

Cu₂Al₇(AsO₄)₄(OH)₁₃•11.5H₂O**Ceruleite**

Crystal Data: Triclinic. *Point Group:* $\bar{1}$ or 1. As rodlike crystals, to 5 μm , in powdery to compact, clayey, massive concretions and in spherical aggregates, to 10 cm.

Physical Properties: Hardness = 5–6 $D(\text{meas.}) = 2.70\text{--}2.80$ $D(\text{calc.}) = [2.77]$

Optical Properties: Semitransparent. *Color:* Sky-blue to pale blue.

Optical Class: Biaxial. $n = 1.60$

Cell Data: *Space Group:* $P\bar{1}$ or $P1$. $a = 14.359(3)$ $b = 14.687(3)$ $c = 7.440(1)$
 $\alpha = 96.06(3)^\circ$ $\beta = 93.19(4)^\circ$ $\gamma = 91.63(4)^\circ$ $Z = 2$

X-ray Powder Pattern: Bolivia.

5.650 (100), 7.296 (75), 5.926 (70), 4.760 (70), 3.545 (60), 2.650 (60), 4.877 (50)

Chemistry:	(1)	(2)	(3)
P ₂ O ₅		trace	
As ₂ O ₅	34.56	38.01	35.36
Al ₂ O ₃	31.26	26.85	27.45
Fe ₂ O ₃		0.11	
CuO	11.80	11.79	12.24
H ₂ O	22.32	23.24	24.95
Total	99.94	100.00	100.00

(1) Emma Louisa mine, Chile. (2) Bolivia; average of seven analyses.

(3) Cu₂Al₇(AsO₄)₄(OH)₁₃•11.5H₂O.

Occurrence: In the oxidized zone of arsenic-rich polymetallic mineral deposits; a post-mine product.

Association: Alumopharmacosiderite, olivenite, schlossmacherite, mansfieldite, quartz (Emma Louisa mine, Chile); mansfieldite, quartz, barite, goethite (Bolivia); liroconite, clinoclase, olivenite (Wheal Gorland, England); posnjakite, scorodite, metazeunerite, cassiterite, tourmaline, quartz (Wheal Maid, England); malachite, azurite, olivenite, mansfieldite, pharmacosiderite (Cap Garonne mine, France).

Distribution: From the Emma Louisa gold mine, Guanaco district, about 100 km east-northeast of Taltal, Antofagasta, Chile. At an unknown locality in southern Bolivia. In England, at Wheal Gorland and Wheal Maid, Gwennap, and in the Penberthy Croft mine, St. Hilary, Cornwall. From the Cap Garonne mine, near Le Pradet, Var, France. At the Anticline prospect, 11 km west-southwest of Ashburton Downs homestead, Capricorn Range, Western Australia. From Tsumeb, Namibia.

Name: From *cerulean*, for the sky-blue color of the mineral.

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

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 927–928. (2) Schmetzer, K., H. Bank, W. Berdesinski, and E. Kroužek (1976) Neue Untersuchungen an Coeruleit. Neues Jahrb. Mineral., Monatsh., 418–425 (in German with English abs.).