

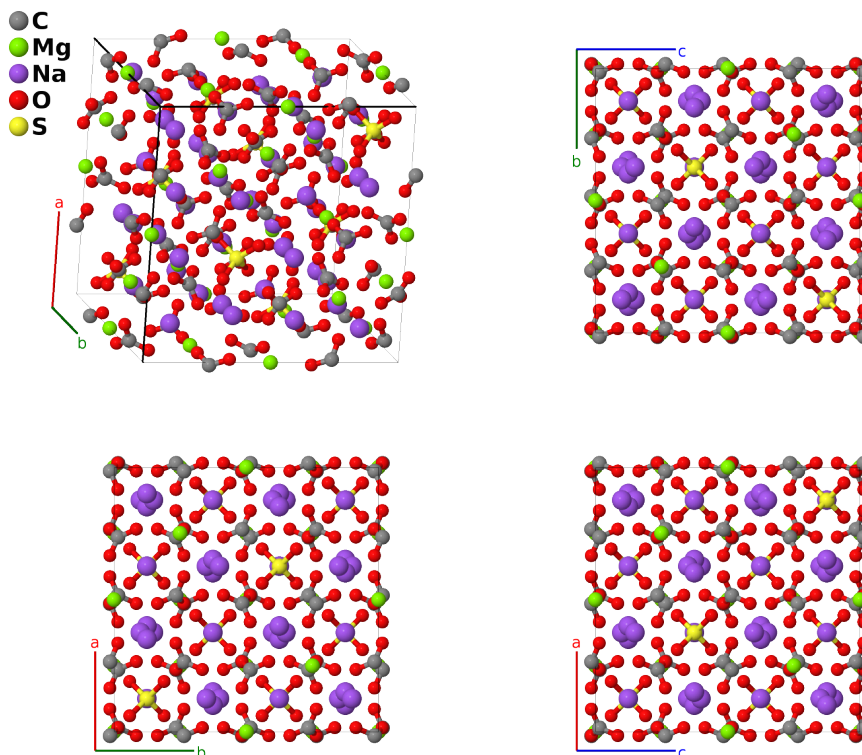
$H5_6$ [Tychite, $\text{Na}_6\text{Mg}_2\text{SO}_4(\text{CO}_3)_4$] Structure (*Obsolete*): A4B2C6D16E_cF232_227_e_c_f_eg_b-001

This structure originally had the label A4B2C6D16E_cF232_227_e_d_f_eg_a. Calls to that address will be redirected here.

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<https://afLOW.org/p/Y05P>

https://afLOW.org/p/A4B2C6D16E_cF232_227_e_c_f_eg_b-001

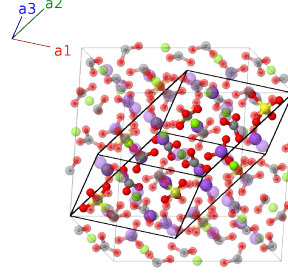


Prototype	$\text{C}_4\text{Mg}_2\text{Na}_6\text{O}_{16}\text{S}$
AFLOW prototype label	A4B2C6D16E_cF232_227_e_c_f_eg_b-001
<i>Strukturbericht</i> designation	$H5_6$
Mineral name	tychite
ICSD	27792
Pearson symbol	cF232
Space group number	227
Space group symbol	$Fd\bar{3}m$
AFLOW prototype command	afLOW --proto=A4B2C6D16E_cF232_227_e_c_f_eg_b-001 --params= $a, x_3, x_4, x_5, x_6, z_6$

- This is the original structure determined by (Shiba, 1931) and given the designation $H5_6$ in (Hermann, 1937). (Schmidt, 2006) showed that the true structure is in space group $Fd\bar{3} \#203$, however the two structures are very similar, and a displacement of the oxygen atoms by less than 1Å brings the two structures into agreement.
- (Hermann, 1937) gives the chemical formula as $\text{Na}_6\text{Mg}_2\text{SO}_4(\text{CO}_3)_2$, but the given Wyckoff positions are in agreement with the correct formula, $\text{Na}_6\text{Mg}_2\text{SO}_4(\text{CO}_3)_4$.

