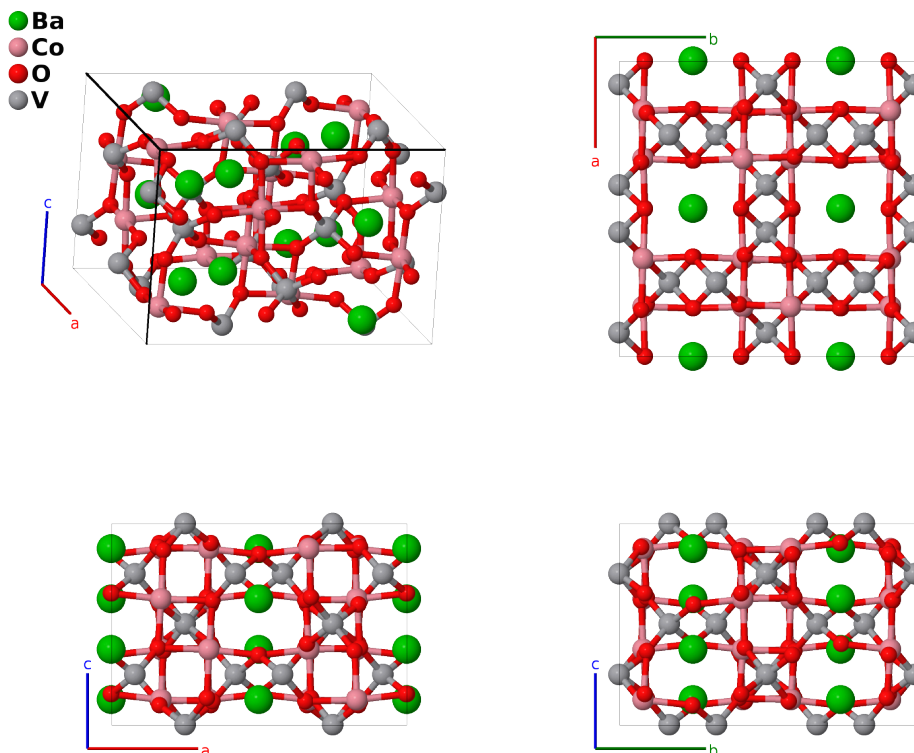


BaCo₂V₂O₈ Structure: AB2C8D2_tI104_142_a_f_2g_e-001

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<https://afLOW.org/p/BMKB>

https://afLOW.org/p/AB2C8D2_tI104_142_a_f_2g_e-001

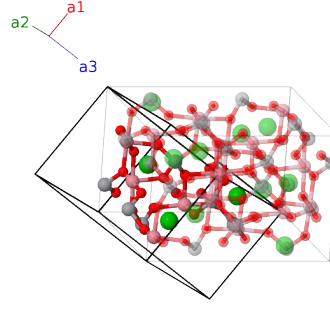


Prototype	BaCo ₂ O ₈ V ₂
AFLOW prototype label	AB2C8D2_tI104_142_a_f_2g_e-001
ICSD	60580
Pearson symbol	tI104
Space group number	142
Space group symbol	$I4_1/acd$
AFLOW prototype command	<pre>afLOW --proto=AB2C8D2_tI104_142_a_f_2g_e-001 --params=a, c/a, x2, x3, x4, y4, z4, x5, y5, z5</pre>

Other compounds with this structure

BaMg₂V₂O₈, BaMn₂V₂O₈, BaMo₂V₂O₈, BaV₂Co₂O₈, PbNi₂V₂O₈

Body-centered Tetragonal primitive vectors



$$\mathbf{a}_1 = -\frac{1}{2}a \hat{\mathbf{x}} + \frac{1}{2}a \hat{\mathbf{y}} + \frac{1}{2}c \hat{\mathbf{z}}$$

$$\mathbf{a}_2 = \frac{1}{2}a \hat{\mathbf{x}} - \frac{1}{2}a \hat{\mathbf{y}} + \frac{1}{2}c \hat{\mathbf{z}}$$

$$\mathbf{a}_3 = \frac{1}{2}a \hat{\mathbf{x}} + \frac{1}{2}a \hat{\mathbf{y}} - \frac{1}{2}c \hat{\mathbf{z}}$$

