UNIT CELL AND SPACE GROUP OF GLAUCOCHROITE

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Glaucochroite, $CaMnSiO_4$, is a rare member of the olivine group first described by Penfield and Warren[1] from the Parker shaft at Franklin, New Jersey. The morphology and optical properties were later described by Palache,[2] who also cited two other analyses.

A Weissenberg x-ray study has been made of the crystals measured by Palache, using both copper and iron radiation. The space group, unit cell content, axial ratios and specific gravity are:

Space group: $Pbnm$ (V_h^{16})
Unit cell content: $Ca_4Mn_4Si_4O_{16}$
Sp. G. = 3.465 (calc.); 3.407 (Penfield, meas.)

$a_0 = 4.92 \pm 0.03$ Å
$b_0 = 11.19 \pm 0.02$
$c_0 = 6.51 \pm 0.02$

$a_0 : b_0 : c_0 = 0.440 : 1 : 0.582$
$a : b : c = 0.4409 : 1 : 0.5808$ (Palache, morph.)

SOME MEASUREMENTS ON MINERALS OF THE PYRITE GROUP

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X-ray measurements

Since two measurements of a_0 for pyrite from Leadville, Colorado, have already been published, pyrite from this locality was used in the present experiments. Peacock and Smith (1) found $a_0 = 5.4079 \pm .0005$ Å using $\lambda = 1.93239$ kX for iron Kα_1 radiation, and Kerr, Holmes, and Knox (2) reported $a_0 = 5.40667 \pm .00007$ Å. Although the latter paper does not give the wavelength of x-rays on which the determination of a_0 is based, it seems likely that kX units were used. When these values are converted to Å, the agreement with the new determination here reported is very satisfactory, as shown in the table.

The lattice constants reported here were determined from x-ray diffraction patterns produced in a symmetrical focusing back reflection camera of 10 cm. diameter, with unfiltered iron radiation. The lines due to Kβ radiation were too weak to be measured accurately. Unequivocal indexing of the back reflection film was not practicable when x-rays from a copper target were used for the exposure.

The values of a_0 were computed by the method of least squares, according to Cohen's (3) method for the improvement of lattice constants.

[1] Penfield, S. L., and Warren, C. H.: *Zeit. Krist.*, **32**, 231–234 (1900).
[2] Palache, Charles: *U. S. Geol. Survey, Prof. Paper* **180**, 79–80 (1935).

The experimental errors indicated are the probable errors computed from residuals.

The temperatures given are the average temperatures of the metal case of the camera during the course of the exposures. The Philips precision camera receives considerable heat from the electric motor mounted in its base. It is consequently necessary to allow the entire apparatus to reach a steady operating temperature before beginning an exposure. The variation during an exposure never exceeded $\pm 0.5°$ C.

SUMMARY OF *X*-RAY RESULTS

	Peacock and Smith (1)	Kerr, Holmes, and Knox (2)	Gordon ($t=29°$ C., $\lambda FeK\alpha_1 = 1.93597$ Å)
Pyrite, Leadville, Colorado (Brush Min. Coll., No. 5818)	$a_0 = 5.4182 \pm .0005$ Å†	$5.41759 \pm .00007$ Å‡	$5.4179 \pm .0003$ Å
Sperrylite* (Brush Min. Coll., No. 2952)			$5.9680 \pm .0003$ Å
Hauerite, Radduse, Sicily (Brush Min. Coll., No. 2821)			$6.1008 \pm .0001$ Å

* Locality uncertain, presumably Ontario.

† Converted fron kX units by factor, 1.00185 computed using authors' λ.

‡ Converted fron kX units by factor, 1.00202.

Optical Measurements

The index of refraction of a prism of the same hauerite was measured on a spectrometer by the method of normal incidence, the transmitted signal being observed with a Bausch and Lomb infrared image converter mounted on the spectrometer telescope. The wavelength corresponding to the greatest spectral sensitivity of the converter was estimated to be 9100 Å by measuring the index of a glass prism of known dispersion with the converter on the telescope. The refractive index of hauerite is $n = 2.58 \pm 0.02$ for the wavelength used. Two other measurements of this index have been published: Dana's *System of Mineralogy* (4) gives $n = 2.69 \pm 0.01$ for the lithium red line and R. Bailly (5) has published the value $n = 2.634$ for "infrared light."

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References

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3. *Rev. Sci. Inst.*, **6,** 68 (1935); *ibid.*, **7,** 155 (1936). See also Jette and Foote, *J. Chem. Phys.*, **3,** 605 (1935).
4. Dana's *System of Mineralogy*, 7th Edition, New York (**1944**).
5. *Bull. Soc. Fr. Min.*, **70,** 117 (1947).