NOTES AND NEWS

THE PSEUDO SYMMETRY OF ENARGITE

C. D. WEST, *Chemical Laboratory of Harvard University.*

While the external symmetry of the mineral enargite, Cu_3AsS_4 is pronouncedly orthorhombic, nevertheless an x-ray powder photograph (in Mo K radiation) of this material[1] can be completely indexed in terms of the following unit:

Hexagonal: $a=3.71$, $c=6.16$, $c/a=1.665$, $Z=2$ formulas of $\frac{1}{4}(Cu_3AsS_4)$, calculated density 4.42.

Characteristic extinctions: *hh.l* with *l* odd.

The observed density is 4.3–4.5.

In dimensions this unit resembles that of hexagonal ZnS (wurtzite) which has $a=3.84$, $c=6.28$; moreover, the intensities of the some 25 lines are in general similar to those observed and calculated for ZnS.[2] Pseudo-hexagonal axes are obtained by doubling the crystallographic a and c axes as follows:

	$a:b:c$
Enargite orthorhombic	0.8713:1:0.8277[3]
Enargite pseudo-hexagonal	1.743 :1:1.655
Wurtzite hexagonal	1.732 :1:1.635
Hexagonal close packing	1.732 :1:1.632

The powder data thus permit the conclusion that enargite has a pseudo-hexagonal close packed structure similar to that of wurtzite.

In accordance with this conclusion a basal Laue photograph shows a number of strong interferences in a pattern indistinguishable from the symmetry of D_{6h} upon which is superposed a pattern of weak interferences with the symmetry of V_h only. Enargite thus illustrates the fallibility, as well as an advantage, of the powder method of crystal structure examination.

[1] From Butte, Montana.

[2] Fuller, M. L., *Phil. Mag.*, vol. **8**, p. 658, 1929. Fuller gives for ZnS, $a=3.81$, $c=6.23$.

[3] Recalculated by Professor C. Palache for the new edition of Dana's *System of Mineralogy*.

Enargite Powder Photograph

$$1/d^2 = .0970(h^2+hk+k^2)+.02625l^2$$

	$1/d^2$		*Observed Intensity*	
hk.l	*obs.*	*calc.*	Enargite	ZnS (Fuller)
10.0	.0958	.0970	8	2
00.2	.1046	.1050	8	.8
10.1	.1231	.1232	9.5	1.9
10.2	.201	.202	5.5	.5
11.0	.289	.291	10	2.4
10.3	.334	.334	10	2.5
20.0		.388		vvw
11.2	.395	.396	6	.85
20.1	.4135	.4143	3.5	.15
00.4		.420	0	0
20.2	.492	.493	2.5	.1
10.4	.515	.517	.5	0
20.3	.625	.624	5	.55
21.0	.677	.679	2	.1
21.1	.705	.707	3	.1
11.4		.711		0
10.5	.752	.754	4.5	.4
21.2	.785	.784	2	
20.4		.808	0	0
30.0	.872	.872	3.5	.2
21.3	.917	.915	6	.65
00.6	.949	.947	.8	.1
30.2	.980	.977	3	
10.6	1.045	1.044	4	
20.5		1.045	1.5	
21.4		1.099	0	
22.0	1.163	1.162	1.5	
11.6	1.241	1.238	3	
31.0		1.260	0	
22.2		1.267	0	
31.1	1.283	1.286	1	
30.4		1.292		
20.6	1.341	1.335	5	
21.5		1.336		
31.2		1.365	0	
10.7	1.382	1.383	w	
31.3	1.496	1.496	3.5	
40.0		1.552	0	
22.4		1.582	0	