

Theisite**Cu₅Zn₅(AsO₄, SbO₄)₂(OH)₁₄**

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Crystal Data: Orthorhombic (probable), pseudo-hexagonal. *Point Group:* n.d. Crystal cleavage plates are usually curved or crumpled, to 2 mm; may be micaceous, lamellar, in spherical aggregates and crusts.

Physical Properties: *Cleavage:* Perfect on {001}. *Tenacity:* Sectile. Hardness = 1.5
D(meas.) = 4.3 D(calc.) = 4.45

Optical Properties: Semitransparent. *Color:* Greenish blue, turquoise-blue, pale turquoise-green, pale emerald-green; pale blue-green in transmitted light. *Streak:* White. *Luster:* Pearly on cleavages.

Optical Class: Biaxial (-), nearly uniaxial (-). $\alpha = 1.755$ $\beta = 1.785$ $\gamma = 1.785$
2V(meas.) = $\approx 0^\circ$

Cell Data: *Space Group:* n.d. $a = 8.220\text{--}8.225$ $b = 7.123$ $c = 14.934\text{--}15.019$ $Z = 2$

X-ray Powder Pattern: Near Durango, Colorado, USA.
3.741 (10), 14.97 (9), 2.534 (9), 7.483 (5), 1.830 (5), 1.533 (5), 4.112 (4)

Chemistry:

	(1)	(2)	(3)
As ₂ O ₅	14.8	14.06	13.03
Sb ₂ O ₅	7.0	8.11	9.92
CuO	33.3	34.32	33.97
ZnO	33.1	35.83	34.50
CaO	0.3		
H ₂ O	10.5		
Total	99.0		

(1) Near Durango, Colorado, USA; H₂O on a separate sample; corresponds to Cu_{4.9}Zn_{4.7}Ca_{0.1} [(As_{0.74}Sb_{0.26})_{Σ=1.0}O₄]₂(OH)_{13.6}. (2) Sa Duchessa mine, Italy; by electron microprobe, average of 11 analyses, (OH)¹⁻ calculated for charge balance; corresponds to Cu_{5.0}Zn_{5.2} [(As_{0.7}Sb_{0.3})_{Σ=1.0}O₄]₂(OH)_{14.4}. (3) Forno, Italy; by electron microprobe, average of 13 analyses, (OH)¹⁻ calculated for charge balance; corresponds to Cu_{4.9}Zn_{4.9}[(As_{0.65}Sb_{0.35})_{Σ=1.0}O₄]₂(OH)_{13.6}.

Occurrence: A rare secondary mineral in thin seams cutting other oxidized minerals (near Durango, Colorado, USA); in dolomitized marble (Forno, Italy).

Association: Cuprite, malachite, azurite, kolwezite, partzite, parnauite, anglesite, cerussite, tenorite, adamite, hemimorphite, chrysocolla, zeunerite, duftite (near Durango, Colorado, USA); azurite, chrysocolla (Sa Duchessa mine, Italy); cinnabar, tetrahedrite, azurite, malachite, fluorite (Forno, Italy).

Distribution: From the Tucker's tunnel uranium deposit, near Durango, Hinsdale Co., Colorado, USA. At the Tynagh mine, near Loughrea, Co. Galway, Ireland. In Germany, from the Glücksrad mine, Oberschulenberg, Harz Mountains; in the Richelsdorf Mountains, Hesse; at the Clara mine, near Oberwolfach, Black Forest. From near Padern, Pyrénées-Orientales, France. In Italy, at the Sa Duchessa mine, Oridda district, and the Is Murvonis mine, Domusnovas, Sardinia; at Canale Fondone, near Forno, Piedmont. From Brixlegg, Tirol, Austria.

Name: To honor Dr. Nicholas J. Theis, who provided the first specimens.

Type Material: The Natural History Museum, London, England, 1984,478.

References: (1) Williams, S.A. (1982) Theisite, a new mineral from Colorado. *Mineral. Mag.*, 46, 49–50. (2) (1983) *Amer. Mineral.*, 68, 282 (abs. ref. 1). (3) Bonazzi, P. and F. Olmi (1989) Theisite from Forno (Alpi Apuane) and from Sa Duchessa (Sardinia), Italy. *Neues Jahrb. Mineral., Monatsh.*, 241–244.

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