Li_7MnN_4 Structure: A7BC4_cP96_218_bcefi_ad_ei-001

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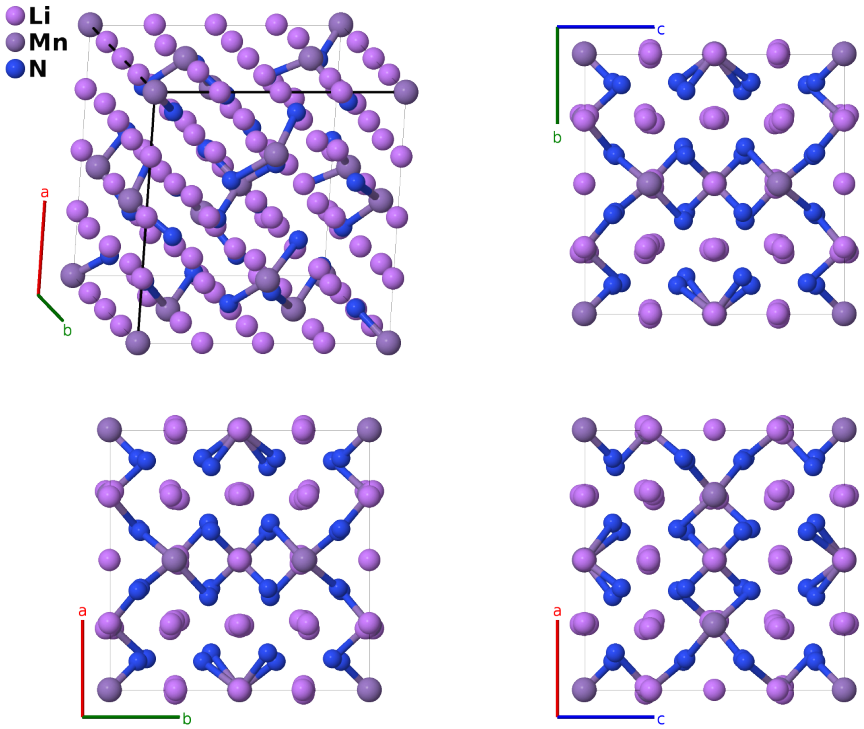
https://aflow.org/p/HJWV

https://aflow.org/p/A7BC4_cP96_218_bcefi_ad_ei-001

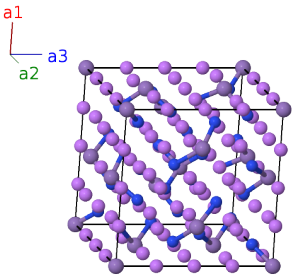


Prototype	Li_7MnN_4
AFLOW prototype label	A7BC4_cP96_218_bcefi_ad_ei-001
ICSD	154076
Pearson symbol	cP96
Space group number	218
Space group symbol	$P\bar{4}3n$
AFLOW prototype command	`aflow --proto=A7BC4_cP96_218_bcefi_ad_ei-001 --params=`$a, x_5, x_6, x_7, x_8, y_8, z_8, x_9, y_9, z_9$

