Orthorhombic $AlPO_4$-5 Structure: AB4C_oP144_27_6e_24e_6e-001

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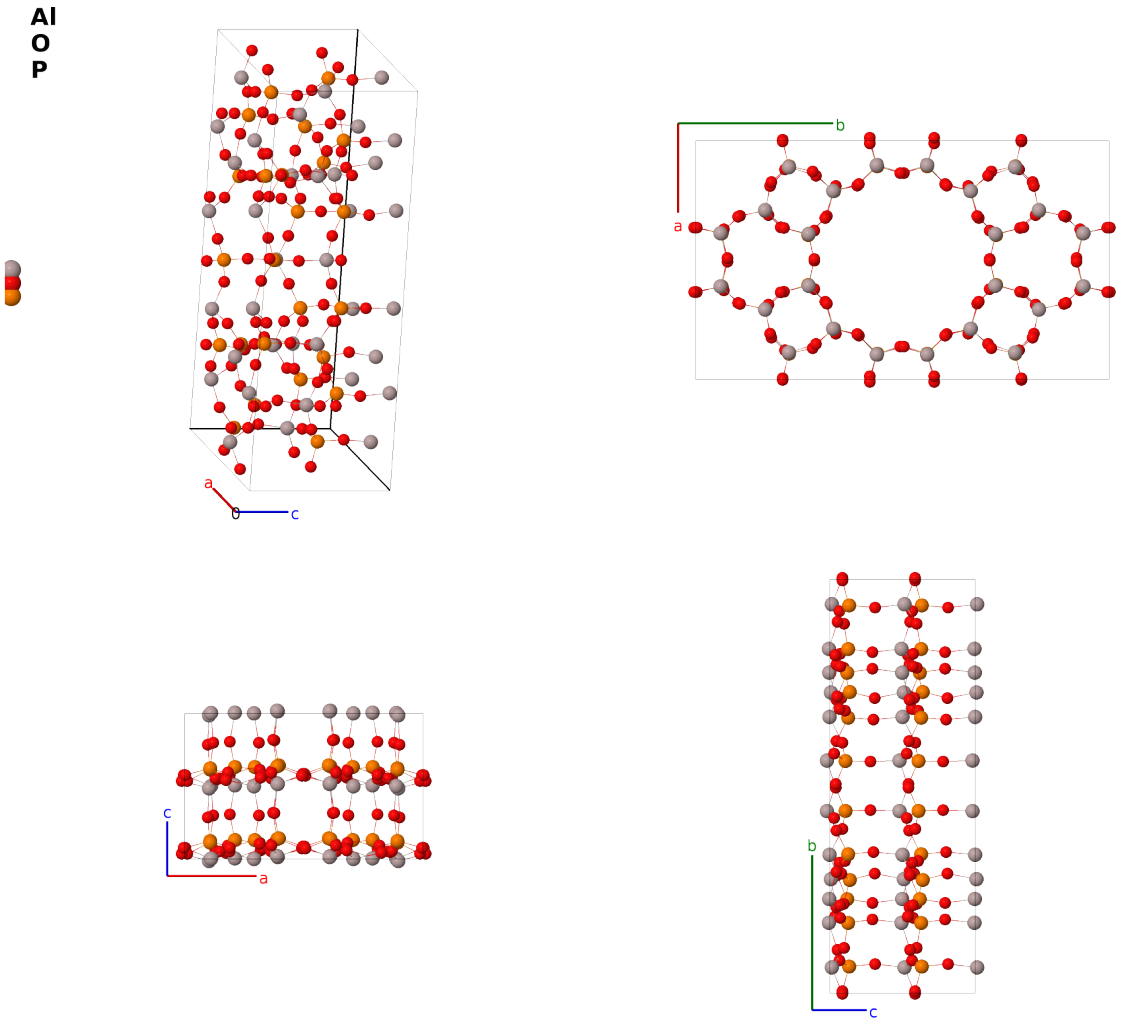
https://aflow.org/prototype-encyclopedia/Y4G8

https://aflow.org/prototype-encyclopedia/AB4C_oP144_27_6e_24e_6e-001



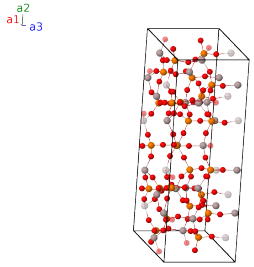
Prototype	AlO_4P
AFLOW prototype label	AB4C_oP144_27_6e_24e_6e-001
ICSD	82863
CCDC	1642920
Pearson symbol	oP144

Space group number	27
Space group symbol	$Pcc2$
AFLOW prototype command	`aflow --proto=AB4C_oP144_27_6e_24e_6e-001 --params=`$a, b/a, c/a, x_1, y_1, z_1, x_2, y_2, z_2, x_3, y_3, z_3, x_4, y_4, z_4, x_5, y_5, z_5, x_6, y_6, z_6, x_7, y_7, z_7, x_8, y_8, z_8, x_9, y_9, z_9, x_{10}, y_{10}, z_{10}, x_{11}, y_{11}, z_{11}, x_{12}, y_{12}, z_{12}, x_{13}, y_{13}, z_{13}, x_{14}, y_{14}, z_{14}, x_{15}, y_{15}, z_{15}, x_{16}, y_{16}, z_{16}, x_{17}, y_{17}, z_{17}, x_{18}, y_{18}, z_{18}, x_{19}, y_{19}, z_{19}, x_{20}, y_{20}, z_{20}, x_{21}, y_{21}, z_{21}, x_{22}, y_{22}, z_{22}, x_{23}, y_{23}, z_{23}, x_{24}, y_{24}, z_{24}, x_{25}, y_{25}, z_{25}, x_{26}, y_{26}, z_{26}, x_{27}, y_{27}, z_{27}, x_{28}, y_{28}, z_{28}, x_{29}, y_{29}, z_{29}, x_{30}, y_{30}, z_{30}, x_{31}, y_{31}, z_{31}, x_{32}, y_{32}, z_{32}, x_{33}, y_{33}, z_{33}, x_{34}, y_{34}, z_{34}, x_{35}, y_{35}, z_{35}, x_{36}, y_{36}, z_{36}$

- $AlPO_4$ can be found in a wide variety of structures (Wilson, 1982). The variants included in the Encyclopedia can be found on the silica/$AlPO_4$ page.
- Ordered $AlPO_4$-5 can have the metallic atoms ordered, space group $P6cc$ #186 (Klapp, 184), although (Ruiz-Salvador, 1996) find it in space group $P6$ #168, and (Mora, 1996) find it in space group $Pcc2$ #27 (this structure).
- It may also have disordered aluminum/phosphorous sites, space group $P6/mcc$ #192 (Richardson, 1987).