Face-centered Cubic primitive vectors

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



Basis vectors

	Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
\mathbf{B}_1	$= \frac{3}{8}\mathbf{a}_1 + \frac{3}{8}\mathbf{a}_2 + \frac{3}{8}\mathbf{a}_3$	$=$	$\frac{3}{8}a \hat{\mathbf{x}} + \frac{3}{8}a \hat{\mathbf{y}} + \frac{3}{8}a \hat{\mathbf{z}}$	(8b)	S I
\mathbf{B}_2	$= \frac{5}{8}\mathbf{a}_1 + \frac{5}{8}\mathbf{a}_2 + \frac{5}{8}\mathbf{a}_3$	$=$	$\frac{5}{8}a \hat{\mathbf{x}} + \frac{5}{8}a \hat{\mathbf{y}} + \frac{5}{8}a \hat{\mathbf{z}}$	(8b)	S I
\mathbf{B}_3	$= 0$	$=$	0	(16c)	Mg I
\mathbf{B}_4	$= \frac{1}{2}\mathbf{a}_3$	$=$	$\frac{1}{4}a \hat{\mathbf{x}} + \frac{1}{4}a \hat{\mathbf{y}}$	(16c)	Mg I
\mathbf{B}_5	$= \frac{1}{2}\mathbf{a}_2$	$=$	$\frac{1}{4}a \hat{\mathbf{x}} + \frac{1}{4}a \hat{\mathbf{z}}$	(16c)	Mg I
\mathbf{B}_6	$= \frac{1}{2}\mathbf{a}_1$	$=$	$\frac{1}{4}a \hat{\mathbf{y}} + \frac{1}{4}a \hat{\mathbf{z}}$	(16c)	Mg I
\mathbf{B}_7	$= x_3 \mathbf{a}_1 + x_3 \mathbf{a}_2 + x_3 \mathbf{a}_3$	$=$	$ax_3 \hat{\mathbf{x}} + ax_3 \hat{\mathbf{y}} + ax_3 \hat{\mathbf{z}}$	(32e)	C I
\mathbf{B}_8	$= x_3 \mathbf{a}_1 + x_3 \mathbf{a}_2 - (3x_3 - \frac{1}{2}) \mathbf{a}_3$	$=$	$-a(x_3 - \frac{1}{4}) \hat{\mathbf{x}} - a(x_3 - \frac{1}{4}) \hat{\mathbf{y}} + ax_3 \hat{\mathbf{z}}$	(32e)	C I
\mathbf{B}_9	$= x_3 \mathbf{a}_1 - (3x_3 - \frac{1}{2}) \mathbf{a}_2 + x_3 \mathbf{a}_3$	$=$	$-a(x_3 - \frac{1}{4}) \hat{\mathbf{x}} + ax_3 \hat{\mathbf{y}} - a(x_3 - \frac{1}{4}) \hat{\mathbf{z}}$	(32e)	C I
\mathbf{B}_{10}	$= -(3x_3 - \frac{1}{2}) \mathbf{a}_1 + x_3 \mathbf{a}_2 + x_3 \mathbf{a}_3$	$=$	$ax_3 \hat{\mathbf{x}} - a(x_3 - \frac{1}{4}) \hat{\mathbf{y}} - a(x_3 - \frac{1}{4}) \hat{\mathbf{z}}$	(32e)	C I
\mathbf{B}_{11}	$= -x_3 \mathbf{a}_1 - x_3 \mathbf{a}_2 + (3x_3 + \frac{1}{2}) \mathbf{a}_3$	$=$	$a(x_3 + \frac{1}{4}) \hat{\mathbf{x}} + a(x_3 + \frac{1}{4}) \hat{\mathbf{y}} - ax_3 \hat{\mathbf{z}}$	(32e)	C I
\mathbf{B}_{12}	$= -x_3 \mathbf{a}_1 - x_3 \mathbf{a}_2 - x_3 \mathbf{a}_3$	$=$	$-ax_3 \hat{\mathbf{x}} - ax_3 \hat{\mathbf{y}} - ax_3 \hat{\mathbf{z}}$	(32e)	C I
\mathbf{B}_{13}	$= -x_3 \mathbf{a}_1 + (3x_3 + \frac{1}{2}) \mathbf{a}_2 - x_3 \mathbf{a}_3$	$=$	$a(x_3 + \frac{1}{4}) \hat{\mathbf{x}} - ax_3 \hat{\mathbf{y}} + a(x_3 + \frac{1}{4}) \hat{\mathbf{z}}$	(32e)	C I