Other compounds with this structure
Li_7PN_4, Li_7VN_4

Simple Cubic primitive vectors

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



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	=	0	=	0	(2a)	Mn I
$\mathbf{B_2}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(2a)	Mn I
$\mathbf{B_3}$	=	$\frac{1}{2}\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{y}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(6b)	Li I
$\mathbf{B_4}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(6b)	Li I
$\mathbf{B_5}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}}$	(6b)	Li I
$\mathbf{B_6}$	=	$\frac{1}{2}\,\mathbf{a}_2$	=	$\frac{1}{2}a\,\hat{\mathbf{y}}$	(6b)	Li I
$\mathbf{B_7}$	=	$\frac{1}{2}\,\mathbf{a}_1$	=	$\frac{1}{2}a\,\hat{\mathbf{x}}$	(6b)	Li I
$\mathbf{B_8}$	=	$\frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{z}}$	(6b)	Li I
$\mathbf{B_9}$	=	$\frac{1}{4}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}}$	(6c)	Li II
$\mathbf{B_{10}}$	=	$\frac{3}{4}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2$	=	$\frac{3}{4}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}}$	(6c)	Li II
$\mathbf{B_{11}}$	=	$\frac{1}{4}\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{y}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(6c)	Li II
$\mathbf{B_{12}}$	=	$\frac{3}{4}\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{3}{4}a\,\hat{\mathbf{y}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(6c)	Li II
$\mathbf{B_{13}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(6c)	Li II
$\mathbf{B_{14}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{3}{4}a\,\hat{\mathbf{z}}$	(6c)	Li II
$\mathbf{B_{15}}$	=	$\frac{1}{4}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(6d)	Mn II
$\mathbf{B_{16}}$	=	$\frac{3}{4}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{3}{4}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(6d)	Mn II
$\mathbf{B_{17}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}}$	(6d)	Mn II
$\mathbf{B_{18}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{3}{4}a\,\hat{\mathbf{y}}$	(6d)	Mn II
$\mathbf{B_{19}}$	=	$\frac{1}{2}\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(6d)	Mn II
$\mathbf{B_{20}}$	=	$\frac{1}{2}\,\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{y}} + \frac{3}{4}a\,\hat{\mathbf{z}}$	(6d)	Mn II
$\mathbf{B_{21}}$	=	$x_5\,\mathbf{a}_1 + x_5\,\mathbf{a}_2 + x_5\,\mathbf{a}_3$	=	$ax_5\,\hat{\mathbf{x}} + ax_5\,\hat{\mathbf{y}} + ax_5\,\hat{\mathbf{z}}$	(8e)	Li III
$\mathbf{B_{22}}$	=	$-x_5\,\mathbf{a}_1 - x_5\,\mathbf{a}_2 + x_5\,\mathbf{a}_3$	=	$-ax_5\,\hat{\mathbf{x}} - ax_5\,\hat{\mathbf{y}} + ax_5\,\hat{\mathbf{z}}$	(8e)	Li III
$\mathbf{B_{23}}$	=	$-x_5\,\mathbf{a}_1 + x_5\,\mathbf{a}_2 - x_5\,\mathbf{a}_3$	=	$-ax_5\,\hat{\mathbf{x}} + ax_5\,\hat{\mathbf{y}} - ax_5\,\hat{\mathbf{z}}$	(8e)	Li III
$\mathbf{B_{24}}$	=	$x_5\,\mathbf{a}_1 - x_5\,\mathbf{a}_2 - x_5\,\mathbf{a}_3$	=	$ax_5\,\hat{\mathbf{x}} - ax_5\,\hat{\mathbf{y}} - ax_5\,\hat{\mathbf{z}}$	(8e)	Li III
$\mathbf{B_{25}}$	=	$\left(x_5 + \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_5 + \frac{1}{2}\right)\,\mathbf{a}_2 + \left(x_5 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(x_5 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(x_5 + \frac{1}{2}\right)\,\hat{\mathbf{y}} + a\left(x_5 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(8e)	Li III
$\mathbf{B_{26}}$	=	$-\left(x_5 - \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_5 - \frac{1}{2}\right)\,\mathbf{a}_2 + \left(x_5 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_5 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_5 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + a\left(x_5 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(8e)	Li III
$\mathbf{B_{27}}$	=	$\left(x_5 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_5 - \frac{1}{2}\right)\,\mathbf{a}_2 - \left(x_5 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(x_5 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_5 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - a\left(x_5 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(8e)	Li III

