

Wupatkiite

(Co, Mg)Al₂(SO₄)₄•22H₂O

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Crystal Data: Monoclinic. *Point Group:* 2/m. Fibers, to 8 mm, in incrustations composed of cross-fiber veins.

Physical Properties: *Cleavage:* One at 70° to fiber length. Hardness = 1.5, in aggregates. D(meas.) = 1.92 D(calc.) = 1.87 Soluble in H₂O.

Optical Properties: Semitransparent. *Color:* Rose-red. *Streak:* White. *Luster:* Silky in masses.

Optical Class: Biaxial. *Pleochroism:* Weak; very pale pink || fiber bundles. *Orientation:* Z ∧ extinction up to 12°. α = 1.477 β = n.d. γ = 1.484 2V(meas.) = n.d.

Cell Data: *Space Group:* [P2₁/c] (by analogy to halotrichite). a = 6.819(4) b = 24.234(10) c = 21.204(10) β = 100.33(5)° Z = [4]

X-ray Powder Pattern: Cameron district, Arizona, USA.

4.790 (100), 3.494 (92), 3.768 (33), 4.295 (27), 3.945 (26), 6.03 (22), 4.106 (22)

Chemistry:	(1)	(2)	(1)	(2)	
SO ₃	35.97		CuO	0.12	
Al ₂ O ₃	11.30	9.81	MgO	1.63	0.31
Fe ₂ O ₃		[2.43]	CaO	0.10	
FeO	0.15	[3.25]	H ₂ O	42.26	
MnO	0.17	0.15	insol.	[4.37]	
CoO	3.41	3.92	Total	[100.00]	
NiO	0.52	0.29			

(1) Cameron district, Arizona, USA; by AA, CoO by colorimetry, CaO by ICP-ES, H₂O by the Penfield method, insoluble by difference, quartz and clay; corresponds to (Co_{0.42}Mg_{0.38}Ni_{0.06}Mn_{0.02}Fe_{0.02}Ca_{0.02}Cu_{0.01})_{Σ=0.93}Al_{2.06}(SO₄)_{4.18}•21.83H₂O. (2) Lorena deposit, Australia; by ICP, after deduction of insoluble 2.5%, original partial analysis here converted to oxides; FeO:Fe₂O₃ partitioned for stoichiometry; corresponds to (Co_{0.47}Fe_{0.41}Mg_{0.07}Ni_{0.04}Mn_{0.02})_{Σ=1.01}(Al_{1.73}Fe_{0.27})_{Σ=2.00}(SO₄)₄•22H₂O.

Mineral Group: Halotrichite group.

Occurrence: A rare post-mine oxidation product of sooty U–Co–Ni–Mo primary mineralization (Cameron district, Arizona, USA).

Association: Pickeringite, moorhouseite, nickel-boussingaultite, quartz, clay (Cameron district, Arizona, USA).

Distribution: From a prospect 13 km east-southeast of Gray Mountain, Cameron district, Coconino Co., Arizona, USA. Abundant in the Lorena gold deposit, near Cloncurry, Queensland, Australia.

Name: For the prehistoric Wupatki Indian pueblos, now a National Monument, nearby the Cameron district, Arizona, USA.

Type Material: National School of Mines, Paris, France.

References: (1) Williams, S.A. and F.P. Cesbron (1995) Wupatkiite from the Cameron uranium district, Arizona, a new member of the halotrichite group. *Mineral. Mag.*, 59, 553–556. (2) (1996) *Amer. Mineral.*, 81, 518 (abs. ref. 1). (3) Lawrence, L.J., V. Munro-Smith, A.R. Ramsden, J.L. Sharpe, and P.A. Williams (1999) Geology and mineralogy of the Lorena gold mine, Cloncurry district, north-west Queensland. *J. & Proc. Royal Society of New South Wales*, 132, 29–35.

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