\mathbf{B}_{14}	$= (3x_3 + \frac{1}{2}) \mathbf{a}_1 - x_3 \mathbf{a}_2 - x_3 \mathbf{a}_3$	$=$	$-ax_3 \hat{\mathbf{x}} + a(x_3 + \frac{1}{4}) \hat{\mathbf{y}} + a(x_3 + \frac{1}{4}) \hat{\mathbf{z}}$	(32e)	C I
\mathbf{B}_{15}	$= x_4 \mathbf{a}_1 + x_4 \mathbf{a}_2 + x_4 \mathbf{a}_3$	$=$	$ax_4 \hat{\mathbf{x}} + ax_4 \hat{\mathbf{y}} + ax_4 \hat{\mathbf{z}}$	(32e)	O I
\mathbf{B}_{16}	$= x_4 \mathbf{a}_1 + x_4 \mathbf{a}_2 - (3x_4 - \frac{1}{2}) \mathbf{a}_3$	$=$	$-a(x_4 - \frac{1}{4}) \hat{\mathbf{x}} - a(x_4 - \frac{1}{4}) \hat{\mathbf{y}} + ax_4 \hat{\mathbf{z}}$	(32e)	O I
\mathbf{B}_{17}	$= x_4 \mathbf{a}_1 - (3x_4 - \frac{1}{2}) \mathbf{a}_2 + x_4 \mathbf{a}_3$	$=$	$-a(x_4 - \frac{1}{4}) \hat{\mathbf{x}} + ax_4 \hat{\mathbf{y}} - a(x_4 - \frac{1}{4}) \hat{\mathbf{z}}$	(32e)	O I
\mathbf{B}_{18}	$= -(3x_4 - \frac{1}{2}) \mathbf{a}_1 + x_4 \mathbf{a}_2 + x_4 \mathbf{a}_3$	$=$	$ax_4 \hat{\mathbf{x}} - a(x_4 - \frac{1}{4}) \hat{\mathbf{y}} - a(x_4 - \frac{1}{4}) \hat{\mathbf{z}}$	(32e)	O I
\mathbf{B}_{19}	$= -x_4 \mathbf{a}_1 - x_4 \mathbf{a}_2 + (3x_4 + \frac{1}{2}) \mathbf{a}_3$	$=$	$a(x_4 + \frac{1}{4}) \hat{\mathbf{x}} + a(x_4 + \frac{1}{4}) \hat{\mathbf{y}} - ax_4 \hat{\mathbf{z}}$	(32e)	O I
\mathbf{B}_{20}	$= -x_4 \mathbf{a}_1 - x_4 \mathbf{a}_2 - x_4 \mathbf{a}_3$	$=$	$-ax_4 \hat{\mathbf{x}} - ax_4 \hat{\mathbf{y}} - ax_4 \hat{\mathbf{z}}$	(32e)	O I
\mathbf{B}_{21}	$= -x_4 \mathbf{a}_1 + (3x_4 + \frac{1}{2}) \mathbf{a}_2 - x_4 \mathbf{a}_3$	$=$	$a(x_4 + \frac{1}{4}) \hat{\mathbf{x}} - ax_4 \hat{\mathbf{y}} + a(x_4 + \frac{1}{4}) \hat{\mathbf{z}}$	(32e)	O I
\mathbf{B}_{22}	$= (3x_4 + \frac{1}{2}) \mathbf{a}_1 - x_4 \mathbf{a}_2 - x_4 \mathbf{a}_3$	$=$	$-ax_4 \hat{\mathbf{x}} + a(x_4 + \frac{1}{4}) \hat{\mathbf{y}} + a(x_4 + \frac{1}{4}) \hat{\mathbf{z}}$	(32e)	O I
\mathbf{B}_{23}	$= -(x_5 - \frac{1}{4}) \mathbf{a}_1 + x_5 \mathbf{a}_2 + x_5 \mathbf{a}_3$	$=$	$ax_5 \hat{\mathbf{x}} + \frac{1}{8}a \hat{\mathbf{y}} + \frac{1}{8}a \hat{\mathbf{z}}$	(48f)	Na I
\mathbf{B}_{24}	$= x_5 \mathbf{a}_1 - (x_5 - \frac{1}{4}) \mathbf{a}_2 - (x_5 - \frac{1}{4}) \mathbf{a}_3$	$=$	$-a(x_5 - \frac{1}{4}) \hat{\mathbf{x}} + \frac{1}{8}a \hat{\mathbf{y}} + \frac{1}{8}a \hat{\mathbf{z}}$	(48f)	Na I

