

V₈C₇ Structure:

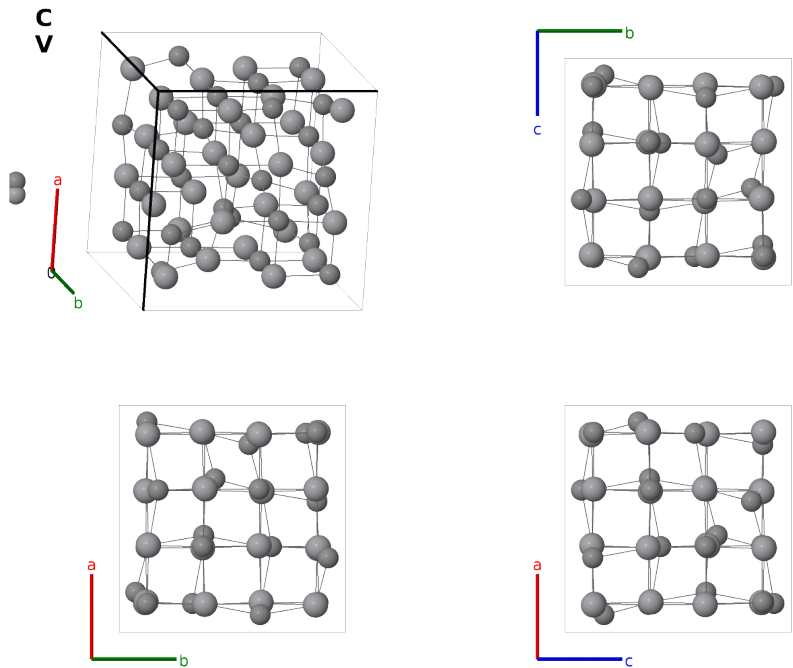
A7B8_cP60_212_a2d_ce-001

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- D. Hicks, M. J. Mehl, M. Esters, C. Oses, O. Levy, G. L. W. Hart, C. Toher, and S. Curtarolo, *The AFLOW Library of Crystallographic Prototypes: Part 3*, Comput. Mater. Sci. **199**, 110450 (2021), doi: 10.1016/j.commatsci.2021.110450.

<https://aflow.org/prototype-encyclopedia/L1XR>

https://aflow.org/prototype-encyclopedia/A7B8_cP60_212_a2d_ce-001



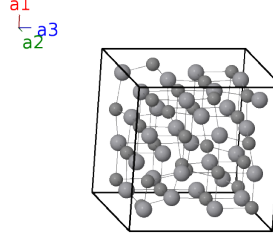
Prototype	C ₇ V ₈
AFLOW prototype label	A7B8_cP60_212_a2d_ce-001
ICSD	85953
CCDC	1645862
Pearson symbol	cP60
Space group number	212
Space group symbol	P ₄ ₃ 32
AFLOW prototype command	<code>aflow --proto=A7B8_cP60_212_a2d_ce-001</code> <code>--params=a, x₂, y₃, y₄, x₅, y₅, z₅</code>

- Above 1112±8°C this transforms into the rock salt (*B1*) structure with disordered carbon vacancies. (Rafaja, 1998)
Below that temperature the vacancies order on the (4b) sites of space group *P*₄₃32 as shown here.

- If we set $x_2 = 3/8$, $y_3 = 5/8$, $y_4 = 3/8$, $x_5 = 1/8$, $y_5 = 3/8$, $z_5 = 1/8$, and place carbon atoms on the (4b) $(5/8 \ 5/8 \ 5/8)$ site then this structure becomes a fully ordered rock salt crystal.
- The current structure may also be found in the enantiomorphic space group $P4_132$ #213.

