$Rh_6Mn_5Bi_{18}$ Structure: A18B5C6_tP58_136_f4i_afg_gi-001

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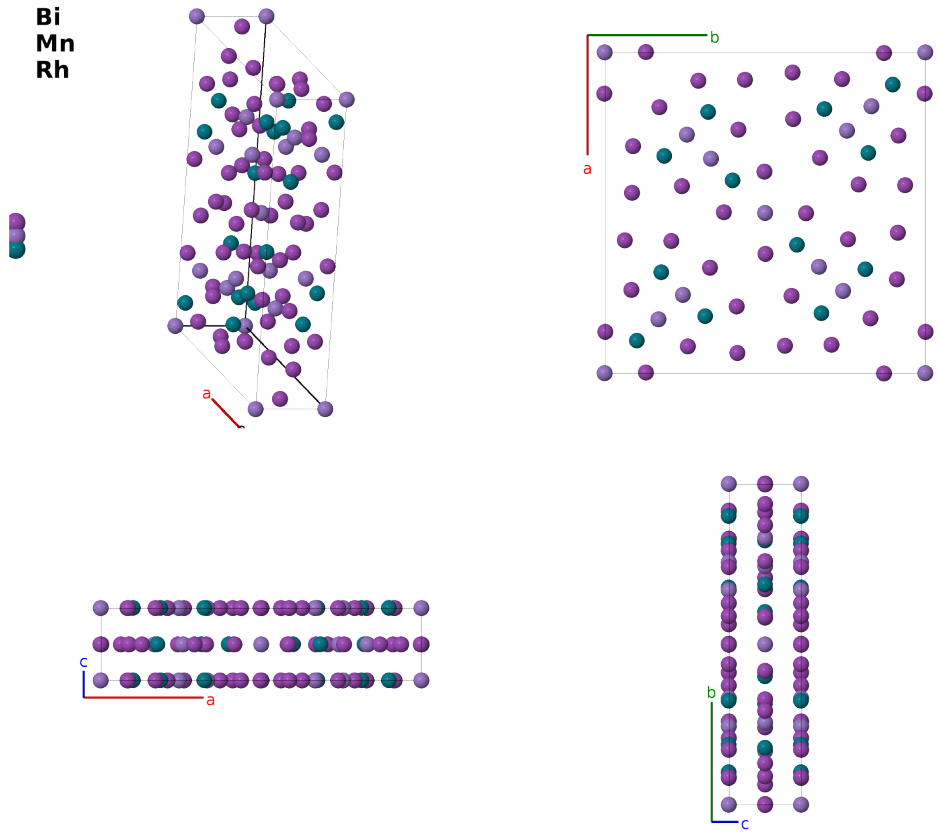
https://aflow.org/prototype-encyclopedia/VQRT

https://aflow.org/prototype-encyclopedia/A18B5C6_tP58_136_f4i_afg_gi-001

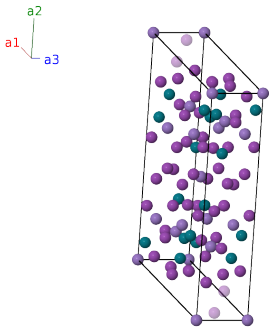


Prototype	$Bi_{18}Mn_5Rh_6$
AFLOW prototype label	A18B5C6_tP58_136_f4i_afg_gi-001
ICSD	130687
CCDC	1850892
Pearson symbol	tP58
Space group number	136
Space group symbol	$P4_2/mnm$
AFLOW prototype command	`aflow --proto=A18B5C6_tP58_136_f4i_afg_gi-001 --params=`$a, c/a, x_2, x_3, x_4, x_5, x_6, y_6, x_7, y_7, x_8, y_8, x_9, y_9, x_{10}, y_{10}$

- AFLOW rotates the system by 180° about the x-axis, so that (x y z) ↔ (x -y -z). The practical effect is to interchange the (4f) and (4g) Wyckoff positions.