$$\begin{aligned}
\mathbf{B}_{25} &= x_5 \mathbf{a}_1 - (x_5 - \frac{1}{4}) \mathbf{a}_2 + x_5 \mathbf{a}_3 &= \frac{1}{8}a \hat{\mathbf{x}} + ax_5 \hat{\mathbf{y}} + \frac{1}{8}a \hat{\mathbf{z}} &(48f) & \text{Na I} \\
\mathbf{B}_{26} &= - (x_5 - \frac{1}{4}) \mathbf{a}_1 + x_5 \mathbf{a}_2 - &= \frac{1}{8}a \hat{\mathbf{x}} - a (x_5 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{8}a \hat{\mathbf{z}} &(48f) & \text{Na I} \\
&\quad (x_5 - \frac{1}{4}) \mathbf{a}_3 \\
\mathbf{B}_{27} &= x_5 \mathbf{a}_1 + x_5 \mathbf{a}_2 - (x_5 - \frac{1}{4}) \mathbf{a}_3 &= \frac{1}{8}a \hat{\mathbf{x}} + \frac{1}{8}a \hat{\mathbf{y}} + ax_5 \hat{\mathbf{z}} &(48f) & \text{Na I} \\
\mathbf{B}_{28} &= - (x_5 - \frac{1}{4}) \mathbf{a}_1 - (x_5 - \frac{1}{4}) \mathbf{a}_2 + &= \frac{1}{8}a \hat{\mathbf{x}} + \frac{1}{8}a \hat{\mathbf{y}} - a (x_5 - \frac{1}{4}) \hat{\mathbf{z}} &(48f) & \text{Na I} \\
&\quad x_5 \mathbf{a}_3 \\
\mathbf{B}_{29} &= (x_5 + \frac{3}{4}) \mathbf{a}_1 - x_5 \mathbf{a}_2 + (x_5 + \frac{3}{4}) \mathbf{a}_3 &= \frac{3}{8}a \hat{\mathbf{x}} + a (x_5 + \frac{3}{4}) \hat{\mathbf{y}} + \frac{3}{8}a \hat{\mathbf{z}} &(48f) & \text{Na I} \\
\mathbf{B}_{30} &= -x_5 \mathbf{a}_1 + (x_5 + \frac{3}{4}) \mathbf{a}_2 - x_5 \mathbf{a}_3 &= \frac{3}{8}a \hat{\mathbf{x}} - ax_5 \hat{\mathbf{y}} + \frac{3}{8}a \hat{\mathbf{z}} &(48f) & \text{Na I} \\
\mathbf{B}_{31} &= -x_5 \mathbf{a}_1 + (x_5 + \frac{3}{4}) \mathbf{a}_2 + &= a (x_5 + \frac{3}{4}) \hat{\mathbf{x}} + \frac{3}{8}a \hat{\mathbf{y}} + \frac{3}{8}a \hat{\mathbf{z}} &(48f) & \text{Na I} \\
&\quad (x_5 + \frac{3}{4}) \mathbf{a}_3 \\
\mathbf{B}_{32} &= (x_5 + \frac{3}{4}) \mathbf{a}_1 - x_5 \mathbf{a}_2 - x_5 \mathbf{a}_3 &= -ax_5 \hat{\mathbf{x}} + \frac{3}{8}a \hat{\mathbf{y}} + \frac{3}{8}a \hat{\mathbf{z}} &(48f) & \text{Na I} \\
\mathbf{B}_{33} &= -x_5 \mathbf{a}_1 - x_5 \mathbf{a}_2 + (x_5 + \frac{3}{4}) \mathbf{a}_3 &= \frac{3}{8}a \hat{\mathbf{x}} + \frac{3}{8}a \hat{\mathbf{y}} - ax_5 \hat{\mathbf{z}} &(48f) & \text{Na I} \\
\mathbf{B}_{34} &= (x_5 + \frac{3}{4}) \mathbf{a}_1 + (x_5 + \frac{3}{4}) \mathbf{a}_2 - x_5 \mathbf{a}_3 &= \frac{3}{8}a \hat{\mathbf{x}} + \frac{3}{8}a \hat{\mathbf{y}} + a (x_5 + \frac{3}{4}) \hat{\mathbf{z}} &(48f) & \text{Na I} \\
