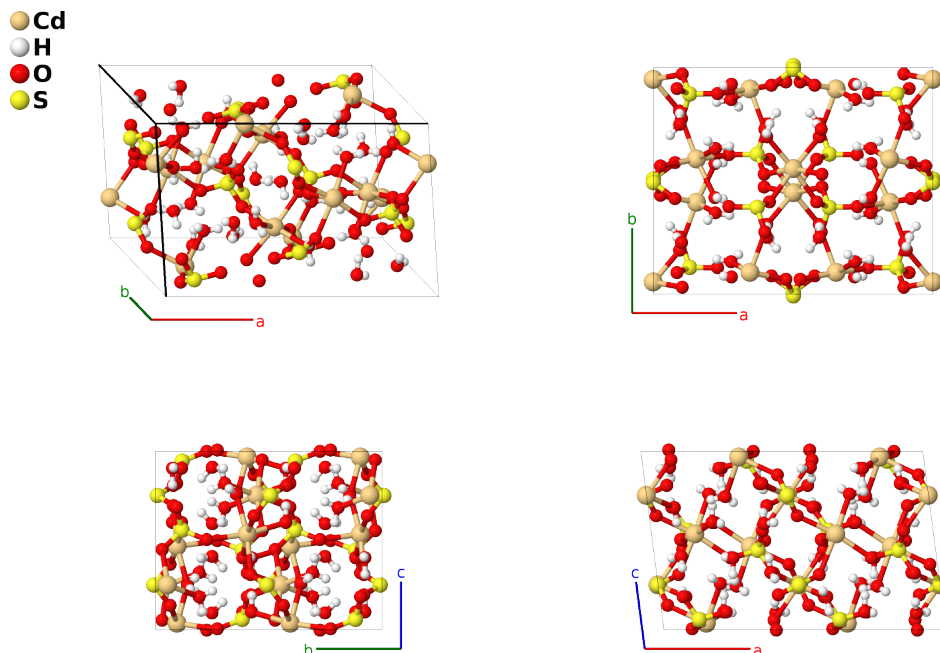# $(CdSO_4)_3 \cdot 8H_2O$ ($H4_{20}$) Structure: A3B16C20D3_mC168_15_ef_8f_10f_ef-001

This structure originally had the label `A3B16C20D3_mC168_15_ef_8f_10f_ef`. Calls to that address will be redirected here.

https://aflow.org/p/VXAE

https://aflow.org/p/A3B16C20D3_mC168_15_ef_8f_10f_ef-001

Prototype	$Cd_3H_{16}O_{20}S_3$
AFLOW prototype label	A3B16C20D3_mC168_15_ef_8f_10f_ef-001
***Strukturbericht* designation**	$H4_{20}$
ICSD	24400
Pearson symbol	mC168
Space group number	15
Space group symbol	$C2/c$
AFLOW prototype command	aflow --proto=A3B16C20D3_mC168_15_ef_8f_10f_ef-001

$$\text{--params=}a, b/a, c/a, \beta, y_1, y_2, x_3, y_3, z_3, x_4, y_4, z_4, x_5, y_5, z_5, x_6, y_6, z_6, x_7, y_7, z_7, x_8, y_8,$$
$$z_8, x_9, y_9, z_9, x_{10}, y_{10}, z_{10}, x_{11}, y_{11}, z_{11}, x_{12}, y_{12}, z_{12}, x_{13}, y_{13}, z_{13}, x_{14}, y_{14}, z_{14}, x_{15}, y_{15}, z_{15}, x_{16},$$
$$y_{16}, z_{16}, x_{17}, y_{17}, z_{17}, x_{18}, y_{18}, z_{18}, x_{19}, y_{19}, z_{19}, x_{20}, y_{20}, z_{20}, x_{21}, y_{21}, z_{21}, x_{22}, y_{22}, z_{22}$$
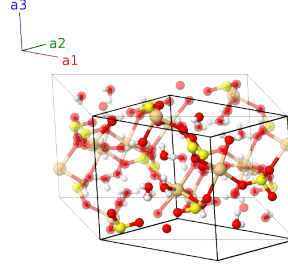
- (Lipson, 1938) originally found this structure and (Gottfried, 1938) gave it the *Strukturbericht* designation $H4_{20}$. Later (Caminiti, 1981) located the hydrogen atoms. As this does not change the rest of the structure we use their results.

- Some of the H-O distances appear to be very small. For example, the O-VIII – H-III distance is only 0.43Å. We have checked our inputs compared to (Caminiti, 1981) and found no error. Unfortunately they do not provide H-O distances for comparison.

Base-centered Monoclinic primitive vectors

$$\mathbf{a_1} = \tfrac{1}{2}a\,\hat{\mathbf{x}} - \tfrac{1}{2}b\,\hat{\mathbf{y}}$$

$$\mathbf{a_2} = \tfrac{1}{2}a\,\hat{\mathbf{x}} + \tfrac{1}{2}b\,\hat{\mathbf{y}}$$