Simple Cubic primitive vectors

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



Basis vectors

	Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B}_1$	$= \frac{1}{8} \mathbf{a}_1 + \frac{1}{8} \mathbf{a}_2 + \frac{1}{8} \mathbf{a}_3$	$=$	$\frac{1}{8} a \hat{\mathbf{x}} + \frac{1}{8} a \hat{\mathbf{y}} + \frac{1}{8} a \hat{\mathbf{z}}$	(4a)	C I
$\mathbf{B}_2$	$= \frac{3}{8} \mathbf{a}_1 + \frac{7}{8} \mathbf{a}_2 + \frac{5}{8} \mathbf{a}_3$	$=$	$\frac{3}{8} a \hat{\mathbf{x}} + \frac{7}{8} a \hat{\mathbf{y}} + \frac{5}{8} a \hat{\mathbf{z}}$	(4a)	C I
$\mathbf{B}_3$	$= \frac{7}{8} \mathbf{a}_1 + \frac{5}{8} \mathbf{a}_2 + \frac{3}{8} \mathbf{a}_3$	$=$	$\frac{7}{8} a \hat{\mathbf{x}} + \frac{5}{8} a \hat{\mathbf{y}} + \frac{3}{8} a \hat{\mathbf{z}}$	(4a)	C I
$\mathbf{B}_4$	$= \frac{5}{8} \mathbf{a}_1 + \frac{3}{8} \mathbf{a}_2 + \frac{7}{8} \mathbf{a}_3$	$=$	$\frac{5}{8} a \hat{\mathbf{x}} + \frac{3}{8} a \hat{\mathbf{y}} + \frac{7}{8} a \hat{\mathbf{z}}$	(4a)	C I
$\mathbf{B}_5$	$= x_2 \mathbf{a}_1 + x_2 \mathbf{a}_2 + x_2 \mathbf{a}_3$	$=$	$a x_2 \hat{\mathbf{x}} + a x_2 \hat{\mathbf{y}} + a x_2 \hat{\mathbf{z}}$	(8c)	V I
$\mathbf{B}_6$	$= -\left(x_2 - \frac{1}{2}\right) \mathbf{a}_1 - x_2 \mathbf{a}_2 + \left(x_2 + \frac{1}{2}\right) \mathbf{a}_3$	$=$	$-a \left(x_2 - \frac{1}{2}\right) \hat{\mathbf{x}} - a x_2 \hat{\mathbf{y}} + a \left(x_2 + \frac{1}{2}\right) \hat{\mathbf{z}}$	(8c)	V I
$\mathbf{B}_7$	$= -x_2 \mathbf{a}_1 + \left(x_2 + \frac{1}{2}\right) \mathbf{a}_2 - \left(x_2 - \frac{1}{2}\right) \mathbf{a}_3$	$=$	$-a x_2 \hat{\mathbf{x}} + a \left(x_2 + \frac{1}{2}\right) \hat{\mathbf{y}} - a \left(x_2 - \frac{1}{2}\right) \hat{\mathbf{z}}$	(8c)	V I
$\mathbf{B}_8$	$= \left(x_2 + \frac{1}{2}\right) \mathbf{a}_1 - \left(x_2 - \frac{1}{2}\right) \mathbf{a}_2 - x_2 \mathbf{a}_3$	$=$	$a \left(x_2 + \frac{1}{2}\right) \hat{\mathbf{x}} - a \left(x_2 - \frac{1}{2}\right) \hat{\mathbf{y}} - a x_2 \hat{\mathbf{z}}$	(8c)	V I
$\mathbf{B}_9$	$= \left(x_2 + \frac{1}{4}\right) \mathbf{a}_1 + \left(x_2 + \frac{3}{4}\right) \mathbf{a}_2 - \left(x_2 - \frac{3}{4}\right) \mathbf{a}_3$	$=$	$a \left(x_2 + \frac{1}{4}\right) \hat{\mathbf{x}} + a \left(x_2 + \frac{3}{4}\right) \hat{\mathbf{y}} - a \left(x_2 - \frac{3}{4}\right) \hat{\mathbf{z}}$	(8c)	V I
$\mathbf{B}_{10}$	$= -\left(x_2 - \frac{1}{4}\right) \mathbf{a}_1 - \left(x_2 - \frac{1}{4}\right) \mathbf{a}_2 - \left(x_2 - \frac{1}{4}\right) \mathbf{a}_3$	$=$	$-a \left(x_2 - \frac{1}{4}\right) \hat{\mathbf{x}} - a \left(x_2 - \frac{1}{4}\right) \hat{\mathbf{y}} - a \left(x_2 - \frac{1}{4}\right) \hat{\mathbf{z}}$	(8c)	V I
