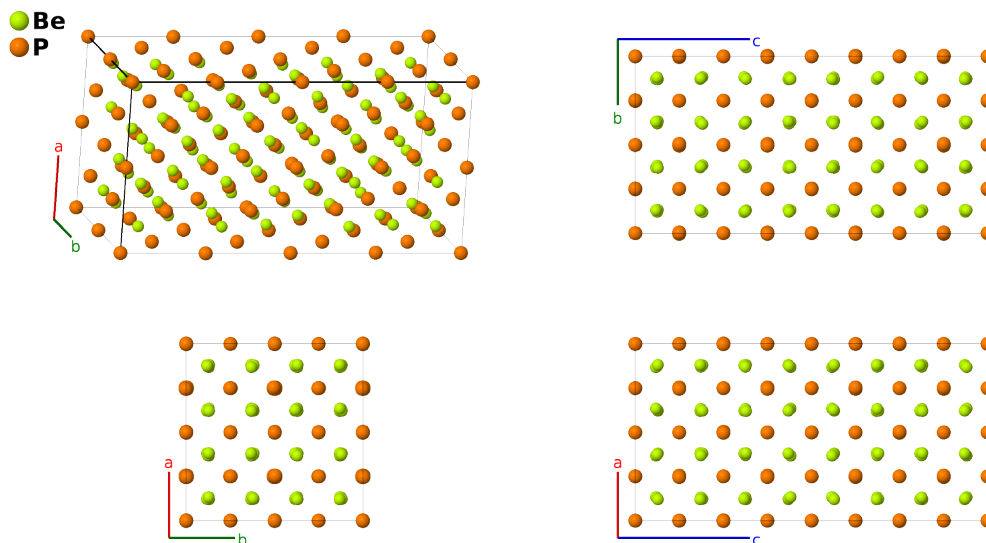


# Tetragonal Be<sub>3</sub>P<sub>2</sub> Structure: A3B2\_tI160\_142\_3g\_abcef-001

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<https://afLOW.org/p/4A1E>

[https://afLOW.org/p/A3B2\\_tI160\\_142\\_3g\\_abcef-001](https://afLOW.org/p/A3B2_tI160_142_3g_abcef-001)

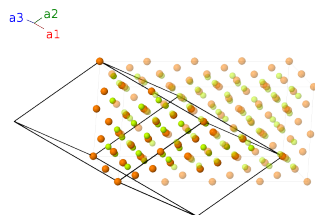


Prototype	Be <sub>3</sub> P <sub>2</sub>
AFLOW prototype label	A3B2_tI160_142_3g_abcef-001
ICSD	42038
Pearson symbol	tI160
Space group number	142
Space group symbol	<i>I</i> 4 <sub>1</sub> / <i>acd</i>
AFLOW prototype command	<code>afLOW --proto=A3B2_tI160_142_3g_abcef-001 --params=a, c/a, x<sub>4</sub>, x<sub>5</sub>, x<sub>6</sub>, y<sub>6</sub>, z<sub>6</sub>, x<sub>7</sub>, y<sub>7</sub>, z<sub>7</sub>, x<sub>8</sub>, y<sub>8</sub>, z<sub>8</sub></code>

- Be<sub>3</sub>P<sub>2</sub> can also be found in the cubic bixbyite (Mn<sub>2</sub>O<sub>3</sub>) structure, and has been reported in the centrosymmetric cubic *D*5<sub>5</sub> (Mg<sub>3</sub>P<sub>2</sub>) structure.

## Body-centered Tetragonal primitive vectors

$$\begin{aligned} \mathbf{a}_1 &= -\frac{1}{2}a \hat{\mathbf{x}} + \frac{1}{2}a \hat{\mathbf{y}} + \frac{1}{2}c \hat{\mathbf{z}} \\ \mathbf{a}_2 &= \frac{1}{2}a \hat{\mathbf{x}} - \frac{1}{2}a \hat{\mathbf{y}} + \frac{1}{2}c \hat{\mathbf{z}} \\ \mathbf{a}_3 &= \frac{1}{2}a \hat{\mathbf{x}} + \frac{1}{2}a \hat{\mathbf{y}} - \frac{1}{2}c \hat{\mathbf{z}} \end{aligned}$$