$$\mathbf{a_3} = c\cos\beta\,\hat{\mathbf{x}} + c\sin\beta\,\hat{\mathbf{z}}$$

Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	$=$	$-y_1\,\mathbf{a_1} + y_1\,\mathbf{a_2} + \tfrac{1}{4}\,\mathbf{a_3}$	$=$	$\tfrac{1}{4}c\cos\beta\,\hat{\mathbf{x}} + by_1\,\hat{\mathbf{y}} + \tfrac{1}{4}c\sin\beta\,\hat{\mathbf{z}}$	(4e)	Cd I
$\mathbf{B_2}$	$=$	$y_1\,\mathbf{a_1} - y_1\,\mathbf{a_2} + \tfrac{3}{4}\,\mathbf{a_3}$	$=$	$\tfrac{3}{4}c\cos\beta\,\hat{\mathbf{x}} - by_1\,\hat{\mathbf{y}} + \tfrac{3}{4}c\sin\beta\,\hat{\mathbf{z}}$	(4e)	Cd I
$\mathbf{B_3}$	$=$	$-y_2\,\mathbf{a_1} + y_2\,\mathbf{a_2} + \tfrac{1}{4}\,\mathbf{a_3}$	$=$	$\tfrac{1}{4}c\cos\beta\,\hat{\mathbf{x}} + by_2\,\hat{\mathbf{y}} + \tfrac{1}{4}c\sin\beta\,\hat{\mathbf{z}}$	(4e)	S I
$\mathbf{B_4}$	$=$	$y_2\,\mathbf{a_1} - y_2\,\mathbf{a_2} + \tfrac{3}{4}\,\mathbf{a_3}$	$=$	$\tfrac{3}{4}c\cos\beta\,\hat{\mathbf{x}} - by_2\,\hat{\mathbf{y}} + \tfrac{3}{4}c\sin\beta\,\hat{\mathbf{z}}$	(4e)	S I
$\mathbf{B_5}$	$=$	$(x_3 - y_3)\,\mathbf{a_1} + (x_3 + y_3)\,\mathbf{a_2} + z_3\,\mathbf{a_3}$	$=$	$(ax_3 + cz_3\cos\beta)\,\hat{\mathbf{x}} + by_3\,\hat{\mathbf{y}} + cz_3\sin\beta\,\hat{\mathbf{z}}$	(8f)	Cd II
$\mathbf{B_6}$	$=$	$-(x_3 + y_3)\,\mathbf{a_1} - (x_3 - y_3)\,\mathbf{a_2} - \left(z_3 - \tfrac{1}{2}\right)\mathbf{a_3}$	$=$	$-\left(ax_3 + c\left(z_3 - \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_3\,\hat{\mathbf{y}} - c\left(z_3 - \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}$	(8f)	Cd II
$\mathbf{B_7}$	$=$	$-(x_3 - y_3)\,\mathbf{a_1} - (x_3 + y_3)\,\mathbf{a_2} - z_3\,\mathbf{a_3}$	$=$	$-(ax_3 + cz_3\cos\beta)\,\hat{\mathbf{x}} - by_3\,\hat{\mathbf{y}} - cz_3\sin\beta\,\hat{\mathbf{z}}$	(8f)	Cd II
$\mathbf{B_8}$	$=$	$(x_3 + y_3)\,\mathbf{a_1} + (x_3 - y_3)\,\mathbf{a_2} + \left(z_3 + \tfrac{1}{2}\right)\mathbf{a_3}$	$=$	$\left(ax_3 + c\left(z_3 + \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_3\,\hat{\mathbf{y}} + c\left(z_3 + \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}$	(8f)	Cd II
$\mathbf{B_9}$	$=$	$(x_4 - y_4)\,\mathbf{a_1} + (x_4 + y_4)\,\mathbf{a_2} + z_4\,\mathbf{a_3}$	$=$	$(ax_4 + cz_4\cos\beta)\,\hat{\mathbf{x}} + by_4\,\hat{\mathbf{y}} + cz_4\sin\beta\,\hat{\mathbf{z}}$	(8f)	H I
$\mathbf{B_{10}}$	$=$	$-(x_4 + y_4)\,\mathbf{a_1} - (x_4 - y_4)\,\mathbf{a_2} - \left(z_4 - \tfrac{1}{2}\right)\mathbf{a_3}$	$=$	$-\left(ax_4 + c\left(z_4 - \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_4\,\hat{\mathbf{y}} - c\left(z_4 - \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}$	(8f)	H I
$\mathbf{B_{11}}$	$=$	$-(x_4 - y_4)\,\mathbf{a_1} - (x_4 + y_4)\,\mathbf{a_2} - z_4\,\mathbf{a_3}$	$=$	$-(ax_4 + cz_4\cos\beta)\,\hat{\mathbf{x}} - by_4\,\hat{\mathbf{y}} - cz_4\sin\beta\,\hat{\mathbf{z}}$	(8f)	H I
$\mathbf{B_{12}}$	$=$	$(x_4 + y_4)\,\mathbf{a_1} + (x_4 - y_4)\,\mathbf{a_2} + \left(z_4 + \tfrac{1}{2}\right)\mathbf{a_3}$	$=$	$\left(ax_4 + c\left(z_4 + \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_4\,\hat{\mathbf{y}} + c\left(z_4 + \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}$	(8f)	H I
$\mathbf{B_{13}}$	$=$	$(x_5 - y_5)\,\mathbf{a_1} + (x_5 + y_5)\,\mathbf{a_2} + z_5\,\mathbf{a_3}$	$=$	$(ax_5 + cz_5\cos\beta)\,\hat{\mathbf{x}} + by_5\,\hat{\mathbf{y}} + cz_5\sin\beta\,\hat{\mathbf{z}}$	(8f)	H II
$\mathbf{B_{14}}$	$=$	$-(x_5 + y_5)\,\mathbf{a_1} - (x_5 - y_5)\,\mathbf{a_2} - \left(z_5 - \tfrac{1}{2}\right)\mathbf{a_3}$	$=$	$-\left(ax_5 + c\left(z_5 - \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_5\,\hat{\mathbf{y}} - c\left(z_5 - \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}$	(8f)	H II
$\mathbf{B_{15}}$	$=$	$-(x_5 - y_5)\,\mathbf{a_1} - (x_5 + y_5)\,\mathbf{a_2} - z_5\,\mathbf{a_3}$	$=$	$-(ax_5 + cz_5\cos\beta)\,\hat{\mathbf{x}} - by_5\,\hat{\mathbf{y}} - cz_5\sin\beta\,\hat{\mathbf{z}}$	(8f)	H II
$\mathbf{B_{16}}$	$=$	$(x_5 + y_5)\,\mathbf{a_1} + (x_5 - y_5)\,\mathbf{a_2} + \left(z_5 + \tfrac{1}{2}\right)\mathbf{a_3}$	$=$	$\left(ax_5 + c\left(z_5 + \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_5\,\hat{\mathbf{y}} + c\left(z_5 + \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}$	(8f)	H II
$\mathbf{B_{17}}$	$=$	$(x_6 - y_6)\,\mathbf{a_1} + (x_6 + y_6)\,\mathbf{a_2} + z_6\,\mathbf{a_3}$	$=$	$(ax_6 + cz_6\cos\beta)\,\hat{\mathbf{x}} + by_6\,\hat{\mathbf{y}} + cz_6\sin\beta\,\hat{\mathbf{z}}$	(8f)	H III