$\mathbf{B}_{11}$	$= \left(x_2 + \frac{3}{4}\right) \mathbf{a}_1 - \left(x_2 - \frac{3}{4}\right) \mathbf{a}_2 + \left(x_2 + \frac{1}{4}\right) \mathbf{a}_3$	$=$	$a \left(x_2 + \frac{3}{4}\right) \hat{\mathbf{x}} - a \left(x_2 - \frac{3}{4}\right) \hat{\mathbf{y}} + a \left(x_2 + \frac{1}{4}\right) \hat{\mathbf{z}}$	(8c)	V I
$\mathbf{B}_{12}$	$= -\left(x_2 - \frac{3}{4}\right) \mathbf{a}_1 + \left(x_2 + \frac{1}{4}\right) \mathbf{a}_2 + \left(x_2 + \frac{3}{4}\right) \mathbf{a}_3$	$=$	$-a \left(x_2 - \frac{3}{4}\right) \hat{\mathbf{x}} + a \left(x_2 + \frac{1}{4}\right) \hat{\mathbf{y}} + a \left(x_2 + \frac{3}{4}\right) \hat{\mathbf{z}}$	(8c)	V I
$\mathbf{B}_{13}$	$= \frac{1}{8} \mathbf{a}_1 + y_3 \mathbf{a}_2 - \left(y_3 - \frac{1}{4}\right) \mathbf{a}_3$	$=$	$\frac{1}{8} a \hat{\mathbf{x}} + a y_3 \hat{\mathbf{y}} - a \left(y_3 - \frac{1}{4}\right) \hat{\mathbf{z}}$	(12d)	C II
$\mathbf{B}_{14}$	$= \frac{3}{8} \mathbf{a}_1 - y_3 \mathbf{a}_2 - \left(y_3 - \frac{3}{4}\right) \mathbf{a}_3$	$=$	$\frac{3}{8} a \hat{\mathbf{x}} - a y_3 \hat{\mathbf{y}} - a \left(y_3 - \frac{3}{4}\right) \hat{\mathbf{z}}$	(12d)	C II
$\mathbf{B}_{15}$	$= \frac{7}{8} \mathbf{a}_1 + \left(y_3 + \frac{1}{2}\right) \mathbf{a}_2 + \left(y_3 + \frac{1}{4}\right) \mathbf{a}_3$	$=$	$\frac{7}{8} a \hat{\mathbf{x}} + a \left(y_3 + \frac{1}{2}\right) \hat{\mathbf{y}} + a \left(y_3 + \frac{1}{4}\right) \hat{\mathbf{z}}$	(12d)	C II
$\mathbf{B}_{16}$	$= \frac{5}{8} \mathbf{a}_1 - \left(y_3 - \frac{1}{2}\right) \mathbf{a}_2 + \left(y_3 + \frac{3}{4}\right) \mathbf{a}_3$	$=$	$\frac{5}{8} a \hat{\mathbf{x}} - a \left(y_3 - \frac{1}{2}\right) \hat{\mathbf{y}} + a \left(y_3 + \frac{3}{4}\right) \hat{\mathbf{z}}$	(12d)	C II
$\mathbf{B}_{17}$	$= -\left(y_3 - \frac{1}{4}\right) \mathbf{a}_1 + \frac{1}{8} \mathbf{a}_2 + y_3 \mathbf{a}_3$	$=$	$-a \left(y_3 - \frac{1}{4}\right) \hat{\mathbf{x}} + \frac{1}{8} a \hat{\mathbf{y}} + a y_3 \hat{\mathbf{z}}$	(12d)	C II
$\mathbf{B}_{18}$	$= -\left(y_3 - \frac{3}{4}\right) \mathbf{a}_1 + \frac{3}{8} \mathbf{a}_2 - y_3 \mathbf{a}_3$	$=$	$-a \left(y_3 - \frac{3}{4}\right) \hat{\mathbf{x}} + \frac{3}{8} a \hat{\mathbf{y}} - a y_3 \hat{\mathbf{z}}$	(12d)	C II
$\mathbf{B}_{19}$	$= \left(y_3 + \frac{1}{4}\right) \mathbf{a}_1 + \frac{7}{8} \mathbf{a}_2 + \left(y_3 + \frac{1}{2}\right) \mathbf{a}_3$	$=$	$a \left(y_3 + \frac{1}{4}\right) \hat{\mathbf{x}} + \frac{7}{8} a \hat{\mathbf{y}} + a \left(y_3 + \frac{1}{2}\right) \hat{\mathbf{z}}$	(12d)	C II
$\mathbf{B}_{20}$	$= \left(y_3 + \frac{3}{4}\right) \mathbf{a}_1 + \frac{5}{8} \mathbf{a}_2 - \left(y_3 - \frac{1}{2}\right) \mathbf{a}_3$	$=$	$a \left(y_3 + \frac{3}{4}\right) \hat{\mathbf{x}} + \frac{5}{8} a \hat{\mathbf{y}} - a \left(y_3 - \frac{1}{2}\right) \hat{\mathbf{z}}$	(12d)	C II