$\mathbf{B_{28}}$	$=$	$-\left(x_5-\frac{1}{2}\right)\mathbf{a}_1+\left(x_5+\frac{1}{2}\right)\mathbf{a}_2-\left(x_5-\frac{1}{2}\right)\mathbf{a}_3$	$=$	$-a\left(x_5-\frac{1}{2}\right)\hat{\mathbf{x}}+a\left(x_5+\frac{1}{2}\right)\hat{\mathbf{y}}-a\left(x_5-\frac{1}{2}\right)\hat{\mathbf{z}}$	(8e)	Li III
$\mathbf{B_{29}}$	$=$	$x_6\,\mathbf{a}_1+x_6\,\mathbf{a}_2+x_6\,\mathbf{a}_3$	$=$	$ax_6\,\hat{\mathbf{x}}+ax_6\,\hat{\mathbf{y}}+ax_6\,\hat{\mathbf{z}}$	(8e)	N I
$\mathbf{B_{30}}$	$=$	$-x_6\,\mathbf{a}_1-x_6\,\mathbf{a}_2+x_6\,\mathbf{a}_3$	$=$	$-ax_6\,\hat{\mathbf{x}}-ax_6\,\hat{\mathbf{y}}+ax_6\,\hat{\mathbf{z}}$	(8e)	N I
$\mathbf{B_{31}}$	$=$	$-x_6\,\mathbf{a}_1+x_6\,\mathbf{a}_2-x_6\,\mathbf{a}_3$	$=$	$-ax_6\,\hat{\mathbf{x}}+ax_6\,\hat{\mathbf{y}}-ax_6\,\hat{\mathbf{z}}$	(8e)	N I
$\mathbf{B_{32}}$	$=$	$x_6\,\mathbf{a}_1-x_6\,\mathbf{a}_2-x_6\,\mathbf{a}_3$	$=$	$ax_6\,\hat{\mathbf{x}}-ax_6\,\hat{\mathbf{y}}-ax_6\,\hat{\mathbf{z}}$	(8e)	N I
$\mathbf{B_{33}}$	$=$	$\left(x_6+\frac{1}{2}\right)\mathbf{a}_1+\left(x_6+\frac{1}{2}\right)\mathbf{a}_2+\left(x_6+\frac{1}{2}\right)\mathbf{a}_3$	$=$	$a\left(x_6+\frac{1}{2}\right)\hat{\mathbf{x}}+a\left(x_6+\frac{1}{2}\right)\hat{\mathbf{y}}+a\left(x_6+\frac{1}{2}\right)\hat{\mathbf{z}}$	(8e)	N I
$\mathbf{B_{34}}$	$=$	$-\left(x_6-\frac{1}{2}\right)\mathbf{a}_1-\left(x_6-\frac{1}{2}\right)\mathbf{a}_2+\left(x_6+\frac{1}{2}\right)\mathbf{a}_3$	$=$	$-a\left(x_6-\frac{1}{2}\right)\hat{\mathbf{x}}-a\left(x_6-\frac{1}{2}\right)\hat{\mathbf{y}}+a\left(x_6+\frac{1}{2}\right)\hat{\mathbf{z}}$	(8e)	N I
$\mathbf{B_{35}}$	$=$	$\left(x_6+\frac{1}{2}\right)\mathbf{a}_1-\left(x_6-\frac{1}{2}\right)\mathbf{a}_2-\left(x_6-\frac{1}{2}\right)\mathbf{a}_3$	$=$	$a\left(x_6+\frac{1}{2}\right)\hat{\mathbf{x}}-a\left(x_6-\frac{1}{2}\right)\hat{\mathbf{y}}-a\left(x_6-\frac{1}{2}\right)\hat{\mathbf{z}}$	(8e)	N I
$\mathbf{B_{36}}$	$=$	$-\left(x_6-\frac{1}{2}\right)\mathbf{a}_1+\left(x_6+\frac{1}{2}\right)\mathbf{a}_2-\left(x_6-\frac{1}{2}\right)\mathbf{a}_3$	$=$	$-a\left(x_6-\frac{1}{2}\right)\hat{\mathbf{x}}+a\left(x_6+\frac{1}{2}\right)\hat{\mathbf{y}}-a\left(x_6-\frac{1}{2}\right)\hat{\mathbf{z}}$	(8e)	N I
$\mathbf{B_{37}}$	$=$	$x_7\,\mathbf{a}_1$	$=$	$ax_7\,\hat{\mathbf{x}}$	(12f)	Li IV
$\mathbf{B_{38}}$	$=$	$-x_7\,\mathbf{a}_1$	$=$	$-ax_7\,\hat{\mathbf{x}}$	(12f)	Li IV
