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New group III–group V compounds: BP and BAs*.

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Boron arsenide (BAs) and boron phosphide (BP)† have been prepared in our laboratory by direct union of the elements in evacuated, sealed, silica tubes at elevated temperatures (BAs: 12 hr. at 800° C.; BP: 12 hr. at 1000° C.).

As predicted (Welker & Weiss, 1956), both compounds crystallize with the cubic, zincblende structure. The lattice constants are

$$\text{BAs, } 4{\cdot}777 \text{ Å}; \quad \text{BP, } 4{\cdot}538 \text{ Å}.$$

X-ray powder diffraction data for the two compounds are listed in Table 1.

Both BP and BAs decompose when heated in air. BP is stable to at least 1250° C. when heated in an atmosphere of phosphorus. In the presence of arsenic vapor BAs is stable to 920° C.; above that temperature it undergoes an irreversible transformation to a tan-colored orthorhombic modification whose exact composition has not yet been established. The unit cell is *C*-face-centered with

$$a = 9{\cdot}710,\ b = 4{\cdot}343 \text{ and } c = 3{\cdot}066 \text{ Å}.$$

This orthorhombic phase is remarkably stable; its X-ray diagram does not change detectably even after it is subjected to prolonged boiling in alkali solution and in concentrated HNO_3, HF, and other acids. Further work on these compounds is in progress.

Table 1. *Powder diffraction data* for* BP *and* BAs (*cubic phase*)

BP		BAs		
d (Å)	I/I_0	*d* (Å)	I/I_0	*HKL*
2·62	100	2·76	100	111
2·27	25	2·388	30	200
1·604	30	1·688	25	220
1·368	20	1·440	20	311
1·310	3	1·378	7	222
1·135	3	1·194	3	400
1·041	6	1·096	9	331
1·015	4	1·068	14	420
0·9264	6	0·9752	7	422
0·8734	12	0·9194	14	511/333
0·8023	3	0·8445	3	440
—	—	0·8075	11	531
—	—	0·7962	7	442/600

* Measurements made with Norelco diffractometer, using filtered copper radiation.

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Popper, P. & Ingles, T. A. (1957). *Nature, Lond.* **179**, 1075.

Welker, H. & Weiss, H. (1956). *Solid State Physics*, vol. 3, pp. 1–5. New York: Academic Press.

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† After this work was submitted for publication, the authors were informed that the preparation of BP had been mentioned briefly by Popper & Ingles (1957).

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A method for growing small spherical crystals of metals and alloys.*

By A. E. Ray and J. F. Smith, *Institute for Atomic Research and Department of Chemistry, Iowa State College, Ames, Iowa, U.S.A.*

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In the determination of crystal structures, precise measurements of the intensity of diffraction peaks are necessary for resolution of detail. Such intensity measurements must be corrected for absorption effects. These corrections are most easily made on crystals of simple geometric shape, such as spheres and cylinders. The method of crystal growth to be described here produces small single crystals which are nearly perfect spheres. Further, crystals of several different diameters are produced in one operation, and intensity data taken from crystals of different size give information concerning the relative importance of primary and secondary extinction effects.

A spherical shape may be obtained with relative ease since the surface tension of a liquid droplet tends to force it into the form of a sphere. The problem is to induce solidification without distortion of shape and with the constraint that the rate of formation of nucleic be small compared with the rate of growth of a nucleus, so that an appreciable number of single crystals will result. Splitstone (1955) obtained spherical single crystals of lithium by melting small pieces of the metal in paraffin and allowing the resulting globules to solidify. There is an obvious temperature limitation in extending the technique to other materials. Cech & Turnbull (1956) prepared spherical single crystals of an iron–nickel alloy in a type of shot tower. Their technique should be applicable to many materials but necessitates the construction of special apparatus.

The present technique utilizes an arc melter, which is a relatively common piece of equipment in metallurgical research laboratories. In this method the arc is struck to the sample in short bursts so that the sample is spat-

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* Contribution No. 597. Work was performed in the Ames Laboratory of the U. S. Atomic Energy Commission.

tered in the form of spherical beads. Some success was achieved when using solid buttons of metal, but best results were obtained when the metal was loaded as a pile of chips or flakes. The melting was done in a water-cooled copper pot under a helium atmosphere. Prior removal of contaminating gases was accomplished by successive evacuation and flushing with helium. The intensity of the arc from the tungsten-tipped electrode was adjusted so that the sample was easily melted but without excessive superheating.

