

**THE ORE
MINERALS
AND THEIR
INTERGROWTHS**

2nd Edition

THE ORE MINERALS AND THEIR INTERGROWTHS

SECOND EDITION

by

PAUL RAMDOHR

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COMMON SULPHIDES and "SULPHOSALTS"

CHALCOCITE

with DIGENITE, DJURLEITE AND ANILITE

I. General data. *Chem.* and *Cryst.* What hitherto has been considered as "chalcocite" with the formula Cu_2S , is a great number of semi-independent minerals and solid solutions, whose relationships are not yet fully understood and for which there are diverse interpretations. The publication by POSNJAK, MERWIN, ALLEN (1916) has been largely superseded by the investigations of N. W. BUEGER (1941) and the later authors. The writer has given an extended interpretation of these studies (1943). Recently they are to be completed by investigations of KULLERUD, DONNAY, MORIMOTO et al. Especially we mention the complication by $\text{Cu}_{1.96}\text{S}$ = "djurleite" and the acute rhombohedric form of digenite (D_{3d}^5 , $a_{rh} = 16.15 \text{ \AA}$, $\alpha_{rh} = 13^\circ 56'$).

Cu_2S (" β - Cu_2S ") formed at a low temperature is *orthorhombic*. It can be transformed into a closely related *hexagonal* one by (usually moderate) heat treatment. Cu_2S solidified from the melt during metallurgical processes, is *cubic*. The latter, however, is actually Cu_9S_5 with Cu in excess. Cu_9S_5 is formed also, with sulphur present in excess, by thermal solutions, partly even at low temperatures. Very often Cu_9S_5 has decomposed in various ways and been transformed into " β - Cu_2S " (formerly known as "paramorphic" or "lamellar" chalcocite).

The properties of all these forms are very similar. It is not yet possible to distinguish sharply the many members with the ore-microscope. Data, how to do it, seem to be problematic.*) Generally, less Cu-content seems to lower the reflectivity, but quick tarnishing caused by micropores or grain-boundaries can compensate the influence completely. Some properties, formerly enigmatic, become consequent, considering the diagram of BUEGER (with small corrections) and the most recent diagram of MORIMOTO & KATO (1970) for the middle part of the former could be explained — some problems remain!

1. *Orthorhombic chalcocite*, orthorhombic up to 103° . *Lattice*: C_{2v}^{15} , $a_0 = 11.90$, $b_0 = 27.82$, $c_0 = 13.43 \text{ \AA}$, $Z = 96$. Cleavage // (110) is rather rare; frequently observed in etched polished sections. $H = 2\frac{1}{2}$ –3, $D = 5.5$ –5.8. Opaque. Density and hardness resemble each other in the diverse varieties to a high degree.

It can have originated in various ways:

- a) from hypogene solutions below 103° , or paramorphically from hexagonal crystals formed above 103° (fig. 335a);
- b) from supergene solutions independently;

* Such investigation is made in an unpublished paper by M. TABAQCHALI for Alghero — for that occurrence rather well fitting.