Simple Orthorhombic primitive vectors

$$\mathbf{a_1} = a\,\hat{\mathbf{x}}$$
$$\mathbf{a_2} = b\,\hat{\mathbf{y}}$$
$$\mathbf{a_3} = c\,\hat{\mathbf{z}}$$



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	=	$x_1\,\mathbf{a}_1 + y_1\,\mathbf{a}_2 + z_1\,\mathbf{a}_3$	=	$ax_1\,\hat{\mathbf{x}} + by_1\,\hat{\mathbf{y}} + cz_1\,\hat{\mathbf{z}}$	(4e)	Al I
$\mathbf{B_2}$	=	$-x_1\,\mathbf{a}_1 - y_1\,\mathbf{a}_2 + z_1\,\mathbf{a}_3$	=	$-ax_1\,\hat{\mathbf{x}} - by_1\,\hat{\mathbf{y}} + cz_1\,\hat{\mathbf{z}}$	(4e)	Al I
$\mathbf{B_3}$	=	$x_1\,\mathbf{a}_1 - y_1\,\mathbf{a}_2 + \left(z_1 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$ax_1\,\hat{\mathbf{x}} - by_1\,\hat{\mathbf{y}} + c\left(z_1 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4e)	Al I
$\mathbf{B_4}$	=	$-x_1\,\mathbf{a}_1 + y_1\,\mathbf{a}_2 + \left(z_1 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_1\,\hat{\mathbf{x}} + by_1\,\hat{\mathbf{y}} + c\left(z_1 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4e)	Al I
$\mathbf{B_5}$	=	$x_2\,\mathbf{a}_1 + y_2\,\mathbf{a}_2 + z_2\,\mathbf{a}_3$	=	$ax_2\,\hat{\mathbf{x}} + by_2\,\hat{\mathbf{y}} + cz_2\,\hat{\mathbf{z}}$	(4e)	Al II
$\mathbf{B_6}$	=	$-x_2\,\mathbf{a}_1 - y_2\,\mathbf{a}_2 + z_2\,\mathbf{a}_3$	=	$-ax_2\,\hat{\mathbf{x}} - by_2\,\hat{\mathbf{y}} + cz_2\,\hat{\mathbf{z}}$	(4e)	Al II
$\mathbf{B_7}$	=	$x_2\,\mathbf{a}_1 - y_2\,\mathbf{a}_2 + \left(z_2 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$ax_2\,\hat{\mathbf{x}} - by_2\,\hat{\mathbf{y}} + c\left(z_2 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4e)	Al II
$\mathbf{B_8}$	=	$-x_2\,\mathbf{a}_1 + y_2\,\mathbf{a}_2 + \left(z_2 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_2\,\hat{\mathbf{x}} + by_2\,\hat{\mathbf{y}} + c\left(z_2 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4e)	Al II
$\mathbf{B_9}$	=	$x_3\,\mathbf{a}_1 + y_3\,\mathbf{a}_2 + z_3\,\mathbf{a}_3$	=	$ax_3\,\hat{\mathbf{x}} + by_3\,\hat{\mathbf{y}} + cz_3\,\hat{\mathbf{z}}$	(4e)	Al III
$\mathbf{B_{10}}$	=	$-x_3\,\mathbf{a}_1 - y_3\,\mathbf{a}_2 + z_3\,\mathbf{a}_3$	=	$-ax_3\,\hat{\mathbf{x}} - by_3\,\hat{\mathbf{y}} + cz_3\,\hat{\mathbf{z}}$	(4e)	Al III
$\mathbf{B_{11}}$	=	$x_3\,\mathbf{a}_1 - y_3\,\mathbf{a}_2 + \left(z_3 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$ax_3\,\hat{\mathbf{x}} - by_3\,\hat{\mathbf{y}} + c\left(z_3 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4e)	Al III
$\mathbf{B_{12}}$	=	$-x_3\,\mathbf{a}_1 + y_3\,\mathbf{a}_2 + \left(z_3 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_3\,\hat{\mathbf{x}} + by_3\,\hat{\mathbf{y}} + c\left(z_3 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4e)	Al III
$\mathbf{B_{13}}$	=	$x_4\,\mathbf{a}_1 + y_4\,\mathbf{a}_2 + z_4\,\mathbf{a}_3$	=	$ax_4\,\hat{\mathbf{x}} + by_4\,\hat{\mathbf{y}} + cz_4\,\hat{\mathbf{z}}$	(4e)	Al IV
$\mathbf{B_{14}}$	=	$-x_4\,\mathbf{a}_1 - y_4\,\mathbf{a}_2 + z_4\,\mathbf{a}_3$	=	$-ax_4\,\hat{\mathbf{x}} - by_4\,\hat{\mathbf{y}} + cz_4\,\hat{\mathbf{z}}$	(4e)	Al IV

