# Greenockite CdS



**Crystal Data:** Hexagonal. *Point Group:* 6*mm*. Crystals hemimorphic pyramidal, to 3 cm; most commonly as earthy coatings. *Twinning:* Twin plane $\{11\bar{2}2\}$ rare, forming fourlings.

**Physical Properties:** *Cleavage:* Distinct on $\{11\bar{2}2\}$, imperfect on $\{0001\}$.
*Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 3–3.5 VHN = n.d. D(meas.) = 4.820 D(calc.) = 4.824

**Optical Properties:** Nearly opaque to translucent. *Color:* Shades of yellow and orange, rarely deep red; in polished section, very pale lemon-yellow to red-brown and blood-red.
*Streak:* Yellow-orange to brick-red. *Luster:* Adamantine to resinous.
*Optical Class:* Uniaxial (+) for red to blue-green, uniaxial (–) for blue-green to blue; isotropic at 523 nm. *Pleochroism:* Weak. $\omega = 2.506$ (Na); 2.431 (Li). $\epsilon = 2.529$ (Na); 2.456 (Li).
R: (400) 20.3, (420) 20.5, (440) 20.6, (460) 21.0, (480) 21.3, (500) 21.2, (520) 20.5, (540) 19.7, (560) 19.0, (580) 18.6, (600) 18.2, (620) 17.8, (640) 17.7, (660) 17.3, (680) 17.1, (700) 16.9

**Cell Data:** *Space Group:* $P6_3mc$. $a = 4.136$ $c = 6.713$ $Z = 2$

**X-ray Powder Pattern:** Synthetic.
3.160 (100), 3.583 (75), 3.367 (60), 2.068 (55), 1.761 (45), 1.898 (40), 2.450 (25)

**Chemistry:**

| | (1) | (2) | (3) |
|---|---|---|---|
| Cd | 77.45 | 70.6 | 77.81 |
| Zn | | 5.3 | |
| S | 22.48 | 23.3 | 22.19 |
| Total | 99.93 | 99.2 | 100.00 |

(1) Bishopton, Scotland; average of two analyses. (2) Madjarovo district, Bulgaria; by electron microprobe. (3) CdS.

**Polymorphism & Series:** Dimorphous with hawleyite.

**Occurrence:** As earthy coatings, especially on sphalerite, in which it also occurs as a substituent; also rarely as crystals in cavities in mafic igneous rocks; in high-temerature hydrothermal vein deposits.

**Association:** Sphalerite, smithsonite, prehnite, other zeolites (low temperature); cassiterite, tetrahedrite, herzenbergite, chalcopyrite, other sulfides (high temperature).

**Distribution:** In Scotland, from Bishopton, near Glasgow, Renfrewshire [TL], large crystals on prehnite; as coatings on sphalerite in the Leadhills-Wanlockhead district, Dumfries. From the Los Blancos mine, Sierra de Cartagena, ??, Spain. At Příbram, Czech Republic. In the Madjarovo district, eastern Rhodope Mountains, Bulgaria. From Pierrefitte, Hautes-Pyrénées, France. In Greece, at Laurium. Pigmenting smithsonite stalactites from Masua, Sardinia, Italy. In Russia, in the Kti-Teberda deposit, northern Caucasus Mountains. In the USA, in New Jersey, at Franklin and Sterling Hill, Ogdensburg, Sussex Co.; from Paterson, Passaic Co.; at the Fanwood quarry, Somerset Co.; from the Summit quarry, Union Co.; in the Arlington quarry, Leesburg, Loudoun Co., Virginia, as crystals; at Friedensville, Lehigh Co., Pennsylvania. In the Joplin district, Jasper Co., Missouri, on sphalerite; as bright yellow coatings on smithsonite in Marion Co., Arkansas. Complex twins from the Asunta Ag–Sn mine, four km northeast of San Vicente, Potosí, and at Llallagua, Bolivia. Numerous other minor occurrences are known.

**Name:** In honor of Charles Murray Cathcart (1783–1859), Lord Greenock.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 228–230. (2) Vlasov, K.A., Ed. (1966) Mineralogy of rare elements, v. II, 570–572. (3) Ulrich, F. and W. Zachariason (1925) Über die Kristallstruktur des $\alpha$- und $\beta$-CdS, sowie des Wurtzits. Zeits. Krist., 62, 260–273 (in German). (4) (1955) NBS Circ. 549, 4, 15–16. (5) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 213.