$H6_4$ [$Ni(NO_3)_2(NH_3)_6$] Structure (*Obsolete*): A2B6CD6_cP60_205_c_d_a_d-001

This structure originally had the label `A2B6CD6_cP60_205_c_d_a_d`. Calls to that address will be redirected here.

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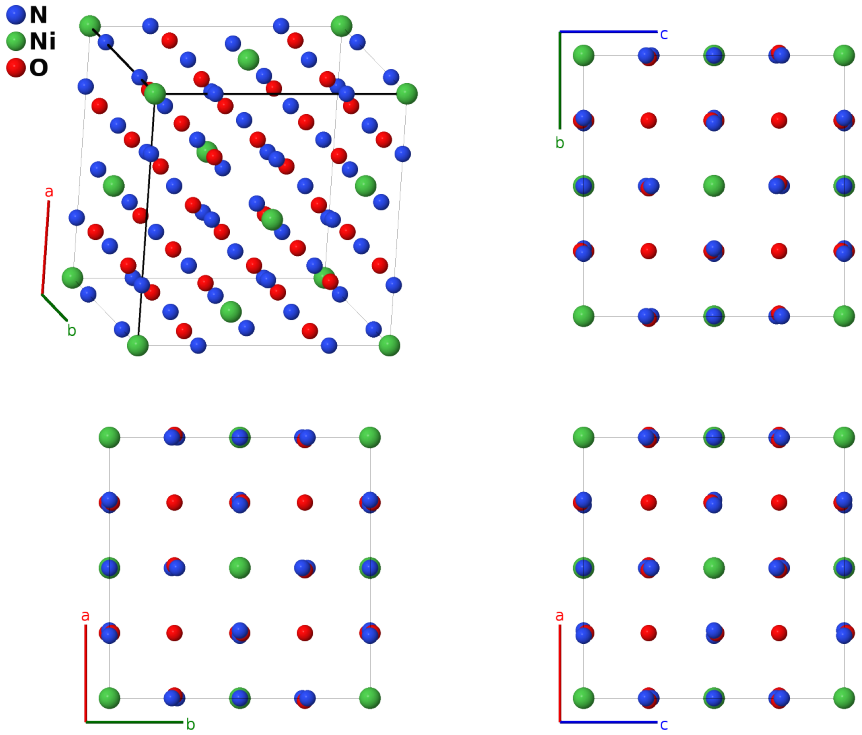
https://aflow.org/p/GED2

https://aflow.org/p/A2B6CD6_cP60_205_c_d_a_d-001



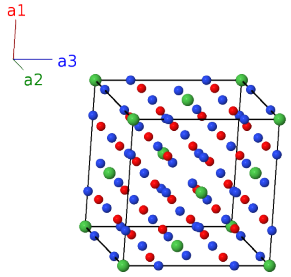
Prototype	$N_2(NH_3)_6NiO_6$
AFLOW prototype label	A2B6CD6_cP60_205_c_d_a_d-001
***Strukturbericht* designation**	$H6_4$
ICSD	none
Pearson symbol	cP60
Space group number	205
Space group symbol	$Pa\bar{3}$
AFLOW prototype command	`aflow --proto=A2B6CD6_cP60_205_c_d_a_d-001 --params=`$a, x_2, x_3, y_3, z_3, x_4, y_4, z_4$

- (Wyckoff, 1922) determined this approximate structure. In his paper, non-zero coordinates were $x_2 = 1/4$ for the nitrogen (8c) atoms, $x_3 = v$, "where v is somewhat less than 0.25," for the NH_3 (24d) molecules, and $x_4 = y_4 = 1/4$, $z_4 = v'$, where v' "should not deviate far from 0." If we take these coordinates as written the space group becomes $Fm\bar{3}m$ #225 rather than Wyckoff's $Pa\bar{3}$ #205, so we adjusted v and v' slightly to put the system in his space group.

- (Ewald, 1931) gave this the *Strukturbericht* designation $H61$, or $H6_1$ in later notation. (Hermann, 1937) moved it to $I1_4$ in their "list of type descriptions," but no other volume of *Strukturbericht* refers to it at all. Accordingly, we will designate this structure by its original label.
- This structure is an idealized appoximation to the true structure of $Ni(NO_3)_2(NH_3)_6$. (Bigoli, 1971) showed that the correct structure is trigonal, with space group $P\bar{1}$ #2.