Simple Tetragonal primitive vectors

$$\mathbf{a_1} = a\,\hat{\mathbf{x}}$$
$$\mathbf{a_2} = a\,\hat{\mathbf{y}}$$
$$\mathbf{a_3} = c\,\hat{\mathbf{z}}$$



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	=	0	=	0	(2a)	Mn I
$\mathbf{B_2}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(2a)	Mn I
$\mathbf{B_3}$	=	$x_2\,\mathbf{a}_1 + x_2\,\mathbf{a}_2$	=	$ax_2\,\hat{\mathbf{x}} + ax_2\,\hat{\mathbf{y}}$	(4f)	Bi I
$\mathbf{B_4}$	=	$-x_2\,\mathbf{a}_1 - x_2\,\mathbf{a}_2$	=	$-ax_2\,\hat{\mathbf{x}} - ax_2\,\hat{\mathbf{y}}$	(4f)	Bi I
$\mathbf{B_5}$	=	$-\left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(4f)	Bi I
$\mathbf{B_6}$	=	$\left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(4f)	Bi I
$\mathbf{B_7}$	=	$x_3\,\mathbf{a}_1 + x_3\,\mathbf{a}_2$	=	$ax_3\,\hat{\mathbf{x}} + ax_3\,\hat{\mathbf{y}}$	(4f)	Mn II
$\mathbf{B_8}$	=	$-x_3\,\mathbf{a}_1 - x_3\,\mathbf{a}_2$	=	$-ax_3\,\hat{\mathbf{x}} - ax_3\,\hat{\mathbf{y}}$	(4f)	Mn II
$\mathbf{B_9}$	=	$-\left(x_3 - \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_3 + \frac{1}{2}\right)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-a\left(x_3 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(x_3 + \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(4f)	Mn II
$\mathbf{B_{10}}$	=	$\left(x_3 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_3 - \frac{1}{2}\right)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$a\left(x_3 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_3 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(4f)	Mn II
$\mathbf{B_{11}}$	=	$x_4\,\mathbf{a}_1 - x_4\,\mathbf{a}_2$	=	$ax_4\,\hat{\mathbf{x}} - ax_4\,\hat{\mathbf{y}}$	(4g)	Mn III
$\mathbf{B_{12}}$	=	$-x_4\,\mathbf{a}_1 + x_4\,\mathbf{a}_2$	=	$-ax_4\,\hat{\mathbf{x}} + ax_4\,\hat{\mathbf{y}}$	(4g)	Mn III
$\mathbf{B_{13}}$	=	$\left(x_4 + \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_4 + \frac{1}{2}\right)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$a\left(x_4 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(x_4 + \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(4g)	Mn III
$\mathbf{B_{14}}$	=	$-\left(x_4 - \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_4 - \frac{1}{2}\right)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-a\left(x_4 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_4 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(4g)	Mn III
$\mathbf{B_{15}}$	=	$x_5\,\mathbf{a}_1 - x_5\,\mathbf{a}_2$	=	$ax_5\,\hat{\mathbf{x}} - ax_5\,\hat{\mathbf{y}}$	(4g)	Rh I
$\mathbf{B_{16}}$	=	$-x_5\,\mathbf{a}_1 + x_5\,\mathbf{a}_2$	=	$-ax_5\,\hat{\mathbf{x}} + ax_5\,\hat{\mathbf{y}}$	(4g)	Rh I
$\mathbf{B_{17}}$	=	$\left(x_5 + \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_5 + \frac{1}{2}\right)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$a\left(x_5 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(x_5 + \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(4g)	Rh I
$\mathbf{B_{18}}$	=	$-\left(x_5 - \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_5 - \frac{1}{2}\right)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-a\left(x_5 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_5 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(4g)	Rh I
$\mathbf{B_{19}}$	=	$x_6\,\mathbf{a}_1 + y_6\,\mathbf{a}_2$	=	$ax_6\,\hat{\mathbf{x}} + ay_6\,\hat{\mathbf{y}}$	(8i)	Bi II
$\mathbf{B_{20}}$	=	$-x_6\,\mathbf{a}_1 - y_6\,\mathbf{a}_2$	=	$-ax_6\,\hat{\mathbf{x}} - ay_6\,\hat{\mathbf{y}}$	(8i)	Bi II
$\mathbf{B_{21}}$	=	$-\left(y_6 - \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_6 + \frac{1}{2}\right)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-a\left(y_6 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(x_6 + \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(8i)	Bi II

