this line the effective Debye temperature of copper is computed to be 299° K. This may be compared with the value 313° K. computed from the vibrational frequency spectrum of copper as measured by Jacobsen (1955).

The advantage of this method is that f^2 and e^{-2M} are obtained from measurements made at only one temperature. The disadvantage is that it involves the diffuse scattering and hence a correction for Compton modified scattering which must be taken from tables computed from a theoretically determined radial distribution of electrons. However, since the Compton scattering is a small fraction of the total diffuse scattering for most measurements, the method should be fairly insensitive to errors introduced from this source.

The author wishes to thank Prof. B. E. Warren, in whose laboratory this work was done, for his interest and encouragement.

References

BERGHUIS, J., HAANAPPEL, I. M., POTTERS, M., LOOPSTRA, B. O., MACGILLAVRY, C. H. & VEENENDAAL, A. L. (1955). *Acta Cryst.* **8**, 478.
HÖNL, H. (1933). *Z. Phys. Lpz.* **84**, 1.
JACOBSEN, E. H. (1955). *Phys. Rev.* **97**, 654.
WARREN, B. E. (1953). *Acta Cryst.* **6**, 803.
WARREN, B. E. (1955). *The Norelco Reporter*, **2**, 63.

Acta Cryst. (1956). **9**, 618

Guanidinium aluminum sulfate hexahydrate: crystallographic data.

By ELIZABETH A. WOOD, *Bell Telephone Laboratories, Inc., Murray Hill, N. J., U.S.A.*

(*Received* 24 *February* 1956)

The discovery of ferroelectricity in guanidinium aluminum sulfate hexahydrate, $C(NH_2)_3Al(SO_4)_26H_2O$, was reported by Holden, Matthias, Merz & Remeika (1955) and some of the properties of this crystal have been discussed in a later paper (Holden, Merz, Remeika & Matthias, 1956).

Morphology and cleavage

The colorless, transparent crystals grow from aqueous solutions as hexagonal prisms terminated by basal planes. There is perfect cleavage parallel to $\{0001\}$ and much less perfect cleavage parallel to $\{11\bar{2}0\}$.

Although most crystals show only the prisms, $\{11\bar{2}0\}$ and $\{2\bar{1}\bar{1}0\}$, and the base $\{0001\}$, some crystals also show the pyramid faces $\{11\bar{2}1\}$, $\{2\bar{1}\bar{1}\bar{1}\}$, $\{11\bar{2}\bar{1}\}$ and $\{2\bar{1}\bar{1}1\}$. Of these, the first two are commonly well developed compared to the second two. The well developed faces are those related by a center of symmetry and the outward form of these crystals thus shows the symmetry D_{3d}–$\bar{3}m$.

Optical properties

The crystals are uniaxial, negative. The indices of refraction for sodium light have been given by Ferraboschi (1908) from measurements made by the minimum-deviation method, using two natural prism faces, with the following results: $n_o = 1{\cdot}5423$, $n_e = 1{\cdot}4540$.

Etch pits

Etch pits produced with water on the $\{0001\}$ faces of these crystals are triangular with edges parallel to three edges of the (0001) face, normal to the *a* axes of the crystal. The orientation of the triangular etch pits and secondary cleavage relative to the crystallographic axes was established by taking a Buerger precession photograph of an etched crystal. Etch pits on $(000\bar{1})$ are related to those on (0001) by twofold axes normal to the *a* axes, thus again exhibiting symmetry D_{3d}–$\bar{3}m$, higher symmetry than that of the crystal which cannot have a twofold axis normal to *c* since the *c* axis is electrically polar. Thus the point group indicated is C_{3v}–$3m$.

A description of etch pits differently 'cocked' in different parts of these crystals has been given by Holden *et al.* (1956). Examination of the optic figure and X-ray precession photographs shows no deviation from parallelism of the crystal structure in these different parts. No difference of any sort has as yet been detected among them by X-ray diffraction or optical methods. The apparent 'cocking' of these etch pits results from the translation of the stepped walls in the deeper parts of the pit, relative to those of the shallower parts, in a direction parallel to the (0001) face and apparently parallel to the *a* axes.

