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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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† 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.*

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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 nuclei 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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