$CdSnP_{14}$ ($HgPbP_{14}$) Structure: AB14C_oP64_62_c_4c5d_c-001

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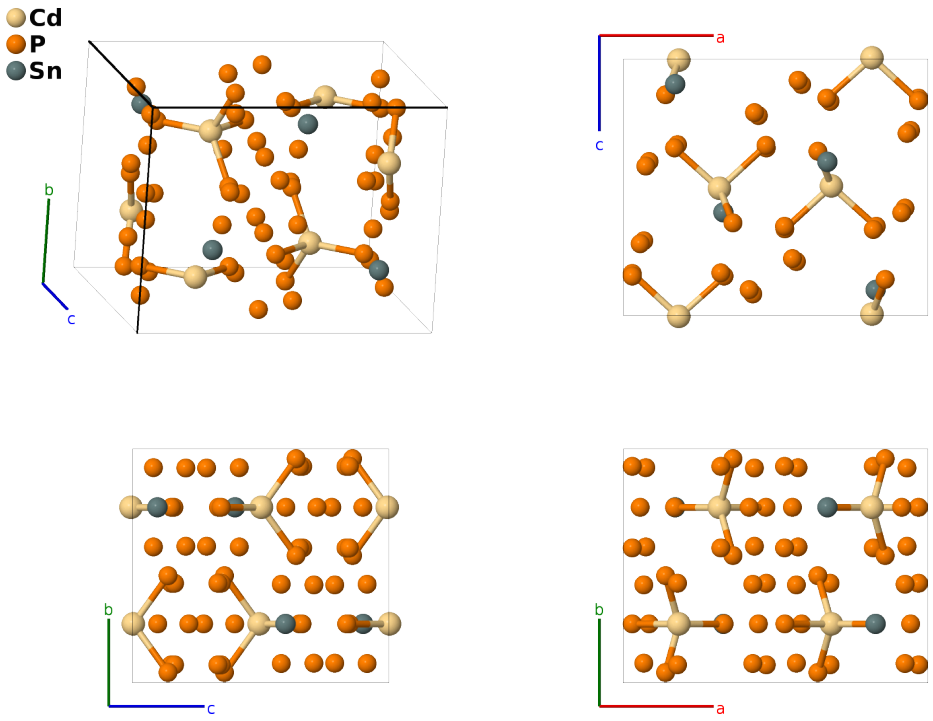
https://aflow.org/p/LZG8

https://aflow.org/p/AB14C_oP64_62_c_4c5d_c-001



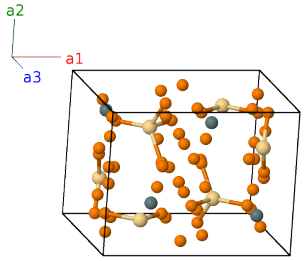
Prototype	$CdP_{14}Sn$
AFLOW prototype label	AB14C_oP64_62_c_4c5d_c-001
ICSD	42976
Pearson symbol	oP64
Space group number	62
Space group symbol	*Pnma*
AFLOW prototype command	`aflow --proto=AB14C_oP64_62_c_4c5d_c-001 --params=`$a, b/a, c/a, x_1, z_1, x_2, z_2, x_3, z_3, x_4, z_4, x_5, z_5, x_6, z_6, x_7, y_7, z_7, x_8, y_8, z_8, x_9, y_9, z_9, x_{10}, y_{10}, z_{10}, x_{11}, y_{11}, z_{11}$

Other compounds with this structure
$CdPbP_{14}$, $HgPbP_{14}$, $HgSnP_{14}$, $ZnPbP_{14}$, $ZnSnP_{14}$

- Although (Krebs, 1958) first described this structure for $HgPbP_{14}$, but their data is very approximate, so we use the refinement made by (Scholz, 1987). They give the Wyckoff positions for $CdSnP_{14}$, so we use that as our prototype.

