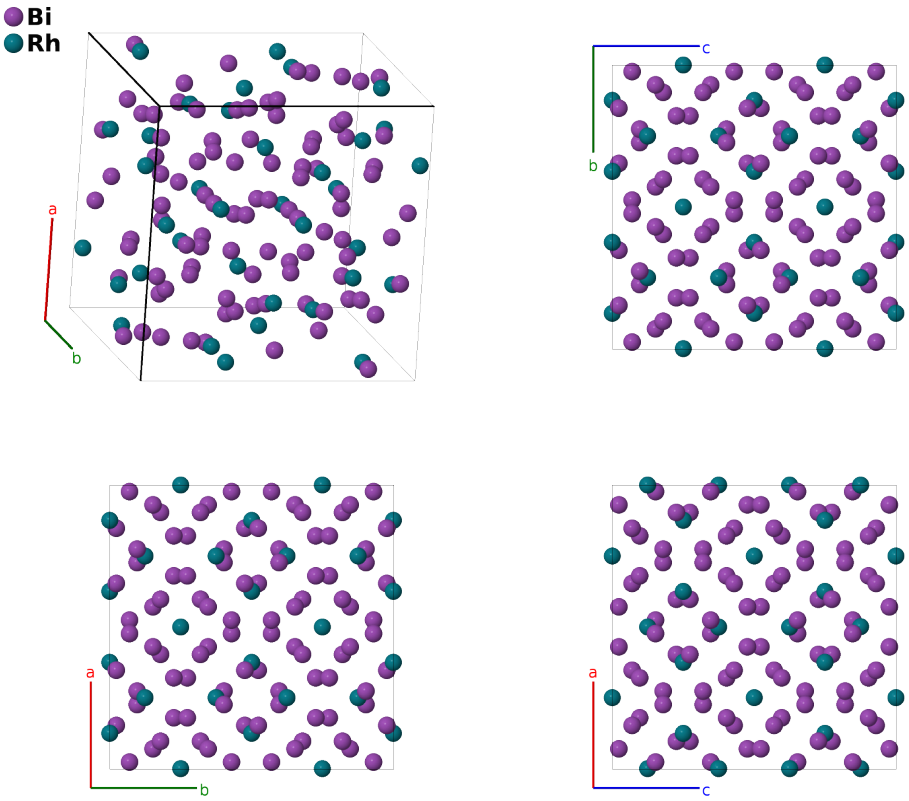
$RhBi_4$ Structure: A4B_cI120_230_h_c-001

Cite this page as: H. Eckert, S. Divilov, A. Zettel, M. J. Mehl, D. Hicks, and S. Curtarolo, *The AFLOW Library of Crystallographic Prototypes: Part 4*. In preparation.

https://aflow.org/p/V61M

https://aflow.org/p/A4B_cI120_230_h_c-001

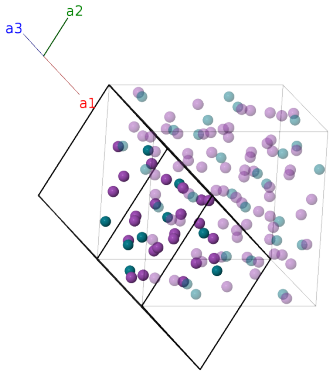


Prototype	Bi_4Rh
AFLOW prototype label	A4B_cI120_230_h_c-001
ICSD	58854
Pearson symbol	cI120
Space group number	230
Space group symbol	$Ia\bar{3}d$
AFLOW prototype command	`aflow --proto=A4B_cI120_230_h_c-001 --params=`a, x_2, y_2, z_2

- (Glagoleva, 1956) give three slightly different values for the location of the bismuth atoms. We choose their final set of coordinates. The ICSD entry is from the earlier publication (Zhdanov, 1954).