\mathbf{B}_{35} &= z_6 \mathbf{a}_1 + z_6 \mathbf{a}_2 + (2x_6 - z_6) \mathbf{a}_3 &= ax_6 \hat{\mathbf{x}} + ax_6 \hat{\mathbf{y}} + az_6 \hat{\mathbf{z}} &(96g) & \text{O II} \\
\mathbf{B}_{36} &= z_6 \mathbf{a}_1 + z_6 \mathbf{a}_2 - (2x_6 + z_6 - \frac{1}{2}) \mathbf{a}_3 &= -a (x_6 - \frac{1}{4}) \hat{\mathbf{x}} - a (x_6 - \frac{1}{4}) \hat{\mathbf{y}} + az_6 \hat{\mathbf{z}} &(96g) & \text{O II} \\
\mathbf{B}_{37} &= (2x_6 - z_6) \mathbf{a}_1 - &= -a (x_6 - \frac{1}{4}) \hat{\mathbf{x}} + ax_6 \hat{\mathbf{y}} - a (z_6 - \frac{1}{4}) \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad (2x_6 + z_6 - \frac{1}{2}) \mathbf{a}_2 + z_6 \mathbf{a}_3 \\
\mathbf{B}_{38} &= - (2x_6 + z_6 - \frac{1}{2}) \mathbf{a}_1 + &= ax_6 \hat{\mathbf{x}} - a (x_6 - \frac{1}{4}) \hat{\mathbf{y}} - a (z_6 - \frac{1}{4}) \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad (2x_6 - z_6) \mathbf{a}_2 + z_6 \mathbf{a}_3 \\
\mathbf{B}_{39} &= (2x_6 - z_6) \mathbf{a}_1 + z_6 \mathbf{a}_2 + z_6 \mathbf{a}_3 &= az_6 \hat{\mathbf{x}} + ax_6 \hat{\mathbf{y}} + ax_6 \hat{\mathbf{z}} &(96g) & \text{O II} \\
\mathbf{B}_{40} &= - (2x_6 + z_6 - \frac{1}{2}) \mathbf{a}_1 + z_6 \mathbf{a}_2 + &= az_6 \hat{\mathbf{x}} - a (x_6 - \frac{1}{4}) \hat{\mathbf{y}} - a (x_6 - \frac{1}{4}) \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad z_6 \mathbf{a}_3 \\
\mathbf{B}_{41} &= z_6 \mathbf{a}_1 + (2x_6 - z_6) \mathbf{a}_2 - &= -a (z_6 - \frac{1}{4}) \hat{\mathbf{x}} - a (x_6 - \frac{1}{4}) \hat{\mathbf{y}} + ax_6 \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad (2x_6 + z_6 - \frac{1}{2}) \mathbf{a}_3 \\
\mathbf{B}_{42} &= z_6 \mathbf{a}_1 - (2x_6 + z_6 - \frac{1}{2}) \mathbf{a}_2 + &= -a (z_6 - \frac{1}{4}) \hat{\mathbf{x}} + ax_6 \hat{\mathbf{y}} - a (x_6 - \frac{1}{4}) \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad (2x_6 - z_6) \mathbf{a}_3 \\
\mathbf{B}_{43} &= z_6 \mathbf{a}_1 + (2x_6 - z_6) \mathbf{a}_2 + z_6 \mathbf{a}_3 &= ax_6 \hat{\mathbf{x}} + az_6 \hat{\mathbf{y}} + ax_6 \hat{\mathbf{z}} &(96g) & \text{O II} \\
\mathbf{B}_{44} &= z_6 \mathbf{a}_1 - (2x_6 + z_6 - \frac{1}{2}) \mathbf{a}_2 + z_6 \mathbf{a}_3 &= -a (x_6 - \frac{1}{4}) \hat{\mathbf{x}} + az_6 \hat{\mathbf{y}} - a (x_6 - \frac{1}{4}) \hat{\mathbf{z}} &(96g) & \text{O II} \\