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**Basis vectors**

	Lattice coordinates		Cartesian coordinates		Wyckoff position	Atom type
$\mathbf{B}_1$	$= \frac{5}{8} \mathbf{a}_1 + \frac{3}{8} \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3$	$=$	$\frac{1}{4} a \hat{\mathbf{y}} + \frac{3}{8} c \hat{\mathbf{z}}$	$(8a)$	P I	
$\mathbf{B}_2$	$= \frac{3}{8} \mathbf{a}_1 + \frac{5}{8} \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3$	$=$	$\frac{1}{2} a \hat{\mathbf{x}} + \frac{1}{4} a \hat{\mathbf{y}} + \frac{1}{8} c \hat{\mathbf{z}}$	$(8a)$	P I	
$\mathbf{B}_3$	$= \frac{7}{8} \mathbf{a}_1 + \frac{1}{8} \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3$	$=$	$\frac{3}{4} a \hat{\mathbf{y}} + \frac{1}{8} c \hat{\mathbf{z}}$	$(8a)$	P I	
$\mathbf{B}_4$	$= \frac{1}{8} \mathbf{a}_1 + \frac{7}{8} \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3$	$=$	$\frac{1}{2} a \hat{\mathbf{x}} - \frac{1}{4} a \hat{\mathbf{y}} + \frac{3}{8} c \hat{\mathbf{z}}$	$(8a)$	P I	
$\mathbf{B}_5$	$= \frac{3}{8} \mathbf{a}_1 + \frac{1}{8} \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3$	$=$	$\frac{1}{4} a \hat{\mathbf{y}} + \frac{1}{8} c \hat{\mathbf{z}}$	$(8b)$	P II	
$\mathbf{B}_6$	$= \frac{1}{8} \mathbf{a}_1 + \frac{3}{8} \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3$	$=$	$\frac{1}{2} a \hat{\mathbf{x}} + \frac{1}{4} a \hat{\mathbf{y}} - \frac{1}{8} c \hat{\mathbf{z}}$	$(8b)$	P II	
$\mathbf{B}_7$	$= \frac{5}{8} \mathbf{a}_1 + \frac{7}{8} \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3$	$=$	$\frac{1}{2} a \hat{\mathbf{x}} + \frac{1}{4} a \hat{\mathbf{y}} + \frac{3}{8} c \hat{\mathbf{z}}$	$(8b)$	P II	
$\mathbf{B}_8$	$= \frac{7}{8} \mathbf{a}_1 + \frac{5}{8} \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3$	$=$	$\frac{1}{4} a \hat{\mathbf{y}} + \frac{5}{8} c \hat{\mathbf{z}}$	$(8b)$	P II	
$\mathbf{B}_9$	$= 0$	$=$	$0$	$(16c)$	P III	
$\mathbf{B}_{10}$	$= \frac{1}{2} \mathbf{a}_1 + \frac{1}{2} \mathbf{a}_3$	$=$	$\frac{1}{2} a \hat{\mathbf{y}}$	$(16c)$	P III	
$\mathbf{B}_{11}$	$= \frac{1}{2} \mathbf{a}_2$	$=$	$\frac{1}{4} a \hat{\mathbf{x}} - \frac{1}{4} a \hat{\mathbf{y}} + \frac{1}{4} c \hat{\mathbf{z}}$	$(16c)$	P III	
$\mathbf{B}_{12}$	$= \frac{1}{2} \mathbf{a}_3$	$=$	$\frac{1}{4} a \hat{\mathbf{x}} + \frac{1}{4} a \hat{\mathbf{y}} - \frac{1}{4} c \hat{\mathbf{z}}$	$(16c)$	P III	
$\mathbf{B}_{13}$	$= \frac{1}{2} \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$	$=$	$\frac{1}{2} a \hat{\mathbf{x}}$	$(16c)$	P III	
$\mathbf{B}_{14}$	$= \frac{1}{2} \mathbf{a}_1 + \frac{1}{2} \mathbf{a}_2$	$=$	$\frac{1}{2} c \hat{\mathbf{z}}$	$(16c)$	P III	
$\mathbf{B}_{15}$	$= \frac{1}{2} \mathbf{a}_1$	$=$	$-\frac{1}{4} a \hat{\mathbf{x}} + \frac{1}{4} a \hat{\mathbf{y}} + \frac{1}{4} c \hat{\mathbf{z}}$	$(16c)$	P III	
$\mathbf{B}_{16}$	$= \frac{1}{2} \mathbf{a}_1 + \frac{1}{2} \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$	$=$	$\frac{1}{4} a \hat{\mathbf{x}} + \frac{1}{4} a \hat{\mathbf{y}} + \frac{1}{4} c \hat{\mathbf{z}}$	$(16c)$	P III	
$\mathbf{B}_{17}$	$= \frac{1}{4} \mathbf{a}_1 + (x_4 + \frac{1}{4}) \mathbf{a}_2 + x_4 \mathbf{a}_3$	$=$	$ax_4 \hat{\mathbf{x}} + \frac{1}{4} c \hat{\mathbf{z}}$	$(16e)$	P IV	
$\mathbf{B}_{18}$	$= \frac{3}{4} \mathbf{a}_1 - (x_4 - \frac{1}{4}) \mathbf{a}_2 - (x_4 - \frac{1}{2}) \mathbf{a}_3$	$=$	$-ax_4 \hat{\mathbf{x}} + \frac{1}{2} a \hat{\mathbf{y}} + \frac{1}{4} c \hat{\mathbf{z}}$	$(16e)$	P IV	