$\mathbf{B_{39}}$	$=$	$x_7\,\mathbf{a}_2$	$=$	$ax_7\,\hat{\mathbf{y}}$	(12f)	Li IV
$\mathbf{B_{40}}$	$=$	$-x_7\,\mathbf{a}_2$	$=$	$-ax_7\,\hat{\mathbf{y}}$	(12f)	Li IV
$\mathbf{B_{41}}$	$=$	$x_7\,\mathbf{a}_3$	$=$	$ax_7\,\hat{\mathbf{z}}$	(12f)	Li IV
$\mathbf{B_{42}}$	$=$	$-x_7\,\mathbf{a}_3$	$=$	$-ax_7\,\hat{\mathbf{z}}$	(12f)	Li IV
$\mathbf{B_{43}}$	$=$	$\frac{1}{2}\,\mathbf{a}_1+\left(x_7+\frac{1}{2}\right)\mathbf{a}_2+\frac{1}{2}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,\hat{\mathbf{x}}+a\left(x_7+\frac{1}{2}\right)\hat{\mathbf{y}}+\frac{1}{2}a\,\hat{\mathbf{z}}$	(12f)	Li IV
$\mathbf{B_{44}}$	$=$	$\frac{1}{2}\,\mathbf{a}_1-\left(x_7-\frac{1}{2}\right)\mathbf{a}_2+\frac{1}{2}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,\hat{\mathbf{x}}-a\left(x_7-\frac{1}{2}\right)\hat{\mathbf{y}}+\frac{1}{2}a\,\hat{\mathbf{z}}$	(12f)	Li IV
$\mathbf{B_{45}}$	$=$	$\left(x_7+\frac{1}{2}\right)\mathbf{a}_1+\frac{1}{2}\,\mathbf{a}_2+\frac{1}{2}\,\mathbf{a}_3$	$=$	$a\left(x_7+\frac{1}{2}\right)\hat{\mathbf{x}}+\frac{1}{2}a\,\hat{\mathbf{y}}+\frac{1}{2}a\,\hat{\mathbf{z}}$	(12f)	Li IV
$\mathbf{B_{46}}$	$=$	$-\left(x_7-\frac{1}{2}\right)\mathbf{a}_1+\frac{1}{2}\,\mathbf{a}_2+\frac{1}{2}\,\mathbf{a}_3$	$=$	$-a\left(x_7-\frac{1}{2}\right)\hat{\mathbf{x}}+\frac{1}{2}a\,\hat{\mathbf{y}}+\frac{1}{2}a\,\hat{\mathbf{z}}$	(12f)	Li IV
$\mathbf{B_{47}}$	$=$	$\frac{1}{2}\,\mathbf{a}_1+\frac{1}{2}\,\mathbf{a}_2+\left(x_7+\frac{1}{2}\right)\mathbf{a}_3$	$=$	$\frac{1}{2}a\,\hat{\mathbf{x}}+\frac{1}{2}a\,\hat{\mathbf{y}}+a\left(x_7+\frac{1}{2}\right)\hat{\mathbf{z}}$	(12f)	Li IV
$\mathbf{B_{48}}$	$=$	$\frac{1}{2}\,\mathbf{a}_1+\frac{1}{2}\,\mathbf{a}_2-\left(x_7-\frac{1}{2}\right)\mathbf{a}_3$	$=$	$\frac{1}{2}a\,\hat{\mathbf{x}}+\frac{1}{2}a\,\hat{\mathbf{y}}-a\left(x_7-\frac{1}{2}\right)\hat{\mathbf{z}}$	(12f)	Li IV
$\mathbf{B_{49}}$	$=$	$x_8\,\mathbf{a}_1+y_8\,\mathbf{a}_2+z_8\,\mathbf{a}_3$	$=$	$ax_8\,\hat{\mathbf{x}}+ay_8\,\hat{\mathbf{y}}+az_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{50}}$	$=$	$-x_8\,\mathbf{a}_1-y_8\,\mathbf{a}_2+z_8\,\mathbf{a}_3$	$=$	$-ax_8\,\hat{\mathbf{x}}-ay_8\,\hat{\mathbf{y}}+az_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{51}}$	$=$	$-x_8\,\mathbf{a}_1+y_8\,\mathbf{a}_2-z_8\,\mathbf{a}_3$	