\mathbf{B}_{45} &= - (2x_6 + z_6 - \frac{1}{2}) \mathbf{a}_1 + z_6 \mathbf{a}_2 + &= ax_6 \hat{\mathbf{x}} - a (z_6 - \frac{1}{4}) \hat{\mathbf{y}} - a (x_6 - \frac{1}{4}) \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad (2x_6 - z_6) \mathbf{a}_3 \\
\mathbf{B}_{46} &= (2x_6 - z_6) \mathbf{a}_1 + z_6 \mathbf{a}_2 - &= -a (x_6 - \frac{1}{4}) \hat{\mathbf{x}} - a (z_6 - \frac{1}{4}) \hat{\mathbf{y}} + ax_6 \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad (2x_6 + z_6 - \frac{1}{2}) \mathbf{a}_3 \\
\mathbf{B}_{47} &= -z_6 \mathbf{a}_1 - z_6 \mathbf{a}_2 + &= a (x_6 + \frac{1}{4}) \hat{\mathbf{x}} + a (x_6 + \frac{1}{4}) \hat{\mathbf{y}} - az_6 \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad (2x_6 + z_6 + \frac{1}{2}) \mathbf{a}_3 \\
\mathbf{B}_{48} &= -z_6 \mathbf{a}_1 - z_6 \mathbf{a}_2 - (2x_6 - z_6) \mathbf{a}_3 &= -ax_6 \hat{\mathbf{x}} - ax_6 \hat{\mathbf{y}} - az_6 \hat{\mathbf{z}} &(96g) & \text{O II} \\
\mathbf{B}_{49} &= - (2x_6 - z_6) \mathbf{a}_1 + &= a (x_6 + \frac{1}{4}) \hat{\mathbf{x}} - ax_6 \hat{\mathbf{y}} + a (z_6 + \frac{1}{4}) \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad (2x_6 + z_6 + \frac{1}{2}) \mathbf{a}_2 - z_6 \mathbf{a}_3 \\
\mathbf{B}_{50} &= (2x_6 + z_6 + \frac{1}{2}) \mathbf{a}_1 - &= -ax_6 \hat{\mathbf{x}} + a (x_6 + \frac{1}{4}) \hat{\mathbf{y}} + a (z_6 + \frac{1}{4}) \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad (2x_6 - z_6) \mathbf{a}_2 - z_6 \mathbf{a}_3 \\
\mathbf{B}_{51} &= - (2x_6 - z_6) \mathbf{a}_1 - z_6 \mathbf{a}_2 + &= a (x_6 + \frac{1}{4}) \hat{\mathbf{x}} + a (z_6 + \frac{1}{4}) \hat{\mathbf{y}} - ax_6 \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad (2x_6 + z_6 + \frac{1}{2}) \mathbf{a}_3 \\
\mathbf{B}_{52} &= (2x_6 + z_6 + \frac{1}{2}) \mathbf{a}_1 - z_6 \mathbf{a}_2 - &= -ax_6 \hat{\mathbf{x}} + a (z_6 + \frac{1}{4}) \hat{\mathbf{y}} + a (x_6 + \frac{1}{4}) \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad (2x_6 - z_6) \mathbf{a}_3 \\
\mathbf{B}_{53} &= -z_6 \mathbf{a}_1 - (2x_6 - z_6) \mathbf{a}_2 - z_6 \mathbf{a}_3 &= -ax_6 \hat{\mathbf{x}} - az_6 \hat{\mathbf{y}} - ax_6 \hat{\mathbf{z}} &(96g) & \text{O II} \\
\mathbf{B}_{54} &= -z_6 \mathbf{a}_1 + (2x_6 + z_6 + \frac{1}{2}) \mathbf{a}_2 - &= a (x_6 + \frac{1}{4}) \hat{\mathbf{x}} - az_6 \hat{\mathbf{y}} + a (x_6 + \frac{1}{4}) \hat{\mathbf{z}} &(96g) & \text{O II} \\
&\quad z_6 \mathbf{a}_3
\end{aligned}$$

