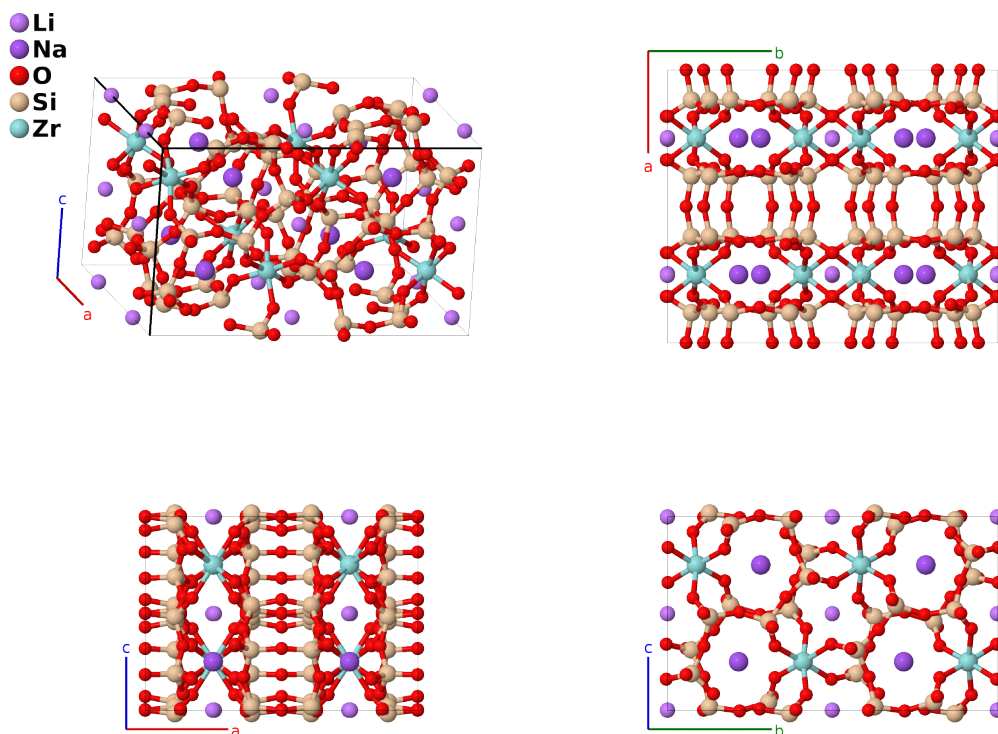


Zektzerite (NaLiZrSi₆O₁₅) Structure: ABC15D6E_oC192_64_d_e_3f6g_3g_e-001

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<https://aflow.org/p/MZR4>

https://aflow.org/p/ABC15D6E_oC192_64_d_e_3f6g_3g_e-001



Prototype	LiNaO ₁₅ Si ₆ Zr
AFLOW prototype label	ABC15D6E_oC192_64_d_e_3f6g_3g_e-001
Mineral name	zektzerite
ICSD	100631
Pearson symbol	oC192
Space group number	64
Space group symbol	<i>Cmce</i>
AFLOW prototype command	<pre>aflow --proto=ABC15D6E_oC192_64_d_e_3f6g_3g_e-001 --params=a, b/a, c/a, x1, y2, y3, y4, z4, y5, z5, y6, z6, x7, y7, z7, x8, y8, z8, x9, y9, z9, x10, y10, z10, x11, y11, z11, x12, y12, z12, x13, y13, z13, x14, y14, z14, x15, y15, z15</pre>

