

## Chrysocolle



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**Crystal Data:** Orthorhombic (?). *Point Group:* n.d. Crystals acicular, to 5 mm, in radiating clusters; fine fibrous, botryoidal, earthy; commonly cryptocrystalline, opaline, or enamel-like.

**Physical Properties:** *Fracture:* Conchoidal. *Tenacity:* Brittle to somewhat sectile. Hardness = ~2–4 D(meas.) = 1.93–2.4 D(calc.) = n.d.

**Optical Properties:** Translucent to opaque. *Color:* Blue, blue-green, or green; brown to black when impure. *Streak:* White when pure. *Luster:* Vitreous, porcelaneous, earthy. *Optical Class:* Biaxial (-).  $\alpha = 1.575\text{--}1.585$   $\beta = 1.597$   $\gamma = 1.598\text{--}1.635$   $2V(\text{meas.}) = \text{n.d.}$

**Cell Data:** *Space Group:* n.d.  $a = 5.72\text{--}5.92$   $b = 17.7\text{--}18.0$   $c = 8.00\text{--}8.28$   $Z = \text{n.d.}$

**X-ray Powder Pattern:** Locality unknown. (ICDD 27-188). 1.486 (100), 17.9 (80), 2.90 (80), 2.56 (70), 7.9 (60), 4.07 (60), 1.602 (40)

### Chemistry:

|                                | (1)    | (2)   |
|--------------------------------|--------|-------|
| SiO <sub>2</sub>               | 35.80  | 39.48 |
| Al <sub>2</sub> O <sub>3</sub> | 2.00   | 1.91  |
| Fe <sub>2</sub> O <sub>3</sub> | trace  | 0.13  |
| MnO                            |        | 0.88  |
| CuO                            | 42.00  | 46.93 |
| MgO                            | 0.08   | 0.47  |
| CaO                            | 1.04   | 0.52  |
| Na <sub>2</sub> O              | 0.04   |       |
| K <sub>2</sub> O               | 0.05   |       |
| H <sub>2</sub> O <sup>+</sup>  | 10.00  | 8.29  |
| H <sub>2</sub> O <sup>-</sup>  | 9.46   | 1.31  |
| Total                          | 100.47 | 99.92 |

(1) Mednorudyansk, Russia. (2) Kamoya, Congo.

**Occurrence:** In the oxidized portions of many copper deposits.

**Association:** Malachite, tenorite, halloysite, nontronite.

**Distribution:** A few localities for rich or commercial material include: from Nizhni Tagil, Ural Mountains, Russia. At Lubietová, near Banská Bystrica (Libethen, near Neusohl), Slovakia. In the Timna (King Solomon's) mine, Israel. From the Star of the Congo mine, Lubumbashi, and at Likasi and Kakanda, Katanga Province, Congo (Shaba Province, Zaire). In the USA, in Arizona, constitutes parts of large orebodies, as in the Globe-Miami district, Gila Co., Morenci, Greenlee Co., San Manuel and Ray mines, Pinal Co.; in New Mexico, at Santa Rita, Grant Co.; from Utah, in the Tintic district, Juab Co. At Cananea, Sonora, Mexico. In Chile, in the Chuquicamata and Exotica deposits; around Copiapó and Coquimbo. From the Chillagoe district, Queensland, Australia.

**Name:** From the Greek for *gold* and *glue*, for a substance used in the soldering of gold, including chrysocolle as well as other blue and green minerals.

**References:** (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 699–700. (2) Chukhrov, F.V., B.B. Zvyagin, A.I. Gorshkov, L.P. Ermilova, and E.S. Rudnitskaya (1968) Chrysocolle. *Izv. Akad. Nauk SSSR, Ser. Geol.*, no. 6, 29–44 (in Russian). (3) (1969) *Amer. Mineral.*, 54, 993 (abs. ref. 2). (4) Van Oosterwyck-Gastuche, M.-C. (1970) La structure de la chrysocolle. *Compt. Rendus Acad. Sci. Paris*, 271, 1837–1840 (in French).

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