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\begin{array}{rcccccc}
\mathbf{B_{15}} & = & x_4\,\mathbf{a}_1 - y_4\,\mathbf{a}_2 + \left(z_4+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_4\,\hat{\mathbf{x}} - by_4\,\hat{\mathbf{y}} + c\left(z_4+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{Al IV} \\
\mathbf{B_{16}} & = & -x_4\,\mathbf{a}_1 + y_4\,\mathbf{a}_2 + \left(z_4+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_4\,\hat{\mathbf{x}} + by_4\,\hat{\mathbf{y}} + c\left(z_4+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{Al IV} \\
\mathbf{B_{17}} & = & x_5\,\mathbf{a}_1 + y_5\,\mathbf{a}_2 + z_5\,\mathbf{a}_3 & = & ax_5\,\hat{\mathbf{x}} + by_5\,\hat{\mathbf{y}} + cz_5\,\hat{\mathbf{z}} & \text{(4e)} & \text{Al V} \\
\mathbf{B_{18}} & = & -x_5\,\mathbf{a}_1 - y_5\,\mathbf{a}_2 + z_5\,\mathbf{a}_3 & = & -ax_5\,\hat{\mathbf{x}} - by_5\,\hat{\mathbf{y}} + cz_5\,\hat{\mathbf{z}} & \text{(4e)} & \text{Al V} \\
\mathbf{B_{19}} & = & x_5\,\mathbf{a}_1 - y_5\,\mathbf{a}_2 + \left(z_5+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_5\,\hat{\mathbf{x}} - by_5\,\hat{\mathbf{y}} + c\left(z_5+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{Al V} \\
\mathbf{B_{20}} & = & -x_5\,\mathbf{a}_1 + y_5\,\mathbf{a}_2 + \left(z_5+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_5\,\hat{\mathbf{x}} + by_5\,\hat{\mathbf{y}} + c\left(z_5+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{Al V} \\
\mathbf{B_{21}} & = & x_6\,\mathbf{a}_1 + y_6\,\mathbf{a}_2 + z_6\,\mathbf{a}_3 & = & ax_6\,\hat{\mathbf{x}} + by_6\,\hat{\mathbf{y}} + cz_6\,\hat{\mathbf{z}} & \text{(4e)} & \text{Al VI} \\
\mathbf{B_{22}} & = & -x_6\,\mathbf{a}_1 - y_6\,\mathbf{a}_2 + z_6\,\mathbf{a}_3 & = & -ax_6\,\hat{\mathbf{x}} - by_6\,\hat{\mathbf{y}} + cz_6\,\hat{\mathbf{z}} & \text{(4e)} & \text{Al VI} \\
\mathbf{B_{23}} & = & x_6\,\mathbf{a}_1 - y_6\,\mathbf{a}_2 + \left(z_6+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_6\,\hat{\mathbf{x}} - by_6\,\hat{\mathbf{y}} + c\left(z_6+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{Al VI} \\
\mathbf{B_{24}} & = & -x_6\,\mathbf{a}_1 + y_6\,\mathbf{a}_2 + \left(z_6+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_6\,\hat{\mathbf{x}} + by_6\,\hat{\mathbf{y}} + c\left(z_6+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{Al VI} \\
\mathbf{B_{25}} & = & x_7\,\mathbf{a}_1 + y_7\,\mathbf{a}_2 + z_7\,\mathbf{a}_3 & = & ax_7\,\hat{\mathbf{x}} + by_7\,\hat{\mathbf{y}} + cz_7\,\hat{\mathbf{z}} & \text{(4e)} & \text{O I} \\
\mathbf{B_{26}} & = & -x_7\,\mathbf{a}_1 - y_7\,\mathbf{a}_2 + z_7\,\mathbf{a}_3 & = & -ax_7\,\hat{\mathbf{x}} - by_7\,\hat{\mathbf{y}} + cz_7\,\hat{\mathbf{z}} & \text{(4e)} & \text{O I} \\
\mathbf{B_{27}} & = & x_7\,\mathbf{a}_1 - y_7\,\mathbf{a}_2 + \left(z_7+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_7\,\hat{\mathbf{x}} - by_7\,\hat{\mathbf{y}} + c\left(z_7+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O I} \\
\mathbf{B_{28}} & = & -x_7\,\mathbf{a}_1 + y_7\,\mathbf{a}_2 + \left(z_7+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_7\,\hat{\mathbf{x}} + by_7\,\hat{\mathbf{y}} + c\left(z_7+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O I} \\
\mathbf{B_{29}} & = & x_8\,\mathbf{a}_1 + y_8\,\mathbf{a}_2 + z_8\,\mathbf{a}_3 & = & ax_8\,\hat{\mathbf{x}} + by_8\,\hat{\mathbf{y}} + cz_8\,\hat{\mathbf{z}} & \text{(4e)} & \text{O II} \\
\mathbf{B_{30}} & = & -x_8\,\mathbf{a}_1 - y_8\,\mathbf{a}_2 + z_8\,\mathbf{a}_3 & = & -ax_8\,\hat{\mathbf{x}} - by_8\,\hat{\mathbf{y}} + cz_8\,\hat{\mathbf{z}} & \text{(4e)} & \text{O II} \\
\mathbf{B_{31}} & = & x_8\,\mathbf{a}_1 - y_8\,\mathbf{a}_2 + \left(z_8+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_8\,\hat{\mathbf{x}} - by_8\,\hat{\mathbf{y}} + c\left(z_8+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O II} \\
\mathbf{B_{32}} & = & -x_8\,\mathbf{a}_1 + y_8\,\mathbf{a}_2 + \left(z_8+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_8\,\hat{\mathbf{x}} + by_8\,\hat{\mathbf{y}} + c\left(z_8+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O II} \\
\mathbf{B_{33}} & = & x_9\,\mathbf{a}_1 + y_9\,\mathbf{a}_2 + z_9\,\mathbf{a}_3 & = & ax_9\,\hat{\mathbf{x}} + by_9\,\hat{\mathbf{y}} + cz_9\,\hat{\mathbf{z}} & \text{(4e)} & \text{O III} \\
\mathbf{B_{34}} & = & -x_9\,\mathbf{a}_1 - y_9\,\mathbf{a}_2 + z_9\,\mathbf{a}_3 & = & -ax_9\,\hat{\mathbf{x}} - by_9\,\hat{\mathbf{y}} + cz_9\,\hat{\mathbf{z}} & \text{(4e)} & \text{O III} \\
\mathbf{B_{35}} & = & x_9\,\mathbf{a}_1 - y_9\,\mathbf{a}_2 + \left(z_9+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_9\,\hat{\mathbf{x}} - by_9\,\hat{\mathbf{y}} + c\left(z_9+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O III} \\
\mathbf{B_{36}} & = & -x_9\,\mathbf{a}_1 + y_9\,\mathbf{a}_2 + \left(z_9+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_9\,\hat{\mathbf{x}} + by_9\,\hat{\mathbf{y}} + c\left(z_9+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O III} \\
\mathbf{B_{37}} & = & x_{10}\,\mathbf{a}_1 + y_{10}\,\mathbf{a}_2 + z_{10}\,\mathbf{a}_3 & = & ax_{10}\,\hat{\mathbf{x}} + by_{10}\,\hat{\mathbf{y}} + cz_{10}\,\hat{\mathbf{z}} & \text{(4e)} & \text{O IV} \\
\mathbf{B_{38}} & = & -x_{10}\,\mathbf{a}_1 - y_{10}\,\mathbf{a}_2 + z_{10}\,\mathbf{a}_3 & = & -ax_{10}\,\hat{\mathbf{x}} - by_{10}\,\hat{\mathbf{y}} + cz_{10}\,\hat{\mathbf{z}} & \text{(4e)} & \text{O IV} \\
\mathbf{B_{39}} & = & x_{10}\,\mathbf{a}_1 - y_{10}\,\mathbf{a}_2 + \left(z_{10}+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_{10}\,\hat{\mathbf{x}} - by_{10}\,\hat{\mathbf{y}} + c\left(z_{10}+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O IV} \\
\mathbf{B_{40}} & = & -x_{10}\,\mathbf{a}_1 + y_{10}\,\mathbf{a}_2 + \left(z_{10}+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_{10}\,\hat{\mathbf{x}} + by_{10}\,\hat{\mathbf{y}} + c\left(z_{10}+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O IV} \\
\mathbf{B_{41}} & = & x_{11}\,\mathbf{a}_1 + y_{11}\,\mathbf{a}_2 + z_{11}\,\mathbf{a}_3 & = & ax_{11}\,\hat{\mathbf{x}} + by_{11}\,\hat{\mathbf{y}} + cz_{11}\,\hat{\mathbf{z}} & \text{(4e)} & \text{O V} \\
\mathbf{B_{42}} & = & -x_{11}\,\mathbf{a}_1 - y_{11}\,\mathbf{a}_2 + z_{11}\,\mathbf{a}_3 & = & -ax_{11}\,\hat{\mathbf{x}} - by_{11}\,\hat{\mathbf{y}} + cz_{11}\,\hat{\mathbf{z}} & \text{(4e)} & \text{O V} \\
\mathbf{B_{43}} & = & x_{11}\,\mathbf{a}_1 - y_{11}\,\mathbf{a}_2 + \left(z_{11}+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_{11}\,\hat{\mathbf{x}} - by_{11}\,\hat{\mathbf{y}} + c\left(z_{11}+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O V} \\
\mathbf{B_{44}} & = & -x_{11}\,\mathbf{a}_1 + y_{11}\,\mathbf{a}_2 + \left(z_{11}+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_{11}\,\hat{\mathbf{x}} + by_{11}\,\hat{\mathbf{y}} + c\left(z_{11}+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O V} \\
\mathbf{B_{45}} & = & x_{12}\,\mathbf{a}_1 + y_{12}\,\mathbf{a}_2 + z_{12}\,\mathbf{a}_3 & = & ax_{12}\,\hat{\mathbf{x}} + by_{12}\,\hat{\mathbf{y}} + cz_{12}\,\hat{\mathbf{z}} & \text{(4e)} & \text{O VI} \\
\mathbf{B_{46}} & = & -x_{12}\,\mathbf{a}_1 - y_{12}\,\mathbf{a}_2 + z_{12}\,\mathbf{a}_3 & = & -ax_{12}\,\hat{\mathbf{x}} - by_{12}\,\hat{\mathbf{y}} + cz_{12}\,\hat{\mathbf{z}} & \text{(4e)} & \text{O VI} \\
\mathbf{B_{47}} & = & x_{12}\,\mathbf{a}_1 - y_{12}\,\mathbf{a}_2 + \left(z_{12}+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_{12}\,\hat{\mathbf{x}} - by_{12}\,\hat{\mathbf{y}} + c\left(z_{12}+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O VI} \\
\mathbf{B_{48}} & = & -x_{12}\,\mathbf{a}_1 + y_{12}\,\mathbf{a}_2 + \left(z_{12}+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_{12}\,\hat{\mathbf{x}} + by_{12}\,\hat{\mathbf{y}} + c\left(z_{12}+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O VI} \\
\mathbf{B_{49}} & = & x_{13}\,\mathbf{a}_1 + y_{13}\,\mathbf{a}_2 + z_{13}\,\mathbf{a}_3 & = & ax_{13}\,\hat{\mathbf{x}} + by_{13}\,\hat{\mathbf{y}} + cz_{13}\,\hat{\mathbf{z}} & \text{(4e)} & \text{O VII} \\
\mathbf{B_{50}} & = & -x_{13}\,\mathbf{a}_1 - y_{13}\,\mathbf{a}_2 + z_{13}\,\mathbf{a}_3 & = & -ax_{13}\,\hat{\mathbf{x}} - by_{13}\,\hat{\mathbf{y}} + cz_{13}\,\hat{\mathbf{z}} & \text{(4e)} & \text{O VII} \\
\mathbf{B_{51}} & = & x_{13}\,\mathbf{a}_1 - y_{13}\,\mathbf{a}_2 + \left(z_{13}+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_{13}\,\hat{\mathbf{x}} - by_{13}\,\hat{\mathbf{y}} + c\left(z_{13}+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O VII} \\
\mathbf{B_{52}} & = & -x_{13}\,\mathbf{a}_1 + y_{13}\,\mathbf{a}_2 + \left(z_{13}+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_{13}\,\hat{\mathbf{x}} + by_{13}\,\hat{\mathbf{y}} + c\left(z_{13}+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O VII} \\
\mathbf{B_{53}} & = & x_{14}\,\mathbf{a}_1 + y_{14}\,\mathbf{a}_2 + z_{14}\,\mathbf{a}_3 & = & ax_{14}\,\hat{\mathbf{x}} + by_{14}\,\hat{\mathbf{y}} + cz_{14}\,\hat{\mathbf{z}} & \text{(4e)} & \text{O VIII} \\
\mathbf{B_{54}} & = & -x_{14}\,\mathbf{a}_1 - y_{14}\,\mathbf{a}_2 + z_{14}\,\mathbf{a}_3 & = & -ax_{14}\,\hat{\mathbf{x}} - by_{14}\,\hat{\mathbf{y}} + cz_{14}\,\hat{\mathbf{z}} & \text{(4e)} & \text{O VIII} \\
\mathbf{B_{55}} & = & x_{14}\,\mathbf{a}_1 - y_{14}\,\mathbf{a}_2 + \left(z_{14}+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_{14}\,\hat{\mathbf{x}} - by_{14}\,\hat{\mathbf{y}} + c\left(z_{14}+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(4e)} & \text{O VIII}
\end{array}
$$