$=$	$-ax_8\,\hat{\mathbf{x}}+ay_8\,\hat{\mathbf{y}}-az_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{52}}$	$=$	$x_8\,\mathbf{a}_1-y_8\,\mathbf{a}_2-z_8\,\mathbf{a}_3$	$=$	$ax_8\,\hat{\mathbf{x}}-ay_8\,\hat{\mathbf{y}}-az_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{53}}$	$=$	$z_8\,\mathbf{a}_1+x_8\,\mathbf{a}_2+y_8\,\mathbf{a}_3$	$=$	$az_8\,\hat{\mathbf{x}}+ax_8\,\hat{\mathbf{y}}+ay_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{54}}$	$=$	$z_8\,\mathbf{a}_1-x_8\,\mathbf{a}_2-y_8\,\mathbf{a}_3$	$=$	$az_8\,\hat{\mathbf{x}}-ax_8\,\hat{\mathbf{y}}-ay_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{55}}$	$=$	$-z_8\,\mathbf{a}_1-x_8\,\mathbf{a}_2+y_8\,\mathbf{a}_3$	$=$	$-az_8\,\hat{\mathbf{x}}-ax_8\,\hat{\mathbf{y}}+ay_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{56}}$	$=$	$-z_8\,\mathbf{a}_1+x_8\,\mathbf{a}_2-y_8\,\mathbf{a}_3$	$=$	$-az_8\,\hat{\mathbf{x}}+ax_8\,\hat{\mathbf{y}}-ay_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{57}}$	$=$	$y_8\,\mathbf{a}_1+z_8\,\mathbf{a}_2+x_8\,\mathbf{a}_3$	$=$	$ay_8\,\hat{\mathbf{x}}+az_8\,\hat{\mathbf{y}}+ax_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{58}}$	$=$	$-y_8\,\mathbf{a}_1+z_8\,\mathbf{a}_2-x_8\,\mathbf{a}_3$	$=$	$-ay_8\,\hat{\mathbf{x}}+az_8\,\hat{\mathbf{y}}-ax_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{59}}$	$=$	$y_8\,\mathbf{a}_1-z_8\,\mathbf{a}_2-x_8\,\mathbf{a}_3$	$=$	$ay_8\,\hat{\mathbf{x}}-az_8\,\hat{\mathbf{y}}-ax_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{60}}$	$=$	$-y_8\,\mathbf{a}_1-z_8\,\mathbf{a}_2+x_8\,\mathbf{a}_3$	$=$	$-ay_8\,\hat{\mathbf{x}}-az_8\,\hat{\mathbf{y}}+ax_8\,\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{61}}$	$=$	$\left(y_8+\frac{1}{2}\right)\mathbf{a}_1+\left(x_8+\frac{1}{2}\right)\mathbf{a}_2+\left(z_8+\frac{1}{2}\right)\mathbf{a}_3$	$=$	$a\left(y_8+\frac{1}{2}\right)\hat{\mathbf{x}}+a\left(x_8+\frac{1}{2}\right)\hat{\mathbf{y}}+a\left(z_8+\frac{1}{2}\right)\hat{\mathbf{z}}$	(24i)	Li V
$\mathbf{B_{62}}$	$=$	$-\left(y_8-\frac{1}{2}\right)\mathbf{a}_1-\left(x_8-\frac{1}{2}\right)\mathbf{a}_2+\left(z_8+\frac{1}{2}\right)\mathbf{a}_3$	$=$	$-a\left(y_8-\frac{1}{2}\right)\hat{\mathbf{x}}-a\left(x_8-\frac{1}{2}\right)\hat{\mathbf{y}}+a\left(z_8+\frac{1}{2}\right)\hat{\mathbf{z}}$	(24i)	Li V

