

Zincgartrellite**Pb(Zn,Cu,Fe)₂(AsO₄)₂(H₂O,OH)₂**

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. As rosette-like aggregates, to 0.5 mm, that consist of crystals <0.1 mm, tabular on {111}.

Physical Properties: *Cleavage:* None. *Fracture:* n.d. *Tenacity:* Brittle.
Hardness = 4.5 D(meas.) = n.d. D(calc.) = 5.30 Soluble in warm, dilute HCl.

Optical Properties: Transparent to translucent. *Color:* Green-yellow. *Streak:* Yellow.
Luster: Vitreous.

Optical Class: Biaxial (-). $\alpha = 1.91(2)$ $\beta(\text{calc.}) = 1.94$ $\gamma = 1.97(2)$ $2V(\text{meas.}) = 87(5)^\circ$
Pleochroism: Weak, X = Z = pale yellow, Y = yellow.

Cell Data: Space Group: $P\bar{1}$. $a = 5.550(1)$ $b = 5.620(1)$ $c = 7.621(1)$ $\alpha = 68.59(1)^\circ$
 $\beta = 69.17(1)^\circ$ $\gamma = 69.51(1)^\circ$ $Z = 1$

X-ray Powder Pattern: Tsumeb mine, Namibia.

2.999 (100), 3.252 (91), 3.283 (89), 4.669 (86), 4.731 (74), 2.894 (74), 2.880 (70)

Chemistry:	(1)
PbO	33.49
CaO	0.35
Fe ₂ O ₃	7.23
Al ₂ O ₃	0.26
CuO	6.26
ZnO	11.40
As ₂ O ₅	34.72
SO ₃	0.13
<u>H₂O</u>	<u>[4.3]</u>
Total	98.62

(1) Tsumeb mine, Namibia; average of 16 electron microprobe analyses supplemented by Fourier transform infrared spectroscopy, H₂O calculated; corresponds to Pb_{1.03}(Zn_{1.08}Cu_{0.50}Fe_{0.37}Al_{0.03}) $\Sigma=1.98$ (AsO₄)_{1.99}[(H₂O)_{1.59}(OH)_{0.45}] $\Sigma=2.04$.

Polymorphism & Series: Related to gartrellite as expressed by the structural formula Pb(Zn_xFe³⁺_{1-x})(Zn_xCu_{1-x})(AsO₄)₂(OH)_{1-x}(H₂O)_{1+x}, where 0.4 < x < ~0.8 for zincgartrellite and x < 0.4 for gartrellite.

Mineral Group: Tsumcorite group.

Occurrence: In the oxidized portion of a polymetallic deposit.

Association: Wulfenite, duftite, β -duftite, conichalcite, cuproadamite, olivenite, chalcocite.

Distribution: From the Tsumeb mine, Namibia.

Name: For the essential *zinc* content and relationship to the isostructural mineral *gartrellite*.

Type Material: The Institut für Mineralogie, University of Bochum, Germany.

References: (1) Effenberger, H., W. Krause, H.-J. Bernhardt, and M. Martin (2000) On the symmetry of tsumcorite group minerals based on the new species rappoldite and zincgartrellite. *Mineral. Mag.*, 64, 1109-1126. (2) (2001) *Amer. Mineral.*, 86, 940 (abs. ref. 1). (3) Krause, W., K. Belendorff, H.-J. Bernhardt, C. McCammon, H. Effenberger, and W. Mikenda (1998) Crystal chemistry of the tsumcorite-group minerals; new data on ferrilotharmeyerite, tsumcorite, thometzekite, mounanaite, helmutwinklerite, and a redefinition of gartrellite. *Eur. J. Mineral.*, 10, 179-206 [*'zincian gartrellite' (sample number #081)*].