$$\mathbf{B_{56}} = -x_{14}\,\mathbf{a}_1 + y_{14}\,\mathbf{a}_2 + \left(z_{14}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{14}\,\hat{\mathbf{x}} + by_{14}\,\hat{\mathbf{y}} + c\left(z_{14}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O VIII}$$

$$\mathbf{B_{57}} = x_{15}\,\mathbf{a}_1 + y_{15}\,\mathbf{a}_2 + z_{15}\,\mathbf{a}_3 = ax_{15}\,\hat{\mathbf{x}} + by_{15}\,\hat{\mathbf{y}} + cz_{15}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O IX}$$

$$\mathbf{B_{58}} = -x_{15}\,\mathbf{a}_1 - y_{15}\,\mathbf{a}_2 + z_{15}\,\mathbf{a}_3 = -ax_{15}\,\hat{\mathbf{x}} - by_{15}\,\hat{\mathbf{y}} + cz_{15}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O IX}$$

$$\mathbf{B_{59}} = x_{15}\,\mathbf{a}_1 - y_{15}\,\mathbf{a}_2 + \left(z_{15}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{15}\,\hat{\mathbf{x}} - by_{15}\,\hat{\mathbf{y}} + c\left(z_{15}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O IX}$$

$$\mathbf{B_{60}} = -x_{15}\,\mathbf{a}_1 + y_{15}\,\mathbf{a}_2 + \left(z_{15}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{15}\,\hat{\mathbf{x}} + by_{15}\,\hat{\mathbf{y}} + c\left(z_{15}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O IX}$$