$$\mathbf{B_{63}} = \left(y_8+\tfrac{1}{2}\right)\mathbf{a}_1-\left(x_8-\tfrac{1}{2}\right)\mathbf{a}_2-\left(z_8-\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(y_8+\tfrac{1}{2}\right)\hat{\mathbf{x}}-a\left(x_8-\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(z_8-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{Li V}$$

$$\mathbf{B_{64}} = -\left(y_8-\tfrac{1}{2}\right)\mathbf{a}_1+\left(x_8+\tfrac{1}{2}\right)\mathbf{a}_2-\left(z_8-\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(y_8-\tfrac{1}{2}\right)\hat{\mathbf{x}}+a\left(x_8+\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(z_8-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{Li V}$$

$$\mathbf{B_{65}} = \left(x_8+\tfrac{1}{2}\right)\mathbf{a}_1+\left(z_8+\tfrac{1}{2}\right)\mathbf{a}_2+\left(y_8+\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(x_8+\tfrac{1}{2}\right)\hat{\mathbf{x}}+a\left(z_8+\tfrac{1}{2}\right)\hat{\mathbf{y}}+a\left(y_8+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{Li V}$$

$$\mathbf{B_{66}} = -\left(x_8-\tfrac{1}{2}\right)\mathbf{a}_1+\left(z_8+\tfrac{1}{2}\right)\mathbf{a}_2-\left(y_8-\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(x_8-\tfrac{1}{2}\right)\hat{\mathbf{x}}+a\left(z_8+\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(y_8-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{Li V}$$

$$\mathbf{B_{67}} = -\left(x_8-\tfrac{1}{2}\right)\mathbf{a}_1-\left(z_8-\tfrac{1}{2}\right)\mathbf{a}_2+\left(y_8+\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(x_8-\tfrac{1}{2}\right)\hat{\mathbf{x}}-a\left(z_8-\tfrac{1}{2}\right)\hat{\mathbf{y}}+a\left(y_8+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{Li V}$$

$$\mathbf{B_{68}} = \left(x_8+\tfrac{1}{2}\right)\mathbf{a}_1-\left(z_8-\tfrac{1}{2}\right)\mathbf{a}_2-\left(y_8-\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(x_8+\tfrac{1}{2}\right)\hat{\mathbf{x}}-a\left(z_8-\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(y_8-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{Li V}$$

$$\mathbf{B_{69}} = \left(z_8+\tfrac{1}{2}\right)\mathbf{a}_1+\left(y_8+\tfrac{1}{2}\right)\mathbf{a}_2+\left(x_8+\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(z_8+\tfrac{1}{2}\right)\hat{\mathbf{x}}+a\left(y_8+\tfrac{1}{2}\right)\hat{\mathbf{y}}+a\left(x_8+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{Li V}$$

$$\mathbf{B_{70}} = \left(z_8+\tfrac{1}{2}\right)\mathbf{a}_1-\left(y_8-\tfrac{1}{2}\right)\mathbf{a}_2-\left(x_8-\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(z_8+\tfrac{1}{2}\right)\hat{\mathbf{x}}-a\left(y_8-\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(x_8-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{Li V}$$

$$\mathbf{B_{71}} = -\left(z_8-\tfrac{1}{2}\right)\mathbf{a}_1+\left(y_8+\tfrac{1}{2}\right)\mathbf{a}_2-\left(x_8-\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(z_8-\tfrac{1}{2}\right)\hat{\mathbf{x}}+a\left(y_8+\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(x_8-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{Li V}$$