Samples of beryllium, vanadium, iron, zirconium, a 70 wt.% Ni/30 wt.% Cu solid-solution alloy, and the intermetallic compound NiAl were tried. X-ray examination showed that in all materials some of the spheres gave diffraction patterns typical of single crystals; however, no exhaustive check was made to prove the absence of coherent boundaries which could conceivably result from allotropic transitions in iron and zirconium. As might be expected, a much higher proportion of smaller spheres than larger spheres were found to be single crystals. Roughly 50% of the spheres with diameters less than 0·1 mm. were found to be single crystals, while only 5–10% of the 0·5–1·0 mm. spheres were single crystals. The largest crystal which was obtained was a beryllium sphere 1·5 mm. in diameter. In some of the larger crystals a slight flattening on one side of the sphere indicated solidification while stationary with respect to the pot. However, with the Cu/Ni alloy, which wets Cu, it is believed that solidification occurred as the beads rolled across the pot.

References

Cech, R. E. & Turnbull, D. (1956). *J. Metals*, 8, 124.
Splitstone, P. L. (1955). Doctoral Thesis, The Ohio State University, Columbus, Ohio, U.S.A.

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 direcct to the Editor (P. P. Ewald, Polytechnic Institute of Brooklyn, 333 Tay Street, Brooklyn 1, N.Y., U.S.A.) or to the Technical Editor (R. W. Asmussen, Chemical Laboratory B of the Technical University of Denmark, Sølvgade 83, Copenhagen K, Denmark)

Editorial Notice

Dr R. C. Evans, the Technical Editor of *Acta Crystallographica*, has asked to be relieved of his duties by 1 April 1958, and Prof. Dr R. W. Asmussen, Chemical Laboratory B of the Technical University of Denmark, Sølvgade 83, Copenhagen K, Denmark has agreed to succeed him.

Dr Evans is one of the founders of *Acta Crystallographica*, and indeed of the International Union of Crystallography. Even before this Union was officially established at the Harvard Assembly in 1948, Dr Evans spent a great amount of thought and time in formulating the aims and draft statutes of the Union, in preparing the way for its recognition by ICSU and for its financial support, and in negotiating for the production of *Acta Crystallographica*. The style and format of the journal were established by him in conjunction with the Cambridge University Press in a way which found general approval. Dr Evans was the sole British Co-editor for the first eight volumes and at the same time was responsible for the arrangement of the production of the entire journal. Besides, he was General Secretary of the Union from 1948 to 1954. As the work in both capacities became heavier, he dropped first the position as Secretary to the Union, and, soon after, the British Co-editorship, which went over to Prof. Lipson. Evans remained, however, as Technical Editor, handling all the accepted manuscripts and seeing them through the galley- and revision-proof stages. He set his pride in a faultless production, and eliminated numerous missettings, wrong references and omissions which had been overlooked by the editors and authors.

That *Acta Crystallographica* has developed its present prestige as a leading scientific journal is to no slight extent due to the direction which Evans gave to the journal while he was the British Co-editor and to the many hours of loving labour which he devoted to its details. His last gift is a *Decennial Index* for Vols. 1–10, which is in the final stage of production.

In thanking Robert Evans for what he has done for *Acta Crystallographica* we express the hope that the relief from this heavy duty may give him the leisure he desires for work on his own problems, including a new edition of his book *Crystal Chemistry*.

Conference on the Use of the IBM 704 Computer for Crystal-Structure Analysis

A conference on the use of the IBM 704 computer for crystal-structure analysis was held on 4 and 5 November 1957 at the National Bureau of Standards (NBS), Washington, D. C., U. S. A., sponsored by the American Crystallographic Association (ACA) and the NBS. About 60 participants were present. There were four sessions. The Conference did not deal exclusively with the IBM 704; papers concerning Maniac II and Datatron computers were also given. The Conference Chairman was S. Block (NBS); the Program Chairman was V. Vand, Pennsylvania State University (Penn State).

The first session was almost wholly devoted to the discussion of the IBM 704 computer, problem preparation, and IBM scientific activities. The second session dealt in detail with crystallographic programs now available or in preparation. The third session was chiefly concerned with evaluation of results and applications of the programs. The fourth session consisted of a one-hour FORTRAN seminar, followed by a meeting of the ACA Temporary Committee on Crystallographic Computing.

The first session was opened by Wallace R. Brode (NBS) with 'An introduction to the National Bureau of Standards', describing the NBS activities, scope and organization. This was followed by B. G. Oldfield (Service Bureau Corporation), who presented 'The IBM 704 and problem preparation', outlining the internal organ-