$$\mathbf{B_{61}} = x_{16}\,\mathbf{a}_1 + y_{16}\,\mathbf{a}_2 + z_{16}\,\mathbf{a}_3 = ax_{16}\,\hat{\mathbf{x}} + by_{16}\,\hat{\mathbf{y}} + cz_{16}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O X}$$

$$\mathbf{B_{62}} = -x_{16}\,\mathbf{a}_1 - y_{16}\,\mathbf{a}_2 + z_{16}\,\mathbf{a}_3 = -ax_{16}\,\hat{\mathbf{x}} - by_{16}\,\hat{\mathbf{y}} + cz_{16}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O X}$$

$$\mathbf{B_{63}} = x_{16}\,\mathbf{a}_1 - y_{16}\,\mathbf{a}_2 + \left(z_{16}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{16}\,\hat{\mathbf{x}} - by_{16}\,\hat{\mathbf{y}} + c\left(z_{16}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O X}$$

$$\mathbf{B_{64}} = -x_{16}\,\mathbf{a}_1 + y_{16}\,\mathbf{a}_2 + \left(z_{16}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{16}\,\hat{\mathbf{x}} + by_{16}\,\hat{\mathbf{y}} + c\left(z_{16}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O X}$$

$$\mathbf{B_{65}} = x_{17}\,\mathbf{a}_1 + y_{17}\,\mathbf{a}_2 + z_{17}\,\mathbf{a}_3 = ax_{17}\,\hat{\mathbf{x}} + by_{17}\,\hat{\mathbf{y}} + cz_{17}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XI}$$

$$\mathbf{B_{66}} = -x_{17}\,\mathbf{a}_1 - y_{17}\,\mathbf{a}_2 + z_{17}\,\mathbf{a}_3 = -ax_{17}\,\hat{\mathbf{x}} - by_{17}\,\hat{\mathbf{y}} + cz_{17}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XI}$$

$$\mathbf{B_{67}} = x_{17}\,\mathbf{a}_1 - y_{17}\,\mathbf{a}_2 + \left(z_{17}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{17}\,\hat{\mathbf{x}} - by_{17}\,\hat{\mathbf{y}} + c\left(z_{17}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XI}$$

$$\mathbf{B_{68}} = -x_{17}\,\mathbf{a}_1 + y_{17}\,\mathbf{a}_2 + \left(z_{17}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{17}\,\hat{\mathbf{x}} + by_{17}\,\hat{\mathbf{y}} + c\left(z_{17}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XI}$$

$$\mathbf{B_{69}} = x_{18}\,\mathbf{a}_1 + y_{18}\,\mathbf{a}_2 + z_{18}\,\mathbf{a}_3 = ax_{18}\,\hat{\mathbf{x}} + by_{18}\,\hat{\mathbf{y}} + cz_{18}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XII}$$

$$\mathbf{B_{70}} = -x_{18}\,\mathbf{a}_1 - y_{18}\,\mathbf{a}_2 + z_{18}\,\mathbf{a}_3 = -ax_{18}\,\hat{\mathbf{x}} - by_{18}\,\hat{\mathbf{y}} + cz_{18}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XII}$$

$$\mathbf{B_{71}} = x_{18}\,\mathbf{a}_1 - y_{18}\,\mathbf{a}_2 + \left(z_{18}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{18}\,\hat{\mathbf{x}} - by_{18}\,\hat{\mathbf{y}} + c\left(z_{18}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XII}$$

$$\mathbf{B_{72}} = -x_{18}\,\mathbf{a}_1 + y_{18}\,\mathbf{a}_2 + \left(z_{18}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{18}\,\hat{\mathbf{x}} + by_{18}\,\hat{\mathbf{y}} + c\left(z_{18}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XII}$$

$$\mathbf{B_{73}} = x_{19}\,\mathbf{a}_1 + y_{19}\,\mathbf{a}_2 + z_{19}\,\mathbf{a}_3 = ax_{19}\,\hat{\mathbf{x}} + by_{19}\,\hat{\mathbf{y}} + cz_{19}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIII}$$

$$\mathbf{B_{74}} = -x_{19}\,\mathbf{a}_1 - y_{19}\,\mathbf{a}_2 + z_{19}\,\mathbf{a}_3 = -ax_{19}\,\hat{\mathbf{x}} - by_{19}\,\hat{\mathbf{y}} + cz_{19}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIII}$$

$$\mathbf{B_{75}} = x_{19}\,\mathbf{a}_1 - y_{19}\,\mathbf{a}_2 + \left(z_{19}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{19}\,\hat{\mathbf{x}} - by_{19}\,\hat{\mathbf{y}} + c\left(z_{19}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIII}$$

$$\mathbf{B_{76}} = -x_{19}\,\mathbf{a}_1 + y_{19}\,\mathbf{a}_2 + \left(z_{19}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{19}\,\hat{\mathbf{x}} + by_{19}\,\hat{\mathbf{y}} + c\left(z_{19}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIII}$$

$$\mathbf{B_{77}} = x_{20}\,\mathbf{a}_1 + y_{20}\,\mathbf{a}_2 + z_{20}\,\mathbf{a}_3 = ax_{20}\,\hat{\mathbf{x}} + by_{20}\,\hat{\mathbf{y}} + cz_{20}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIV}$$

$$\mathbf{B_{78}} = -x_{20}\,\mathbf{a}_1 - y_{20}\,\mathbf{a}_2 + z_{20}\,\mathbf{a}_3 = -ax_{20}\,\hat{\mathbf{x}} - by_{20}\,\hat{\mathbf{y}} + cz_{20}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIV}$$

$$\mathbf{B_{79}} = x_{20}\,\mathbf{a}_1 - y_{20}\,\mathbf{a}_2 + \left(z_{20}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{20}\,\hat{\mathbf{x}} - by_{20}\,\hat{\mathbf{y}} + c\left(z_{20}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIV}$$

$$\mathbf{B_{80}} = -x_{20}\,\mathbf{a}_1 + y_{20}\,\mathbf{a}_2 + \left(z_{20}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{20}\,\hat{\mathbf{x}} + by_{20}\,\hat{\mathbf{y}} + c\left(z_{20}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIV}$$

$$\mathbf{B_{81}} = x_{21}\,\mathbf{a}_1 + y_{21}\,\mathbf{a}_2 + z_{21}\,\mathbf{a}_3 = ax_{21}\,\hat{\mathbf{x}} + by_{21}\,\hat{\mathbf{y}} + cz_{21}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XV}$$