$\mathbf{B}_{21} =$	$y_3 \mathbf{a}_1 - (y_3 - \frac{1}{4}) \mathbf{a}_2 + \frac{1}{8} \mathbf{a}_3$	$=$	$ay_3 \hat{\mathbf{x}} - a(y_3 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{8}a \hat{\mathbf{z}}$	(12d)	C II
$\mathbf{B}_{22} =$	$-y_3 \mathbf{a}_1 - (y_3 - \frac{3}{4}) \mathbf{a}_2 + \frac{3}{8} \mathbf{a}_3$	$=$	$-ay_3 \hat{\mathbf{x}} - a(y_3 - \frac{3}{4}) \hat{\mathbf{y}} + \frac{3}{8}a \hat{\mathbf{z}}$	(12d)	C II
$\mathbf{B}_{23} =$	$(y_3 + \frac{1}{2}) \mathbf{a}_1 + (y_3 + \frac{1}{4}) \mathbf{a}_2 + \frac{7}{8} \mathbf{a}_3$	$=$	$a(y_3 + \frac{1}{2}) \hat{\mathbf{x}} + a(y_3 + \frac{1}{4}) \hat{\mathbf{y}} + \frac{7}{8}a \hat{\mathbf{z}}$	(12d)	C II
$\mathbf{B}_{24} =$	$-(y_3 - \frac{1}{2}) \mathbf{a}_1 + (y_3 + \frac{3}{4}) \mathbf{a}_2 + \frac{5}{8} \mathbf{a}_3$	$=$	$-a(y_3 - \frac{1}{2}) \hat{\mathbf{x}} + a(y_3 + \frac{3}{4}) \hat{\mathbf{y}} + \frac{5}{8}a \hat{\mathbf{z}}$	(12d)	C II
$\mathbf{B}_{25} =$	$\frac{1}{8} \mathbf{a}_1 + y_4 \mathbf{a}_2 - (y_4 - \frac{1}{4}) \mathbf{a}_3$	$=$	$\frac{1}{8}a \hat{\mathbf{x}} + ay_4 \hat{\mathbf{y}} - a(y_4 - \frac{1}{4}) \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{26} =$	$\frac{3}{8} \mathbf{a}_1 - y_4 \mathbf{a}_2 - (y_4 - \frac{3}{4}) \mathbf{a}_3$	$=$	$\frac{3}{8}a \hat{\mathbf{x}} - ay_4 \hat{\mathbf{y}} - a(y_4 - \frac{3}{4}) \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{27} =$	$\frac{7}{8} \mathbf{a}_1 + (y_4 + \frac{1}{2}) \mathbf{a}_2 + (y_4 + \frac{1}{4}) \mathbf{a}_3$	$=$	$\frac{7}{8}a \hat{\mathbf{x}} + a(y_4 + \frac{1}{2}) \hat{\mathbf{y}} + a(y_4 + \frac{1}{4}) \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{28} =$	$\frac{5}{8} \mathbf{a}_1 - (y_4 - \frac{1}{2}) \mathbf{a}_2 + (y_4 + \frac{3}{4}) \mathbf{a}_3$	$=$	$\frac{5}{8}a \hat{\mathbf{x}} - a(y_4 - \frac{1}{2}) \hat{\mathbf{y}} + a(y_4 + \frac{3}{4}) \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{29} =$	$-(y_4 - \frac{1}{4}) \mathbf{a}_1 + \frac{1}{8} \mathbf{a}_2 + y_4 \mathbf{a}_3$	$=$	$-a(y_4 - \frac{1}{4}) \hat{\mathbf{x}} + \frac{1}{8}a \hat{\mathbf{y}} + ay_4 \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{30} =$	$-(y_4 - \frac{3}{4}) \mathbf{a}_1 + \frac{3}{8} \mathbf{a}_2 - y_4 \mathbf{a}_3$	$=$	$-a(y_4 - \frac{3}{4}) \hat{\mathbf{x}} + \frac{3}{8}a \hat{\mathbf{y}} - ay_4 \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{31} =$	$(y_4 + \frac{1}{4}) \mathbf{a}_1 + \frac{7}{8} \mathbf{a}_2 + (y_4 + \frac{1}{2}) \mathbf{a}_3$	$=$	$a(y_4 + \frac{1}{4}) \hat{\mathbf{x}} + \frac{7}{8}a \hat{\mathbf{y}} + a(y_4 + \frac{1}{2}) \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{32} =$	$(y_4 + \frac{3}{4}) \mathbf{a}_1 + \frac{5}{8} \mathbf{a}_2 - (y_4 - \frac{1}{2}) \mathbf{a}_3$	$=$	$a(y_4 + \frac{3}{4}) \hat{\mathbf{x}} + \frac{5}{8}a \hat{\mathbf{y}} - a(y_4 - \frac{1}{2}) \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{33} =$	$y_4 \mathbf{a}_1 - (y_4 - \frac{1}{4}) \mathbf{a}_2 + \frac{1}{8} \mathbf{a}_3$	$=$	$ay_4 \hat{\mathbf{x}} - a(y_4 - \frac{1}{4}) \hat{\mathbf{y}} + \frac{1}{8}a \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{34} =$	$-y_4 \mathbf{a}_1 - (y_4 - \frac{3}{4}) \mathbf{a}_2 + \frac{3}{8} \mathbf{a}_3$	$=$	$-ay_4 \hat{\mathbf{x}} - a(y_4 - \frac{3}{4}) \hat{\mathbf{y}} + \frac{3}{8}a \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{35} =$	$(y_4 + \frac{1}{2}) \mathbf{a}_1 + (y_4 + \frac{1}{4}) \mathbf{a}_2 + \frac{7}{8} \mathbf{a}_3$	$=$	$a(y_4 + \frac{1}{2}) \hat{\mathbf{x}} + a(y_4 + \frac{1}{4}) \hat{\mathbf{y}} + \frac{7}{8}a \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{36} =$	$-(y_4 - \frac{1}{2}) \mathbf{a}_1 + (y_4 + \frac{3}{4}) \mathbf{a}_2 + \frac{5}{8} \mathbf{a}_3$	$=$	$-a(y_4 - \frac{1}{2}) \hat{\mathbf{x}} + a(y_4 + \frac{3}{4}) \hat{\mathbf{y}} + \frac{5}{8}a \hat{\mathbf{z}}$	(12d)	C III
$\mathbf{B}_{37} =$	$x_5 \mathbf{a}_1 + y_5 \mathbf{a}_2 + z_5 \mathbf{a}_3$	$=$	$ax_5 \hat{\mathbf{x}} + ay_5 \hat{\mathbf{y}} + az_5 \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{38} =$	$-(x_5 - \frac{1}{2}) \mathbf{a}_1 - y_5 \mathbf{a}_2 + (z_5 + \frac{1}{2}) \mathbf{a}_3$	$=$	$-a(x_5 - \frac{1}{2}) \hat{\mathbf{x}} - ay_5 \hat{\mathbf{y}} + a(z_5 + \frac{1}{2}) \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{39} =$	$-x_5 \mathbf{a}_1 + (y_5 + \frac{1}{2}) \mathbf{a}_2 - (z_5 - \frac{1}{2}) \mathbf{a}_3$	$=$	$-ax_5 \hat{\mathbf{x}} + a(y_5 + \frac{1}{2}) \hat{\mathbf{y}} - a(z_5 - \frac{1}{2}) \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{40} =$	$(x_5 + \frac{1}{2}) \mathbf{a}_1 - (y_5 - \frac{1}{2}) \mathbf{a}_2 - z_5 \mathbf{a}_3$	$=$	$a(x_5 + \frac{1}{2}) \hat{\mathbf{x}} - a(y_5 - \frac{1}{2}) \hat{\mathbf{y}} - az_5 \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{41} =$	$z_5 \mathbf{a}_1 + x_5 \mathbf{a}_2 + y_5 \mathbf{a}_3$	$=$	$az_5 \hat{\mathbf{x}} + ax_5 \hat{\mathbf{y}} + ay_5 \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{42} =$	$(z_5 + \frac{1}{2}) \mathbf{a}_1 - (x_5 - \frac{1}{2}) \mathbf{a}_2 - y_5 \mathbf{a}_3$	$=$	$a(z_5 + \frac{1}{2}) \hat{\mathbf{x}} - a(x_5 - \frac{1}{2}) \hat{\mathbf{y}} - ay_5 \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{43} =$	$-(z_5 - \frac{1}{2}) \mathbf{a}_1 - x_5 \mathbf{a}_2 + (y_5 + \frac{1}{2}) \mathbf{a}_3$	$=$	$-a(z_5 - \frac{1}{2}) \hat{\mathbf{x}} - ax_5 \hat{\mathbf{y}} + a(y_5 + \frac{1}{2}) \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{44} =$	$-z_5 \mathbf{a}_1 + (x_5 + \frac{1}{2}) \mathbf{a}_2 - (y_5 - \frac{1}{2}) \mathbf{a}_3$	$=$	$-az_5 \hat{\mathbf{x}} + a(x_5 + \frac{1}{2}) \hat{\mathbf{y}} - a(y_5 - \frac{1}{2}) \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{45} =$	$y_5 \mathbf{a}_1 + z_5 \mathbf{a}_2 + x_5 \mathbf{a}_3$	$=$	$ay_5 \hat{\mathbf{x}} + az_5 \hat{\mathbf{y}} + ax_5 \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{46} =$	$-y_5 \mathbf{a}_1 + (z_5 + \frac{1}{2}) \mathbf{a}_2 - (x_5 - \frac{1}{2}) \mathbf{a}_3$	$=$	$-ay_5 \hat{\mathbf{x}} + a(z_5 + \frac{1}{2}) \hat{\mathbf{y}} - a(x_5 - \frac{1}{2}) \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{47} =$	$(y_5 + \frac{1}{2}) \mathbf{a}_1 - (z_5 - \frac{1}{2}) \mathbf{a}_2 - x_5 \mathbf{a}_3$	$=$	$a(y_5 + \frac{1}{2}) \hat{\mathbf{x}} - a(z_5 - \frac{1}{2}) \hat{\mathbf{y}} - ax_5 \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{48} =$	$-(y_5 - \frac{1}{2}) \mathbf{a}_1 - z_5 \mathbf{a}_2 + (x_5 + \frac{1}{2}) \mathbf{a}_3$	$=$	$-a(y_5 - \frac{1}{2}) \hat{\mathbf{x}} - az_5 \hat{\mathbf{y}} + a(x_5 + \frac{1}{2}) \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{49} =$	$(y_5 + \frac{1}{4}) \mathbf{a}_1 + (x_5 + \frac{3}{4}) \mathbf{a}_2 - (z_5 - \frac{3}{4}) \mathbf{a}_3$	$=$	$a(y_5 + \frac{1}{4}) \hat{\mathbf{x}} + a(x_5 + \frac{3}{4}) \hat{\mathbf{y}} - a(z_5 - \frac{3}{4}) \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{50} =$	$-(y_5 - \frac{1}{4}) \mathbf{a}_1 - (x_5 - \frac{1}{4}) \mathbf{a}_2 - (z_5 - \frac{1}{4}) \mathbf{a}_3$	$=$	$-a(y_5 - \frac{1}{4}) \hat{\mathbf{x}} - a(x_5 - \frac{1}{4}) \hat{\mathbf{y}} - a(z_5 - \frac{1}{4}) \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{51} =$	$(y_5 + \frac{3}{4}) \mathbf{a}_1 - (x_5 - \frac{3}{4}) \mathbf{a}_2 + (z_5 + \frac{1}{4}) \mathbf{a}_3$	$=$	$a(y_5 + \frac{3}{4}) \hat{\mathbf{x}} - a(x_5 - \frac{3}{4}) \hat{\mathbf{y}} + a(z_5 + \frac{1}{4}) \hat{\mathbf{z}}$	(24e)	V II
$\mathbf{B}_{52} =$	$-(y_5 - \frac{3}{4}) \mathbf{a}_1 + (x_5 + \frac{1}{4}) \mathbf{a}_2 + (z_5 + \frac{3}{4}) \mathbf{a}_3$	$=$	$-a(y_5 - \frac{3}{4}) \hat{\mathbf{x}} + a(x_5 + \frac{1}{4}) \hat{\mathbf{y}} + a(z_5 + \frac{3}{4}) \hat{\mathbf{z}}$	(24e)	V II