Body-centered Cubic primitive vectors

$$\begin{aligned}
\mathbf{a_1} &= -\tfrac{1}{2}a\,\hat{\mathbf{x}} + \tfrac{1}{2}a\,\hat{\mathbf{y}} + \tfrac{1}{2}a\,\hat{\mathbf{z}} \\
\mathbf{a_2} &= \tfrac{1}{2}a\,\hat{\mathbf{x}} - \tfrac{1}{2}a\,\hat{\mathbf{y}} + \tfrac{1}{2}a\,\hat{\mathbf{z}} \\
\mathbf{a_3} &= \tfrac{1}{2}a\,\hat{\mathbf{x}} + \tfrac{1}{2}a\,\hat{\mathbf{y}} - \tfrac{1}{2}a\,\hat{\mathbf{z}}
\end{aligned}$$



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	=	$\frac{1}{4}\,\mathbf{a}_1 + \frac{3}{8}\,\mathbf{a}_2 + \frac{1}{8}\,\mathbf{a}_3$	=	$\frac{1}{8}a\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24c)	Rh I
$\mathbf{B_2}$	=	$\frac{3}{4}\,\mathbf{a}_1 + \frac{1}{8}\,\mathbf{a}_2 + \frac{3}{8}\,\mathbf{a}_3$	=	$-\frac{1}{8}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24c)	Rh I
$\mathbf{B_3}$	=	$\frac{1}{8}\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 + \frac{3}{8}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{1}{8}a\,\hat{\mathbf{y}}$	(24c)	Rh I
$\mathbf{B_4}$	=	$\frac{3}{8}\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 + \frac{1}{8}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} - \frac{1}{8}a\,\hat{\mathbf{y}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(24c)	Rh I
$\mathbf{B_5}$	=	$\frac{3}{8}\,\mathbf{a}_1 + \frac{1}{8}\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{y}} + \frac{1}{8}a\,\hat{\mathbf{z}}$	(24c)	Rh I
$\mathbf{B_6}$	=	$\frac{1}{8}\,\mathbf{a}_1 + \frac{3}{8}\,\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}} - \frac{1}{8}a\,\hat{\mathbf{z}}$	(24c)	Rh I
$\mathbf{B_7}$	=	$\frac{3}{4}\,\mathbf{a}_1 + \frac{5}{8}\,\mathbf{a}_2 + \frac{7}{8}\,\mathbf{a}_3$	=	$\frac{3}{8}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24c)	Rh I
$\mathbf{B_8}$	=	$\frac{1}{4}\,\mathbf{a}_1 + \frac{7}{8}\,\mathbf{a}_2 + \frac{5}{8}\,\mathbf{a}_3$	=	$\frac{5}{8}a\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24c)	Rh I
$\mathbf{B_9}$	=	$\frac{7}{8}\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 + \frac{5}{8}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{3}{8}a\,\hat{\mathbf{y}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(24c)	Rh I
$\mathbf{B_{10}}$	=	$\frac{5}{8}\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 + \frac{7}{8}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{5}{8}a\,\hat{\mathbf{y}}$	(24c)	Rh I
$\mathbf{B_{11}}$	=	$\frac{5}{8}\,\mathbf{a}_1 + \frac{7}{8}\,\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}} + \frac{3}{8}a\,\hat{\mathbf{z}}$	(24c)	Rh I
$\mathbf{B_{12}}$	=	$\frac{7}{8}\,\mathbf{a}_1 + \frac{5}{8}\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{y}} + \frac{5}{8}a\,\hat{\mathbf{z}}$	(24c)	Rh I
$\mathbf{B_{13}}$	=	$(y_2 + z_2)\,\mathbf{a}_1 + (x_2 + z_2)\,\mathbf{a}_2 + (x_2 + y_2)\,\mathbf{a}_3$	=	$ax_2\,\hat{\mathbf{x}} + ay_2\,\hat{\mathbf{y}} + az_2\,\hat{\mathbf{z}}$	(96h)	Bi I
$\mathbf{B_{14}}$	=	$\left(-y_2 + z_2 + \frac{1}{2}\right)\,\mathbf{a}_1 - (x_2 - z_2)\,\mathbf{a}_2 - \left(x_2 + y_2 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_2\,\hat{\mathbf{x}} - a\left(y_2 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + az_2\,\hat{\mathbf{z}}$	(96h)	Bi I
$\mathbf{B_{15}}$	=	$(y_2 - z_2)\,\mathbf{a}_1 - \left(x_2 + z_2 - \frac{1}{2}\right)\,\mathbf{a}_2 + \left(-x_2 + y_2 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + ay_2\,\hat{\mathbf{y}} - az_2\,\hat{\mathbf{z}}$	(96h)	Bi I
$\mathbf{B_{16}}$	=	$-\left(y_2 + z_2 - \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_2 - z_2 + \frac{1}{2}\right)\,\mathbf{a}_2 + (x_2 - y_2)\,\mathbf{a}_3$	=	$ax_2\,\hat{\mathbf{x}} - ay_2\,\hat{\mathbf{y}} - a\left(z_2 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(96h)	Bi I
$\mathbf{B_{17}}$	=	$(x_2 + y_2)\,\mathbf{a}_1 + (y_2 + z_2)\,\mathbf{a}_2 + (x_2 + z_2)\,\mathbf{a}_3$	=	$az_2\,\hat{\mathbf{x}} + ax_2\,\hat{\mathbf{y}} + ay_2\,\hat{\mathbf{z}}$	(96h)	Bi I
$\mathbf{B_{18}}$	=	$-\left(x_2 + y_2 - \frac{1}{2}\right)\,\mathbf{a}_1 + \left(-y_2 + z_2 + \frac{1}{2}\right)\,\mathbf{a}_2 - (x_2 - z_2)\,\mathbf{a}_3$	=	$az_2\,\hat{\mathbf{x}} - ax_2\,\hat{\mathbf{y}} - a\left(y_2 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(96h)	Bi I
$\mathbf{B_{19}}$	=	$\left(-x_2 + y_2 + \frac{1}{2}\right)\,\mathbf{a}_1 + (y_2 - z_2)\,\mathbf{a}_2 - \left(x_2 + z_2 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-az_2\,\hat{\mathbf{x}} - a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + ay_2\,\hat{\mathbf{z}}$	(96h)	Bi I
$\mathbf{B_{20}}$	=	$(x_2 - y_2)\,\mathbf{a}_1 - \left(y_2 + z_2 - \frac{1}{2}\right)\,\mathbf{a}_2 + \left(x_2 - z_2 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(z_2 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + ax_2\,\hat{\mathbf{y}} - ay_2\,\hat{\mathbf{z}}$	(96h)	Bi I
$\mathbf{B_{21}}$	=	$(x_2 + z_2)\,\mathbf{a}_1 + (x_2 + y_2)\,\mathbf{a}_2 + (y_2 + z_2)\,\mathbf{a}_3$	=	$ay_2\,\hat{\mathbf{x}} + az_2\,\hat{\mathbf{y}} + ax_2\,\hat{\mathbf{z}}$	(96h)	Bi I