$$\mathbf{B_{22}} = \left(y_6+\tfrac{1}{2}\right)\mathbf{a}_1 - \left(x_6-\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = a\left(y_6+\tfrac{1}{2}\right)\hat{\mathbf{x}} - a\left(x_6-\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi II}$$

$$\mathbf{B_{23}} = -\left(x_6-\tfrac{1}{2}\right)\mathbf{a}_1 + \left(y_6+\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = -a\left(x_6-\tfrac{1}{2}\right)\hat{\mathbf{x}} + a\left(y_6+\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi II}$$

$$\mathbf{B_{24}} = \left(x_6+\tfrac{1}{2}\right)\mathbf{a}_1 - \left(y_6-\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = a\left(x_6+\tfrac{1}{2}\right)\hat{\mathbf{x}} - a\left(y_6-\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi II}$$

$$\mathbf{B_{25}} = y_6\mathbf{a}_1 + x_6\mathbf{a}_2 = ay_6\hat{\mathbf{x}} + ax_6\hat{\mathbf{y}} \quad (8i) \quad \text{Bi II}$$

$$\mathbf{B_{26}} = -y_6\mathbf{a}_1 - x_6\mathbf{a}_2 = -ay_6\hat{\mathbf{x}} - ax_6\hat{\mathbf{y}} \quad (8i) \quad \text{Bi II}$$

$$\mathbf{B_{27}} = x_7\mathbf{a}_1 + y_7\mathbf{a}_2 = ax_7\hat{\mathbf{x}} + ay_7\hat{\mathbf{y}} \quad (8i) \quad \text{Bi III}$$

$$\mathbf{B_{28}} = -x_7\mathbf{a}_1 - y_7\mathbf{a}_2 = -ax_7\hat{\mathbf{x}} - ay_7\hat{\mathbf{y}} \quad (8i) \quad \text{Bi III}$$

$$\mathbf{B_{29}} = -\left(y_7-\tfrac{1}{2}\right)\mathbf{a}_1 + \left(x_7+\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = -a\left(y_7-\tfrac{1}{2}\right)\hat{\mathbf{x}} + a\left(x_7+\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi III}$$

$$\mathbf{B_{30}} = \left(y_7+\tfrac{1}{2}\right)\mathbf{a}_1 - \left(x_7-\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = a\left(y_7+\tfrac{1}{2}\right)\hat{\mathbf{x}} - a\left(x_7-\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi III}$$

$$\mathbf{B_{31}} = -\left(x_7-\tfrac{1}{2}\right)\mathbf{a}_1 + \left(y_7+\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = -a\left(x_7-\tfrac{1}{2}\right)\hat{\mathbf{x}} + a\left(y_7+\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi III}$$

$$\mathbf{B_{32}} = \left(x_7+\tfrac{1}{2}\right)\mathbf{a}_1 - \left(y_7-\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = a\left(x_7+\tfrac{1}{2}\right)\hat{\mathbf{x}} - a\left(y_7-\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi III}$$

$$\mathbf{B_{33}} = y_7\mathbf{a}_1 + x_7\mathbf{a}_2 = ay_7\hat{\mathbf{x}} + ax_7\hat{\mathbf{y}} \quad (8i) \quad \text{Bi III}$$

$$\mathbf{B_{34}} = -y_7\mathbf{a}_1 - x_7\mathbf{a}_2 = -ay_7\hat{\mathbf{x}} - ax_7\hat{\mathbf{y}} \quad (8i) \quad \text{Bi III}$$