Basis vectors

	Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
\mathbf{B}_1	$= \frac{5}{8} \mathbf{a}_1 + \frac{3}{8} \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3$	$=$	$\frac{1}{4}a \hat{\mathbf{y}} + \frac{3}{8}c \hat{\mathbf{z}}$	(8a)	Ba I
\mathbf{B}_2	$= \frac{3}{8} \mathbf{a}_1 + \frac{5}{8} \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3$	$=$	$\frac{1}{2}a \hat{\mathbf{x}} + \frac{1}{4}a \hat{\mathbf{y}} + \frac{1}{8}c \hat{\mathbf{z}}$	(8a)	Ba I
\mathbf{B}_3	$= \frac{7}{8} \mathbf{a}_1 + \frac{1}{8} \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3$	$=$	$\frac{3}{4}a \hat{\mathbf{y}} + \frac{1}{8}c \hat{\mathbf{z}}$	(8a)	Ba I
\mathbf{B}_4	$= \frac{1}{8} \mathbf{a}_1 + \frac{7}{8} \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3$	$=$	$\frac{1}{2}a \hat{\mathbf{x}} - \frac{1}{4}a \hat{\mathbf{y}} + \frac{3}{8}c \hat{\mathbf{z}}$	(8a)	Ba I
\mathbf{B}_5	$= \frac{1}{4} \mathbf{a}_1 + (x_2 + \frac{1}{4}) \mathbf{a}_2 + x_2 \mathbf{a}_3$	$=$	$ax_2 \hat{\mathbf{x}} + \frac{1}{4}c \hat{\mathbf{z}}$	(16e)	V I
\mathbf{B}_6	$= \frac{3}{4} \mathbf{a}_1 - (x_2 - \frac{1}{4}) \mathbf{a}_2 - (x_2 - \frac{1}{2}) \mathbf{a}_3$	$=$	$-ax_2 \hat{\mathbf{x}} + \frac{1}{2}a \hat{\mathbf{y}} + \frac{1}{4}c \hat{\mathbf{z}}$	(16e)	V I
\mathbf{B}_7	$= (x_2 + \frac{1}{4}) \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 + x_2 \mathbf{a}_3$	$=$	$\frac{1}{4}a \hat{\mathbf{x}} + a (x_2 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{2}c \hat{\mathbf{z}}$	(16e)	V I
\mathbf{B}_8	$= -(x_2 - \frac{1}{4}) \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 - (x_2 - \frac{1}{2}) \mathbf{a}_3$	$=$	$\frac{1}{4}a \hat{\mathbf{x}} - a (x_2 - \frac{1}{4}) \hat{\mathbf{y}}$	(16e)	V I
\mathbf{B}_9	$= \frac{3}{4} \mathbf{a}_1 - (x_2 - \frac{3}{4}) \mathbf{a}_2 - x_2 \mathbf{a}_3$	$=$	$-ax_2 \hat{\mathbf{x}} + \frac{3}{4}c \hat{\mathbf{z}}$	(16e)	V I
\mathbf{B}_{10}	$= \frac{1}{4} \mathbf{a}_1 + (x_2 + \frac{3}{4}) \mathbf{a}_2 + (x_2 + \frac{1}{2}) \mathbf{a}_3$	$=$	$a (x_2 + \frac{1}{2}) \hat{\mathbf{x}} + \frac{1}{4}c \hat{\mathbf{z}}$	(16e)	V I
\mathbf{B}_{11}	$= -(x_2 - \frac{3}{4}) \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 - x_2 \mathbf{a}_3$	$=$	$-\frac{1}{4}a \hat{\mathbf{x}} - a (x_2 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{2}c \hat{\mathbf{z}}$	(16e)	V I
\mathbf{B}_{12}	$= (x_2 + \frac{3}{4}) \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 + (x_2 + \frac{1}{2}) \mathbf{a}_3$	$=$	$\frac{1}{4}a \hat{\mathbf{x}} + a (x_2 + \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{2}c \hat{\mathbf{z}}$	(16e)	V I