$$\mathbf{B_{72}} = -\left(z_8-\tfrac{1}{2}\right)\mathbf{a}_1-\left(y_8-\tfrac{1}{2}\right)\mathbf{a}_2+\left(x_8+\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(z_8-\tfrac{1}{2}\right)\hat{\mathbf{x}}-a\left(y_8-\tfrac{1}{2}\right)\hat{\mathbf{y}}+a\left(x_8+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{Li V}$$

$$\mathbf{B_{73}} = x_9\,\mathbf{a}_1+y_9\,\mathbf{a}_2+z_9\,\mathbf{a}_3 = ax_9\,\hat{\mathbf{x}}+ay_9\,\hat{\mathbf{y}}+az_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{74}} = -x_9\,\mathbf{a}_1-y_9\,\mathbf{a}_2+z_9\,\mathbf{a}_3 = -ax_9\,\hat{\mathbf{x}}-ay_9\,\hat{\mathbf{y}}+az_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{75}} = -x_9\,\mathbf{a}_1+y_9\,\mathbf{a}_2-z_9\,\mathbf{a}_3 = -ax_9\,\hat{\mathbf{x}}+ay_9\,\hat{\mathbf{y}}-az_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{76}} = x_9\,\mathbf{a}_1-y_9\,\mathbf{a}_2-z_9\,\mathbf{a}_3 = ax_9\,\hat{\mathbf{x}}-ay_9\,\hat{\mathbf{y}}-az_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{77}} = z_9\,\mathbf{a}_1+x_9\,\mathbf{a}_2+y_9\,\mathbf{a}_3 = az_9\,\hat{\mathbf{x}}+ax_9\,\hat{\mathbf{y}}+ay_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{78}} = z_9\,\mathbf{a}_1-x_9\,\mathbf{a}_2-y_9\,\mathbf{a}_3 = az_9\,\hat{\mathbf{x}}-ax_9\,\hat{\mathbf{y}}-ay_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{79}} = -z_9\,\mathbf{a}_1-x_9\,\mathbf{a}_2+y_9\,\mathbf{a}_3 = -az_9\,\hat{\mathbf{x}}-ax_9\,\hat{\mathbf{y}}+ay_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{80}} = -z_9\,\mathbf{a}_1+x_9\,\mathbf{a}_2-y_9\,\mathbf{a}_3 = -az_9\,\hat{\mathbf{x}}+ax_9\,\hat{\mathbf{y}}-ay_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{81}} = y_9\,\mathbf{a}_1+z_9\,\mathbf{a}_2+x_9\,\mathbf{a}_3 = ay_9\,\hat{\mathbf{x}}+az_9\,\hat{\mathbf{y}}+ax_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{82}} = -y_9\,\mathbf{a}_1+z_9\,\mathbf{a}_2-x_9\,\mathbf{a}_3 = -ay_9\,\hat{\mathbf{x}}+az_9\,\hat{\mathbf{y}}-ax_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{83}} = y_9\,\mathbf{a}_1-z_9\,\mathbf{a}_2-x_9\,\mathbf{a}_3 = ay_9\,\hat{\mathbf{x}}-az_9\,\hat{\mathbf{y}}-ax_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{84}} = -y_9\,\mathbf{a}_1-z_9\,\mathbf{a}_2+x_9\,\mathbf{a}_3 = -ay_9\,\hat{\mathbf{x}}-az_9\,\hat{\mathbf{y}}+ax_9\,\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{85}} = \left(y_9+\tfrac{1}{2}\right)\mathbf{a}_1+\left(x_9+\tfrac{1}{2}\right)\mathbf{a}_2+\left(z_9+\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(y_9+\tfrac{1}{2}\right)\hat{\mathbf{x}}+a\left(x_9+\tfrac{1}{2}\right)\hat{\mathbf{y}}+a\left(z_9+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{86}} = -\left(y_9-\tfrac{1}{2}\right)\mathbf{a}_1-\left(x_9-\tfrac{1}{2}\right)\mathbf{a}_2+\left(z_9+\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(y_9-\tfrac{1}{2}\right)\hat{\mathbf{x}}-a\left(x_9-\tfrac{1}{2}\right)\hat{\mathbf{y}}+a\left(z_9+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{87}} = \left(y_9+\tfrac{1}{2}\right)\mathbf{a}_1-\left(x_9-\tfrac{1}{2}\right)\mathbf{a}_2-\left(z_9-\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