$$\mathbf{B_{18}} = \begin{array}{l} -\left(x_6 + y_6\right)\mathbf{a}_1 - \left(x_6 - y_6\right)\mathbf{a}_2 - \\ \left(z_6 - \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} -\left(ax_6 + c\left(z_6 - \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_6\,\hat{\mathbf{y}} - \\ c\left(z_6 - \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H III}$$

$$\mathbf{B_{19}} = \begin{array}{l} -\left(x_6 - y_6\right)\mathbf{a}_1 - \left(x_6 + y_6\right)\mathbf{a}_2 - \\ z_6\,\mathbf{a}_3 \end{array} = -\left(ax_6 + cz_6\cos\beta\right)\hat{\mathbf{x}} - by_6\,\hat{\mathbf{y}} - cz_6\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \qquad \text{H III}$$

$$\mathbf{B_{20}} = \begin{array}{l} \left(x_6 + y_6\right)\mathbf{a}_1 + \left(x_6 - y_6\right)\mathbf{a}_2 + \\ \left(z_6 + \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} \left(ax_6 + c\left(z_6 + \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_6\,\hat{\mathbf{y}} + \\ c\left(z_6 + \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H III}$$

$$\mathbf{B_{21}} = \begin{array}{l} \left(x_7 - y_7\right)\mathbf{a}_1 + \left(x_7 + y_7\right)\mathbf{a}_2 + \\ z_7\,\mathbf{a}_3 \end{array} = \left(ax_7 + cz_7\cos\beta\right)\hat{\mathbf{x}} + by_7\,\hat{\mathbf{y}} + cz_7\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \qquad \text{H IV}$$

$$\mathbf{B_{22}} = \begin{array}{l} -\left(x_7 + y_7\right)\mathbf{a}_1 - \left(x_7 - y_7\right)\mathbf{a}_2 - \\ \left(z_7 - \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} -\left(ax_7 + c\left(z_7 - \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_7\,\hat{\mathbf{y}} - \\ c\left(z_7 - \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H IV}$$

$$\mathbf{B_{23}} = \begin{array}{l} -\left(x_7 - y_7\right)\mathbf{a}_1 - \left(x_7 + y_7\right)\mathbf{a}_2 - \\ z_7\,\mathbf{a}_3 \end{array} = -\left(ax_7 + cz_7\cos\beta\right)\hat{\mathbf{x}} - by_7\,\hat{\mathbf{y}} - cz_7\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \qquad \text{H IV}$$

$$\mathbf{B_{24}} = \begin{array}{l} \left(x_7 + y_7\right)\mathbf{a}_1 + \left(x_7 - y_7\right)\mathbf{a}_2 + \\ \left(z_7 + \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} \left(ax_7 + c\left(z_7 + \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_7\,\hat{\mathbf{y}} + \\ c\left(z_7 + \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H IV}$$

$$\mathbf{B_{25}} = \begin{array}{l} \left(x_8 - y_8\right)\mathbf{a}_1 + \left(x_8 + y_8\right)\mathbf{a}_2 + \\ z_8\,\mathbf{a}_3 \end{array} = \left(ax_8 + cz_8\cos\beta\right)\hat{\mathbf{x}} + by_8\,\hat{\mathbf{y}} + cz_8\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \qquad \text{H V}$$

$$\mathbf{B_{26}} = \begin{array}{l} -\left(x_8 + y_8\right)\mathbf{a}_1 - \left(x_8 - y_8\right)\mathbf{a}_2 - \\ \left(z_8 - \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} -\left(ax_8 + c\left(z_8 - \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_8\,\hat{\mathbf{y}} - \\ c\left(z_8 - \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H V}$$