\mathbf{B}_{13}	$= (x_3 + \frac{3}{8}) \mathbf{a}_1 + (x_3 + \frac{1}{8}) \mathbf{a}_2 + (2x_3 + \frac{1}{4}) \mathbf{a}_3$	$=$	$ax_3 \hat{\mathbf{x}} + a (x_3 + \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{8}c \hat{\mathbf{z}}$	(16f)	Co I
\mathbf{B}_{14}	$= -(x_3 - \frac{3}{8}) \mathbf{a}_1 - (x_3 - \frac{1}{8}) \mathbf{a}_2 - (2x_3 - \frac{1}{4}) \mathbf{a}_3$	$=$	$-ax_3 \hat{\mathbf{x}} - a (x_3 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{8}c \hat{\mathbf{z}}$	(16f)	Co I
\mathbf{B}_{15}	$= (x_3 + \frac{1}{8}) \mathbf{a}_1 - (x_3 - \frac{3}{8}) \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3$	$=$	$-a (x_3 - \frac{1}{2}) \hat{\mathbf{x}} + a (x_3 + \frac{1}{4}) \hat{\mathbf{y}} - \frac{1}{8}c \hat{\mathbf{z}}$	(16f)	Co I
\mathbf{B}_{16}	$= -(x_3 - \frac{1}{8}) \mathbf{a}_1 + (x_3 + \frac{3}{8}) \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3$	$=$	$a (x_3 + \frac{1}{2}) \hat{\mathbf{x}} - a (x_3 - \frac{1}{4}) \hat{\mathbf{y}} - \frac{1}{8}c \hat{\mathbf{z}}$	(16f)	Co I
\mathbf{B}_{17}	$= -(x_3 - \frac{5}{8}) \mathbf{a}_1 - (x_3 - \frac{7}{8}) \mathbf{a}_2 - (2x_3 - \frac{3}{4}) \mathbf{a}_3$	$=$	$-a (x_3 - \frac{1}{2}) \hat{\mathbf{x}} - a (x_3 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{3}{8}c \hat{\mathbf{z}}$	(16f)	Co I
\mathbf{B}_{18}	$= (x_3 + \frac{5}{8}) \mathbf{a}_1 + (x_3 + \frac{7}{8}) \mathbf{a}_2 + (2x_3 + \frac{3}{4}) \mathbf{a}_3$	$=$	$a (x_3 + \frac{1}{2}) \hat{\mathbf{x}} + a (x_3 + \frac{1}{4}) \hat{\mathbf{y}} + \frac{3}{8}c \hat{\mathbf{z}}$	(16f)	Co I
\mathbf{B}_{19}	$= -(x_3 - \frac{7}{8}) \mathbf{a}_1 + (x_3 + \frac{5}{8}) \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3$	$=$	$ax_3 \hat{\mathbf{x}} - a (x_3 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{5}{8}c \hat{\mathbf{z}}$	(16f)	Co I
\mathbf{B}_{20}	$= (x_3 + \frac{7}{8}) \mathbf{a}_1 - (x_3 - \frac{5}{8}) \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3$	$=$	$-ax_3 \hat{\mathbf{x}} + a (x_3 + \frac{1}{4}) \hat{\mathbf{y}} + \frac{5}{8}c \hat{\mathbf{z}}$	(16f)	Co I
\mathbf{B}_{21}	$= (y_4 + z_4) \mathbf{a}_1 + (x_4 + z_4) \mathbf{a}_2 + (x_4 + y_4) \mathbf{a}_3$	$=$	$ax_4 \hat{\mathbf{x}} + ay_4 \hat{\mathbf{y}} + cz_4 \hat{\mathbf{z}}$	(32g)	O I
\mathbf{B}_{22}	$= (-y_4 + z_4 + \frac{1}{2}) \mathbf{a}_1 - (x_4 - z_4) \mathbf{a}_2 - (x_4 + y_4 - \frac{1}{2}) \mathbf{a}_3$	$=$	$-ax_4 \hat{\mathbf{x}} - a (y_4 - \frac{1}{2}) \hat{\mathbf{y}} + cz_4 \hat{\mathbf{z}}$	(32g)	O I