(y_9+\tfrac{1}{2}\right)\hat{\mathbf{x}}-a\left(x_9-\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(z_9-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{88}} = -\left(y_9-\tfrac{1}{2}\right)\mathbf{a}_1+\left(x_9+\tfrac{1}{2}\right)\mathbf{a}_2-\left(z_9-\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(y_9-\tfrac{1}{2}\right)\hat{\mathbf{x}}+a\left(x_9+\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(z_9-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{89}} = \left(x_9+\tfrac{1}{2}\right)\mathbf{a}_1+\left(z_9+\tfrac{1}{2}\right)\mathbf{a}_2+\left(y_9+\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(x_9+\tfrac{1}{2}\right)\hat{\mathbf{x}}+a\left(z_9+\tfrac{1}{2}\right)\hat{\mathbf{y}}+a\left(y_9+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{90}} = -\left(x_9-\tfrac{1}{2}\right)\mathbf{a}_1+\left(z_9+\tfrac{1}{2}\right)\mathbf{a}_2-\left(y_9-\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(x_9-\tfrac{1}{2}\right)\hat{\mathbf{x}}+a\left(z_9+\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(y_9-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{91}} = -\left(x_9-\tfrac{1}{2}\right)\mathbf{a}_1-\left(z_9-\tfrac{1}{2}\right)\mathbf{a}_2+\left(y_9+\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(x_9-\tfrac{1}{2}\right)\hat{\mathbf{x}}-a\left(z_9-\tfrac{1}{2}\right)\hat{\mathbf{y}}+a\left(y_9+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{92}} = \left(x_9+\tfrac{1}{2}\right)\mathbf{a}_1-\left(z_9-\tfrac{1}{2}\right)\mathbf{a}_2-\left(y_9-\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(x_9+\tfrac{1}{2}\right)\hat{\mathbf{x}}-a\left(z_9-\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(y_9-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{93}} = \left(z_9+\tfrac{1}{2}\right)\mathbf{a}_1+\left(y_9+\tfrac{1}{2}\right)\mathbf{a}_2+\left(x_9+\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(z_9+\tfrac{1}{2}\right)\hat{\mathbf{x}}+a\left(y_9+\tfrac{1}{2}\right)\hat{\mathbf{y}}+a\left(x_9+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{94}} = \left(z_9+\tfrac{1}{2}\right)\mathbf{a}_1-\left(y_9-\tfrac{1}{2}\right)\mathbf{a}_2-\left(x_9-\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(z_9+\tfrac{1}{2}\right)\hat{\mathbf{x}}-a\left(y_9-\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(x_9-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{95}} = -\left(z_9-\tfrac{1}{2}\right)\mathbf{a}_1+\left(y_9+\tfrac{1}{2}\right)\mathbf{a}_2-\left(x_9-\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(z_9-\tfrac{1}{2}\right)\hat{\mathbf{x}}+a\left(y_9+\tfrac{1}{2}\right)\hat{\mathbf{y}}-a\left(x_9-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

$$\mathbf{B_{96}} = -\left(z_9-\tfrac{1}{2}\right)\mathbf{a}_1-\left(y_9-\tfrac{1}{2}\right)\mathbf{a}_2+\left(x_9+\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(z_9-\tfrac{1}{2}\right)\hat{\mathbf{x}}-a\left(y_9-\tfrac{1}{2}\right)\hat{\mathbf{y}}+a\left(x_9+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (24i) \quad \text{N II}$$

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