$$\mathbf{B_{27}} = \begin{array}{l} -\left(x_8 - y_8\right)\mathbf{a}_1 - \left(x_8 + y_8\right)\mathbf{a}_2 - \\ z_8\,\mathbf{a}_3 \end{array} = -\left(ax_8 + cz_8\cos\beta\right)\hat{\mathbf{x}} - by_8\,\hat{\mathbf{y}} - cz_8\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \qquad \text{H V}$$

$$\mathbf{B_{28}} = \begin{array}{l} \left(x_8 + y_8\right)\mathbf{a}_1 + \left(x_8 - y_8\right)\mathbf{a}_2 + \\ \left(z_8 + \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} \left(ax_8 + c\left(z_8 + \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_8\,\hat{\mathbf{y}} + \\ c\left(z_8 + \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H V}$$

$$\mathbf{B_{29}} = \begin{array}{l} \left(x_9 - y_9\right)\mathbf{a}_1 + \left(x_9 + y_9\right)\mathbf{a}_2 + \\ z_9\,\mathbf{a}_3 \end{array} = \left(ax_9 + cz_9\cos\beta\right)\hat{\mathbf{x}} + by_9\,\hat{\mathbf{y}} + cz_9\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \qquad \text{H VI}$$

$$\mathbf{B_{30}} = \begin{array}{l} -\left(x_9 + y_9\right)\mathbf{a}_1 - \left(x_9 - y_9\right)\mathbf{a}_2 - \\ \left(z_9 - \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} -\left(ax_9 + c\left(z_9 - \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_9\,\hat{\mathbf{y}} - \\ c\left(z_9 - \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H VI}$$

$$\mathbf{B_{31}} = \begin{array}{l} -\left(x_9 - y_9\right)\mathbf{a}_1 - \left(x_9 + y_9\right)\mathbf{a}_2 - \\ z_9\,\mathbf{a}_3 \end{array} = -\left(ax_9 + cz_9\cos\beta\right)\hat{\mathbf{x}} - by_9\,\hat{\mathbf{y}} - cz_9\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \qquad \text{H VI}$$

$$\mathbf{B_{32}} = \begin{array}{l} \left(x_9 + y_9\right)\mathbf{a}_1 + \left(x_9 - y_9\right)\mathbf{a}_2 + \\ \left(z_9 + \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} \left(ax_9 + c\left(z_9 + \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_9\,\hat{\mathbf{y}} + \\ c\left(z_9 + \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H VI}$$

$$\mathbf{B_{33}} = \begin{array}{l} \left(x_{10} - y_{10}\right)\mathbf{a}_1 + \\ \left(x_{10} + y_{10}\right)\mathbf{a}_2 + z_{10}\,\mathbf{a}_3 \end{array} = \left(ax_{10} + cz_{10}\cos\beta\right)\hat{\mathbf{x}} + by_{10}\,\hat{\mathbf{y}} + cz_{10}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \qquad \text{H VII}$$

$$\mathbf{B_{34}} = \begin{array}{l} -\left(x_{10} + y_{10}\right)\mathbf{a}_1 - \\ \left(x_{10} - y_{10}\right)\mathbf{a}_2 - \left(z_{10} - \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} -\left(ax_{10} + c\left(z_{10} - \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{10}\,\hat{\mathbf{y}} - \\ c\left(z_{10} - \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H VII}$$

$$\mathbf{B_{35}} = \begin{array}{l} -\left(x_{10} - y_{10}\right)\mathbf{a}_1 - \\ \left(x_{10} + y_{10}\right)\mathbf{a}_2 - z_{10}\,\mathbf{a}_3 \end{array} = \begin{array}{l} -\left(ax_{10} + cz_{10}\cos\beta\right)\hat{\mathbf{x}} - by_{10}\,\hat{\mathbf{y}} - \\ cz_{10}\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H VII}$$

$$\mathbf{B_{36}} = \begin{array}{l} \left(x_{10} + y_{10}\right)\mathbf{a}_1 + \\ \left(x_{10} - y_{10}\right)\mathbf{a}_2 + \left(z_{10} + \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} \left(ax_{10} + c\left(z_{10} + \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{10}\,\hat{\mathbf{y}} + \\ c\left(z_{10} + \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H VII}$$

$$\mathbf{B_{37}} = \begin{array}{l} \left(x_{11} - y_{11}\right)\mathbf{a}_1 + \\ \left(x_{11} + y_{11}\right)\mathbf{a}_2 + z_{11}\,\mathbf{a}_3 \end{array} = \left(ax_{11} + cz_{11}\cos\beta\right)\hat{\mathbf{x}} + by_{11}\,\hat{\mathbf{y}} + cz_{11}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \qquad \text{H VIII}$$

$$\mathbf{B_{38}} = \begin{array}{l} -\left(x_{11} + y_{11}\right)\mathbf{a}_1 - \\ \left(x_{11} - y_{11}\right)\mathbf{a}_2 - \left(z_{11} - \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} -\left(ax_{11} + c\left(z_{11} - \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{11}\,\hat{\mathbf{y}} - \\ c\left(z_{11} - \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H VIII}$$

$$\mathbf{B_{39}} = \begin{array}{l} -\left(x_{11} - y_{11}\right)\mathbf{a}_1 - \\ \left(x_{11} + y_{11}\right)\mathbf{a}_2 - z_{11}\,\mathbf{a}_3 \end{array} = \begin{array}{l} -\left(ax_{11} + cz_{11}\cos\beta\right)\hat{\mathbf{x}} - by_{11}\,\hat{\mathbf{y}} - \\ cz_{11}\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H VIII}$$