Other compounds with this structure

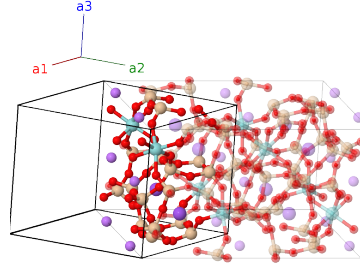
Li₂VSi₆O₁₅, Li₂ZrSi₆O₁₅, Na₂VLi₆O₁₅

Base-centered Orthorhombic primitive vectors

$$\mathbf{a}_1 = \frac{1}{2}a \hat{\mathbf{x}} - \frac{1}{2}b \hat{\mathbf{y}}$$

$$\mathbf{a}_2 = \frac{1}{2}a \hat{\mathbf{x}} + \frac{1}{2}b \hat{\mathbf{y}}$$

$$\mathbf{a}_3 = c \hat{\mathbf{z}}$$



Basis vectors

	Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
\mathbf{B}_1	$= x_1 \mathbf{a}_1 + x_1 \mathbf{a}_2 =$		$ax_1 \hat{\mathbf{x}}$	(8d)	Li I
\mathbf{B}_2	$= -\left(x_1 - \frac{1}{2}\right) \mathbf{a}_1 - \left(x_1 - \frac{1}{2}\right) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3 =$		$-a \left(x_1 - \frac{1}{2}\right) \hat{\mathbf{x}} + \frac{1}{2}c \hat{\mathbf{z}}$	(8d)	Li I
\mathbf{B}_3	$= -x_1 \mathbf{a}_1 - x_1 \mathbf{a}_2 =$		$-ax_1 \hat{\mathbf{x}}$	(8d)	Li I
\mathbf{B}_4	$= \left(x_1 + \frac{1}{2}\right) \mathbf{a}_1 + \left(x_1 + \frac{1}{2}\right) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3 =$		$a \left(x_1 + \frac{1}{2}\right) \hat{\mathbf{x}} + \frac{1}{2}c \hat{\mathbf{z}}$	(8d)	Li I
\mathbf{B}_5	$= -\left(y_2 - \frac{1}{4}\right) \mathbf{a}_1 + \left(y_2 + \frac{1}{4}\right) \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3 =$		$\frac{1}{4}a \hat{\mathbf{x}} + by_2 \hat{\mathbf{y}} + \frac{1}{4}c \hat{\mathbf{z}}$	(8e)	Na I
\mathbf{B}_6	$= \left(y_2 + \frac{1}{4}\right) \mathbf{a}_1 - \left(y_2 - \frac{1}{4}\right) \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3 =$		$\frac{1}{4}a \hat{\mathbf{x}} - by_2 \hat{\mathbf{y}} + \frac{3}{4}c \hat{\mathbf{z}}$	(8e)	Na I
\mathbf{B}_7	$= \left(y_2 + \frac{3}{4}\right) \mathbf{a}_1 - \left(y_2 - \frac{3}{4}\right) \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3 =$		$\frac{3}{4}a \hat{\mathbf{x}} - by_2 \hat{\mathbf{y}} + \frac{3}{4}c \hat{\mathbf{z}}$	(8e)	Na I
\mathbf{B}_8	$= -\left(y_2 - \frac{3}{4}\right) \mathbf{a}_1 + \left(y_2 + \frac{3}{4}\right) \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3 =$		$\frac{3}{4}a \hat{\mathbf{x}} + by_2 \hat{\mathbf{y}} + \frac{1}{4}c \hat{\mathbf{z}}$	(8e)	Na I
\mathbf{B}_9	$= -\left(y_3 - \frac{1}{4}\right) \mathbf{a}_1 + \left(y_3 + \frac{1}{4}\right) \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3 =$		$\frac{1}{4}a \hat{\mathbf{x}} + by_3 \hat{\mathbf{y}} + \frac{1}{4}c \hat{\mathbf{z}}$	(8e)	Zr I