$$\mathbf{B_{22}} = -(x_2 - z_2)\,\mathbf{a}_1 - \left(x_2 + y_2 - \tfrac{1}{2}\right)\mathbf{a}_2 + \left(-y_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(y_2 - \tfrac{1}{2}\right)\hat{\mathbf{x}} + az_2\,\hat{\mathbf{y}} - ax_2\,\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{23}} = -\left(x_2 + z_2 - \tfrac{1}{2}\right)\mathbf{a}_1 + \left(-x_2 + y_2 + \tfrac{1}{2}\right)\mathbf{a}_2 + (y_2 - z_2)\,\mathbf{a}_3 = ay_2\,\hat{\mathbf{x}} - az_2\,\hat{\mathbf{y}} - a\left(x_2 - \tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{24}} = \left(x_2 - z_2 + \tfrac{1}{2}\right)\mathbf{a}_1 + (x_2 - y_2)\,\mathbf{a}_2 - \left(y_2 + z_2 - \tfrac{1}{2}\right)\mathbf{a}_3 = -ay_2\,\hat{\mathbf{x}} - a\left(z_2 - \tfrac{1}{2}\right)\hat{\mathbf{y}} + ax_2\,\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{25}} = \left(x_2 - z_2 + \tfrac{1}{2}\right)\mathbf{a}_1 + (y_2 - z_2)\,\mathbf{a}_2 + (x_2 + y_2)\,\mathbf{a}_3 = a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{26}} = -\left(x_2 + z_2 - \tfrac{1}{2}\right)\mathbf{a}_1 - \left(y_2 + z_2 - \tfrac{1}{2}\right)\mathbf{a}_2 - \left(x_2 + y_2 - \tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{27}} = -(x_2 - z_2)\,\mathbf{a}_1 + (y_2 + z_2)\,\mathbf{a}_2 + \left(-x_2 + y_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{28}} = (x_2 + z_2)\,\mathbf{a}_1 + \left(-y_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_2 + (x_2 - y_2)\,\mathbf{a}_3 = -a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{29}} = \left(-y_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_1 + (x_2 - y_2)\,\mathbf{a}_2 + (x_2 + z_2)\,\mathbf{a}_3 = a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{30}} = (y_2 + z_2)\,\mathbf{a}_1 + \left(-x_2 + y_2 + \tfrac{1}{2}\right)\mathbf{a}_2 - (x_2 - z_2)\,\mathbf{a}_3 = -a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{31}} = -\left(y_2 + z_2 - \tfrac{1}{2}\right)\mathbf{a}_1 - \left(x_2 + y_2 - \tfrac{1}{2}\right)\mathbf{a}_2 - \left(x_2 + z_2 - \tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{32}} = (y_2 - z_2)\,\mathbf{a}_1 + (x_2 + y_2)\,\mathbf{a}_2 + \left(x_2 - z_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{33}} = \left(-x_2 + y_2 + \tfrac{1}{2}\right)\mathbf{a}_1 - (x_2 - z_2)\,\mathbf{a}_2 + (y_2 + z_2)\,\mathbf{a}_3 = a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{34}} = (x_2 - y_2)\,\mathbf{a}_1 + (x_2 + z_2)\,\mathbf{a}_2 + \left(-y_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{35}} = (x_2 + y_2)\,\mathbf{a}_1 + \left(x_2 - z_2 + \tfrac{1}{2}\right)\mathbf{a}_2 + (y_2 - z_2)\,\mathbf{a}_3 = -a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{36}} = -\left(x_2 + y_2 - \tfrac{1}{2}\right)\mathbf{a}_1 - \left(x_2 + z_2 - \tfrac{1}{2}\right)\mathbf{a}_2 - \left(y_2 + z_2 - \tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{37}} = -(y_2 + z_2)\,\mathbf{a}_1 - (x_2 + z_2)\,\mathbf{a}_2 - (x_2 + y_2)\,\mathbf{a}_3 = -ax_2\,\hat{\mathbf{x}} - ay_2\,\hat{\mathbf{y}} - az_2\,\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{38}} = \left(y_2 - z_2 + \tfrac{1}{2}\right)\mathbf{a}_1 + (x_2 - z_2)\,\mathbf{a}_2 + \left(x_2 + y_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = ax_2\,\hat{\mathbf{x}} + a\left(y_2 + \tfrac{1}{2}\right)\hat{\mathbf{y}} - az_2\,\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{39}} = -(y_2 - z_2)\,\mathbf{a}_1 + \left(x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_2 + \left(x_2 - y_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = a\left(x_2 + \tfrac{1}{2}\right)\hat{\mathbf{x}} - ay_2\,\hat{\mathbf{y}} + az_2\,\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{40}} = \left(y_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_1 + \left(-x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_2 - (x_2 - y_2)\,\mathbf{a}_3 = -ax_2\,\hat{\mathbf{x}} + ay_2\,\hat{\mathbf{y}} + a\left(z_2 + \tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{41}} = -(x_2 + y_2)\,\mathbf{a}_1 - (y_2 + z_2)\,\mathbf{a}_2 - (x_2 + z_2)\,\mathbf{a}_3 = -az_2\,\hat{\mathbf{x}} - ax_2\,\hat{\mathbf{y}} - ay_2\,\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{42}} = \left(x_2 + y_2 + \tfrac{1}{2}\right)\mathbf{a}_1 + \left(y_2 - z_2 + \tfrac{1}{2}\right)\mathbf{a}_2 + (x_2 - z_2)\,\mathbf{a}_3 = -az_2\,\hat{\mathbf{x}} + ax_2\,\hat{\mathbf{y}} + a\left(y_2 + \tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{43}} = \left(x_2 - y_2 + \tfrac{1}{2}\right)\mathbf{a}_1 - \left(y_2 - z_2\right)\mathbf{a}_2 + \left(x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = az_2\,\hat{\mathbf{x}} + a\left(x_2 + \tfrac{1}{2}\right)\hat{\mathbf{y}} - ay_2\,\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{44}} = -\left(x_2 - y_2\right)\mathbf{a}_1 + \left(y_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_2 + \left(-x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = a\left(z_2 + \tfrac{1}{2}\right)\hat{\mathbf{x}} - ax_2\,\hat{\mathbf{y}} + ay_2\,\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{45}} = -\left(x_2 + z_2\right)\mathbf{a}_1 - \left(x_2 + y_2\right)\mathbf{a}_2 - \left(y_2 + z_2\right)\mathbf{a}_3 = -ay_2\,\hat{\mathbf{x}} - az_2\,\hat{\mathbf{y}} - ax_2\,\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{46}} = \left(x_2 - z_2\right)\mathbf{a}_1 + \left(x_2 + y_2 + \tfrac{1}{2}\right)\mathbf{a}_2 + \left(y_2 - z_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = a\left(y_2 + \tfrac{1}{2}\right)\hat{\mathbf{x}} - az_2\,\hat{\mathbf{y}} + ax_2\,\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{47}} = \left(x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_1 + \left(x_2 - y_2 + \tfrac{1}{2}\right)\mathbf{a}_2 - \left(y_2 - z_2\right)\mathbf{a}_3 = -ay_2\,\hat{\mathbf{x}} + az_2\,\hat{\mathbf{y}} + a\left(x_2 + \tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{48}} = \left(-x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_1 - \left(x_2 - y_2\right)\mathbf{a}_2 + \left(y_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = ay_2\,\hat{\mathbf{x}} + a\left(z_2 + \tfrac{1}{2}\right)\hat{\mathbf{y}} - ax_2\,\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{49}} = \left(-x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_1 - \left(y_2 - z_2\right)\mathbf{a}_2 - \left(x_2 + y_2\right)\mathbf{a}_3 = -a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{50}} = \left(x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_1 + \left(y_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_2 + \left(x_2 + y_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{51}} = \left(x_2 - z_2\right)\mathbf{a}_1 - \left(y_2 + z_2\right)\mathbf{a}_2 + \left(x_2 - y_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{52}} = -\left(x_2 + z_2\right)\mathbf{a}_1 + \left(y_2 - z_2 + \tfrac{1}{2}\right)\mathbf{a}_2 - \left(x_2 - y_2\right)\mathbf{a}_3 = a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{53}} = \left(y_2 - z_2 + \tfrac{1}{2}\right)\mathbf{a}_1 - \left(x_2 - y_2\right)\mathbf{a}_2 - \left(x_2 + z_2\right)\mathbf{a}_3 = -a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{54}} = -\left(y_2 + z_2\right)\mathbf{a}_1 + \left(x_2 - y_2 + \tfrac{1}{2}\right)\mathbf{a}_2 + \left(x_2 - z_2\right)\mathbf{a}_3 = a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{55}} = \left(y_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_1 + \left(x_2 + y_2 + \tfrac{1}{2}\right)\mathbf{a}_2 + \left(x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{56}} = -\left(y_2 - z_2\right)\mathbf{a}_1 - \left(x_2 + y_2\right)\mathbf{a}_2 + \left(-x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{57}} = \left(x_2 - y_2 + \tfrac{1}{2}\right)\mathbf{a}_1 + \left(x_2 - z_2\right)\mathbf{a}_2 - \left(y_2 + z_2\right)\mathbf{a}_3 = -a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(y_2 - \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{58}} = -\left(x_2 - y_2\right)\mathbf{a}_1 - \left(x_2 + z_2\right)\mathbf{a}_2 + \left(y_2 - z_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(z_2 - \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{59}} = -\left(x_2 + y_2\right)\mathbf{a}_1 + \left(-x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_2 - \left(y_2 - z_2\right)\mathbf{a}_3 = a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} - a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} - a\left(x_2 - \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

