Chalcopyrite

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Crystal Data: Tetragonal. Point Group: $\text{42} \overline{2m}$. Equant, tetrahedral-shaped crystals, may be modified by scalenohedral faces, to as large as 10 cm. Sphenoidal faces \{112\} typically large, dull in luster and striated $\parallel [1\overline{1}0]$; \{112\} faces are small and bright. Commonly massive, compact; can be botryoidal. Twinning: Twin plane \{112\}, composition surface commonly \{112\}; twin plane \{012\}; also by rotation about \{001\} with composition plane \{110\}, producing penetration twins.

Physical Properties: Cleavage: Poor on \{011\} and \{111\}. Hardness = 3.5–4 VHN = 187–203 (basal section); 181–192 (vertical section) (100 g load). D(meas.) = 4.1–4.3 D(calc.) = 4.283


R$_1$–R$_2$: (400) 16.0–17.3, (420) 20.0–21.3, (440) 24.8–26.1, (460) 30.2–31.4, (480) 34.9–35.9, (500) 38.9–39.9, (520) 41.9–42.7, (540) 44.0–44.9, (560) 45.4–46.4, (580) 46.6–47.6, (600) 47.1–48.3, (620) 47.5–48.6, (640) 47.6–48.7, (660) 47.6–48.7, (680) 47.6–48.7, (700) 47.6–48.6

Cell Data: Space Group: $\text{I}4_{2}d$. $a = 5.281 \ c = 10.401 \ Z = 4$

X-ray Powder Pattern: Merkur mine, Ems, Hesse, Germany. 3.038 (100), 1.8570 (35), 1.5927 (27), 1.8697 (22), 1.5753 (14), 2.644 (5), 1.2025 (5)

Chemistry:

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<tr>
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<th>(2)</th>
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<tbody>
<tr>
<td>Cu</td>
<td>35.03</td>
<td>34.63</td>
</tr>
<tr>
<td>Fe</td>
<td>31.00</td>
<td>30.43</td>
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<tr>
<td>S</td>
<td>34.96</td>
<td>34.94</td>
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<tr>
<td>Total</td>
<td>100.99</td>
<td>100.00</td>
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(1) Western mines, Vancouver Island, British Columbia, Canada; by electron microprobe, leading to $\text{Cu}_{1.01}\text{Fe}_{1.01}\text{S}_{2.00}$. (2) $\text{CuFeS}_2$.

Polymorphism & Series: Forms a series with eskebornite.

Mineral Group: Chalcopyrite group.

Occurrence: A primary mineral in hydrothermal veins, stockworks, disseminations, and massive replacements; an exsolution product in mafic igneous rocks; of sedimentary origin controlled by redox conditions.

Association: Sphalerite, galena, tetrahedrite, pyrite, many copper sulfides.

Distribution: A very common copper mineral, so only a few outstanding localities can be mentioned. In the USA an important ore mineral at many of the copper mines of Arizona, as at Bisbee, Cochise Co.; large crystals from the Groundhog mine, Vanadium, Grant Co., New Mexico; in crystals from New York, at the Rossie lead mine, St. Lawrence Co.; at French Creek, Chester Co., Pennsylvania; in Missouri, at Joplin, Jasper Co. From Cananea, Sonora, Mexico. At Huaron, Peru. In Canada, in the Rouyn district, Quebec, at the Noranda mine; from Ontario, in the Kidd Creek mine, near Timmins, and at Sudbury. In Slovakia, at Baˇ nsk´ a ˇStiavnica (Schemnitz). In the Czech Republic, at Horní Slavkov (Schlaggenwald). From Freiberg, Saxony; Dillenburg, Hesse; in the Georg mine, near Horhausen, Westerwald; and a number of mines in North Rhine-Westphalia, Germany. At Vinsknoes, Karmoen, Norway. From the Ani and Arakawa mines, Akita Prefecture, Japan. Large crystals in the Nababiep mine, Cape Province, South Africa.

Name: From the Greek for brass and pyrite.