\mathbf{B}_{10}	$= \left(y_3 + \frac{1}{4}\right) \mathbf{a}_1 - \left(y_3 - \frac{1}{4}\right) \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3 =$		$\frac{1}{4}a \hat{\mathbf{x}} - by_3 \hat{\mathbf{y}} + \frac{3}{4}c \hat{\mathbf{z}}$	(8e)	Zr I
\mathbf{B}_{11}	$= \left(y_3 + \frac{3}{4}\right) \mathbf{a}_1 - \left(y_3 - \frac{3}{4}\right) \mathbf{a}_2 + \frac{3}{4} \mathbf{a}_3 =$		$\frac{3}{4}a \hat{\mathbf{x}} - by_3 \hat{\mathbf{y}} + \frac{3}{4}c \hat{\mathbf{z}}$	(8e)	Zr I
\mathbf{B}_{12}	$= -\left(y_3 - \frac{3}{4}\right) \mathbf{a}_1 + \left(y_3 + \frac{3}{4}\right) \mathbf{a}_2 + \frac{1}{4} \mathbf{a}_3 =$		$\frac{3}{4}a \hat{\mathbf{x}} + by_3 \hat{\mathbf{y}} + \frac{1}{4}c \hat{\mathbf{z}}$	(8e)	Zr I
\mathbf{B}_{13}	$= -y_4 \mathbf{a}_1 + y_4 \mathbf{a}_2 + z_4 \mathbf{a}_3 =$		$by_4 \hat{\mathbf{y}} + cz_4 \hat{\mathbf{z}}$	(8f)	O I
\mathbf{B}_{14}	$= \left(y_4 + \frac{1}{2}\right) \mathbf{a}_1 - \left(y_4 - \frac{1}{2}\right) \mathbf{a}_2 + \left(z_4 + \frac{1}{2}\right) \mathbf{a}_3 =$		$\frac{1}{2}a \hat{\mathbf{x}} - by_4 \hat{\mathbf{y}} + c \left(z_4 + \frac{1}{2}\right) \hat{\mathbf{z}}$	(8f)	O I
\mathbf{B}_{15}	$= -\left(y_4 - \frac{1}{2}\right) \mathbf{a}_1 + \left(y_4 + \frac{1}{2}\right) \mathbf{a}_2 - \left(z_4 - \frac{1}{2}\right) \mathbf{a}_3 =$		$\frac{1}{2}a \hat{\mathbf{x}} + by_4 \hat{\mathbf{y}} - c \left(z_4 - \frac{1}{2}\right) \hat{\mathbf{z}}$	(8f)	O I
\mathbf{B}_{16}	$= y_4 \mathbf{a}_1 - y_4 \mathbf{a}_2 - z_4 \mathbf{a}_3 =$		$-by_4 \hat{\mathbf{y}} - cz_4 \hat{\mathbf{z}}$	(8f)	O I
\mathbf{B}_{17}	$= -y_5 \mathbf{a}_1 + y_5 \mathbf{a}_2 + z_5 \mathbf{a}_3 =$		$by_5 \hat{\mathbf{y}} + cz_5 \hat{\mathbf{z}}$	(8f)	O II
\mathbf{B}_{18}	$= \left(y_5 + \frac{1}{2}\right) \mathbf{a}_1 - \left(y_5 - \frac{1}{2}\right) \mathbf{a}_2 + \left(z_5 + \frac{1}{2}\right) \mathbf{a}_3 =$		$\frac{1}{2}a \hat{\mathbf{x}} - by_5 \hat{\mathbf{y}} + c \left(z_5 + \frac{1}{2}\right) \hat{\mathbf{z}}$	(8f)	O II
\mathbf{B}_{19}	$= -\left(y_5 - \frac{1}{2}\right) \mathbf{a}_1 + \left(y_5 + \frac{1}{2}\right) \mathbf{a}_2 - \left(z_5 - \frac{1}{2}\right) \mathbf{a}_3 =$		$\frac{1}{2}a \hat{\mathbf{x}} + by_5 \hat{\mathbf{y}} - c \left(z_5 - \frac{1}{2}\right) \hat{\mathbf{z}}$	(8f)	O II
\mathbf{B}_{20}	$= y_5 \mathbf{a}_1 - y_5 \mathbf{a}_2 - z_5 \mathbf{a}_3 =$		$-by_5 \hat{\mathbf{y}} - cz_5 \hat{\mathbf{z}}$	(8f)	O II
\mathbf{B}_{21}	$= -y_6 \mathbf{a}_1 + y_6 \mathbf{a}_2 + z_6 \mathbf{a}_3 =$		$by_6 \hat{\mathbf{y}} + cz_6 \hat{\mathbf{z}}$	(8f)	O III