$\mathbf{B}_{19}$	$= (x_4 + \frac{1}{4}) \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 + x_4 \mathbf{a}_3$	$=$	$\frac{1}{4} a \hat{\mathbf{x}} + a (x_4 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{2} c \hat{\mathbf{z}}$	$(16e)$	P IV	
$\mathbf{B}_{20}$	$= -(x_4 - \frac{1}{4}) \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 - (x_4 - \frac{1}{2}) \mathbf{a}_3$	$=$	$\frac{1}{4} a \hat{\mathbf{x}} - a (x_4 - \frac{1}{4}) \hat{\mathbf{y}}$	$(16e)$	P IV	
$\mathbf{B}_{21}$	$= \frac{3}{4} \mathbf{a}_1 - (x_4 - \frac{3}{4}) \mathbf{a}_2 - x_4 \mathbf{a}_3$	$=$	$-ax_4 \hat{\mathbf{x}} + \frac{3}{4} c \hat{\mathbf{z}}$	$(16e)$	P IV	
$\mathbf{B}_{22}$	$= \frac{1}{4} \mathbf{a}_1 + (x_4 + \frac{3}{4}) \mathbf{a}_2 + (x_4 + \frac{1}{2}) \mathbf{a}_3$	$=$	$a (x_4 + \frac{1}{2}) \hat{\mathbf{x}} + \frac{1}{4} c \hat{\mathbf{z}}$	$(16e)$	P IV	
$\mathbf{B}_{23}$	$= -(x_4 - \frac{3}{4}) \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 - x_4 \mathbf{a}_3$	$=$	$-\frac{1}{4} a \hat{\mathbf{x}} - a (x_4 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{2} c \hat{\mathbf{z}}$	$(16e)$	P IV	
$\mathbf{B}_{24}$	$= (x_4 + \frac{3}{4}) \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 + (x_4 + \frac{1}{2}) \mathbf{a}_3$	$=$	$\frac{1}{4} a \hat{\mathbf{x}} + a (x_4 + \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{2} c \hat{\mathbf{z}}$	$(16e)$	P IV	
$\mathbf{B}_{25}$	$= (x_5 + \frac{3}{8}) \mathbf{a}_1 + (x_5 + \frac{1}{8}) \mathbf{a}_2 + (2x_5 + \frac{1}{4}) \mathbf{a}_3$	$=$	$ax_5 \hat{\mathbf{x}} + a (x_5 + \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{8} c \hat{\mathbf{z}}$	$(16f)$	P V	
$\mathbf{B}_{26}$	$= -(x_5 - \frac{3}{8}) \mathbf{a}_1 - (x_5 - \frac{1}{8}) \mathbf{a}_2 - (2x_5 - \frac{1}{4}) \mathbf{a}_3$	$=$	$-ax_5 \hat{\mathbf{x}} - a (x_5 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{8} c \hat{\mathbf{z}}$	$(16f)$	P V	
$\mathbf{B}_{27}$	$= (x_5 + \frac{1}{8}) \mathbf{a}_1 - (x_5 - \frac{3}{8}) \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3$	$=$	$-a (x_5 - \frac{1}{2}) \hat{\mathbf{x}} + a (x_5 + \frac{1}{4}) \hat{\mathbf{y}} - \frac{1}{8} c \hat{\mathbf{z}}$	$(16f)$	P V	
$\mathbf{B}_{28}$	$= -(x_5 - \frac{1}{8}) \mathbf{a}_1 + (x_5 + \frac{3}{8}) \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3$	$=$	$a (x_5 + \frac{1}{2}) \hat{\mathbf{x}} - a (x_5 - \frac{1}{4}) \hat{\mathbf{y}} - \frac{1}{8} c \hat{\mathbf{z}}$	$(16f)$	P V	
$\mathbf{B}_{29}$	$= -(x_5 - \frac{5}{8}) \mathbf{a}_1 - (x_5 - \frac{7}{8}) \mathbf{a}_2 - (2x_5 - \frac{3}{4}) \mathbf{a}_3$	$=$	$-a (x_5 - \frac{1}{2}) \hat{\mathbf{x}} - a (x_5 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{3}{8} c \hat{\mathbf{z}}$	$(16f)$	P V	
$\mathbf{B}_{30}$	$= (x_5 + \frac{5}{8}) \mathbf{a}_1 + (x_5 + \frac{7}{8}) \mathbf{a}_2 + (2x_5 + \frac{3}{4}) \mathbf{a}_3$	$=$	$a (x_5 + \frac{1}{2}) \hat{\mathbf{x}} + a (x_5 + \frac{1}{4}) \hat{\mathbf{y}} + \frac{3}{8} c \hat{\mathbf{z}}$	$(16f)$	P V	
$\mathbf{B}_{31}$	$= -(x_5 - \frac{7}{8}) \mathbf{a}_1 + (x_5 + \frac{5}{8}) \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3$	$=$	$ax_5 \hat{\mathbf{x}} - a (x_5 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{5}{8} c \hat{\mathbf{z}}$	$(16f)$	P V	
$\mathbf{B}_{32}$	$= (x_5 + \frac{7}{8}) \mathbf{a}_1 - (x_5 - \frac{5}{8}) \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3$	$=$	$-ax_5 \hat{\mathbf{x}} + a (x_5 + \frac{1}{4}) \hat{\mathbf{y}} + \frac{5}{8} c \hat{\mathbf{z}}$	$(16f)$	P V	