$$\mathbf{B_{82}} = -x_{21}\,\mathbf{a}_1 - y_{21}\,\mathbf{a}_2 + z_{21}\,\mathbf{a}_3 = -ax_{21}\,\hat{\mathbf{x}} - by_{21}\,\hat{\mathbf{y}} + cz_{21}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XV}$$

$$\mathbf{B_{83}} = x_{21}\,\mathbf{a}_1 - y_{21}\,\mathbf{a}_2 + \left(z_{21}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{21}\,\hat{\mathbf{x}} - by_{21}\,\hat{\mathbf{y}} + c\left(z_{21}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XV}$$

$$\mathbf{B_{84}} = -x_{21}\,\mathbf{a}_1 + y_{21}\,\mathbf{a}_2 + \left(z_{21}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{21}\,\hat{\mathbf{x}} + by_{21}\,\hat{\mathbf{y}} + c\left(z_{21}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XV}$$

$$\mathbf{B_{85}} = x_{22}\,\mathbf{a}_1 + y_{22}\,\mathbf{a}_2 + z_{22}\,\mathbf{a}_3 = ax_{22}\,\hat{\mathbf{x}} + by_{22}\,\hat{\mathbf{y}} + cz_{22}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVI}$$

$$\mathbf{B_{86}} = -x_{22}\,\mathbf{a}_1 - y_{22}\,\mathbf{a}_2 + z_{22}\,\mathbf{a}_3 = -ax_{22}\,\hat{\mathbf{x}} - by_{22}\,\hat{\mathbf{y}} + cz_{22}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVI}$$

$$\mathbf{B_{87}} = x_{22}\,\mathbf{a}_1 - y_{22}\,\mathbf{a}_2 + \left(z_{22}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{22}\,\hat{\mathbf{x}} - by_{22}\,\hat{\mathbf{y}} + c\left(z_{22}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVI}$$

$$\mathbf{B_{88}} = -x_{22}\,\mathbf{a}_1 + y_{22}\,\mathbf{a}_2 + \left(z_{22}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{22}\,\hat{\mathbf{x}} + by_{22}\,\hat{\mathbf{y}} + c\left(z_{22}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVI}$$

$$\mathbf{B_{89}} = x_{23}\,\mathbf{a}_1 + y_{23}\,\mathbf{a}_2 + z_{23}\,\mathbf{a}_3 = ax_{23}\,\hat{\mathbf{x}} + by_{23}\,\hat{\mathbf{y}} + cz_{23}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVII}$$

$$\mathbf{B_{90}} = -x_{23}\,\mathbf{a}_1 - y_{23}\,\mathbf{a}_2 + z_{23}\,\mathbf{a}_3 = -ax_{23}\,\hat{\mathbf{x}} - by_{23}\,\hat{\mathbf{y}} + cz_{23}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVII}$$

$$\mathbf{B_{91}} = x_{23}\,\mathbf{a}_1 - y_{23}\,\mathbf{a}_2 + \left(z_{23}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{23}\,\hat{\mathbf{x}} - by_{23}\,\hat{\mathbf{y}} + c\left(z_{23}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVII}$$

$$\mathbf{B_{92}} = -x_{23}\,\mathbf{a}_1 + y_{23}\,\mathbf{a}_2 + \left(z_{23}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{23}\,\hat{\mathbf{x}} + by_{23}\,\hat{\mathbf{y}} + c\left(z_{23}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVII}$$

$$\mathbf{B_{93}} = x_{24}\,\mathbf{a}_1 + y_{24}\,\mathbf{a}_2 + z_{24}\,\mathbf{a}_3 = ax_{24}\,\hat{\mathbf{x}} + by_{24}\,\hat{\mathbf{y}} + cz_{24}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVIII}$$

$$\mathbf{B_{94}} = -x_{24}\,\mathbf{a}_1 - y_{24}\,\mathbf{a}_2 + z_{24}\,\mathbf{a}_3 = -ax_{24}\,\hat{\mathbf{x}} - by_{24}\,\hat{\mathbf{y}} + cz_{24}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVIII}$$

$$\mathbf{B_{95}} = x_{24}\,\mathbf{a}_1 - y_{24}\,\mathbf{a}_2 + \left(z_{24}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{24}\,\hat{\mathbf{x}} - by_{24}\,\hat{\mathbf{y}} + c\left(z_{24}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVIII}$$

$$\mathbf{B_{96}} = -x_{24}\,\mathbf{a}_1 + y_{24}\,\mathbf{a}_2 + \left(z_{24}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{24}\,\hat{\mathbf{x}} + by_{24}\,\hat{\mathbf{y}} + c\left(z_{24}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XVIII}$$

$$\mathbf{B_{97}} = x_{25}\,\mathbf{a}_1 + y_{25}\,\mathbf{a}_2 + z_{25}\,\mathbf{a}_3 = ax_{25}\,\hat{\mathbf{x}} + by_{25}\,\hat{\mathbf{y}} + cz_{25}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIX}$$

$$\mathbf{B_{98}} = -x_{25}\,\mathbf{a}_1 - y_{25}\,\mathbf{a}_2 + z_{25}\,\mathbf{a}_3 = -ax_{25}\,\hat{\mathbf{x}} - by_{25}\,\hat{\mathbf{y}} + cz_{25}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIX}$$

$$\mathbf{B_{99}} = x_{25}\,\mathbf{a}_1 - y_{25}\,\mathbf{a}_2 + \left(z_{25}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{25}\,\hat{\mathbf{x}} - by_{25}\,\hat{\mathbf{y}} + c\left(z_{25}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIX}$$

$$\mathbf{B_{100}} = -x_{25}\,\mathbf{a}_1 + y_{25}\,\mathbf{a}_2 + \left(z_{25}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{25}\,\hat{\mathbf{x}} + by_{25}\,\hat{\mathbf{y}} + c\left(z_{25}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XIX}$$

$$\mathbf{B_{101}} = x_{26}\,\mathbf{a}_1 + y_{26}\,\mathbf{a}_2 + z_{26}\,\mathbf{a}_3 = ax_{26}\,\hat{\mathbf{x}} + by_{26}\,\hat{\mathbf{y}} + cz_{26}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XX}$$

$$\mathbf{B_{102}} = -x_{26}\,\mathbf{a}_1 - y_{26}\,\mathbf{a}_2 + z_{26}\,\mathbf{a}_3 = -ax_{26}\,\hat{\mathbf{x}} - by_{26}\,\hat{\mathbf{y}} + cz_{26}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XX}$$

$$\mathbf{B_{103}} = x_{26}\,\mathbf{a}_1 - y_{26}\,\mathbf{a}_2 + \left(z_{26}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{26}\,\hat{\mathbf{x}} - by_{26}\,\hat{\mathbf{y}} + c\left(z_{26}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XX}$$

