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Short Communications

On the Crystal Structure of Tin(II) Bromide

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A compound with the stoichiometric formula $SnBr_2$ was prepared by heating metallic tin with hydrobromic acid under reflux and then distilling off the constant boiling mixture of $HBr-H_2O$. The remaining dark brown liquid gave colourless transparent needles on cooling.

X-Ray diffraction data were collected with Weissenberg techniques. The crystals have orthorhombic symmetry and belong to space group No. 62, *Pnma*, or No. 33, $Pna2_1$.[1] The cell dimensions, as determined from Guinier powder diffraction data, are:

$a=8.384(3)$ Å, $b=4.233(2)$ Å, $c=10.516(4)$ Å, $V=373.2$ Å^3

The unit cell contains 4 formula units.

A three-dimensional Patterson synthesis was calculated from *h0l* and *h1l* Weissenberg data. Assuming all the atoms to occupy the point position *Pnma:* 4(*c*), *i.e.* $\pm(x,\frac{1}{4},z),\pm(\frac{1}{2}-x,\frac{3}{4},\frac{1}{2}+z)$ it was possible to explain all the peaks in the Patterson synthesis and to determine the x and z parameters of the atoms. A least squares refinement based on 138 *h0l* and *h1l* reflections yielded an R-value of 8.2 %. More data are to be collected.

Fig. 1. shows a projection of the structure of $SnBr_2$ on the xz plane. Each tin is surrounded by eight bromine, six of which lie at the apices of a trigonal prism while the remaining two lie outside prism faces. The configuration of bromine around tin in $SnBr_2$ is thus similar to that in $2SnBr_2.H_2O$,[2] $6SnBr_2.5H_2O$,[3] and $3SnBr_2.H_2O$.[4]

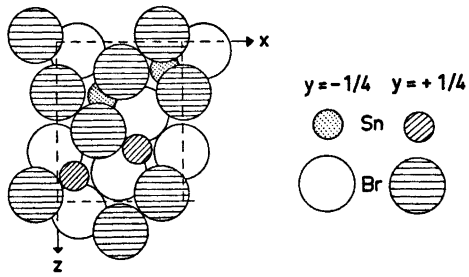

Fig. 1. A projection of the structure of $SnBr_2$ on the xz plane.

Table 1. Approximate atomic parameters for $SnBr_2$.

Atom	x	y	z
Sn	0.1336	0.2500	0.8350
Br(1)	0.3305	0.2500	0.5506
Br(2)	0.5117	0.2500	0.1855

Since $SnCl_2$ is isomorphous with $PbBr_2$ it might be expected that $SnBr_2$ was also isomorphous with $PbBr_2$. The tin and lead coordination polyhedra are fairly similar in $SnCl_2$, $SnBr_2$ and $PbBr_2$, *i.e.*, trigonal prisms with anions outside the centers of prism faces, but Sn is eight-coordinated in $SnBr_2$ whereas Sn and Pb are nine-coordinated in $SnCl_2$ and $PbBr_2$.

In $SnBr_2$ the five bromine nearest to tin are at 2.81, 2.90, 2.90, 3.11, 3.11 Å. These five bromine form a polyhedron similar to the tetragonal pyramide of bromine around tin in $NH_4SnBr_3.H_2O$.[5]

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1. *International Tables for X-Ray Crystallography*, 2nd Ed., Kynoch Press, Birmingham 1952, Vol. I.
2. Andersson, J. *Acta Chem. Scand. 26* (1972) 1730.
3. Andersson, J. *Acta Chem. Scand. 26* (1972) 2543.
4. Andersson, J. *Acta Chem. Scand. 26* (1972) 3813.
5. Andersson, J. *To be published.*

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