$$\begin{aligned}
\mathbf{B}_{53} &= \begin{pmatrix} x_5 + \frac{1}{4} \\ y_5 - \frac{3}{4} \end{pmatrix} \mathbf{a}_1 + \begin{pmatrix} z_5 + \frac{3}{4} \\ y_5 - \frac{3}{4} \end{pmatrix} \mathbf{a}_2 - \begin{pmatrix} x_5 + \frac{1}{4} \\ y_5 - \frac{3}{4} \end{pmatrix} \mathbf{a}_3 &= a \begin{pmatrix} x_5 + \frac{1}{4} \\ y_5 - \frac{3}{4} \end{pmatrix} \hat{\mathbf{x}} + a \begin{pmatrix} z_5 + \frac{3}{4} \\ y_5 - \frac{3}{4} \end{pmatrix} \hat{\mathbf{y}} - a \begin{pmatrix} x_5 + \frac{1}{4} \\ y_5 - \frac{3}{4} \end{pmatrix} \hat{\mathbf{z}} &(24e) & \text{V II} \\
\mathbf{B}_{54} &= - \begin{pmatrix} x_5 - \frac{3}{4} \\ y_5 + \frac{3}{4} \end{pmatrix} \mathbf{a}_1 + \begin{pmatrix} z_5 + \frac{1}{4} \\ y_5 + \frac{3}{4} \end{pmatrix} \mathbf{a}_2 + \begin{pmatrix} x_5 - \frac{3}{4} \\ y_5 + \frac{3}{4} \end{pmatrix} \mathbf{a}_3 &= -a \begin{pmatrix} x_5 - \frac{3}{4} \\ y_5 + \frac{3}{4} \end{pmatrix} \hat{\mathbf{x}} + a \begin{pmatrix} z_5 + \frac{1}{4} \\ y_5 + \frac{3}{4} \end{pmatrix} \hat{\mathbf{y}} + a \begin{pmatrix} x_5 - \frac{3}{4} \\ y_5 + \frac{3}{4} \end{pmatrix} \hat{\mathbf{z}} &(24e) & \text{V II} \\
\mathbf{B}_{55} &= - \begin{pmatrix} x_5 - \frac{1}{4} \\ y_5 - \frac{1}{4} \end{pmatrix} \mathbf{a}_1 - \begin{pmatrix} z_5 - \frac{1}{4} \\ y_5 - \frac{1}{4} \end{pmatrix} \mathbf{a}_2 - \begin{pmatrix} x_5 - \frac{1}{4} \\ y_5 - \frac{1}{4} \end{pmatrix} \mathbf{a}_3 &= -a \begin{pmatrix} x_5 - \frac{1}{4} \\ y_5 - \frac{1}{4} \end{pmatrix} \hat{\mathbf{x}} - a \begin{pmatrix} z_5 - \frac{1}{4} \\ y_5 - \frac{1}{4} \end{pmatrix} \hat{\mathbf{y}} - a \begin{pmatrix} x_5 - \frac{1}{4} \\ y_5 - \frac{1}{4} \end{pmatrix} \hat{\mathbf{z}} &(24e) & \text{V II} \\
\mathbf{B}_{56} &= \begin{pmatrix} x_5 + \frac{3}{4} \\ y_5 + \frac{1}{4} \end{pmatrix} \mathbf{a}_1 - \begin{pmatrix} z_5 - \frac{3}{4} \\ y_5 + \frac{1}{4} \end{pmatrix} \mathbf{a}_2 + \begin{pmatrix} x_5 + \frac{3}{4} \\ y_5 + \frac{1}{4} \end{pmatrix} \mathbf{a}_3 &= a \begin{pmatrix} x_5 + \frac{3}{4} \\ y_5 + \frac{1}{4} \end{pmatrix} \hat{\mathbf{x}} - a \begin{pmatrix} z_5 - \frac{3}{4} \\ y_5 + \frac{1}{4} \end{pmatrix} \hat{\mathbf{y}} + a \begin{pmatrix} x_5 + \frac{3}{4} \\ y_5 + \frac{1}{4} \end{pmatrix} \hat{\mathbf{z}} &(24e) & \text{V II} \\
