Coalingite $Mg_{10}Fe^{3+}_2(CO_3)(OH)_{24}\cdot 2H_2O$

Crystal Data: Hexagonal. *Point Group:* $\bar{3}\ 2/m$. In irregular platelets, to 0.2 mm, and equant grains, intergrown with hydrotalcite–pyroaurite or brucite; also as fibers, to 5 mm. *Twinning:* By reflection across {0001}, common.

Physical Properties: *Cleavage:* {0001}, perfect; another at 45°. Hardness = 1–2
D(meas.) = 2.32–2.42 D(calc.) = 2.26

Optical Properties: Translucent. *Color:* Deep reddish brown, brown, straw-yellow; golden brown in transmitted light. *Luster:* Resinous.
Optical Class: Uniaxial (–); may be anomalously biaxial. *Pleochroism:* Marked; O = golden brown, dark brown; E = colorless. *Absorption:* $O > E$. ω = 1.588–1.606; 1.620–1.634
ϵ = 1.560–1.575; 1.585–1.590 2V(meas.) = 5°–20°

Cell Data: *Space Group:* $R\bar{3}m$. $a = 3.12$ $c = 37.4$ Z = 0.5

X-ray Powder Pattern: Near Coalinga, California, USA.
2.34 (10), 4.20 (8), 6.05 (5), 1.558 (5), 13.4 (4b), 2.67 (3), 1.884 (3)

Chemistry:

	(1)	(2)	(3)
SiO_2	1.7	4.82	
Fe_2O_3	18.3	16.97	20.9
FeO	n.d.	0.05	0.7
MnO			1.0
MgO	46.1	46.43	42.9
CaO	0.5	0.38	
H_2O^+	28.8	27.53	32.0
CO_2	4.8	3.87	1.6
Total	[100.2]	100.05	[99.1]

(1) Near Coalinga, California, USA; original total given as 100.7%, after deduction of SiO_2 as chrysotile and Ca as calcite, corresponds to $Mg_{10.08}Fe^{3+}_{2.08}C_{0.92}H_{27.85}O_{29}$. (2) Do.; corresponds to $Mg_{10.16}Fe^{3+}_{2.06}C_{0.81}H_{28.28}O_{29}$. (3) Muskox intrusion, Canada; after corrections for total loss on ignition 33.4%, partially attributed to introduced density liquids; corresponds to $Mg_{9.4}Mn_{0.2}Fe^{2+}_{0.1}Fe^{3+}_{2.3}(CO_3)_{0.32}(OH)_{25.66}\cdot 2.88H_2O$.

Occurrence: Developed from iron-rich brucite in the surface weathering zone of a serpentinite (near Coalinga, California, USA); formed (after collection) in thin veinlets in serpentinite from a layered ultramafic complex (Muskox intrusive, Canada).

Association: Lizardite, antigorite, chrysotile, hydrotalcite–pyroaurite, artinite, hydromagnesite, brucite, magnetite, chromite, uvarovite, calcite (near Coalinga, California, USA).

Distribution: In the USA, from about 55 km northwest of Coalinga, Fresno Co., California; from the Rockville quarry, Rockville, Montgomery Co., Maryland; in the Cedar Hill quarry, Lancaster Co., Pennsylvania. In the Muskox intrusion, Coppermine River area, Northwest Territories, Canada. At Hagdale, Unst, Shetland Islands, Scotland. From Montjovet, Piedmont, Italy. In Russia, in the Lower Tagil massif, Ural Mountains. Found at Mashiki, Kumamoto Prefecture, Japan. At Woodsreef, Barraba, New South Wales, Australia.

Name: For Coalinga, California, USA, near the original occurrence.

Type Material: National Museum of Natural History, Washington, D.C., USA, 119335.

References: (1) Mumpton, F.A., H.W. Jaffe, and C.S. Thompson (1965) Coalingite, a new mineral from the New Idria serpentinite, Fresno and San Benito Counties, California. Amer. Mineral., 50, 1893–1913. (2) Jambor, J.L. (1969) Coalingite from the Muskox intrusion, Northwest Territories. Amer. Mineral., 54, 437–447. (3) Pastor-Rodriguez, J. and H.F.W. Taylor (1971) Crystal structure of coalingite. Mineral. Mag., 38, 286–294.