$$\mathbf{B_{40}} = \begin{array}{l} \left(x_{11} + y_{11}\right)\mathbf{a}_1 + \\ \left(x_{11} - y_{11}\right)\mathbf{a}_2 + \left(z_{11} + \frac{1}{2}\right)\mathbf{a}_3 \end{array} = \begin{array}{l} \left(ax_{11} + c\left(z_{11} + \frac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{11}\,\hat{\mathbf{y}} + \\ c\left(z_{11} + \frac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}} \end{array} \quad \text{(8f)} \qquad \text{H VIII}$$

$$\mathbf{B_{41}} = \begin{array}{c}(x_{12} - y_{12})\,\mathbf{a_1} + \\ (x_{12} + y_{12})\,\mathbf{a_2} + z_{12}\,\mathbf{a_3}\end{array} = (ax_{12} + cz_{12}\cos\beta)\,\hat{\mathbf{x}} + by_{12}\,\hat{\mathbf{y}} + cz_{12}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \quad \text{O I}$$

$$\mathbf{B_{42}} = \begin{array}{c}-(x_{12} + y_{12})\,\mathbf{a_1} - \\ (x_{12} - y_{12})\,\mathbf{a_2} - \left(z_{12} - \tfrac{1}{2}\right)\mathbf{a_3}\end{array} = \begin{array}{c}-\left(ax_{12} + c\left(z_{12} - \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{12}\,\hat{\mathbf{y}} - \\ c\left(z_{12} - \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O I}$$

$$\mathbf{B_{43}} = \begin{array}{c}-(x_{12} - y_{12})\,\mathbf{a_1} - \\ (x_{12} + y_{12})\,\mathbf{a_2} - z_{12}\,\mathbf{a_3}\end{array} = \begin{array}{c}-(ax_{12} + cz_{12}\cos\beta)\,\hat{\mathbf{x}} - by_{12}\,\hat{\mathbf{y}} - \\ cz_{12}\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O I}$$

$$\mathbf{B_{44}} = \begin{array}{c}(x_{12} + y_{12})\,\mathbf{a_1} + \\ (x_{12} - y_{12})\,\mathbf{a_2} + \left(z_{12} + \tfrac{1}{2}\right)\mathbf{a_3}\end{array} = \begin{array}{c}\left(ax_{12} + c\left(z_{12} + \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{12}\,\hat{\mathbf{y}} + \\ c\left(z_{12} + \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O I}$$

$$\mathbf{B_{45}} = \begin{array}{c}(x_{13} - y_{13})\,\mathbf{a_1} + \\ (x_{13} + y_{13})\,\mathbf{a_2} + z_{13}\,\mathbf{a_3}\end{array} = (ax_{13} + cz_{13}\cos\beta)\,\hat{\mathbf{x}} + by_{13}\,\hat{\mathbf{y}} + cz_{13}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \quad \text{O II}$$

$$\mathbf{B_{46}} = \begin{array}{c}-(x_{13} + y_{13})\,\mathbf{a_1} - \\ (x_{13} - y_{13})\,\mathbf{a_2} - \left(z_{13} - \tfrac{1}{2}\right)\mathbf{a_3}\end{array} = \begin{array}{c}-\left(ax_{13} + c\left(z_{13} - \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{13}\,\hat{\mathbf{y}} - \\ c\left(z_{13} - \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O II}$$

$$\mathbf{B_{47}} = \begin{array}{c}-(x_{13} - y_{13})\,\mathbf{a_1} - \\ (x_{13} + y_{13})\,\mathbf{a_2} - z_{13}\,\mathbf{a_3}\end{array} = \begin{array}{c}-(ax_{13} + cz_{13}\cos\beta)\,\hat{\mathbf{x}} - by_{13}\,\hat{\mathbf{y}} - \\ cz_{13}\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O II}$$

$$\mathbf{B_{48}} = \begin{array}{c}(x_{13} + y_{13})\,\mathbf{a_1} + \\ (x_{13} - y_{13})\,\mathbf{a_2} + \left(z_{13} + \tfrac{1}{2}\right)\mathbf{a_3}\end{array} = \begin{array}{c}\left(ax_{13} + c\left(z_{13} + \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{13}\,\hat{\mathbf{y}} + \\ c\left(z_{13} + \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O II}$$

$$\mathbf{B_{49}} = \begin{array}{c}(x_{14} - y_{14})\,\mathbf{a_1} + \\ (x_{14} + y_{14})\,\mathbf{a_2} + z_{14}\,\mathbf{a_3}\end{array} = (ax_{14} + cz_{14}\cos\beta)\,\hat{\mathbf{x}} + by_{14}\,\hat{\mathbf{y}} + cz_{14}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \quad \text{O III}$$

$$\mathbf{B_{50}} = \begin{array}{c}-(x_{14} + y_{14})\,\mathbf{a_1} - \\ (x_{14} - y_{14})\,\mathbf{a_2} - \left(z_{14} - \tfrac{1}{2}\right)\mathbf{a_3}\end{array} = \begin{array}{c}-\left(ax_{14} + c\left(z_{14} - \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{14}\,\hat{\mathbf{y}} - \\ c\left(z_{14} - \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O III}$$