$$\begin{aligned}
\mathbf{B}_{33} &= (y_6 + z_6) \mathbf{a}_1 + (x_6 + z_6) \mathbf{a}_2 + (x_6 + y_6) \mathbf{a}_3 &= ax_6 \hat{\mathbf{x}} + ay_6 \hat{\mathbf{y}} + cz_6 \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{34} &= (-y_6 + z_6 + \frac{1}{2}) \mathbf{a}_1 - (x_6 - z_6) \mathbf{a}_2 - (x_6 + y_6 - \frac{1}{2}) \mathbf{a}_3 &= -ax_6 \hat{\mathbf{x}} - a(y_6 - \frac{1}{2}) \hat{\mathbf{y}} + cz_6 \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{35} &= (x_6 + z_6) \mathbf{a}_1 + (-y_6 + z_6 + \frac{1}{2}) \mathbf{a}_2 + (x_6 - y_6) \mathbf{a}_3 &= -a(y_6 - \frac{1}{4}) \hat{\mathbf{x}} + a(x_6 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_6 + \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{36} &= -(x_6 - z_6) \mathbf{a}_1 + (y_6 + z_6) \mathbf{a}_2 + (-x_6 + y_6 + \frac{1}{2}) \mathbf{a}_3 &= a(y_6 + \frac{1}{4}) \hat{\mathbf{x}} - a(x_6 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_6 - \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{37} &= (y_6 - z_6) \mathbf{a}_1 - (x_6 + z_6 - \frac{1}{2}) \mathbf{a}_2 + (-x_6 + y_6 + \frac{1}{2}) \mathbf{a}_3 &= -a(x_6 - \frac{1}{2}) \hat{\mathbf{x}} + ay_6 \hat{\mathbf{y}} - cz_6 \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{38} &= -(y_6 + z_6 - \frac{1}{2}) \mathbf{a}_1 + (x_6 - z_6 + \frac{1}{2}) \mathbf{a}_2 + (x_6 - y_6) \mathbf{a}_3 &= ax_6 \hat{\mathbf{x}} - ay_6 \hat{\mathbf{y}} - c(z_6 - \frac{1}{2}) \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{39} &= (x_6 - z_6 + \frac{1}{2}) \mathbf{a}_1 + (y_6 - z_6) \mathbf{a}_2 + (x_6 + y_6) \mathbf{a}_3 &= a(y_6 - \frac{1}{4}) \hat{\mathbf{x}} + a(x_6 + \frac{1}{4}) \hat{\mathbf{y}} - c(z_6 - \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{40} &= -(x_6 + z_6 - \frac{1}{2}) \mathbf{a}_1 - (y_6 + z_6 - \frac{1}{2}) \mathbf{a}_2 - (x_6 + y_6 - \frac{1}{2}) \mathbf{a}_3 &= -a(y_6 - \frac{1}{4}) \hat{\mathbf{x}} - a(x_6 - \frac{1}{4}) \hat{\mathbf{y}} - c(z_6 - \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{41} &= -(y_6 + z_6) \mathbf{a}_1 - (x_6 + z_6) \mathbf{a}_2 - (x_6 + y_6) \mathbf{a}_3 &= -ax_6 \hat{\mathbf{x}} - ay_6 \hat{\mathbf{y}} - cz_6 \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{42} &= (y_6 - z_6 + \frac{1}{2}) \mathbf{a}_1 + (x_6 - z_6) \mathbf{a}_2 + (x_6 + y_6 + \frac{1}{2}) \mathbf{a}_3 &= ax_6 \hat{\mathbf{x}} + a(y_6 + \frac{1}{2}) \hat{\mathbf{y}} - cz_6 \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{43} &= -(x_6 + z_6) \mathbf{a}_1 + (y_6 - z_6 + \frac{1}{2}) \mathbf{a}_2 - (x_6 - y_6) \mathbf{a}_3 &= a(y_6 + \frac{1}{4}) \hat{\mathbf{x}} - a(x_6 + \frac{1}{4}) \hat{\mathbf{y}} - c(z_6 - \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{44} &= (x_6 - z_6) \mathbf{a}_1 - (y_6 + z_6) \mathbf{a}_2 + (x_6 - y_6 + \frac{1}{2}) \mathbf{a}_3 &= -a(y_6 - \frac{1}{4}) \hat{\mathbf{x}} + a(x_6 + \frac{1}{4}) \hat{\mathbf{y}} - c(z_6 + \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{45} &= -(y_6 - z_6) \mathbf{a}_1 + (x_6 + z_6 + \frac{1}{2}) \mathbf{a}_2 + (x_6 - y_6 + \frac{1}{2}) \mathbf{a}_3 &= a(x_6 + \frac{1}{2}) \hat{\mathbf{x}} - ay_6 \hat{\mathbf{y}} + cz_6 \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{46} &= (y_6 + z_6 + \frac{1}{2}) \mathbf{a}_1 + (-x_6 + z_6 + \frac{1}{2}) \mathbf{a}_2 - (x_6 - y_6) \mathbf{a}_3 &= -ax_6 \hat{\mathbf{x}} + ay_6 \hat{\mathbf{y}} + c(z_6 + \frac{1}{2}) \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{47} &= (-x_6 + z_6 + \frac{1}{2}) \mathbf{a}_1 - (y_6 - z_6) \mathbf{a}_2 - (x_6 + y_6) \mathbf{a}_3 &= -a(y_6 + \frac{1}{4}) \hat{\mathbf{x}} - a(x_6 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_6 + \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{48} &= (x_6 + z_6 + \frac{1}{2}) \mathbf{a}_1 + (y_6 + z_6 + \frac{1}{2}) \mathbf{a}_2 + (x_6 + y_6 + \frac{1}{2}) \mathbf{a}_3 &= a(y_6 + \frac{1}{4}) \hat{\mathbf{x}} + a(x_6 + \frac{1}{4}) \hat{\mathbf{y}} + c(z_6 + \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{Be I} \\
\mathbf{B}_{49} &= (y_7 + z_7) \mathbf{a}_1 + (x_7 + z_7) \mathbf{a}_2 + (x_7 + y_7) \mathbf{a}_3 &= ax_7 \hat{\mathbf{x}} + ay_7 \hat{\mathbf{y}} + cz_7 \hat{\mathbf{z}} & (32g) & \text{Be II} \\
\mathbf{B}_{50} &= (-y_7 + z_7 + \frac{1}{2}) \mathbf{a}_1 - (x_7 - z_7) \mathbf{a}_2 - (x_7 + y_7 - \frac{1}{2}) \mathbf{a}_3 &= -ax_7 \hat{\mathbf{x}} - a(y_7 - \frac{1}{2}) \hat{\mathbf{y}} + cz_7 \hat{\mathbf{z}} & (32g) & \text{Be II} \\
\mathbf{B}_{51} &= (x_7 + z_7) \mathbf{a}_1 + (-y_7 + z_7 + \frac{1}{2}) \mathbf{a}_2 + (x_7 - y_7) \mathbf{a}_3 &= -a(y_7 - \frac{1}{4}) \hat{\mathbf{x}} + a(x_7 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_7 + \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{Be II} \\
\mathbf{B}_{52} &= -(x_7 - z_7) \mathbf{a}_1 + (y_7 + z_7) \mathbf{a}_2 + (-x_7 + y_7 + \frac{1}{2}) \mathbf{a}_3 &= a(y_7 + \frac{1}{4}) \hat{\mathbf{x}} - a(x_7 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_7 - \frac{1}{4}) \hat{\mathbf{z}} & (32g) & \text{Be II} \\
\mathbf{B}_{53} &= (y_7 - z_7) \mathbf{a}_1 - (x_7 + z_7 - \frac{1}{2}) \mathbf{a}_2 + (-x_7 + y_7 + \frac{1}{2}) \mathbf{a}_3 &= -a(x_7 - \frac{1}{2}) \hat{\mathbf{x}} + ay_7 \hat{\mathbf{y}} - cz_7 \hat{\mathbf{z}} & (32g) & \text{Be II} \\
\mathbf{B}_{54} &= -(y_7 + z_7 - \frac{1}{2}) \mathbf{a}_1 + (x_7 - z_7 + \frac{1}{2}) \mathbf{a}_2 + (x_7 - y_7) \mathbf{a}_3 &= ax_7 \hat{\mathbf{x}} - ay_7 \hat{\mathbf{y}} - c(z_7 - \frac{1}{2}) \hat{\mathbf{z}} & (32g) & \text{Be II}
\end{aligned}$$