$$\mathbf{B_{60}} = \left(x_2 + y_2 + \tfrac{1}{2}\right)\mathbf{a}_1 + \left(x_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_2 + \left(y_2 + z_2 + \tfrac{1}{2}\right)\mathbf{a}_3 = a\left(z_2 + \tfrac{1}{4}\right)\hat{\mathbf{x}} + a\left(y_2 + \tfrac{1}{4}\right)\hat{\mathbf{y}} + a\left(x_2 + \tfrac{1}{4}\right)\hat{\mathbf{z}} \quad (96h) \quad \text{Bi I}$$

References

[1] V. P. Glagoleva and G. S. Zhdanov, *The Structure of Superconductors. IX. Roentgenographic Determination of the Structure of α-Bi_4Rh*, Soviet Phys.—JETP **3**, 155–158 (1956).

[2] G. S. Zhdanov, *The binary systems Bi - Ni and Bi - Rh*, Trudy Inst. Geol. Nauk Akad. Nauk S.S.S.R. **10**, 99–116 (1954).

Found in

[1] P. Villars, H. Okamoto, and K. Cenzual, eds., *ASM Alloy Phase Diagram Database* (ASM International, 2018), chap. Bismuth-Rhodium Binary Phase Diagram (1962 Ross R.G.). Copyright ©2006-2018 ASM International.