$$\mathbf{B_{104}} = -x_{26}\,\mathbf{a}_1 + y_{26}\,\mathbf{a}_2 + \left(z_{26}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{26}\,\hat{\mathbf{x}} + by_{26}\,\hat{\mathbf{y}} + c\left(z_{26}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XX}$$

$$\mathbf{B_{105}} = x_{27}\,\mathbf{a}_1 + y_{27}\,\mathbf{a}_2 + z_{27}\,\mathbf{a}_3 = ax_{27}\,\hat{\mathbf{x}} + by_{27}\,\hat{\mathbf{y}} + cz_{27}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXI}$$

$$\mathbf{B_{106}} = -x_{27}\,\mathbf{a}_1 - y_{27}\,\mathbf{a}_2 + z_{27}\,\mathbf{a}_3 = -ax_{27}\,\hat{\mathbf{x}} - by_{27}\,\hat{\mathbf{y}} + cz_{27}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXI}$$

$$\mathbf{B_{107}} = x_{27}\,\mathbf{a}_1 - y_{27}\,\mathbf{a}_2 + \left(z_{27}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{27}\,\hat{\mathbf{x}} - by_{27}\,\hat{\mathbf{y}} + c\left(z_{27}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXI}$$

$$\mathbf{B_{108}} = -x_{27}\,\mathbf{a}_1 + y_{27}\,\mathbf{a}_2 + \left(z_{27}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{27}\,\hat{\mathbf{x}} + by_{27}\,\hat{\mathbf{y}} + c\left(z_{27}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXI}$$

$$\mathbf{B_{109}} = x_{28}\,\mathbf{a}_1 + y_{28}\,\mathbf{a}_2 + z_{28}\,\mathbf{a}_3 = ax_{28}\,\hat{\mathbf{x}} + by_{28}\,\hat{\mathbf{y}} + cz_{28}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXII}$$

$$\mathbf{B_{110}} = -x_{28}\,\mathbf{a}_1 - y_{28}\,\mathbf{a}_2 + z_{28}\,\mathbf{a}_3 = -ax_{28}\,\hat{\mathbf{x}} - by_{28}\,\hat{\mathbf{y}} + cz_{28}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXII}$$

$$\mathbf{B_{111}} = x_{28}\,\mathbf{a}_1 - y_{28}\,\mathbf{a}_2 + \left(z_{28}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{28}\,\hat{\mathbf{x}} - by_{28}\,\hat{\mathbf{y}} + c\left(z_{28}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXII}$$

$$\mathbf{B_{112}} = -x_{28}\,\mathbf{a}_1 + y_{28}\,\mathbf{a}_2 + \left(z_{28}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{28}\,\hat{\mathbf{x}} + by_{28}\,\hat{\mathbf{y}} + c\left(z_{28}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXII}$$

$$\mathbf{B_{113}} = x_{29}\,\mathbf{a}_1 + y_{29}\,\mathbf{a}_2 + z_{29}\,\mathbf{a}_3 = ax_{29}\,\hat{\mathbf{x}} + by_{29}\,\hat{\mathbf{y}} + cz_{29}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXIII}$$

$$\mathbf{B_{114}} = -x_{29}\,\mathbf{a}_1 - y_{29}\,\mathbf{a}_2 + z_{29}\,\mathbf{a}_3 = -ax_{29}\,\hat{\mathbf{x}} - by_{29}\,\hat{\mathbf{y}} + cz_{29}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXIII}$$

$$\mathbf{B_{115}} = x_{29}\,\mathbf{a}_1 - y_{29}\,\mathbf{a}_2 + \left(z_{29}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{29}\,\hat{\mathbf{x}} - by_{29}\,\hat{\mathbf{y}} + c\left(z_{29}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXIII}$$

$$\mathbf{B_{116}} = -x_{29}\,\mathbf{a}_1 + y_{29}\,\mathbf{a}_2 + \left(z_{29}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{29}\,\hat{\mathbf{x}} + by_{29}\,\hat{\mathbf{y}} + c\left(z_{29}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXIII}$$

$$\mathbf{B_{117}} = x_{30}\,\mathbf{a}_1 + y_{30}\,\mathbf{a}_2 + z_{30}\,\mathbf{a}_3 = ax_{30}\,\hat{\mathbf{x}} + by_{30}\,\hat{\mathbf{y}} + cz_{30}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXIV}$$

$$\mathbf{B_{118}} = -x_{30}\,\mathbf{a}_1 - y_{30}\,\mathbf{a}_2 + z_{30}\,\mathbf{a}_3 = -ax_{30}\,\hat{\mathbf{x}} - by_{30}\,\hat{\mathbf{y}} + cz_{30}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXIV}$$

$$\mathbf{B_{119}} = x_{30}\,\mathbf{a}_1 - y_{30}\,\mathbf{a}_2 + \left(z_{30}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{30}\,\hat{\mathbf{x}} - by_{30}\,\hat{\mathbf{y}} + c\left(z_{30}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXIV}$$

$$\mathbf{B_{120}} = -x_{30}\,\mathbf{a}_1 + y_{30}\,\mathbf{a}_2 + \left(z_{30}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{30}\,\hat{\mathbf{x}} + by_{30}\,\hat{\mathbf{y}} + c\left(z_{30}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{O XXIV}$$

$$\mathbf{B_{121}} = x_{31}\,\mathbf{a}_1 + y_{31}\,\mathbf{a}_2 + z_{31}\,\mathbf{a}_3 = ax_{31}\,\hat{\mathbf{x}} + by_{31}\,\hat{\mathbf{y}} + cz_{31}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P I}$$

$$\mathbf{B_{122}} = -x_{31}\,\mathbf{a}_1 - y_{31}\,\mathbf{a}_2 + z_{31}\,\mathbf{a}_3 = -ax_{31}\,\hat{\mathbf{x}} - by_{31}\,\hat{\mathbf{y}} + cz_{31}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P I}$$

$$\mathbf{B_{123}} = x_{31}\,\mathbf{a}_1 - y_{31}\,\mathbf{a}_2 + \left(z_{31}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{31}\,\hat{\mathbf{x}} - by_{31}\,\hat{\mathbf{y}} + c\left(z_{31}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P I}$$

$$\mathbf{B_{124}} = -x_{31}\,\mathbf{a}_1 + y_{31}\,\mathbf{a}_2 + \left(z_{31}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{31}\,\hat{\mathbf{x}} + by_{31}\,\hat{\mathbf{y}} + c\left(z_{31}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P I}$$

$$\mathbf{B_{125}} = x_{32}\,\mathbf{a}_1 + y_{32}\,\mathbf{a}_2 + z_{32}\,\mathbf{a}_3 = ax_{32}\,\hat{\mathbf{x}} + by_{32}\,\hat{\mathbf{y}} + cz_{32}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P II}$$