Unit cell and space group

The diffraction symmetry is D_{3d}–$\bar{3}m$ with no systematic absences. The lattice constants are:

$$a_0 = 11{\cdot}77 \pm 0{\cdot}04,\ c_0 = 8{\cdot}98 \pm 0{\cdot}03\ \text{Å}\ .$$

Both from the precession photographs and from the etch pits we see that the symmetry planes are parallel to the crystallographic axes. Therefore the probable space groups are as follows: D_{3d}^1–$P\bar{3}1m$; C_{3v}^2–$P31m$; D_3^1–$P312$; D_3^2–$P321$. On the basis of our knowledge that the crystal is ferroelectric, we can eliminate space group D_{3d}^1–$P31m$, which requires a center of symmetry, and also D_3^1–$P312$ and D_3^2–$P321$, which require twofold axes normal to *c*. This leaves C_{3v}^2–$P31m$ uniquely determined as the space group of this crystal. A trial structure has been obtained by S. Geller and work on the refinement is going on.

The writer wishes to express her thanks to S. Geller and A. N. Holden for helpful discussion, and to J. P. Remeika, who grew the crystals on which this work was done.

References

Ferraboschi, F. (1908). *Proc. Camb. Phil. Soc.* **14**, 471.
Holden, A. N., Matthias, B. T., Merz, W. J. & Remeika, J. P. (1955). *Phys. Rev.* **98**, 546.
Holden, A. N., Merz, W. J., Remeika, J. P. & Matthias, B. T. (1956). *Phys. Rev.* In the Press.

Notes and News

Announcements and other items of crystallographic interest will be published under this heading at the discretion of the Editorial Board. Copy should be sent direct to the British Co-editor (*R. C. Evans, Crystallographic Laboratory, Cavendish Laboratory, Cambridge, England*).

International Union of Crystallography

Fourth General Assembly and International Congress, Montreal, Canada, 10–17 July 1957

By kind invitation of the Canadian National Research Council, the Fourth General Assembly and International Congress of the Union will be held in Montreal from 10 to 17 July 1957. The Congress will be followed by two Symposia on 18 and 19 July.

For the organization of the meeting a Local and a Programme Committee have been established. The Chairmen of these Committees are respectively Dr W. H. Barnes (Division of Pure Physics, National Research Council, Ottawa 2, Ontario, Canada) and Dr W. N. Lipscomb (University of Minnesota, Minneapolis, Minnesota, U.S.A.).

The headquarters' site and most of the sessions of the General Assembly, the International Congress, and the Symposia will be in the Physical Sciences Centre of McGill University. A special evening session during the Congress will be held at the University of Montreal.

An information booklet, which will contain the necessary registration forms for the use of the Local Committee, the Programme Committee, and the American Express Company (official travel agents), is now in preparation. Copies of this booklet should be in the hands of the Secretaries of the National Committees early in September 1956 for distribution among crystallographers in their countries. If any interested individual has not received a copy by 1 November 1956 he should write to the Secretary of the National Committee in his country (for names and addresses, see *Acta Cryst.* (1955), **8**, 858, but for U.S.A. read Dr G. A. Jeffrey, Department of Chemistry, The University of Pittsburgh, Pittsburgh 13, Pennsylvania). Residents of countries which at present do not adhere to the Union may obtain copies of the booklet and registration forms by writing to the Chairman of the Local Committee (Dr Barnes, envelope to be clearly marked 'Personal') after 1 October 1956.

Second World Metallurgical Congress

The above Congress, sponsored by the American Society for Metals, will be held simultaneously with the 39th annual National Metal Congress and Exposition and the Second World Congress on Nondestructive Testing, at Chicago, Illinois, U.S.A., during the period 2–8 November 1957.

Requests for further information should be addressed to: W. H. Eisenman, Secretary, American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio, U.S.A.

Pittsburgh Diffraction Conference

The fourteenth annual Pittsburgh Diffraction Conference will be held from 31 October to 2 November 1956, at the Mellon Institute in Pittsburgh, Pennsylvania, U.S.A.

This year it is the desire of the Conference Committee to emphasize

1. Small-angle scattering
2. High- and low-temperature diffraction studies
3. Structural aspects of solid-state physics
4. Instrumentation and methods
5. Neutron diffraction

and papers on these subjects will be particularly welcome.

Titles of contributed papers should be sent to the Program Chairman, Dr A. Taylor, Westinghouse Research Laboratories, Beulah Road, Pittsburgh 35, Pennsylvania, U.S.A., before 1 September 1956. Abstracts should be submitted by 20 September.