$$\begin{aligned}
\mathbf{B}_{22} &= \begin{pmatrix} (y_6 + \frac{1}{2}) \mathbf{a}_1 - (y_6 - \frac{1}{2}) \mathbf{a}_2 + \\ (z_6 + \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = \frac{1}{2} a \hat{\mathbf{x}} - by_6 \hat{\mathbf{y}} + c (z_6 + \frac{1}{2}) \hat{\mathbf{z}} & (8f) & \text{O III} \\
\mathbf{B}_{23} &= \begin{pmatrix} -(y_6 - \frac{1}{2}) \mathbf{a}_1 + (y_6 + \frac{1}{2}) \mathbf{a}_2 - \\ (z_6 - \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = \frac{1}{2} a \hat{\mathbf{x}} + by_6 \hat{\mathbf{y}} - c (z_6 - \frac{1}{2}) \hat{\mathbf{z}} & (8f) & \text{O III} \\
\mathbf{B}_{24} &= y_6 \mathbf{a}_1 - y_6 \mathbf{a}_2 - z_6 \mathbf{a}_3 = -by_6 \hat{\mathbf{y}} - cz_6 \hat{\mathbf{z}} & (8f) & \text{O III} \\
\mathbf{B}_{25} &= \begin{pmatrix} (x_7 - y_7) \mathbf{a}_1 + (x_7 + y_7) \mathbf{a}_2 + \\ z_7 \mathbf{a}_3 \end{pmatrix} = ax_7 \hat{\mathbf{x}} + by_7 \hat{\mathbf{y}} + cz_7 \hat{\mathbf{z}} & (16g) & \text{O IV} \\
\mathbf{B}_{26} &= \begin{pmatrix} (-x_7 + y_7 + \frac{1}{2}) \mathbf{a}_1 - \\ (x_7 + y_7 - \frac{1}{2}) \mathbf{a}_2 + (z_7 + \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = -a (x_7 - \frac{1}{2}) \hat{\mathbf{x}} - by_7 \hat{\mathbf{y}} + c (z_7 + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O IV} \\
\mathbf{B}_{27} &= \begin{pmatrix} -(x_7 + y_7 - \frac{1}{2}) \mathbf{a}_1 + \\ (-x_7 + y_7 + \frac{1}{2}) \mathbf{a}_2 - (z_7 - \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = -a (x_7 - \frac{1}{2}) \hat{\mathbf{x}} + by_7 \hat{\mathbf{y}} - c (z_7 - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O IV} \\
\mathbf{B}_{28} &= \begin{pmatrix} (x_7 + y_7) \mathbf{a}_1 + (x_7 - y_7) \mathbf{a}_2 - \\ z_7 \mathbf{a}_3 \end{pmatrix} = ax_7 \hat{\mathbf{x}} - by_7 \hat{\mathbf{y}} - cz_7 \hat{\mathbf{z}} & (16g) & \text{O IV} \\
\mathbf{B}_{29} &= \begin{pmatrix} -(x_7 - y_7) \mathbf{a}_1 - (x_7 + y_7) \mathbf{a}_2 - \\ z_7 \mathbf{a}_3 \end{pmatrix} = -ax_7 \hat{\mathbf{x}} - by_7 \hat{\mathbf{y}} - cz_7 \hat{\mathbf{z}} & (16g) & \text{O IV} \\
\mathbf{B}_{30} &= \begin{pmatrix} (x_7 - y_7 + \frac{1}{2}) \mathbf{a}_1 + \\ (x_7 + y_7 + \frac{1}{2}) \mathbf{a}_2 - (z_7 - \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = a (x_7 + \frac{1}{2}) \hat{\mathbf{x}} + by_7 \hat{\mathbf{y}} - c (z_7 - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O IV} \\
\mathbf{B}_{31} &= \begin{pmatrix} (x_7 + y_7 + \frac{1}{2}) \mathbf{a}_1 + \\ (x_7 - y_7 + \frac{1}{2}) \mathbf{a}_2 + (z_7 + \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = a (x_7 + \frac{1}{2}) \hat{\mathbf{x}} - by_7 \hat{\mathbf{y}} + c (z_7 + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O IV} \\
\mathbf{B}_{32} &= \begin{pmatrix} -(x_7 + y_7) \mathbf{a}_1 - (x_7 - y_7) \mathbf{a}_2 + \\ z_7 \mathbf{a}_3 \end{pmatrix} = -ax_7 \hat{\mathbf{x}} + by_7 \hat{\mathbf{y}} + cz_7 \hat{\mathbf{z}} & (16g) & \text{O IV} \\
\mathbf{B}_{33} &= \begin{pmatrix} (x_8 - y_8) \mathbf{a}_1 + (x_8 + y_8) \mathbf{a}_2 + \\ z_8 \mathbf{a}_3 \end{pmatrix} = ax_8 \hat{\mathbf{x}} + by_8 \hat{\mathbf{y}} + cz_8 \hat{\mathbf{z}} & (16g) & \text{O V} \\
