Stannite

\( \text{Cu}_2\text{FeSnS}_4 \)

**Crystal Data:** Tetragonal. **Point Group:** \( \text{I}42m \). Rarely as crystals, to 6 cm, with a pseudo-octahedral habit due to twinning; also massive, granular, and disseminated. **Twinning:** As penetration twins on \{102\} and with \{112\} as twin axis and \{112\} as composition plane. Polysynthetic lamellae seen in polished section.

**Physical Properties:** Cleavage: Indistinct on \{110\} and \{001\}. Fracture: Uneven. Hardness = 4 VHN = 216–265 (25 g load). \( D(\text{meas.}) = 4.3–4.5 \) \( D(\text{calc.}) = 4.490 \)


**Cell Data:** Space Group: \( \text{I}42m \). \( a = 5.4432(11) \) \( c = 10.7299(51) \) \( Z = 2 \)

**X-ray Powder Pattern:** Synthetic. 3.11 (100), 1.908 (80), 1.640 (60), 1.623 (60), 2.427 (50), 1.784 (50), 1.240 (50)

**Chemistry:**

\[ \begin{array}{ccc|ccc}
\text{Cu} & 29.24 & 29.6 & 29.58 & \text{Sn} & 27.14 & 27.7 & 27.61 \\
\text{Fe} & 13.95 & 10.8 & 12.99 & \text{In} & 0.03 \\
\text{Zn} & 0.08 & 2.2 & \text{S} & 28.88 & 29.7 & 29.82 \\
\text{Cd} & 0.11 & \text{insol.} & 0.51 \\
\hline
\text{Total} & 99.80 & 100.1 & 100.00 \\
\end{array} \]

(1) Chocaya, Bolivia; corresponds to \( \text{Cu}_{2.04}\text{Fe}_{1.11}\text{Sn}_{1.02}\text{S}_{4.00}. \) (2) Oruro, Bolivia; by electron microprobe, corresponding to \( \text{Cu}_{2.01}(\text{Fe}_{0.84}\text{Zn}_{0.14})\Sigma=0.98\text{Sn}_{1.01}\text{S}_{4.00}. \) (3) \( \text{Cu}_2\text{FeSnS}_4 \).

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

**Mineral Group:** Stannite group.

**Occurrence:** In tin-bearing vein deposits of hydrothermal origin.

**Association:** Chalcopyrite, sphalerite, tetrahedrite, arsenopyrite, pyrite, cassiterite, wolframite.

**Distribution:** In Cornwall, England, from Wheal Rock, near St. Agnes [TL], and at a number of other mines, where it may constitute an ore mineral. In the Czech Republic, from Cínovec (Zinnwald). In Australia, at Broken Hill, New South Wales, and from Zeehan, Tasmania. In Bolivia, in the Itos and San José mines, Oruro; at Llallagua, Chocaya, and Cerro Rico, Potosí; and from Uncia. In the USA, at the Peerless and Etta mines, near Keystone, Pennington Co., South Dakota. From the Brunswick tin mines, 56 km southwest of Fredericton, New Brunswick, Canada. As large crystals from the Yaogangxian mine, 45 km northeast of Yizhang, Hunan Province, China. Noted in small amounts from a number of other localities world-wide.

**Name:** From the Latin stannum, tin.