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
$\mathbf{B_1}$	=	$x_1\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 + z_1\,\mathbf{a}_3$	=	$ax_1\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} + cz_1\,\hat{\mathbf{z}}$	(4c)	Cd I
$\mathbf{B_2}$	=	$-\left(x_1 - \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 + \left(z_1 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_1 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} + c\left(z_1 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	Cd I
$\mathbf{B_3}$	=	$-x_1\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 - z_1\,\mathbf{a}_3$	=	$-ax_1\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} - cz_1\,\hat{\mathbf{z}}$	(4c)	Cd I
$\mathbf{B_4}$	=	$\left(x_1 + \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 - \left(z_1 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(x_1 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} - c\left(z_1 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	Cd I
$\mathbf{B_5}$	=	$x_2\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 + z_2\,\mathbf{a}_3$	=	$ax_2\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} + cz_2\,\hat{\mathbf{z}}$	(4c)	P I
$\mathbf{B_6}$	=	$-\left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 + \left(z_2 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} + c\left(z_2 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	P I
$\mathbf{B_7}$	=	$-x_2\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 - z_2\,\mathbf{a}_3$	=	$-ax_2\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} - cz_2\,\hat{\mathbf{z}}$	(4c)	P I
$\mathbf{B_8}$	=	$\left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 - \left(z_2 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} - c\left(z_2 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	P I
$\mathbf{B_9}$	=	$x_3\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 + z_3\,\mathbf{a}_3$	=	$ax_3\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} + cz_3\,\hat{\mathbf{z}}$	(4c)	P II
$\mathbf{B_{10}}$	=	$-\left(x_3 - \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 + \left(z_3 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_3 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} + c\left(z_3 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	P II
$\mathbf{B_{11}}$	=	$-x_3\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 - z_3\,\mathbf{a}_3$	=	$-ax_3\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} - cz_3\,\hat{\mathbf{z}}$	(4c)	P II
$\mathbf{B_{12}}$	=	$\left(x_3 + \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 - \left(z_3 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(x_3 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} - c\left(z_3 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	P II
$\mathbf{B_{13}}$	=	$x_4\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 + z_4\,\mathbf{a}_3$	=	$ax_4\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} + cz_4\,\hat{\mathbf{z}}$	(4c)	P III
$\mathbf{B_{14}}$	=	$-\left(x_4 - \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 + \left(z_4 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_4 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} + c\left(z_4 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	P III
$\mathbf{B_{15}}$	=	$-x_4\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 - z_4\,\mathbf{a}_3$	=	$-ax_4\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} - cz_4\,\hat{\mathbf{z}}$	(4c)	P III
$\mathbf{B_{16}}$	=	$\left(x_4 + \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 - \left(z_4 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(x_4 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} - c\left(z_4 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	P III
$\mathbf{B_{17}}$	=	$x_5\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 + z_5\,\mathbf{a}_3$	=	$ax_5\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} + cz_5\,\hat{\mathbf{z}}$	(4c)	P IV
$\mathbf{B_{18}}$	=	$-\left(x_5 - \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 + \left(z_5 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_5 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} + c\left(z_5 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	P IV
$\mathbf{B_{19}}$	=	$-x_5\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 - z_5\,\mathbf{a}_3$	=	$-ax_5\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} - cz_5\,\hat{\mathbf{z}}$	(4c)	P IV
$\mathbf{B_{20}}$	=	$\left(x_5 + \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 - \left(z_5 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(x_5 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} - c\left(z_5 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	P IV
$\mathbf{B_{21}}$	=	$x_6\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 + z_6\,\mathbf{a}_3$	=	$ax_6\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} + cz_6\,\hat{\mathbf{z}}$	(4c)	Sn I
$\mathbf{B_{22}}$	=	$-\left(x_6 - \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 + \left(z_6 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_6 - \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} + c\left(z_6 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	Sn I
$\mathbf{B_{23}}$	=	$-x_6\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 - z_6\,\mathbf{a}_3$	=	$-ax_6\,\hat{\mathbf{x}} + \frac{3}{4}b\,\hat{\mathbf{y}} - cz_6\,\hat{\mathbf{z}}$	(4c)	Sn I
$\mathbf{B_{24}}$	=	$\left(x_6 + \frac{1}{2}\right)\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 - \left(z_6 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$a\left(x_6 + \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{1}{4}b\,\hat{\mathbf{y}} - c\left(z_6 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4c)	Sn I