\mathbf{B}_{34} &= \begin{pmatrix} (-x_8 + y_8 + \frac{1}{2}) \mathbf{a}_1 - \\ (x_8 + y_8 - \frac{1}{2}) \mathbf{a}_2 + (z_8 + \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = -a (x_8 - \frac{1}{2}) \hat{\mathbf{x}} - by_8 \hat{\mathbf{y}} + c (z_8 + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O V} \\
\mathbf{B}_{35} &= \begin{pmatrix} -(x_8 + y_8 - \frac{1}{2}) \mathbf{a}_1 + \\ (-x_8 + y_8 + \frac{1}{2}) \mathbf{a}_2 - (z_8 - \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = -a (x_8 - \frac{1}{2}) \hat{\mathbf{x}} + by_8 \hat{\mathbf{y}} - c (z_8 - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O V} \\
\mathbf{B}_{36} &= \begin{pmatrix} (x_8 + y_8) \mathbf{a}_1 + (x_8 - y_8) \mathbf{a}_2 - \\ z_8 \mathbf{a}_3 \end{pmatrix} = ax_8 \hat{\mathbf{x}} - by_8 \hat{\mathbf{y}} - cz_8 \hat{\mathbf{z}} & (16g) & \text{O V} \\
\mathbf{B}_{37} &= \begin{pmatrix} -(x_8 - y_8) \mathbf{a}_1 - (x_8 + y_8) \mathbf{a}_2 - \\ z_8 \mathbf{a}_3 \end{pmatrix} = -ax_8 \hat{\mathbf{x}} - by_8 \hat{\mathbf{y}} - cz_8 \hat{\mathbf{z}} & (16g) & \text{O V} \\
\mathbf{B}_{38} &= \begin{pmatrix} (x_8 - y_8 + \frac{1}{2}) \mathbf{a}_1 + \\ (x_8 + y_8 + \frac{1}{2}) \mathbf{a}_2 - (z_8 - \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = a (x_8 + \frac{1}{2}) \hat{\mathbf{x}} + by_8 \hat{\mathbf{y}} - c (z_8 - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O V} \\
\mathbf{B}_{39} &= \begin{pmatrix} (x_8 + y_8 + \frac{1}{2}) \mathbf{a}_1 + \\ (x_8 - y_8 + \frac{1}{2}) \mathbf{a}_2 + (z_8 + \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = a (x_8 + \frac{1}{2}) \hat{\mathbf{x}} - by_8 \hat{\mathbf{y}} + c (z_8 + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O V} \\
\mathbf{B}_{40} &= \begin{pmatrix} -(x_8 + y_8) \mathbf{a}_1 - (x_8 - y_8) \mathbf{a}_2 + \\ z_8 \mathbf{a}_3 \end{pmatrix} = -ax_8 \hat{\mathbf{x}} + by_8 \hat{\mathbf{y}} + cz_8 \hat{\mathbf{z}} & (16g) & \text{O V} \\
\mathbf{B}_{41} &= \begin{pmatrix} (x_9 - y_9) \mathbf{a}_1 + (x_9 + y_9) \mathbf{a}_2 + \\ z_9 \mathbf{a}_3 \end{pmatrix} = ax_9 \hat{\mathbf{x}} + by_9 \hat{\mathbf{y}} + cz_9 \hat{\mathbf{z}} & (16g) & \text{O VI} \\
\mathbf{B}_{42} &= \begin{pmatrix} (-x_9 + y_9 + \frac{1}{2}) \mathbf{a}_1 - \\ (x_9 + y_9 - \frac{1}{2}) \mathbf{a}_2 + (z_9 + \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = -a (x_9 - \frac{1}{2}) \hat{\mathbf{x}} - by_9 \hat{\mathbf{y}} + c (z_9 + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VI} \\
\mathbf{B}_{43} &= \begin{pmatrix} -(x_9 + y_9 - \frac{1}{2}) \mathbf{a}_1 + \\ (-x_9 + y_9 + \frac{1}{2}) \mathbf{a}_2 - (z_9 - \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = -a (x_9 - \frac{1}{2}) \hat{\mathbf{x}} + by_9 \hat{\mathbf{y}} - c (z_9 - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VI} \\
\mathbf{B}_{44} &= \begin{pmatrix} (x_9 + y_9) \mathbf{a}_1 + (x_9 - y_9) \mathbf{a}_2 - \\ z_9 \mathbf{a}_3 \end{pmatrix} = ax_9 \hat{\mathbf{x}} - by_9 \hat{\mathbf{y}} - cz_9 \hat{\mathbf{z}} & (16g) & \text{O VI} \\
\mathbf{B}_{45} &= \begin{pmatrix} -(x_9 - y_9) \mathbf{a}_1 - (x_9 + y_9) \mathbf{a}_2 - \\ z_9 \mathbf{a}_3 \end{pmatrix} = -ax_9 \hat{\mathbf{x}} - by_9 \hat{\mathbf{y}} - cz_9 \hat{\mathbf{z}} & (16g) & \text{O VI}
\end{aligned}$$