$$\begin{aligned}
\mathbf{B}_{55} &= \begin{matrix} -z_6 \mathbf{a}_1 - (2x_6 - z_6) \mathbf{a}_2 + \\ (2x_6 + z_6 + \frac{1}{2}) \mathbf{a}_3 \end{matrix} = a \left(z_6 + \frac{1}{4} \right) \hat{\mathbf{x}} + a \left(x_6 + \frac{1}{4} \right) \hat{\mathbf{y}} - ax_6 \hat{\mathbf{z}} & (96g) & \text{O II} \\
\mathbf{B}_{56} &= \begin{matrix} -z_6 \mathbf{a}_1 + (2x_6 + z_6 + \frac{1}{2}) \mathbf{a}_2 - \\ (2x_6 - z_6) \mathbf{a}_3 \end{matrix} = a \left(z_6 + \frac{1}{4} \right) \hat{\mathbf{x}} - ax_6 \hat{\mathbf{y}} + a \left(x_6 + \frac{1}{4} \right) \hat{\mathbf{z}} & (96g) & \text{O II} \\
\mathbf{B}_{57} &= \left(2x_6 + z_6 + \frac{1}{2} \right) \mathbf{a}_1 - z_6 \mathbf{a}_2 - z_6 \mathbf{a}_3 = -az_6 \hat{\mathbf{x}} + a \left(x_6 + \frac{1}{4} \right) \hat{\mathbf{y}} + a \left(x_6 + \frac{1}{4} \right) \hat{\mathbf{z}} & (96g) & \text{O II} \\
\mathbf{B}_{58} &= -(2x_6 - z_6) \mathbf{a}_1 - z_6 \mathbf{a}_2 - z_6 \mathbf{a}_3 = -az_6 \hat{\mathbf{x}} - ax_6 \hat{\mathbf{y}} - ax_6 \hat{\mathbf{z}} & (96g) & \text{O II}
\end{aligned}$$

References

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