$$\begin{aligned}
\mathbf{B}_{77} &= \begin{aligned} &-(y_8 - z_8) \mathbf{a}_1 + \\ &(x_8 + z_8 + \frac{1}{2}) \mathbf{a}_2 + \\ &(x_8 - y_8 + \frac{1}{2}) \mathbf{a}_3 \end{aligned} &= a(x_8 + \frac{1}{2}) \hat{\mathbf{x}} - ay_8 \hat{\mathbf{y}} + cz_8 \hat{\mathbf{z}} &(32g) &\text{Be III} \\
\mathbf{B}_{78} &= \begin{aligned} &(y_8 + z_8 + \frac{1}{2}) \mathbf{a}_1 + \\ &(-x_8 + z_8 + \frac{1}{2}) \mathbf{a}_2 - (x_8 - y_8) \mathbf{a}_3 \end{aligned} &= -ax_8 \hat{\mathbf{x}} + ay_8 \hat{\mathbf{y}} + c(z_8 + \frac{1}{2}) \hat{\mathbf{z}} &(32g) &\text{Be III} \\
\mathbf{B}_{79} &= \begin{aligned} &(-x_8 + z_8 + \frac{1}{2}) \mathbf{a}_1 - \\ &(y_8 - z_8) \mathbf{a}_2 - (x_8 + y_8) \mathbf{a}_3 \end{aligned} &= -a(y_8 + \frac{1}{4}) \hat{\mathbf{x}} - a(x_8 - \frac{1}{4}) \hat{\mathbf{y}} + c(z_8 + \frac{1}{4}) \hat{\mathbf{z}} &(32g) &\text{Be III} \\
\mathbf{B}_{80} &= \begin{aligned} &(x_8 + z_8 + \frac{1}{2}) \mathbf{a}_1 + \\ &(y_8 + z_8 + \frac{1}{2}) \mathbf{a}_2 + \\ &(x_8 + y_8 + \frac{1}{2}) \mathbf{a}_3 \end{aligned} &= a(y_8 + \frac{1}{4}) \hat{\mathbf{x}} + a(x_8 + \frac{1}{4}) \hat{\mathbf{y}} + c(z_8 + \frac{1}{4}) \hat{\mathbf{z}} &(32g) &\text{Be III}
\end{aligned}$$

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