$$\begin{aligned}
\mathbf{B}_{46} &= \begin{pmatrix} (x_9 - y_9 + \frac{1}{2}) \mathbf{a}_1 + \\ (x_9 + y_9 + \frac{1}{2}) \mathbf{a}_2 - (z_9 - \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = a(x_9 + \frac{1}{2}) \hat{\mathbf{x}} + by_9 \hat{\mathbf{y}} - c(z_9 - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VI} \\
\mathbf{B}_{47} &= \begin{pmatrix} (x_9 + y_9 + \frac{1}{2}) \mathbf{a}_1 + \\ (x_9 - y_9 + \frac{1}{2}) \mathbf{a}_2 + (z_9 + \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = a(x_9 + \frac{1}{2}) \hat{\mathbf{x}} - by_9 \hat{\mathbf{y}} + c(z_9 + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VI} \\
\mathbf{B}_{48} &= \begin{pmatrix} -(x_9 + y_9) \mathbf{a}_1 - (x_9 - y_9) \mathbf{a}_2 + \\ z_9 \mathbf{a}_3 \end{pmatrix} = -ax_9 \hat{\mathbf{x}} + by_9 \hat{\mathbf{y}} + cz_9 \hat{\mathbf{z}} & (16g) & \text{O VI} \\
\mathbf{B}_{49} &= \begin{pmatrix} (x_{10} - y_{10}) \mathbf{a}_1 + \\ (x_{10} + y_{10}) \mathbf{a}_2 + z_{10} \mathbf{a}_3 \end{pmatrix} = ax_{10} \hat{\mathbf{x}} + by_{10} \hat{\mathbf{y}} + cz_{10} \hat{\mathbf{z}} & (16g) & \text{O VII} \\
\mathbf{B}_{50} &= \begin{pmatrix} (-x_{10} + y_{10} + \frac{1}{2}) \mathbf{a}_1 - \\ (x_{10} + y_{10} - \frac{1}{2}) \mathbf{a}_2 + \\ (z_{10} + \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = -a(x_{10} - \frac{1}{2}) \hat{\mathbf{x}} - by_{10} \hat{\mathbf{y}} + c(z_{10} + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VII} \\
\mathbf{B}_{51} &= \begin{pmatrix} -(x_{10} + y_{10} - \frac{1}{2}) \mathbf{a}_1 + \\ (-x_{10} + y_{10} + \frac{1}{2}) \mathbf{a}_2 - \\ (z_{10} - \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = -a(x_{10} - \frac{1}{2}) \hat{\mathbf{x}} + by_{10} \hat{\mathbf{y}} - c(z_{10} - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VII} \\
\mathbf{B}_{52} &= \begin{pmatrix} (x_{10} + y_{10}) \mathbf{a}_1 + \\ (x_{10} - y_{10}) \mathbf{a}_2 - z_{10} \mathbf{a}_3 \end{pmatrix} = ax_{10} \hat{\mathbf{x}} - by_{10} \hat{\mathbf{y}} - cz_{10} \hat{\mathbf{z}} & (16g) & \text{O VII} \\
\mathbf{B}_{53} &= \begin{pmatrix} -(x_{10} - y_{10}) \mathbf{a}_1 - \\ (x_{10} + y_{10}) \mathbf{a}_2 - z_{10} \mathbf{a}_3 \end{pmatrix} = -ax_{10} \hat{\mathbf{x}} - by_{10} \hat{\mathbf{y}} - cz_{10} \hat{\mathbf{z}} & (16g) & \text{O VII} \\
\mathbf{B}_{54} &= \begin{pmatrix} (x_{10} - y_{10} + \frac{1}{2}) \mathbf{a}_1 + \\ (x_{10} + y_{10} + \frac{1}{2}) \mathbf{a}_2 - \\ (z_{10} - \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = a(x_{10} + \frac{1}{2}) \hat{\mathbf{x}} + by_{10} \hat{\mathbf{y}} - c(z_{10} - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VII} \\
\mathbf{B}_{55} &= \begin{pmatrix} (x_{10} + y_{10} + \frac{1}{2}) \mathbf{a}_1 + \\ (x_{10} - y_{10} + \frac{1}{2}) \mathbf{a}_2 + \\ (z_{10} + \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = a(x_{10} + \frac{1}{2}) \hat{\mathbf{x}} - by_{10} \hat{\mathbf{y}} + c(z_{10} + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VII} \\