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	(4a)	Ni I
$\mathbf{B_2}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(4a)	Ni I
$\mathbf{B_3}$	=	$\frac{1}{2}\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{y}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(4a)	Ni I
$\mathbf{B_4}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}}$	(4a)	Ni I
$\mathbf{B_5}$	=	$x_2\,\mathbf{a}_1 + x_2\,\mathbf{a}_2 + x_2\,\mathbf{a}_3$	=	$ax_2\,\hat{\mathbf{x}} + ax_2\,\hat{\mathbf{y}} + ax_2\,\hat{\mathbf{z}}$	(8c)	N I
$\mathbf{B_6}$	=	$-\left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_1 - x_2\,\mathbf{a}_2 + \left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - ax_2\,\hat{\mathbf{y}} + a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(8c)	N I
$\mathbf{B_7}$	=	$-x_2\,\mathbf{a}_1 + \left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_2 - \left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_2\,\hat{\mathbf{x}} + a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{y}} - a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(8c)	N I
$\mathbf{B_8}$	=	$\left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_2 - x_2\,\mathbf{a}_3$	=	$a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - ax_2\,\hat{\mathbf{z}}$	(8c)	N I
$\mathbf{B_9}$	=	$-x_2\,\mathbf{a}_1 - x_2\,\mathbf{a}_2 - x_2\,\mathbf{a}_3$	=	$-ax_2\,\hat{\mathbf{x}} - ax_2\,\hat{\mathbf{y}} - ax_2\,\hat{\mathbf{z}}$	(8c)	N I
$\mathbf{B_{10}}$	=	$\left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_1 + x_2\,\mathbf{a}_2 - \left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + ax_2\,\hat{\mathbf{y}} - a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(8c)	N I
$\mathbf{B_{11}}$	=	$x_2\,\mathbf{a}_1 - \left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_2 + \left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$ax_2\,\hat{\mathbf{x}} - a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{y}} + a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(8c)	N I
$\mathbf{B_{12}}$	=	$-\left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_1 + \left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_2 + x_2\,\mathbf{a}_3$	=	$-a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{y}} + ax_2\,\hat{\mathbf{z}}$	(8c)	N I
$\mathbf{B_{13}}$	=	$x_3\,\mathbf{a}_1 + y_3\,\mathbf{a}_2 + z_3\,\mathbf{a}_3$	=	$ax_3\,\hat{\mathbf{x}} + ay_3\,\hat{\mathbf{y}} + az_3\,\hat{\mathbf{z}}$	(24d)	NH I
$\mathbf{B_{14}}$	=	$-\left(x_3 - \frac{1}{2}\right)\,\mathbf{a}_1 - y_3\,\mathbf{a}_2 + \left(z_3 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_3 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - ay_3\,\hat{\mathbf{y}} + a\left(z_3 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(24d)	NH I
$\mathbf{B_{15}}$	=	$-x_3\,\mathbf{a}_1 + \left(y_3 + \frac{1}{2}\right)\,\mathbf{a}_2 - \left(z_3 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_3\,\hat{\mathbf{x}} + a\left(y_3 + \frac{1}{2}\right)\,\hat{\mathbf{y}} - a\left(z_3 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(24d)	NH I
$\mathbf{B_{16}}$	=	$\left(x_3 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(y_3 - \frac{1}{2}\right)\,\mathbf{a}_2 - z_3\,\mathbf{a}_3$	=	$a\left(x_3 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(y_3 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - az_3\,\hat{\mathbf{z}}$	(24d)	NH I
$\mathbf{B_{17}}$	=	$z_3\,\mathbf{a}_1 + x_3\,\mathbf{a}_2 + y_3\,\mathbf{a}_3$	=	$az_3\,\hat{\mathbf{x}} + ax_3\,\hat{\mathbf{y}} + ay_3\,\hat{\mathbf{z}}$	(24d)	NH I
$\mathbf{B_{18}}$	=	$\left(z_3 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_3 - \frac{1}{2}\right)\,\mathbf{a}_2 - y_3\,\mathbf{a}_3$	=	$a\left(z_3 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_3 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - ay_3\,\hat{\mathbf{z}}$	(24d)	NH I
$\mathbf{B_{19}}$	=	$-\left(z_3 - \frac{1}{2}\right)\,\mathbf{a}_1 - x_3\,\mathbf{a}_2 + \left(y_3 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(z_3 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - ax_3\,\hat{\mathbf{y}} + a\left(y_3 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(24d)	NH I