$$\begin{aligned}
\mathbf{B}_{23} &= (x_4 + z_4) \mathbf{a}_1 + (-y_4 + z_4 + \frac{1}{2}) \mathbf{a}_2 + (x_4 - y_4) \mathbf{a}_3 &= -a(y_4 - \frac{1}{4}) \hat{\mathbf{x}} + a(x_4 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_4 + \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{24} &= -(x_4 - z_4) \mathbf{a}_1 + (y_4 + z_4) \mathbf{a}_2 + (-x_4 + y_4 + \frac{1}{2}) \mathbf{a}_3 &= a(y_4 + \frac{1}{4}) \hat{\mathbf{x}} - a(x_4 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_4 - \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{25} &= (y_4 - z_4) \mathbf{a}_1 - (x_4 + z_4 - \frac{1}{2}) \mathbf{a}_2 + (-x_4 + y_4 + \frac{1}{2}) \mathbf{a}_3 &= -a(x_4 - \frac{1}{2}) \hat{\mathbf{x}} + ay_4 \hat{\mathbf{y}} - cz_4 \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{26} &= -(y_4 + z_4 - \frac{1}{2}) \mathbf{a}_1 + (x_4 - z_4 + \frac{1}{2}) \mathbf{a}_2 + (x_4 - y_4) \mathbf{a}_3 &= ax_4 \hat{\mathbf{x}} - ay_4 \hat{\mathbf{y}} - c(z_4 - \frac{1}{2}) \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{27} &= (x_4 - z_4 + \frac{1}{2}) \mathbf{a}_1 + (y_4 - z_4) \mathbf{a}_2 + (x_4 + y_4) \mathbf{a}_3 &= a(y_4 - \frac{1}{4}) \hat{\mathbf{x}} + a(x_4 + \frac{1}{4}) \hat{\mathbf{y}} - c(z_4 - \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{28} &= -(x_4 + z_4 - \frac{1}{2}) \mathbf{a}_1 - (y_4 + z_4 - \frac{1}{2}) \mathbf{a}_2 - (x_4 + y_4 - \frac{1}{2}) \mathbf{a}_3 &= -a(y_4 - \frac{1}{4}) \hat{\mathbf{x}} - a(x_4 - \frac{1}{4}) \hat{\mathbf{y}} - c(z_4 - \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{29} &= -(y_4 + z_4) \mathbf{a}_1 - (x_4 + z_4) \mathbf{a}_2 - (x_4 + y_4) \mathbf{a}_3 &= -ax_4 \hat{\mathbf{x}} - ay_4 \hat{\mathbf{y}} - cz_4 \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{30} &= (y_4 - z_4 + \frac{1}{2}) \mathbf{a}_1 + (x_4 - z_4) \mathbf{a}_2 + (x_4 + y_4 + \frac{1}{2}) \mathbf{a}_3 &= ax_4 \hat{\mathbf{x}} + a(y_4 + \frac{1}{2}) \hat{\mathbf{y}} - cz_4 \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{31} &= -(x_4 + z_4) \mathbf{a}_1 + (y_4 - z_4 + \frac{1}{2}) \mathbf{a}_2 - (x_4 - y_4) \mathbf{a}_3 &= a(y_4 + \frac{1}{4}) \hat{\mathbf{x}} - a(x_4 + \frac{1}{4}) \hat{\mathbf{y}} - c(z_4 - \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{32} &= (x_4 - z_4) \mathbf{a}_1 - (y_4 + z_4) \mathbf{a}_2 + (x_4 - y_4 + \frac{1}{2}) \mathbf{a}_3 &= -a(y_4 - \frac{1}{4}) \hat{\mathbf{x}} + a(x_4 + \frac{1}{4}) \hat{\mathbf{y}} - c(z_4 + \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{33} &= -(y_4 - z_4) \mathbf{a}_1 + (x_4 + z_4 + \frac{1}{2}) \mathbf{a}_2 + (x_4 - y_4 + \frac{1}{2}) \mathbf{a}_3 &= a(x_4 + \frac{1}{2}) \hat{\mathbf{x}} - ay_4 \hat{\mathbf{y}} + cz_4 \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{34} &= (y_4 + z_4 + \frac{1}{2}) \mathbf{a}_1 + (-x_4 + z_4 + \frac{1}{2}) \mathbf{a}_2 - (x_4 - y_4) \mathbf{a}_3 &= -ax_4 \hat{\mathbf{x}} + ay_4 \hat{\mathbf{y}} + c(z_4 + \frac{1}{2}) \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{35} &= (-x_4 + z_4 + \frac{1}{2}) \mathbf{a}_1 - (y_4 - z_4) \mathbf{a}_2 - (x_4 + y_4) \mathbf{a}_3 &= -a(y_4 + \frac{1}{4}) \hat{\mathbf{x}} - a(x_4 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_4 + \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{36} &= (x_4 + z_4 + \frac{1}{2}) \mathbf{a}_1 + (y_4 + z_4 + \frac{1}{2}) \mathbf{a}_2 + (x_4 + y_4 + \frac{1}{2}) \mathbf{a}_3 &= a(y_4 + \frac{1}{4}) \hat{\mathbf{x}} + a(x_4 + \frac{1}{4}) \hat{\mathbf{y}} + c(z_4 + \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O I} \\
\mathbf{B}_{37} &= (y_5 + z_5) \mathbf{a}_1 + (x_5 + z_5) \mathbf{a}_2 + (x_5 + y_5) \mathbf{a}_3 &= ax_5 \hat{\mathbf{x}} + ay_5 \hat{\mathbf{y}} + cz_5 \hat{\mathbf{z}} &(32g) & \text{O II} \\
\mathbf{B}_{38} &= (-y_5 + z_5 + \frac{1}{2}) \mathbf{a}_1 - (x_5 - z_5) \mathbf{a}_2 - (x_5 + y_5 - \frac{1}{2}) \mathbf{a}_3 &= -ax_5 \hat{\mathbf{x}} - a(y_5 - \frac{1}{2}) \hat{\mathbf{y}} + cz_5 \hat{\mathbf{z}} &(32g) & \text{O II} \\
\mathbf{B}_{39} &= (x_5 + z_5) \mathbf{a}_1 + (-y_5 + z_5 + \frac{1}{2}) \mathbf{a}_2 + (x_5 - y_5) \mathbf{a}_3 &= -a(y_5 - \frac{1}{4}) \hat{\mathbf{x}} + a(x_5 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_5 + \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O II} \\
\mathbf{B}_{40} &= -(x_5 - z_5) \mathbf{a}_1 + (y_5 + z_5) \mathbf{a}_2 + (-x_5 + y_5 + \frac{1}{2}) \mathbf{a}_3 &= a(y_5 + \frac{1}{4}) \hat{\mathbf{x}} - a(x_5 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_5 - \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O II} \\
\mathbf{B}_{41} &= (y_5 - z_5) \mathbf{a}_1 - (x_5 + z_5 - \frac{1}{2}) \mathbf{a}_2 + (-x_5 + y_5 + \frac{1}{2}) \mathbf{a}_3 &= -a(x_5 - \frac{1}{2}) \hat{\mathbf{x}} + ay_5 \hat{\mathbf{y}} - cz_5 \hat{\mathbf{z}} &(32g) & \text{O II} \\
\mathbf{B}_{42} &= -(y_5 + z_5 - \frac{1}{2}) \mathbf{a}_1 + (x_5 - z_5 + \frac{1}{2}) \mathbf{a}_2 + (x_5 - y_5) \mathbf{a}_3 &= ax_5 \hat{\mathbf{x}} - ay_5 \hat{\mathbf{y}} - c(z_5 - \frac{1}{2}) \hat{\mathbf{z}} &(32g) & \text{O II} \\
\mathbf{B}_{43} &= (x_5 - z_5 + \frac{1}{2}) \mathbf{a}_1 + (y_5 - z_5) \mathbf{a}_2 + (x_5 + y_5) \mathbf{a}_3 &= a(y_5 - \frac{1}{4}) \hat{\mathbf{x}} + a(x_5 + \frac{1}{4}) \hat{\mathbf{y}} - c(z_5 - \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O II} \\
\mathbf{B}_{44} &= -(x_5 + z_5 - \frac{1}{2}) \mathbf{a}_1 - (y_5 + z_5 - \frac{1}{2}) \mathbf{a}_2 - (x_5 + y_5 - \frac{1}{2}) \mathbf{a}_3 &= -a(y_5 - \frac{1}{4}) \hat{\mathbf{x}} - a(x_5 - \frac{1}{4}) \hat{\mathbf{y}} - c(z_5 - \frac{1}{4}) \hat{\mathbf{z}} &(32g) & \text{O II}
\end{aligned}$$

