

# Nullagineite

# Ni<sub>2</sub>(CO<sub>3</sub>)(OH)<sub>2</sub>

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**Crystal Data:** Monoclinic. *Point Group:* 2/m or 2. Fibers showing felted texture, cross-vein or in ovoid to irregular nodules, to 2 mm.

**Physical Properties:** Hardness = n.d. VHN = 25–45 (20 g load). D(meas.) = 3.56(4)  
D(calc.) = 3.66

**Optical Properties:** Semitransparent. *Color:* Bright green; pale green in transmitted light.  
*Luster:* Dull, claylike, silky in cross-vein fibers.

*Optical Class:* Biaxial (-). *Pleochroism:* Weak. *Orientation:* Y or Z  $\simeq$  b; X  $\wedge$  c = 6°.

*Absorption:* Normal to fiber > along length of fiber.  $\alpha = 1.67$   $\beta = 1.78$   $\gamma = 1.78$   
2V(meas.) = n.d.

**Cell Data:** *Space Group:* P2<sub>1</sub>/m or P2<sub>1</sub>. a = 9.236(3) b = 12.001(6) c = 3.091(2)  
 $\beta = 90.48(7)^\circ$  Z = 4

**X-ray Powder Pattern:** Otway deposit, Australia.

2.579 (100), 2.557 (90), 4.619 (40), 3.660 (40), 7.30 (30b), 5.038 (30), 1.545 (30)

## Chemistry:

	(1)	(2)
CO <sub>2</sub>	[21.02]	20.82
Fe <sub>2</sub> O <sub>3</sub>	0.24	
Cr <sub>2</sub> O <sub>3</sub>	0.42	
NiO	68.67	70.66
CuO	0.11	
MgO	0.98	
H <sub>2</sub> O	[8.56]	8.52
Total	[100.00]	100.00

(1) Otway deposit, Australia; by electron microprobe, average of five determinations, recalculated to 100% from an elemental analysis totaling 89.43% and estimated to contain pecoraite 8.6%, total thought low due to adsorbed H<sub>2</sub>O; (CO<sub>3</sub>)<sup>2-</sup> and (OH)<sup>1-</sup> calculated from stoichiometry; then corresponds to (Ni<sub>1.93</sub>Mg<sub>0.05</sub>Cr<sub>0.01</sub>)<sub>Σ=1.99</sub>(CO<sub>3</sub>)(OH)<sub>2</sub>. (2) Ni<sub>2</sub>(CO<sub>3</sub>)(OH)<sub>2</sub>.

**Mineral Group:** Rosasite group.

**Occurrence:** A rare mineral formed in the oxidation zone of nickel-rich hydrothermal ore deposits.

**Association:** Magnesian pecoraite, gaspéite, magnetite, “chlorite”, nickeloan serpentine (Otway deposit, Australia).

**Distribution:** From the Otway nickel deposit, near Spinnaway, Nullagine district, and in the 132 North nickel mine, 4 km southwest of Widgiemooltha, Western Australia.

**Name:** For the Nullagine district, Western Australia, in which the mineral was first found.

**Type Material:** Western Australian Museum, Perth, Australia, M.76a.1991, M.76b.1991; The Natural History Museum, London, England, 1982.74.

**References:** (1) Nickel, E.H. and L.G. Berry (1981) The new mineral nullagineite and additional data on the related minerals rosasite and glaukosphaerite. *Can. Mineral.*, 19, 315–324. (2) (1982) *Amer. Mineral.*, 67, 857–858 (abs. ref. 1).