Giftgrubeite $CaMn_2Ca_2(AsO_4)_2(AsO_3OH)_2 \cdot 4H_2O$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As rosettes of tabular crystals flattened on {100} to 0.2 mm.

Physical Properties: *Cleavage*: None. *Tenacity*: Brittle. *Fracture*: Curved. Hardness = 3.5 D(meas.) = 3.23(2) D(calc.) = 3.24 Nonfluorescent.

Optical Properties: Transparent. *Color*: Colorless, rarely pearl white to pale yellow.
Streak: White. *Luster*: Vitreous.
Optical Class: Biaxial (-). α = 1.630(2) β = 1.640(2) γ = 1.646(2) 2V(meas.) = ~72°
2V(calc.) = 75.1° Nonpleochroic.

Cell Data: *Space Group*: *C*2/*c*. a = 18.495(7) b = 9.475(4) c = 9.986(4) β = 96.79(3)° Z = 4

X-Ray Diffraction Pattern: Giftgrube Mine, St. Jacques vein, Rauenthal, Sainte-Marie-aux-Mines, Haut-Rhin Department, Grand Est, France.
3.33 (100), 3.18 (80), 2.414 (60), 4.80 (50), 4.65 (50), 3.05 (50), 2.488 (50)

Chemistry:

	(1)	(2)
MgO	1.82	
CaO	20.26	19.57
MnO	11.02	16.50
FeO	2.43	
As_2O_5	54.54	53.46
H_2O	[10.70]	10.48
Total	100.77	100.00

(1) Giftgrube Mine, St Jacques vein, Rauenthal, Sainte-Marie-aux-Mines, Haut-Rhin Department, Grand Est, France; average electron microprobe analysis supplemented by Raman spectroscopy, H_2O for charge balance; corresponding to $(Ca_{3.04}Mn_{1.30}Mg_{0.38}Fe_{0.28})_{\Sigma=5.00}(AsO_4)_{1.99}(AsO_3OH)_2 \cdot 4H_2O$.
(2) $CaMn_2Ca_2(AsO_4)_2(AsO_3OH)_2 \cdot 4H_2O$.

Polymorphism & Series: An ordered intermediate member between villyaellenite and sainfeldite.

Mineral Group: Hureaulite group.

Occurrence: A secondary mineral, formed by alteration of arsenical minerals after mining.

Association: Arsenolite, picropharmacolite, pharmacolite, ± haidingerite, chongite, scorodite, Mn-bearing calcite, native arsenic, löllingite.

Distribution From the St Jacques vein, Giftgrube Mine, Rauenthal, Sainte-Marie-aux-Mines, Haut-Rhin Department, Grand Est, France.

Name: For the mine that yielded the studied material.

Type Material: Geology Museum, University of Lausanne, Switzerland (MGL 080133 and 080134).

References: (1) Meisser, N., J. Plášil, T. Brunsperger, C. Lheur, and R. Škoda (2019) Giftgrubeite, $CaMn_2Ca_2(AsO_4)_2(AsO_3OH)_2 \cdot 4H_2O$, a new member of the hureaulite group from Sainte-Marie-aux-Mines, Haut-Rhin Department, Vosges, France. Journal of Geosciences, 64, 73-80.