$$\mathbf{B_{126}} = -x_{32}\,\mathbf{a}_1 - y_{32}\,\mathbf{a}_2 + z_{32}\,\mathbf{a}_3 = -ax_{32}\,\hat{\mathbf{x}} - by_{32}\,\hat{\mathbf{y}} + cz_{32}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P II}$$

$$\mathbf{B_{127}} = x_{32}\,\mathbf{a}_1 - y_{32}\,\mathbf{a}_2 + \left(z_{32}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{32}\,\hat{\mathbf{x}} - by_{32}\,\hat{\mathbf{y}} + c\left(z_{32}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P II}$$

$$\mathbf{B_{128}} = -x_{32}\,\mathbf{a}_1 + y_{32}\,\mathbf{a}_2 + \left(z_{32}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{32}\,\hat{\mathbf{x}} + by_{32}\,\hat{\mathbf{y}} + c\left(z_{32}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P II}$$

$$\mathbf{B_{129}} = x_{33}\,\mathbf{a}_1 + y_{33}\,\mathbf{a}_2 + z_{33}\,\mathbf{a}_3 = ax_{33}\,\hat{\mathbf{x}} + by_{33}\,\hat{\mathbf{y}} + cz_{33}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P III}$$

$$\mathbf{B_{130}} = -x_{33}\,\mathbf{a}_1 - y_{33}\,\mathbf{a}_2 + z_{33}\,\mathbf{a}_3 = -ax_{33}\,\hat{\mathbf{x}} - by_{33}\,\hat{\mathbf{y}} + cz_{33}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P III}$$

$$\mathbf{B_{131}} = x_{33}\,\mathbf{a}_1 - y_{33}\,\mathbf{a}_2 + \left(z_{33}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{33}\,\hat{\mathbf{x}} - by_{33}\,\hat{\mathbf{y}} + c\left(z_{33}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P III}$$

$$\mathbf{B_{132}} = -x_{33}\,\mathbf{a}_1 + y_{33}\,\mathbf{a}_2 + \left(z_{33}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{33}\,\hat{\mathbf{x}} + by_{33}\,\hat{\mathbf{y}} + c\left(z_{33}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P III}$$

$$\mathbf{B_{133}} = x_{34}\,\mathbf{a}_1 + y_{34}\,\mathbf{a}_2 + z_{34}\,\mathbf{a}_3 = ax_{34}\,\hat{\mathbf{x}} + by_{34}\,\hat{\mathbf{y}} + cz_{34}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P IV}$$

$$\mathbf{B_{134}} = -x_{34}\,\mathbf{a}_1 - y_{34}\,\mathbf{a}_2 + z_{34}\,\mathbf{a}_3 = -ax_{34}\,\hat{\mathbf{x}} - by_{34}\,\hat{\mathbf{y}} + cz_{34}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P IV}$$

$$\mathbf{B_{135}} = x_{34}\,\mathbf{a}_1 - y_{34}\,\mathbf{a}_2 + \left(z_{34}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = ax_{34}\,\hat{\mathbf{x}} - by_{34}\,\hat{\mathbf{y}} + c\left(z_{34}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P IV}$$

$$\mathbf{B_{136}} = -x_{34}\,\mathbf{a}_1 + y_{34}\,\mathbf{a}_2 + \left(z_{34}+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -ax_{34}\,\hat{\mathbf{x}} + by_{34}\,\hat{\mathbf{y}} + c\left(z_{34}+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P IV}$$

$$\mathbf{B_{137}} = x_{35}\,\mathbf{a}_1 + y_{35}\,\mathbf{a}_2 + z_{35}\,\mathbf{a}_3 = ax_{35}\,\hat{\mathbf{x}} + by_{35}\,\hat{\mathbf{y}} + cz_{35}\,\hat{\mathbf{z}} \quad \text{(4e)} \quad \text{P V}$$

$\mathbf{B_{138}} =$	$-x_{35}\,\mathbf{a}_1 - y_{35}\,\mathbf{a}_2 + z_{35}\,\mathbf{a}_3$	$=$	$-ax_{35}\,\hat{\mathbf{x}} - by_{35}\,\hat{\mathbf{y}} + cz_{35}\,\hat{\mathbf{z}}$	(4e)	P V
$\mathbf{B_{139}} =$	$x_{35}\,\mathbf{a}_1 - y_{35}\,\mathbf{a}_2 + \left(z_{35}+\frac{1}{2}\right)\,\mathbf{a}_3$	$=$	$ax_{35}\,\hat{\mathbf{x}} - by_{35}\,\hat{\mathbf{y}} + c\left(z_{35}+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4e)	P V
$\mathbf{B_{140}} =$	$-x_{35}\,\mathbf{a}_1 + y_{35}\,\mathbf{a}_2 + \left(z_{35}+\frac{1}{2}\right)\,\mathbf{a}_3$	$=$	$-ax_{35}\,\hat{\mathbf{x}} + by_{35}\,\hat{\mathbf{y}} + c\left(z_{35}+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4e)	P V
$\mathbf{B_{141}} =$	$x_{36}\,\mathbf{a}_1 + y_{36}\,\mathbf{a}_2 + z_{36}\,\mathbf{a}_3$	$=$	$ax_{36}\,\hat{\mathbf{x}} + by_{36}\,\hat{\mathbf{y}} + cz_{36}\,\hat{\mathbf{z}}$	(4e)	P VI
$\mathbf{B_{142}} =$	$-x_{36}\,\mathbf{a}_1 - y_{36}\,\mathbf{a}_2 + z_{36}\,\mathbf{a}_3$	$=$	$-ax_{36}\,\hat{\mathbf{x}} - by_{36}\,\hat{\mathbf{y}} + cz_{36}\,\hat{\mathbf{z}}$	(4e)	P VI
$\mathbf{B_{143}} =$	$x_{36}\,\mathbf{a}_1 - y_{36}\,\mathbf{a}_2 + \left(z_{36}+\frac{1}{2}\right)\,\mathbf{a}_3$	$=$	$ax_{36}\,\hat{\mathbf{x}} - by_{36}\,\hat{\mathbf{y}} + c\left(z_{36}+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4e)	P VI
$\mathbf{B_{144}} =$	$-x_{36}\,\mathbf{a}_1 + y_{36}\,\mathbf{a}_2 + \left(z_{36}+\frac{1}{2}\right)\,\mathbf{a}_3$	$=$	$-ax_{36}\,\hat{\mathbf{x}} + by_{36}\,\hat{\mathbf{y}} + c\left(z_{36}+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4e)	P VI

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