$$\mathbf{B_{35}} = x_8\mathbf{a}_1 + y_8\mathbf{a}_2 = ax_8\hat{\mathbf{x}} + ay_8\hat{\mathbf{y}} \quad (8i) \quad \text{Bi IV}$$

$$\mathbf{B_{36}} = -x_8\mathbf{a}_1 - y_8\mathbf{a}_2 = -ax_8\hat{\mathbf{x}} - ay_8\hat{\mathbf{y}} \quad (8i) \quad \text{Bi IV}$$

$$\mathbf{B_{37}} = -\left(y_8-\tfrac{1}{2}\right)\mathbf{a}_1 + \left(x_8+\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = -a\left(y_8-\tfrac{1}{2}\right)\hat{\mathbf{x}} + a\left(x_8+\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi IV}$$

$$\mathbf{B_{38}} = \left(y_8+\tfrac{1}{2}\right)\mathbf{a}_1 - \left(x_8-\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = a\left(y_8+\tfrac{1}{2}\right)\hat{\mathbf{x}} - a\left(x_8-\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi IV}$$

$$\mathbf{B_{39}} = -\left(x_8-\tfrac{1}{2}\right)\mathbf{a}_1 + \left(y_8+\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = -a\left(x_8-\tfrac{1}{2}\right)\hat{\mathbf{x}} + a\left(y_8+\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi IV}$$

$$\mathbf{B_{40}} = \left(x_8+\tfrac{1}{2}\right)\mathbf{a}_1 - \left(y_8-\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = a\left(x_8+\tfrac{1}{2}\right)\hat{\mathbf{x}} - a\left(y_8-\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi IV}$$

$$\mathbf{B_{41}} = y_8\mathbf{a}_1 + x_8\mathbf{a}_2 = ay_8\hat{\mathbf{x}} + ax_8\hat{\mathbf{y}} \quad (8i) \quad \text{Bi IV}$$

$$\mathbf{B_{42}} = -y_8\mathbf{a}_1 - x_8\mathbf{a}_2 = -ay_8\hat{\mathbf{x}} - ax_8\hat{\mathbf{y}} \quad (8i) \quad \text{Bi IV}$$

$$\mathbf{B_{43}} = x_9\mathbf{a}_1 + y_9\mathbf{a}_2 = ax_9\hat{\mathbf{x}} + ay_9\hat{\mathbf{y}} \quad (8i) \quad \text{Bi V}$$

$$\mathbf{B_{44}} = -x_9\mathbf{a}_1 - y_9\mathbf{a}_2 = -ax_9\hat{\mathbf{x}} - ay_9\hat{\mathbf{y}} \quad (8i) \quad \text{Bi V}$$

$$\mathbf{B_{45}} = -\left(y_9-\tfrac{1}{2}\right)\mathbf{a}_1 + \left(x_9+\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = -a\left(y_9-\tfrac{1}{2}\right)\hat{\mathbf{x}} + a\left(x_9+\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi V}$$

$$\mathbf{B_{46}} = \left(y_9+\tfrac{1}{2}\right)\mathbf{a}_1 - \left(x_9-\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = a\left(y_9+\tfrac{1}{2}\right)\hat{\mathbf{x}} - a\left(x_9-\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi V}$$

$$\mathbf{B_{47}} = -\left(x_9-\tfrac{1}{2}\right)\mathbf{a}_1 + \left(y_9+\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = -a\left(x_9-\tfrac{1}{2}\right)\hat{\mathbf{x}} + a\left(y_9+\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi V}$$

$$\mathbf{B_{48}} = \left(x_9+\tfrac{1}{2}\right)\mathbf{a}_1 - \left(y_9-\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = a\left(x_9+\tfrac{1}{2}\right)\hat{\mathbf{x}} - a\left(y_9-\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Bi V}$$