\mathbf{B}_{56} &= \begin{pmatrix} -(x_{10} + y_{10}) \mathbf{a}_1 - \\ (x_{10} - y_{10}) \mathbf{a}_2 + z_{10} \mathbf{a}_3 \end{pmatrix} = -ax_{10} \hat{\mathbf{x}} + by_{10} \hat{\mathbf{y}} + cz_{10} \hat{\mathbf{z}} & (16g) & \text{O VII} \\
\mathbf{B}_{57} &= \begin{pmatrix} (x_{11} - y_{11}) \mathbf{a}_1 + \\ (x_{11} + y_{11}) \mathbf{a}_2 + z_{11} \mathbf{a}_3 \end{pmatrix} = ax_{11} \hat{\mathbf{x}} + by_{11} \hat{\mathbf{y}} + cz_{11} \hat{\mathbf{z}} & (16g) & \text{O VIII} \\
\mathbf{B}_{58} &= \begin{pmatrix} (-x_{11} + y_{11} + \frac{1}{2}) \mathbf{a}_1 - \\ (x_{11} + y_{11} - \frac{1}{2}) \mathbf{a}_2 + \\ (z_{11} + \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = -a(x_{11} - \frac{1}{2}) \hat{\mathbf{x}} - by_{11} \hat{\mathbf{y}} + c(z_{11} + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VIII} \\
\mathbf{B}_{59} &= \begin{pmatrix} -(x_{11} + y_{11} - \frac{1}{2}) \mathbf{a}_1 + \\ (-x_{11} + y_{11} + \frac{1}{2}) \mathbf{a}_2 - \\ (z_{11} - \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = -a(x_{11} - \frac{1}{2}) \hat{\mathbf{x}} + by_{11} \hat{\mathbf{y}} - c(z_{11} - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VIII} \\
\mathbf{B}_{60} &= \begin{pmatrix} (x_{11} + y_{11}) \mathbf{a}_1 + \\ (x_{11} - y_{11}) \mathbf{a}_2 - z_{11} \mathbf{a}_3 \end{pmatrix} = ax_{11} \hat{\mathbf{x}} - by_{11} \hat{\mathbf{y}} - cz_{11} \hat{\mathbf{z}} & (16g) & \text{O VIII} \\
\mathbf{B}_{61} &= \begin{pmatrix} -(x_{11} - y_{11}) \mathbf{a}_1 - \\ (x_{11} + y_{11}) \mathbf{a}_2 - z_{11} \mathbf{a}_3 \end{pmatrix} = -ax_{11} \hat{\mathbf{x}} - by_{11} \hat{\mathbf{y}} - cz_{11} \hat{\mathbf{z}} & (16g) & \text{O VIII} \\
\mathbf{B}_{62} &= \begin{pmatrix} (x_{11} - y_{11} + \frac{1}{2}) \mathbf{a}_1 + \\ (x_{11} + y_{11} + \frac{1}{2}) \mathbf{a}_2 - \\ (z_{11} - \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = a(x_{11} + \frac{1}{2}) \hat{\mathbf{x}} + by_{11} \hat{\mathbf{y}} - c(z_{11} - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VIII} \\
\mathbf{B}_{63} &= \begin{pmatrix} (x_{11} + y_{11} + \frac{1}{2}) \mathbf{a}_1 + \\ (x_{11} - y_{11} + \frac{1}{2}) \mathbf{a}_2 + \\ (z_{11} + \frac{1}{2}) \mathbf{a}_3 \end{pmatrix} = a(x_{11} + \frac{1}{2}) \hat{\mathbf{x}} - by_{11} \hat{\mathbf{y}} + c(z_{11} + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{O VIII} \\
\mathbf{B}_{64} &= \begin{pmatrix} -(x_{11} + y_{11}) \mathbf{a}_1 - \\ (x_{11} - y_{11}) \mathbf{a}_2 + z_{11} \mathbf{a}_3 \end{pmatrix} = -ax_{11} \hat{\mathbf{x}} + by_{11} \hat{\mathbf{y}} + cz_{11} \hat{\mathbf{z}} & (16g) & \text{O VIII} \\
\mathbf{B}_{65} &= \begin{pmatrix} (x_{12} - y_{12}) \mathbf{a}_1 + \\ (x_{12} + y_{12}) \mathbf{a}_2 + z_{12} \mathbf{a}_3 \end{pmatrix} = ax_{12} \hat{\mathbf{x}} + by_{12} \hat{\mathbf{y}} + cz_{12} \hat{\mathbf{z}} & (16g) & \text{O IX}
\end{aligned}$$