$$\mathbf{B_{51}} = \begin{array}{c}-(x_{14} - y_{14})\,\mathbf{a_1} - \\ (x_{14} + y_{14})\,\mathbf{a_2} - z_{14}\,\mathbf{a_3}\end{array} = \begin{array}{c}-(ax_{14} + cz_{14}\cos\beta)\,\hat{\mathbf{x}} - by_{14}\,\hat{\mathbf{y}} - \\ cz_{14}\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O III}$$

$$\mathbf{B_{52}} = \begin{array}{c}(x_{14} + y_{14})\,\mathbf{a_1} + \\ (x_{14} - y_{14})\,\mathbf{a_2} + \left(z_{14} + \tfrac{1}{2}\right)\mathbf{a_3}\end{array} = \begin{array}{c}\left(ax_{14} + c\left(z_{14} + \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{14}\,\hat{\mathbf{y}} + \\ c\left(z_{14} + \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O III}$$

$$\mathbf{B_{53}} = \begin{array}{c}(x_{15} - y_{15})\,\mathbf{a_1} + \\ (x_{15} + y_{15})\,\mathbf{a_2} + z_{15}\,\mathbf{a_3}\end{array} = (ax_{15} + cz_{15}\cos\beta)\,\hat{\mathbf{x}} + by_{15}\,\hat{\mathbf{y}} + cz_{15}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \quad \text{O IV}$$

$$\mathbf{B_{54}} = \begin{array}{c}-(x_{15} + y_{15})\,\mathbf{a_1} - \\ (x_{15} - y_{15})\,\mathbf{a_2} - \left(z_{15} - \tfrac{1}{2}\right)\mathbf{a_3}\end{array} = \begin{array}{c}-\left(ax_{15} + c\left(z_{15} - \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{15}\,\hat{\mathbf{y}} - \\ c\left(z_{15} - \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O IV}$$

$$\mathbf{B_{55}} = \begin{array}{c}-(x_{15} - y_{15})\,\mathbf{a_1} - \\ (x_{15} + y_{15})\,\mathbf{a_2} - z_{15}\,\mathbf{a_3}\end{array} = \begin{array}{c}-(ax_{15} + cz_{15}\cos\beta)\,\hat{\mathbf{x}} - by_{15}\,\hat{\mathbf{y}} - \\ cz_{15}\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O IV}$$

$$\mathbf{B_{56}} = \begin{array}{c}(x_{15} + y_{15})\,\mathbf{a_1} + \\ (x_{15} - y_{15})\,\mathbf{a_2} + \left(z_{15} + \tfrac{1}{2}\right)\mathbf{a_3}\end{array} = \begin{array}{c}\left(ax_{15} + c\left(z_{15} + \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{15}\,\hat{\mathbf{y}} + \\ c\left(z_{15} + \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O IV}$$

$$\mathbf{B_{57}} = \begin{array}{c}(x_{16} - y_{16})\,\mathbf{a_1} + \\ (x_{16} + y_{16})\,\mathbf{a_2} + z_{16}\,\mathbf{a_3}\end{array} = (ax_{16} + cz_{16}\cos\beta)\,\hat{\mathbf{x}} + by_{16}\,\hat{\mathbf{y}} + cz_{16}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \quad \text{O V}$$

$$\mathbf{B_{58}} = \begin{array}{c}-(x_{16} + y_{16})\,\mathbf{a_1} - \\ (x_{16} - y_{16})\,\mathbf{a_2} - \left(z_{16} - \tfrac{1}{2}\right)\mathbf{a_3}\end{array} = \begin{array}{c}-\left(ax_{16} + c\left(z_{16} - \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{16}\,\hat{\mathbf{y}} - \\ c\left(z_{16} - \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O V}$$

$$\mathbf{B_{59}} = \begin{array}{c}-(x_{16} - y_{16})\,\mathbf{a_1} - \\ (x_{16} + y_{16})\,\mathbf{a_2} - z_{16}\,\mathbf{a_3}\end{array} = \begin{array}{c}-(ax_{16} + cz_{16}\cos\beta)\,\hat{\mathbf{x}} - by_{16}\,\hat{\mathbf{y}} - \\ cz_{16}\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O V}$$

$$\mathbf{B_{60}} = \begin{array}{c}(x_{16} + y_{16})\,\mathbf{a_1} + \\ (x_{16} - y_{16})\,\mathbf{a_2} + \left(z_{16} + \tfrac{1}{2}\right)\mathbf{a_3}\end{array} = \begin{array}{c}\left(ax_{16} + c\left(z_{16} + \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{16}\,\hat{\mathbf{y}} + \\ c\left(z_{16} + \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O V}$$

$$\mathbf{B_{61}} = \begin{array}{c}(x_{17} - y_{17})\,\mathbf{a_1} + \\ (x_{17} + y_{17})\,\mathbf{a_2} + z_{17}\,\mathbf{a_3}\end{array} = (ax_{17} + cz_{17}\cos\beta)\,\hat{\mathbf{x}} + by_{17}\,\hat{\mathbf{y}} + cz_{17}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \quad \text{O VI}$$

$$\mathbf{B_{62}} = \begin{array}{c}-(x_{17} + y_{17})\,\mathbf{a_1} - \\ (x_{17} - y_{17})\,\mathbf{a_2} - \left(z_{17} - \tfrac{1}{2}\right)\mathbf{a_3}\end{array} = \begin{array}{c}-\left(ax_{17} + c\left(z_{17} - \tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{17}\,\hat{\mathbf{y}} - \\ c\left(z_{17} - \tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O VI}$$