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\begin{array}{lcccccc}
\mathbf{B_{20}} & = & -z_3\,\mathbf{a}_1+\left(x_3+\frac{1}{2}\right)\,\mathbf{a}_2-\left(y_3-\frac{1}{2}\right)\,\mathbf{a}_3 & = & -az_3\,\hat{\mathbf{x}}+a\left(x_3+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(y_3-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{21}} & = & y_3\,\mathbf{a}_1+z_3\,\mathbf{a}_2+x_3\,\mathbf{a}_3 & = & ay_3\,\hat{\mathbf{x}}+az_3\,\hat{\mathbf{y}}+ax_3\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{22}} & = & -y_3\,\mathbf{a}_1+\left(z_3+\frac{1}{2}\right)\,\mathbf{a}_2-\left(x_3-\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ay_3\,\hat{\mathbf{x}}+a\left(z_3+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(x_3-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{23}} & = & \left(y_3+\frac{1}{2}\right)\,\mathbf{a}_1-\left(z_3-\frac{1}{2}\right)\,\mathbf{a}_2-x_3\,\mathbf{a}_3 & = & a\left(y_3+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(z_3-\frac{1}{2}\right)\,\hat{\mathbf{y}}-ax_3\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{24}} & = & -\left(y_3-\frac{1}{2}\right)\,\mathbf{a}_1-z_3\,\mathbf{a}_2+\left(x_3+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -a\left(y_3-\frac{1}{2}\right)\,\hat{\mathbf{x}}-az_3\,\hat{\mathbf{y}}+a\left(x_3+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{25}} & = & -x_3\,\mathbf{a}_1-y_3\,\mathbf{a}_2-z_3\,\mathbf{a}_3 & = & -ax_3\,\hat{\mathbf{x}}-ay_3\,\hat{\mathbf{y}}-az_3\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{26}} & = & \left(x_3+\frac{1}{2}\right)\,\mathbf{a}_1+y_3\,\mathbf{a}_2-\left(z_3-\frac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(x_3+\frac{1}{2}\right)\,\hat{\mathbf{x}}+ay_3\,\hat{\mathbf{y}}-a\left(z_3-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{27}} & = & x_3\,\mathbf{a}_1-\left(y_3-\frac{1}{2}\right)\,\mathbf{a}_2+\left(z_3+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_3\,\hat{\mathbf{x}}-a\left(y_3-\frac{1}{2}\right)\,\hat{\mathbf{y}}+a\left(z_3+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{28}} & = & -\left(x_3-\frac{1}{2}\right)\,\mathbf{a}_1+\left(y_3+\frac{1}{2}\right)\,\mathbf{a}_2+z_3\,\mathbf{a}_3 & = & -a\left(x_3-\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(y_3+\frac{1}{2}\right)\,\hat{\mathbf{y}}+az_3\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{29}} & = & -z_3\,\mathbf{a}_1-x_3\,\mathbf{a}_2-y_3\,\mathbf{a}_3 & = & -az_3\,\hat{\mathbf{x}}-ax_3\,\hat{\mathbf{y}}-ay_3\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{30}} & = & -\left(z_3-\frac{1}{2}\right)\,\mathbf{a}_1+\left(x_3+\frac{1}{2}\right)\,\mathbf{a}_2+y_3\,\mathbf{a}_3 & = & -a\left(z_3-\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(x_3+\frac{1}{2}\right)\,\hat{\mathbf{y}}+ay_3\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{31}} & = & \left(z_3+\frac{1}{2}\right)\,\mathbf{a}_1+x_3\,\mathbf{a}_2-\left(y_3-\frac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(z_3+\frac{1}{2}\right)\,\hat{\mathbf{x}}+ax_3\,\hat{\mathbf{y}}-a\left(y_3-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{32}} & = & z_3\,\mathbf{a}_1-\left(x_3-\frac{1}{2}\right)\,\mathbf{a}_2+\left(y_3+\frac{1}{2}\right)\,\mathbf{a}_3 & = & az_3\,\hat{\mathbf{x}}-a\left(x_3-\frac{1}{2}\right)\,\hat{\mathbf{y}}+a\left(y_3+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{33}} & = & -y_3\,\mathbf{a}_1-z_3\,\mathbf{a}_2-x_3\,\mathbf{a}_3 & = & -ay_3\,\hat{\mathbf{x}}-az_3\,\hat{\mathbf{y}}-ax_3\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{34}} & = & y_3\,\mathbf{a}_1-\left(z_3-\frac{1}{2}\right)\,\mathbf{a}_2+\left(x_3+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ay_3\,\hat{\mathbf{x}}-a\left(z_3-\frac{1}{2}\right)\,\hat{\mathbf{y}}+a\left(x_3+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{35}} & = & -\left(y_3-\frac{1}{2}\right)\,\mathbf{a}_1+\left(z_3+\frac{1}{2}\right)\,\mathbf{a}_2+x_3\,\mathbf{a}_3 & = & -a\left(y_3-\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(z_3+\frac{1}{2}\right)\,\hat{\mathbf{y}}+ax_3\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{36}} & = & \left(y_3+\frac{1}{2}\right)\,\mathbf{a}_1+z_3\,\mathbf{a}_2-\left(x_3-\frac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(y_3+\frac{1}{2}\right)\,\hat{\mathbf{x}}+az_3\,\hat{\mathbf{y}}-a\left(x_3-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{NH I}\\