$$\begin{aligned}
\mathbf{B}_{85} &= \begin{matrix} -(x_{14} - y_{14}) \mathbf{a}_1 - \\ (x_{14} + y_{14}) \mathbf{a}_2 - z_{14} \mathbf{a}_3 \end{matrix} &= & -ax_{14} \hat{\mathbf{x}} - by_{14} \hat{\mathbf{y}} - cz_{14} \hat{\mathbf{z}} & (16g) & \text{Si II} \\
\mathbf{B}_{86} &= \begin{matrix} (x_{14} - y_{14} + \frac{1}{2}) \mathbf{a}_1 + \\ (x_{14} + y_{14} + \frac{1}{2}) \mathbf{a}_2 - \\ (z_{14} - \frac{1}{2}) \mathbf{a}_3 \end{matrix} &= & a(x_{14} + \frac{1}{2}) \hat{\mathbf{x}} + by_{14} \hat{\mathbf{y}} - c(z_{14} - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{Si II} \\
\mathbf{B}_{87} &= \begin{matrix} (x_{14} + y_{14} + \frac{1}{2}) \mathbf{a}_1 + \\ (x_{14} - y_{14} + \frac{1}{2}) \mathbf{a}_2 + \\ (z_{14} + \frac{1}{2}) \mathbf{a}_3 \end{matrix} &= & a(x_{14} + \frac{1}{2}) \hat{\mathbf{x}} - by_{14} \hat{\mathbf{y}} + c(z_{14} + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{Si II} \\
\mathbf{B}_{88} &= \begin{matrix} -(x_{14} + y_{14}) \mathbf{a}_1 - \\ (x_{14} - y_{14}) \mathbf{a}_2 + z_{14} \mathbf{a}_3 \end{matrix} &= & -ax_{14} \hat{\mathbf{x}} + by_{14} \hat{\mathbf{y}} + cz_{14} \hat{\mathbf{z}} & (16g) & \text{Si II} \\
\mathbf{B}_{89} &= \begin{matrix} (x_{15} - y_{15}) \mathbf{a}_1 + \\ (x_{15} + y_{15}) \mathbf{a}_2 + z_{15} \mathbf{a}_3 \end{matrix} &= & ax_{15} \hat{\mathbf{x}} + by_{15} \hat{\mathbf{y}} + cz_{15} \hat{\mathbf{z}} & (16g) & \text{Si III} \\
\mathbf{B}_{90} &= \begin{matrix} (-x_{15} + y_{15} + \frac{1}{2}) \mathbf{a}_1 - \\ (x_{15} + y_{15} - \frac{1}{2}) \mathbf{a}_2 + \\ (z_{15} + \frac{1}{2}) \mathbf{a}_3 \end{matrix} &= & -a(x_{15} - \frac{1}{2}) \hat{\mathbf{x}} - by_{15} \hat{\mathbf{y}} + c(z_{15} + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{Si III} \\
\mathbf{B}_{91} &= \begin{matrix} -(x_{15} + y_{15} - \frac{1}{2}) \mathbf{a}_1 + \\ (-x_{15} + y_{15} + \frac{1}{2}) \mathbf{a}_2 - \\ (z_{15} - \frac{1}{2}) \mathbf{a}_3 \end{matrix} &= & -a(x_{15} - \frac{1}{2}) \hat{\mathbf{x}} + by_{15} \hat{\mathbf{y}} - c(z_{15} - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{Si III} \\
\mathbf{B}_{92} &= \begin{matrix} (x_{15} + y_{15}) \mathbf{a}_1 + \\ (x_{15} - y_{15}) \mathbf{a}_2 - z_{15} \mathbf{a}_3 \end{matrix} &= & ax_{15} \hat{\mathbf{x}} - by_{15} \hat{\mathbf{y}} - cz_{15} \hat{\mathbf{z}} & (16g) & \text{Si III} \\
\mathbf{B}_{93} &= \begin{matrix} -(x_{15} - y_{15}) \mathbf{a}_1 - \\ (x_{15} + y_{15}) \mathbf{a}_2 - z_{15} \mathbf{a}_3 \end{matrix} &= & -ax_{15} \hat{\mathbf{x}} - by_{15} \hat{\mathbf{y}} - cz_{15} \hat{\mathbf{z}} & (16g) & \text{Si III} \\
\mathbf{B}_{94} &= \begin{matrix} (x_{15} - y_{15} + \frac{1}{2}) \mathbf{a}_1 + \\ (x_{15} + y_{15} + \frac{1}{2}) \mathbf{a}_2 - \\ (z_{15} - \frac{1}{2}) \mathbf{a}_3 \end{matrix} &= & a(x_{15} + \frac{1}{2}) \hat{\mathbf{x}} + by_{15} \hat{\mathbf{y}} - c(z_{15} - \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{Si III} \\
\mathbf{B}_{95} &= \begin{matrix} (x_{15} + y_{15} + \frac{1}{2}) \mathbf{a}_1 + \\ (x_{15} - y_{15} + \frac{1}{2}) \mathbf{a}_2 + \\ (z_{15} + \frac{1}{2}) \mathbf{a}_3 \end{matrix} &= & a(x_{15} + \frac{1}{2}) \hat{\mathbf{x}} - by_{15} \hat{\mathbf{y}} + c(z_{15} + \frac{1}{2}) \hat{\mathbf{z}} & (16g) & \text{Si III} \\
\mathbf{B}_{96} &= \begin{matrix} -(x_{15} + y_{15}) \mathbf{a}_1 - \\ (x_{15} - y_{15}) \mathbf{a}_2 + z_{15} \mathbf{a}_3 \end{matrix} &= & -ax_{15} \hat{\mathbf{x}} + by_{15} \hat{\mathbf{y}} + cz_{15} \hat{\mathbf{z}} & (16g) & \text{Si III}
\end{aligned}$$

References

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