$$\mathbf{B_{63}} = \begin{array}{c}-(x_{17} - y_{17})\,\mathbf{a_1} - \\ (x_{17} + y_{17})\,\mathbf{a_2} - z_{17}\,\mathbf{a_3}\end{array} = \begin{array}{c}-(ax_{17} + cz_{17}\cos\beta)\,\hat{\mathbf{x}} - by_{17}\,\hat{\mathbf{y}} - \\ cz_{17}\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O VI}$$

$$\mathbf{B_{64}} = \begin{array}{c}(x_{17}+y_{17})\,\mathbf{a}_1 + \\ (x_{17}-y_{17})\,\mathbf{a}_2 + (z_{17}+\tfrac{1}{2})\,\mathbf{a}_3\end{array} = \begin{array}{c}\left(ax_{17}+c\left(z_{17}+\tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{17}\,\hat{\mathbf{y}} + \\ c\left(z_{17}+\tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O VI}$$

$$\mathbf{B_{65}} = \begin{array}{c}(x_{18}-y_{18})\,\mathbf{a}_1 + \\ (x_{18}+y_{18})\,\mathbf{a}_2 + z_{18}\,\mathbf{a}_3\end{array} = \left(ax_{18}+cz_{18}\cos\beta\right)\hat{\mathbf{x}} + by_{18}\,\hat{\mathbf{y}} + cz_{18}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \quad \text{O VII}$$

$$\mathbf{B_{66}} = \begin{array}{c}-(x_{18}+y_{18})\,\mathbf{a}_1 - \\ (x_{18}-y_{18})\,\mathbf{a}_2 - (z_{18}-\tfrac{1}{2})\,\mathbf{a}_3\end{array} = \begin{array}{c}-\left(ax_{18}+c\left(z_{18}-\tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{18}\,\hat{\mathbf{y}} - \\ c\left(z_{18}-\tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O VII}$$

$$\mathbf{B_{67}} = \begin{array}{c}-(x_{18}-y_{18})\,\mathbf{a}_1 - \\ (x_{18}+y_{18})\,\mathbf{a}_2 - z_{18}\,\mathbf{a}_3\end{array} = \begin{array}{c}-\left(ax_{18}+cz_{18}\cos\beta\right)\hat{\mathbf{x}} - by_{18}\,\hat{\mathbf{y}} - \\ cz_{18}\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O VII}$$

$$\mathbf{B_{68}} = \begin{array}{c}(x_{18}+y_{18})\,\mathbf{a}_1 + \\ (x_{18}-y_{18})\,\mathbf{a}_2 + (z_{18}+\tfrac{1}{2})\,\mathbf{a}_3\end{array} = \begin{array}{c}\left(ax_{18}+c\left(z_{18}+\tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{18}\,\hat{\mathbf{y}} + \\ c\left(z_{18}+\tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O VII}$$

$$\mathbf{B_{69}} = \begin{array}{c}(x_{19}-y_{19})\,\mathbf{a}_1 + \\ (x_{19}+y_{19})\,\mathbf{a}_2 + z_{19}\,\mathbf{a}_3\end{array} = \left(ax_{19}+cz_{19}\cos\beta\right)\hat{\mathbf{x}} + by_{19}\,\hat{\mathbf{y}} + cz_{19}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \quad \text{O VIII}$$

$$\mathbf{B_{70}} = \begin{array}{c}-(x_{19}+y_{19})\,\mathbf{a}_1 - \\ (x_{19}-y_{19})\,\mathbf{a}_2 - (z_{19}-\tfrac{1}{2})\,\mathbf{a}_3\end{array} = \begin{array}{c}-\left(ax_{19}+c\left(z_{19}-\tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{19}\,\hat{\mathbf{y}} - \\ c\left(z_{19}-\tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O VIII}$$

$$\mathbf{B_{71}} = \begin{array}{c}-(x_{19}-y_{19})\,\mathbf{a}_1 - \\ (x_{19}+y_{19})\,\mathbf{a}_2 - z_{19}\,\mathbf{a}_3\end{array} = \begin{array}{c}-\left(ax_{19}+cz_{19}\cos\beta\right)\hat{\mathbf{x}} - by_{19}\,\hat{\mathbf{y}} - \\ cz_{19}\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O VIII}$$

$$\mathbf{B_{72}} = \begin{array}{c}(x_{19}+y_{19})\,\mathbf{a}_1 + \\ (x_{19}-y_{19})\,\mathbf{a}_2 + (z_{19}+\tfrac{1}{2})\,\mathbf{a}_3\end{array} = \begin{array}{c}\left(ax_{19}+c\left(z_{19}+\tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{19}\,\hat{\mathbf{y}} + \\ c\left(z_{19}+\tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O VIII}$$

$$\mathbf{B_{73}} = \begin{array}{c}(x_{20}-y_{20})\,\mathbf{a}_1 + \\ (x_{20}+y_{20})\,\mathbf{a}_2 + z_{20}\,\mathbf{a}_3\end{array} = \left(ax_{20}+cz_{20}\cos\beta\right)\hat{\mathbf{x}} + by_{20}\,\hat{\mathbf{y}} + cz_{20}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \quad \text{O IX}$$