\mathbf{B}_{57} &= \begin{pmatrix} z_5 + \frac{1}{4} \\ x_5 - \frac{3}{4} \end{pmatrix} \mathbf{a}_1 + \begin{pmatrix} y_5 + \frac{3}{4} \\ x_5 - \frac{3}{4} \end{pmatrix} \mathbf{a}_2 - \begin{pmatrix} z_5 + \frac{1}{4} \\ x_5 - \frac{3}{4} \end{pmatrix} \mathbf{a}_3 &= a \begin{pmatrix} z_5 + \frac{1}{4} \\ x_5 - \frac{3}{4} \end{pmatrix} \hat{\mathbf{x}} + a \begin{pmatrix} y_5 + \frac{3}{4} \\ x_5 - \frac{3}{4} \end{pmatrix} \hat{\mathbf{y}} - a \begin{pmatrix} z_5 + \frac{1}{4} \\ x_5 - \frac{3}{4} \end{pmatrix} \hat{\mathbf{z}} &(24e) & \text{V II} \\
\mathbf{B}_{58} &= \begin{pmatrix} z_5 + \frac{3}{4} \\ x_5 + \frac{1}{4} \end{pmatrix} \mathbf{a}_1 - \begin{pmatrix} y_5 - \frac{3}{4} \\ x_5 + \frac{1}{4} \end{pmatrix} \mathbf{a}_2 + \begin{pmatrix} z_5 + \frac{3}{4} \\ x_5 + \frac{1}{4} \end{pmatrix} \mathbf{a}_3 &= a \begin{pmatrix} z_5 + \frac{3}{4} \\ x_5 + \frac{1}{4} \end{pmatrix} \hat{\mathbf{x}} - a \begin{pmatrix} y_5 - \frac{3}{4} \\ x_5 + \frac{1}{4} \end{pmatrix} \hat{\mathbf{y}} + a \begin{pmatrix} z_5 + \frac{3}{4} \\ x_5 + \frac{1}{4} \end{pmatrix} \hat{\mathbf{z}} &(24e) & \text{V II} \\
\mathbf{B}_{59} &= - \begin{pmatrix} z_5 - \frac{3}{4} \\ x_5 + \frac{3}{4} \end{pmatrix} \mathbf{a}_1 + \begin{pmatrix} y_5 + \frac{1}{4} \\ x_5 + \frac{3}{4} \end{pmatrix} \mathbf{a}_2 + \begin{pmatrix} z_5 - \frac{3}{4} \\ x_5 + \frac{3}{4} \end{pmatrix} \mathbf{a}_3 &= -a \begin{pmatrix} z_5 - \frac{3}{4} \\ x_5 + \frac{3}{4} \end{pmatrix} \hat{\mathbf{x}} + a \begin{pmatrix} y_5 + \frac{1}{4} \\ x_5 + \frac{3}{4} \end{pmatrix} \hat{\mathbf{y}} + a \begin{pmatrix} z_5 - \frac{3}{4} \\ x_5 + \frac{3}{4} \end{pmatrix} \hat{\mathbf{z}} &(24e) & \text{V II} \\
\mathbf{B}_{60} &= - \begin{pmatrix} z_5 - \frac{1}{4} \\ x_5 - \frac{1}{4} \end{pmatrix} \mathbf{a}_1 - \begin{pmatrix} y_5 - \frac{1}{4} \\ x_5 - \frac{1}{4} \end{pmatrix} \mathbf{a}_2 - \begin{pmatrix} z_5 - \frac{1}{4} \\ x_5 - \frac{1}{4} \end{pmatrix} \mathbf{a}_3 &= -a \begin{pmatrix} z_5 - \frac{1}{4} \\ x_5 - \frac{1}{4} \end{pmatrix} \hat{\mathbf{x}} - a \begin{pmatrix} y_5 - \frac{1}{4} \\ x_5 - \frac{1}{4} \end{pmatrix} \hat{\mathbf{y}} - a \begin{pmatrix} z_5 - \frac{1}{4} \\ x_5 - \frac{1}{4} \end{pmatrix} \hat{\mathbf{z}} &(24e) & \text{V II}
\end{aligned}$$

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