$$\begin{aligned}
\mathbf{B}_{45} &= \begin{matrix} -(y_5 + z_5) \mathbf{a}_1 - (x_5 + z_5) \mathbf{a}_2 - \\ (x_5 + y_5) \mathbf{a}_3 \end{matrix} = -ax_5 \hat{\mathbf{x}} - ay_5 \hat{\mathbf{y}} - cz_5 \hat{\mathbf{z}} & (32g) & \text{O II} \\
\mathbf{B}_{46} &= \begin{matrix} (y_5 - z_5 + \frac{1}{2}) \mathbf{a}_1 + \\ (x_5 - z_5) \mathbf{a}_2 + (x_5 + y_5 + \frac{1}{2}) \mathbf{a}_3 \end{matrix} = ax_5 \hat{\mathbf{x}} + a(y_5 + \frac{1}{2}) \hat{\mathbf{y}} - cz_5 \hat{\mathbf{z}} & (32g) & \text{O II} \\
\mathbf{B}_{47} &= \begin{matrix} -(x_5 + z_5) \mathbf{a}_1 + \\ (y_5 - z_5 + \frac{1}{2}) \mathbf{a}_2 - (x_5 - y_5) \mathbf{a}_3 \end{matrix} = a(y_5 + \frac{1}{4}) \hat{\mathbf{x}} - a(x_5 + \frac{1}{4}) \hat{\mathbf{y}} - c(z_5 - \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{O II} \\
\mathbf{B}_{48} &= \begin{matrix} (x_5 - z_5) \mathbf{a}_1 - (y_5 + z_5) \mathbf{a}_2 + \\ (x_5 - y_5 + \frac{1}{2}) \mathbf{a}_3 \end{matrix} = -a(y_5 - \frac{1}{4}) \hat{\mathbf{x}} + a(x_5 + \frac{1}{4}) \hat{\mathbf{y}} - c(z_5 + \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{O II} \\
\mathbf{B}_{49} &= \begin{matrix} -(y_5 - z_5) \mathbf{a}_1 + \\ (x_5 + z_5 + \frac{1}{2}) \mathbf{a}_2 + \\ (x_5 - y_5 + \frac{1}{2}) \mathbf{a}_3 \end{matrix} = a(x_5 + \frac{1}{2}) \hat{\mathbf{x}} - ay_5 \hat{\mathbf{y}} + cz_5 \hat{\mathbf{z}} & (32g) & \text{O II} \\
\mathbf{B}_{50} &= \begin{matrix} (y_5 + z_5 + \frac{1}{2}) \mathbf{a}_1 + \\ (-x_5 + z_5 + \frac{1}{2}) \mathbf{a}_2 - (x_5 - y_5) \mathbf{a}_3 \end{matrix} = -ax_5 \hat{\mathbf{x}} + ay_5 \hat{\mathbf{y}} + c(z_5 + \frac{1}{2}) \hat{\mathbf{z}} & (32g) & \text{O II} \\
\mathbf{B}_{51} &= \begin{matrix} (-x_5 + z_5 + \frac{1}{2}) \mathbf{a}_1 - \\ (y_5 - z_5) \mathbf{a}_2 - (x_5 + y_5) \mathbf{a}_3 \end{matrix} = -a(y_5 + \frac{1}{4}) \hat{\mathbf{x}} - a(x_5 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_5 + \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{O II} \\
\mathbf{B}_{52} &= \begin{matrix} (x_5 + z_5 + \frac{1}{2}) \mathbf{a}_1 + \\ (y_5 + z_5 + \frac{1}{2}) \mathbf{a}_2 + \\ (x_5 + y_5 + \frac{1}{2}) \mathbf{a}_3 \end{matrix} = a(y_5 + \frac{1}{4}) \hat{\mathbf{x}} + a(x_5 + \frac{1}{4}) \hat{\mathbf{y}} + c(z_5 + \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{O II}
\end{aligned}$$

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