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Preliminary study of the structure of a new synthetic hydrate of aluminum arsenate.*

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In an attempt to increase the size of synthetic crystals of aluminum orthoarsenate ($AlAsO_4$) as grown by the hydrothermal method, a change was made in the normally used temperature gradient and mixture concentration of Al_2O_3, As_2O_5 and H_2O. Instead of obtaining single crystals with the usual well developed α-quartz type of morphology, a dense polycrystalline product resulted. The aggregate was in the form of fibrous crystallites in parallel arrangement which readily parted into exceedingly fine, clear needles suitable for X-ray and optical studies. The material used in this study was grown by Mr J. M. Stanley of this laboratory.

Differential thermal analyses, loss-in-weight measurements, Debye–Scherrer powder studies, and chemical analysis all indicated the material to be a hitherto unreported synthetic hydrate of aluminum arsenate. The end product of thermal decomposition studies at 1000° C. was found to be aluminum orthoarsenate ($AlAsO_4$).

The following oxide formulation was determined by chemical analysis: $1Al_2O_3.3As_2O_5.10H_2O$.

Rotation photographs were taken of a single crystal using filtered Cu K radiation, the crystal being rotated about the fiber axis. Uniform optical extinction between crossed Nicols along the needle axis indicated this direction to be a crystallographic axis. An orthorhombic unit cell was established, using rotation and Weissenberg photographs, with dimensions

$$a = 12{\cdot}30,\ b = 4{\cdot}64,\ c = 8{\cdot}61\ \text{Å}.$$

The pycnometric density of a powdered sample was measured, using acetone, and found to be 3·19 g.cm.$^{-3}$. The calculated density for two molecules per unit cell was 3·27 g.cm.$^{-3}$.

Zero-, first- and second-level Weissenberg photographs were taken about the b or fiber axis, using the equi-inclination method for the latter two levels. All reflections for which $h+k+l$ are odd were absent. These extinctions indicate a body-centered unit cell; the possible space groups are: D_{2h}^{25}–$Immm$, C_{2v}^{20}–$Imm2$, D_2^8–$I222$.

A complete structure determination has been started.

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Letters to the Editor

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The training of modern crystallographers.

From Kathleen Lonsdale, *Chemistry Department, University College, London W.C.1, England*

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In his constructively critical review (*Acta Cryst.* (1953), **6**, 751) of A. Guinier's *X-ray Crystallographic Technology*, Dr Pepinsky takes courteous exception to the statement made in my foreword that 'it is still difficult for a thorough training in the subject to be obtained except in a few places, either in Great Britain or the U.S.A.'.

As this question of the training of modern crystallographers is one of first importance for the future of our science, I would like to discuss it further. It is perhaps significant that there is at present no opportunity for such discussion at the forthcoming International Congress in Paris except under the heading 'Miscellaneous'.

May I therefore throw out a challenge and say that in my opinion most crystallographers, including myself, are almost uneducated in their own field. Until this is remedied, I believe that our work will be pedestrian and our subject regarded simply as a highly specialized form of technology instead of as an important science with many technological applications. Confirmation of this is to be found in the fact that libraries and book publishers rarely have a separate category for 'Crystallography' (even though it is one of the few sciences to have a really active International Union) and our books are to be found nestling uncomfortably, like cuckoos or ugly ducklings, among 'Chemistry', 'Physics', 'Geology', 'Mathematics' or what-have-you.

P. Terpstra's *A Thousand and One Questions on Crystallographic Problems* (for junior students), reviewed in your columns by Dr N. F. M. Henry (*Acta Cryst.* (1953), **6**, 432), and in the *American Mineralogist*((1953), **38**, 421) by Drs J. D. & G. Donnay, quite justifiably provoked the comments that 'At present it is certain that a considerable proportion of the large number of students in X-ray crystallography have not received an adequate education in subjects such as projections, the geometry and symmetry of crystals, crystal twinning and calculations', and that 'anyone who could answer all these questions would be a well-rounded crystallographer indeed'. But these problems included *none* on diffraction theory, advanced structure analysis, crystal chemistry, crystal dynamics, crystal physics (except for practical crystal optics), crystal growth and equilibrium of the crystalline surface, the technology of X-ray, neutron or electron diffraction, the history of X-ray analysis and many other branches of modern crystallography which are included in the two-year courses of