\mathbf{B_{37}} & = & x_4\,\mathbf{a}_1+y_4\,\mathbf{a}_2+z_4\,\mathbf{a}_3 & = & ax_4\,\hat{\mathbf{x}}+ay_4\,\hat{\mathbf{y}}+az_4\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{38}} & = & -\left(x_4-\frac{1}{2}\right)\,\mathbf{a}_1-y_4\,\mathbf{a}_2+\left(z_4+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -a\left(x_4-\frac{1}{2}\right)\,\hat{\mathbf{x}}-ay_4\,\hat{\mathbf{y}}+a\left(z_4+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{39}} & = & -x_4\,\mathbf{a}_1+\left(y_4+\frac{1}{2}\right)\,\mathbf{a}_2-\left(z_4-\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_4\,\hat{\mathbf{x}}+a\left(y_4+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(z_4-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{40}} & = & \left(x_4+\frac{1}{2}\right)\,\mathbf{a}_1-\left(y_4-\frac{1}{2}\right)\,\mathbf{a}_2-z_4\,\mathbf{a}_3 & = & a\left(x_4+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(y_4-\frac{1}{2}\right)\,\hat{\mathbf{y}}-az_4\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{41}} & = & z_4\,\mathbf{a}_1+x_4\,\mathbf{a}_2+y_4\,\mathbf{a}_3 & = & az_4\,\hat{\mathbf{x}}+ax_4\,\hat{\mathbf{y}}+ay_4\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{42}} & = & \left(z_4+\frac{1}{2}\right)\,\mathbf{a}_1-\left(x_4-\frac{1}{2}\right)\,\mathbf{a}_2-y_4\,\mathbf{a}_3 & = & a\left(z_4+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(x_4-\frac{1}{2}\right)\,\hat{\mathbf{y}}-ay_4\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{43}} & = & -\left(z_4-\frac{1}{2}\right)\,\mathbf{a}_1-x_4\,\mathbf{a}_2+\left(y_4+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -a\left(z_4-\frac{1}{2}\right)\,\hat{\mathbf{x}}-ax_4\,\hat{\mathbf{y}}+a\left(y_4+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{44}} & = & -z_4\,\mathbf{a}_1+\left(x_4+\frac{1}{2}\right)\,\mathbf{a}_2-\left(y_4-\frac{1}{2}\right)\,\mathbf{a}_3 & = & -az_4\,\hat{\mathbf{x}}+a\left(x_4+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(y_4-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{45}} & = & y_4\,\mathbf{a}_1+z_4\,\mathbf{a}_2+x_4\,\mathbf{a}_3 & = & ay_4\,\hat{\mathbf{x}}+az_4\,\hat{\mathbf{y}}+ax_4\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{46}} & = & -y_4\,\mathbf{a}_1+\left(z_4+\frac{1}{2}\right)\,\mathbf{a}_2-\left(x_4-\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ay_4\,\hat{\mathbf{x}}+a\left(z_4+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(x_4-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{47}} & = & \left(y_4+\frac{1}{2}\right)\,\mathbf{a}_1-\left(z_4-\frac{1}{2}\right)\,\mathbf{a}_2-x_4\,\mathbf{a}_3 & = & a\left(y_4+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(z_4-\frac{1}{2}\right)\,\hat{\mathbf{y}}-ax_4\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{48}} & = & -\left(y_4-\frac{1}{2}\right)\,\mathbf{a}_1-z_4\,\mathbf{a}_2+\left(x_4+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -a\left(y_4-\frac{1}{2}\right)\,\hat{\mathbf{x}}-az_4\,\hat{\mathbf{y}}+a\left(x_4+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{49}} & = & -x_4\,\mathbf{a}_1-y_4\,\mathbf{a}_2-z_4\,\mathbf{a}_3 & = & -ax_4\,\hat{\mathbf{x}}-ay_4\,\hat{\mathbf{y}}-az_4\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{50}} & = & \left(x_4+\frac{1}{2}\right)\,\mathbf{a}_1+y_4\,\mathbf{a}_2-\left(z_4-\frac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(x_4+\frac{1}{2}\right)\,\hat{\mathbf{x}}+ay_4\,\hat{\mathbf{y}}-a\left(z_4-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}\\
\mathbf{B_{51}} & = & x_4\,\mathbf{a}_1-\left(y_4-\frac{1}{2}\right)\,\mathbf{a}_2+\left(z_4+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_4\,\hat{\mathbf{x}}-a\left(y_4-\frac{1}{2}\right)\,\hat{\mathbf{y}}+a\left(z_4+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24d)} & \text{O I}
\end{array}
$$