$$\mathbf{B_{49}} = y_9\mathbf{a}_1 + x_9\mathbf{a}_2 = ay_9\hat{\mathbf{x}} + ax_9\hat{\mathbf{y}} \quad (8i) \quad \text{Bi V}$$

$$\mathbf{B_{50}} = -y_9\mathbf{a}_1 - x_9\mathbf{a}_2 = -ay_9\hat{\mathbf{x}} - ax_9\hat{\mathbf{y}} \quad (8i) \quad \text{Bi V}$$

$$\mathbf{B_{51}} = x_{10}\mathbf{a}_1 + y_{10}\mathbf{a}_2 = ax_{10}\hat{\mathbf{x}} + ay_{10}\hat{\mathbf{y}} \quad (8i) \quad \text{Rh II}$$

$$\mathbf{B_{52}} = -x_{10}\mathbf{a}_1 - y_{10}\mathbf{a}_2 = -ax_{10}\hat{\mathbf{x}} - ay_{10}\hat{\mathbf{y}} \quad (8i) \quad \text{Rh II}$$

$$\mathbf{B_{53}} = -\left(y_{10}-\tfrac{1}{2}\right)\mathbf{a}_1 + \left(x_{10}+\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = -a\left(y_{10}-\tfrac{1}{2}\right)\hat{\mathbf{x}} + a\left(x_{10}+\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Rh II}$$

$$\mathbf{B_{54}} = \left(y_{10}+\tfrac{1}{2}\right)\mathbf{a}_1 - \left(x_{10}-\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = a\left(y_{10}+\tfrac{1}{2}\right)\hat{\mathbf{x}} - a\left(x_{10}-\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Rh II}$$

$$\mathbf{B_{55}} = -\left(x_{10}-\tfrac{1}{2}\right)\mathbf{a}_1 + \left(y_{10}+\tfrac{1}{2}\right)\mathbf{a}_2 + \tfrac{1}{2}\mathbf{a}_3 = -a\left(x_{10}-\tfrac{1}{2}\right)\hat{\mathbf{x}} + a\left(y_{10}+\tfrac{1}{2}\right)\hat{\mathbf{y}} + \tfrac{1}{2}c\hat{\mathbf{z}} \quad (8i) \quad \text{Rh II}$$

$\mathbf{B_{56}}$ = $\left(x_{10}+\frac{1}{2}\right)\,\mathbf{a}_1-\left(y_{10}-\frac{1}{2}\right)\,\mathbf{a}_2+\frac{1}{2}\,\mathbf{a}_3$ = $a\left(x_{10}+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(y_{10}-\frac{1}{2}\right)\,\hat{\mathbf{y}}+\frac{1}{2}c\,\hat{\mathbf{z}}$ (8i) Rh II

$\mathbf{B_{57}}$ = $y_{10}\,\mathbf{a}_1+x_{10}\,\mathbf{a}_2$ = $ay_{10}\,\hat{\mathbf{x}}+ax_{10}\,\hat{\mathbf{y}}$ (8i) Rh II

$\mathbf{B_{58}}$ = $-y_{10}\,\mathbf{a}_1-x_{10}\,\mathbf{a}_2$ = $-ay_{10}\,\hat{\mathbf{x}}-ax_{10}\,\hat{\mathbf{y}}$ (8i) Rh II

References

[1] P. Kainzbauer, K. W. Richter, H. S. Effenberger, M. C. J. Marker, and H. Ipser, *Single-crystal structure determination of two new ternary bismuthides: $Rh_6Mn_5Bi_{18}$ and $RhMnBi_3$*, Acta Crystallogr. Sect. C **74**, 863–869 (2018), doi:10.1107/S2053229618009087.

Found in

[1] P. Kainzbauer, M. C. J. M., and K. W. Richter, *Reassessment of the Binary Mn-Rh Phase Diagram and Experimental Investigations of the Ternary Bi-Mn-Rh System*, J. Phase Equilib. Diffus. **41**, 282–298 (2020), doi:10.1007/s11669-020-00820-6.

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