

# Cyanotrichite

# $\text{Cu}_4\text{Al}_2(\text{SO}_4)(\text{OH})_{12}\cdot 2\text{H}_2\text{O}$

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**Crystal Data:** Orthorhombic. *Point Group:* n.d. Crystals are acicular [001], to 3 cm; may be cottonball-like, commonly in radially fibrous and plushlike tufted aggregates forming incrustations.

**Physical Properties:** Hardness = n.d.  $D(\text{meas.}) = 2.74\text{--}2.95$   $D(\text{calc.}) = 2.88$

**Optical Properties:** Transparent to translucent. *Color:* Sky-blue to azure-blue. *Streak:* Pale blue. *Luster:* Silky.

*Optical Class:* Biaxial (+). *Pleochroism:*  $X = \text{colorless}$ ;  $Y = \text{pale blue}$ ;  $Z = \text{bright blue}$ .

*Orientation:*  $X \perp$  elongation;  $Z = c$ .  $\alpha = 1.588\text{--}1.591$   $\beta = 1.617\text{--}1.620$   $\gamma = 1.654\text{--}1.655$   
 $2V(\text{meas.}) = 82^\circ$

**Cell Data:** *Space Group:* n.d.  $a = 10.16$   $b = 12.61$   $c = 2.90$   $Z = 1$

**X-ray Powder Pattern:** Grandview mine, Arizona, USA. (ICDD 11–131).  
10.2 (100), 3.88 (90), 5.26 (80), 5.47 (50), 3.04 (40), 3.38 (35), 2.392 (35)

Chemistry:	(1)	(2)
$\text{SO}_3$	12.19	12.43
$\text{Al}_2\text{O}_3$	15.59	15.82
$\text{Fe}_2\text{O}_3$	0.43	
CuO	47.50	49.38
CaO	0.11	
$\text{H}_2\text{O}$	23.20	22.37
insol.	1.46	
Total	100.48	100.00

(1) Grandview mine, Arizona, USA. (2)  $\text{Cu}_4\text{Al}_2(\text{SO}_4)(\text{OH})_{12}\cdot 2\text{H}_2\text{O}$ .

**Occurrence:** An uncommon secondary mineral in the oxidized portions of copper sulfide deposits.

**Association:** Brochantite, spangolite, chalcophyllite, olivenite, tyrolite, parnauite, azurite, malachite.

**Distribution:** From Moldova Nouă (Moldova), Romania. At the Cap Garonne mine, near le Pradet, Var, France. In England, from Wheal Gorland, St. Day, the Phoenix United mine, Linkinhorne, at Lanivet, and elsewhere in Cornwall; in the Old Potts Gill mine, Caldbeck Fells, Cumbria. At the Sa Duchessa mine, Sardinia, Italy. From Laurium, Greece. At the Mednorudyanskoye copper deposit, near Nizhni Tagil, Ural Mountains, Russia. From Akchagyl, Kazakhstan. From the Springbok mine, Namaqualand, South Africa. In the USA, in Arizona, exceptional specimens from the Grandview (Last Chance) mine, Grand Canyon National Park, Coconino Co.; at the Maid of Sunshine mine, Courtland, and Bisbee, Cochise Co.; from Morenci, Greenlee Co.; at Jerome, Yavapai Co. Large sprays from the Mex-Tex mine, near Bingham, Hansonburg district, Socorro Co., New Mexico; in the American Eagle mine, Tintic district, Juab Co., Utah; at Majuba Hill, Pershing Co., and elsewhere in Nevada; fine examples from the Peacock mine, near Leadore, Lemhi Co., Idaho. At Mina la Vieja, near Potrerillos, Atacama, Chile. Other minor localities have been noted.

**Name:** From the Greek for *blue* and *hair*, in allusion to the typical color and habit.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 578–579.