$\mathbf{B_{52}}$	=	$-\left(x_4-\frac{1}{2}\right)\,\mathbf{a}_1+\left(y_4+\frac{1}{2}\right)\,\mathbf{a}_2+z_4\,\mathbf{a}_3$	=	$-a\left(x_4-\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(y_4+\frac{1}{2}\right)\,\hat{\mathbf{y}}+az_4\,\hat{\mathbf{z}}$	(24d)	O I
$\mathbf{B_{53}}$	=	$-z_4\,\mathbf{a}_1-x_4\,\mathbf{a}_2-y_4\,\mathbf{a}_3$	=	$-az_4\,\hat{\mathbf{x}}-ax_4\,\hat{\mathbf{y}}-ay_4\,\hat{\mathbf{z}}$	(24d)	O I
$\mathbf{B_{54}}$	=	$-\left(z_4-\frac{1}{2}\right)\,\mathbf{a}_1+\left(x_4+\frac{1}{2}\right)\,\mathbf{a}_2+y_4\,\mathbf{a}_3$	=	$-a\left(z_4-\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(x_4+\frac{1}{2}\right)\,\hat{\mathbf{y}}+ay_4\,\hat{\mathbf{z}}$	(24d)	O I
$\mathbf{B_{55}}$	=	$\left(z_4+\frac{1}{2}\right)\,\mathbf{a}_1+x_4\,\mathbf{a}_2-\left(y_4-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(z_4+\frac{1}{2}\right)\,\hat{\mathbf{x}}+ax_4\,\hat{\mathbf{y}}-a\left(y_4-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(24d)	O I
$\mathbf{B_{56}}$	=	$z_4\,\mathbf{a}_1-\left(x_4-\frac{1}{2}\right)\,\mathbf{a}_2+\left(y_4+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$az_4\,\hat{\mathbf{x}}-a\left(x_4-\frac{1}{2}\right)\,\hat{\mathbf{y}}+a\left(y_4+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(24d)	O I
$\mathbf{B_{57}}$	=	$-y_4\,\mathbf{a}_1-z_4\,\mathbf{a}_2-x_4\,\mathbf{a}_3$	=	$-ay_4\,\hat{\mathbf{x}}-az_4\,\hat{\mathbf{y}}-ax_4\,\hat{\mathbf{z}}$	(24d)	O I
$\mathbf{B_{58}}$	=	$y_4\,\mathbf{a}_1-\left(z_4-\frac{1}{2}\right)\,\mathbf{a}_2+\left(x_4+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$ay_4\,\hat{\mathbf{x}}-a\left(z_4-\frac{1}{2}\right)\,\hat{\mathbf{y}}+a\left(x_4+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(24d)	O I
$\mathbf{B_{59}}$	=	$-\left(y_4-\frac{1}{2}\right)\,\mathbf{a}_1+\left(z_4+\frac{1}{2}\right)\,\mathbf{a}_2+x_4\,\mathbf{a}_3$	=	$-a\left(y_4-\frac{1}{2}\right)\,\hat{\mathbf{x}}+a\left(z_4+\frac{1}{2}\right)\,\hat{\mathbf{y}}+ax_4\,\hat{\mathbf{z}}$	(24d)	O I
$\mathbf{B_{60}}$	=	$\left(y_4+\frac{1}{2}\right)\,\mathbf{a}_1+z_4\,\mathbf{a}_2-\left(x_4-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(y_4+\frac{1}{2}\right)\,\hat{\mathbf{x}}+az_4\,\hat{\mathbf{y}}-a\left(x_4-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(24d)	O I

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