eugene Callaghan (1904–1990), Director of the New Mexico Bureau of Mines, Socorro, New Mexico, USA, for his work on magnesite deposits.

Type Material: National Museum of Natural History, Washington, D.C., USA, R9406.

References: (1) Beck, C.W. and J.H. Burns (1954) Callaghanite, a new mineral. *Amer. Mineral.*, 39, 630–635. (2) Brunton, G. (1973) Refinement of the callaghanite structure. *Amer. Mineral.*, 58, 551.