$$
\begin{array}{lcccccc}
\mathbf{B_{25}} & = & x_7\,\mathbf{a}_1 + y_7\,\mathbf{a}_2 + z_7\,\mathbf{a}_3 & = & a x_7\,\hat{\mathbf{x}} + b y_7\,\hat{\mathbf{y}} + c z_7\,\hat{\mathbf{z}} & \text{(8d)} & \text{P V} \\
\mathbf{B_{26}} & = & -\left(x_7 - \tfrac{1}{2}\right)\,\mathbf{a}_1 - y_7\,\mathbf{a}_2 + \left(z_7 + \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & -a\left(x_7 - \tfrac{1}{2}\right)\,\hat{\mathbf{x}} - b y_7\,\hat{\mathbf{y}} + c\left(z_7 + \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P V} \\
\mathbf{B_{27}} & = & -x_7\,\mathbf{a}_1 + \left(y_7 + \tfrac{1}{2}\right)\,\mathbf{a}_2 - z_7\,\mathbf{a}_3 & = & -a x_7\,\hat{\mathbf{x}} + b\left(y_7 + \tfrac{1}{2}\right)\,\hat{\mathbf{y}} - c z_7\,\hat{\mathbf{z}} & \text{(8d)} & \text{P V} \\
\mathbf{B_{28}} & = & \left(x_7 + \tfrac{1}{2}\right)\,\mathbf{a}_1 - \left(y_7 - \tfrac{1}{2}\right)\,\mathbf{a}_2 - \left(z_7 - \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(x_7 + \tfrac{1}{2}\right)\,\hat{\mathbf{x}} - b\left(y_7 - \tfrac{1}{2}\right)\,\hat{\mathbf{y}} - c\left(z_7 - \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P V} \\
\mathbf{B_{29}} & = & -x_7\,\mathbf{a}_1 - y_7\,\mathbf{a}_2 - z_7\,\mathbf{a}_3 & = & -a x_7\,\hat{\mathbf{x}} - b y_7\,\hat{\mathbf{y}} - c z_7\,\hat{\mathbf{z}} & \text{(8d)} & \text{P V} \\
\mathbf{B_{30}} & = & \left(x_7 + \tfrac{1}{2}\right)\,\mathbf{a}_1 + y_7\,\mathbf{a}_2 - \left(z_7 - \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(x_7 + \tfrac{1}{2}\right)\,\hat{\mathbf{x}} + b y_7\,\hat{\mathbf{y}} - c\left(z_7 - \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P V} \\
\mathbf{B_{31}} & = & x_7\,\mathbf{a}_1 - \left(y_7 - \tfrac{1}{2}\right)\,\mathbf{a}_2 + z_7\,\mathbf{a}_3 & = & a x_7\,\hat{\mathbf{x}} - b\left(y_7 - \tfrac{1}{2}\right)\,\hat{\mathbf{y}} + c z_7\,\hat{\mathbf{z}} & \text{(8d)} & \text{P V} \\
\mathbf{B_{32}} & = & -\left(x_7 - \tfrac{1}{2}\right)\,\mathbf{a}_1 + \left(y_7 + \tfrac{1}{2}\right)\,\mathbf{a}_2 + \left(z_7 + \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & -a\left(x_7 - \tfrac{1}{2}\right)\,\hat{\mathbf{x}} + b\left(y_7 + \tfrac{1}{2}\right)\,\hat{\mathbf{y}} + c\left(z_7 + \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P V} \\
\mathbf{B_{33}} & = & x_8\,\mathbf{a}_1 + y_8\,\mathbf{a}_2 + z_8\,\mathbf{a}_3 & = & a x_8\,\hat{\mathbf{x}} + b y_8\,\hat{\mathbf{y}} + c z_8\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VI} \\
\mathbf{B_{34}} & = & -\left(x_8 - \tfrac{1}{2}\right)\,\mathbf{a}_1 - y_8\,\mathbf{a}_2 + \left(z_8 + \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & -a\left(x_8 - \tfrac{1}{2}\right)\,\hat{\mathbf{x}} - b y_8\,\hat{\mathbf{y}} + c\left(z_8 + \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VI} \\
\mathbf{B_{35}} & = & -x_8\,\mathbf{a}_1 + \left(y_8 + \tfrac{1}{2}\right)\,\mathbf{a}_2 - z_8\,\mathbf{a}_3 & = & -a x_8\,\hat{\mathbf{x}} + b\left(y_8 + \tfrac{1}{2}\right)\,\hat{\mathbf{y}} - c z_8\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VI} \\
\mathbf{B_{36}} & = & \left(x_8 + \tfrac{1}{2}\right)\,\mathbf{a}_1 - \left(y_8 - \tfrac{1}{2}\right)\,\mathbf{a}_2 - \left(z_8 - \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(x_8 + \tfrac{1}{2}\right)\,\hat{\mathbf{x}} - b\left(y_8 - \tfrac{1}{2}\right)\,\hat{\mathbf{y}} - c\left(z_8 - \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VI} \\