$$\mathbf{B_{74}} = \begin{array}{c}-(x_{20}+y_{20})\,\mathbf{a}_1 - \\ (x_{20}-y_{20})\,\mathbf{a}_2 - (z_{20}-\tfrac{1}{2})\,\mathbf{a}_3\end{array} = \begin{array}{c}-\left(ax_{20}+c\left(z_{20}-\tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{20}\,\hat{\mathbf{y}} - \\ c\left(z_{20}-\tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O IX}$$

$$\mathbf{B_{75}} = \begin{array}{c}-(x_{20}-y_{20})\,\mathbf{a}_1 - \\ (x_{20}+y_{20})\,\mathbf{a}_2 - z_{20}\,\mathbf{a}_3\end{array} = \begin{array}{c}-\left(ax_{20}+cz_{20}\cos\beta\right)\hat{\mathbf{x}} - by_{20}\,\hat{\mathbf{y}} - \\ cz_{20}\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O IX}$$

$$\mathbf{B_{76}} = \begin{array}{c}(x_{20}+y_{20})\,\mathbf{a}_1 + \\ (x_{20}-y_{20})\,\mathbf{a}_2 + (z_{20}+\tfrac{1}{2})\,\mathbf{a}_3\end{array} = \begin{array}{c}\left(ax_{20}+c\left(z_{20}+\tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{20}\,\hat{\mathbf{y}} + \\ c\left(z_{20}+\tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O IX}$$

$$\mathbf{B_{77}} = \begin{array}{c}(x_{21}-y_{21})\,\mathbf{a}_1 + \\ (x_{21}+y_{21})\,\mathbf{a}_2 + z_{21}\,\mathbf{a}_3\end{array} = \left(ax_{21}+cz_{21}\cos\beta\right)\hat{\mathbf{x}} + by_{21}\,\hat{\mathbf{y}} + cz_{21}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \quad \text{O X}$$

$$\mathbf{B_{78}} = \begin{array}{c}-(x_{21}+y_{21})\,\mathbf{a}_1 - \\ (x_{21}-y_{21})\,\mathbf{a}_2 - (z_{21}-\tfrac{1}{2})\,\mathbf{a}_3\end{array} = \begin{array}{c}-\left(ax_{21}+c\left(z_{21}-\tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{21}\,\hat{\mathbf{y}} - \\ c\left(z_{21}-\tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O X}$$

$$\mathbf{B_{79}} = \begin{array}{c}-(x_{21}-y_{21})\,\mathbf{a}_1 - \\ (x_{21}+y_{21})\,\mathbf{a}_2 - z_{21}\,\mathbf{a}_3\end{array} = \begin{array}{c}-\left(ax_{21}+cz_{21}\cos\beta\right)\hat{\mathbf{x}} - by_{21}\,\hat{\mathbf{y}} - \\ cz_{21}\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O X}$$

$$\mathbf{B_{80}} = \begin{array}{c}(x_{21}+y_{21})\,\mathbf{a}_1 + \\ (x_{21}-y_{21})\,\mathbf{a}_2 + (z_{21}+\tfrac{1}{2})\,\mathbf{a}_3\end{array} = \begin{array}{c}\left(ax_{21}+c\left(z_{21}+\tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{21}\,\hat{\mathbf{y}} + \\ c\left(z_{21}+\tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{O X}$$

$$\mathbf{B_{81}} = \begin{array}{c}(x_{22}-y_{22})\,\mathbf{a}_1 + \\ (x_{22}+y_{22})\,\mathbf{a}_2 + z_{22}\,\mathbf{a}_3\end{array} = \left(ax_{22}+cz_{22}\cos\beta\right)\hat{\mathbf{x}} + by_{22}\,\hat{\mathbf{y}} + cz_{22}\sin\beta\,\hat{\mathbf{z}} \quad \text{(8f)} \quad \text{S II}$$

$$\mathbf{B_{82}} = \begin{array}{c}-(x_{22}+y_{22})\,\mathbf{a}_1 - \\ (x_{22}-y_{22})\,\mathbf{a}_2 - (z_{22}-\tfrac{1}{2})\,\mathbf{a}_3\end{array} = \begin{array}{c}-\left(ax_{22}+c\left(z_{22}-\tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} + by_{22}\,\hat{\mathbf{y}} - \\ c\left(z_{22}-\tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{S II}$$

$$\mathbf{B_{83}} = \begin{array}{c}-(x_{22}-y_{22})\,\mathbf{a}_1 - \\ (x_{22}+y_{22})\,\mathbf{a}_2 - z_{22}\,\mathbf{a}_3\end{array} = \begin{array}{c}-\left(ax_{22}+cz_{22}\cos\beta\right)\hat{\mathbf{x}} - by_{22}\,\hat{\mathbf{y}} - \\ cz_{22}\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{S II}$$

$$\mathbf{B_{84}} = \begin{array}{c}(x_{22}+y_{22})\,\mathbf{a}_1 + \\ (x_{22}-y_{22})\,\mathbf{a}_2 + (z_{22}+\tfrac{1}{2})\,\mathbf{a}_3\end{array} = \begin{array}{c}\left(ax_{22}+c\left(z_{22}+\tfrac{1}{2}\right)\cos\beta\right)\hat{\mathbf{x}} - by_{22}\,\hat{\mathbf{y}} + \\ c\left(z_{22}+\tfrac{1}{2}\right)\sin\beta\,\hat{\mathbf{z}}\end{array} \quad \text{(8f)} \quad \text{S II}$$

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