\mathbf{B_{37}} & = & -x_8\,\mathbf{a}_1 - y_8\,\mathbf{a}_2 - z_8\,\mathbf{a}_3 & = & -a x_8\,\hat{\mathbf{x}} - b y_8\,\hat{\mathbf{y}} - c z_8\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VI} \\
\mathbf{B_{38}} & = & \left(x_8 + \tfrac{1}{2}\right)\,\mathbf{a}_1 + y_8\,\mathbf{a}_2 - \left(z_8 - \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(x_8 + \tfrac{1}{2}\right)\,\hat{\mathbf{x}} + b y_8\,\hat{\mathbf{y}} - c\left(z_8 - \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VI} \\
\mathbf{B_{39}} & = & x_8\,\mathbf{a}_1 - \left(y_8 - \tfrac{1}{2}\right)\,\mathbf{a}_2 + z_8\,\mathbf{a}_3 & = & a x_8\,\hat{\mathbf{x}} - b\left(y_8 - \tfrac{1}{2}\right)\,\hat{\mathbf{y}} + c z_8\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VI} \\
\mathbf{B_{40}} & = & -\left(x_8 - \tfrac{1}{2}\right)\,\mathbf{a}_1 + \left(y_8 + \tfrac{1}{2}\right)\,\mathbf{a}_2 + \left(z_8 + \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & -a\left(x_8 - \tfrac{1}{2}\right)\,\hat{\mathbf{x}} + b\left(y_8 + \tfrac{1}{2}\right)\,\hat{\mathbf{y}} + c\left(z_8 + \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VI} \\
\mathbf{B_{41}} & = & x_9\,\mathbf{a}_1 + y_9\,\mathbf{a}_2 + z_9\,\mathbf{a}_3 & = & a x_9\,\hat{\mathbf{x}} + b y_9\,\hat{\mathbf{y}} + c z_9\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VII} \\
\mathbf{B_{42}} & = & -\left(x_9 - \tfrac{1}{2}\right)\,\mathbf{a}_1 - y_9\,\mathbf{a}_2 + \left(z_9 + \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & -a\left(x_9 - \tfrac{1}{2}\right)\,\hat{\mathbf{x}} - b y_9\,\hat{\mathbf{y}} + c\left(z_9 + \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VII} \\
\mathbf{B_{43}} & = & -x_9\,\mathbf{a}_1 + \left(y_9 + \tfrac{1}{2}\right)\,\mathbf{a}_2 - z_9\,\mathbf{a}_3 & = & -a x_9\,\hat{\mathbf{x}} + b\left(y_9 + \tfrac{1}{2}\right)\,\hat{\mathbf{y}} - c z_9\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VII} \\
\mathbf{B_{44}} & = & \left(x_9 + \tfrac{1}{2}\right)\,\mathbf{a}_1 - \left(y_9 - \tfrac{1}{2}\right)\,\mathbf{a}_2 - \left(z_9 - \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(x_9 + \tfrac{1}{2}\right)\,\hat{\mathbf{x}} - b\left(y_9 - \tfrac{1}{2}\right)\,\hat{\mathbf{y}} - c\left(z_9 - \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VII} \\
\mathbf{B_{45}} & = & -x_9\,\mathbf{a}_1 - y_9\,\mathbf{a}_2 - z_9\,\mathbf{a}_3 & = & -a x_9\,\hat{\mathbf{x}} - b y_9\,\hat{\mathbf{y}} - c z_9\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VII} \\
\mathbf{B_{46}} & = & \left(x_9 + \tfrac{1}{2}\right)\,\mathbf{a}_1 + y_9\,\mathbf{a}_2 - \left(z_9 - \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(x_9 + \tfrac{1}{2}\right)\,\hat{\mathbf{x}} + b y_9\,\hat{\mathbf{y}} - c\left(z_9 - \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VII} \\
\mathbf{B_{47}} & = & x_9\,\mathbf{a}_1 - \left(y_9 - \tfrac{1}{2}\right)\,\mathbf{a}_2 + z_9\,\mathbf{a}_3 & = & a x_9\,\hat{\mathbf{x}} - b\left(y_9 - \tfrac{1}{2}\right)\,\hat{\mathbf{y}} + c z_9\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VII} \\
\mathbf{B_{48}} & = & -\left(x_9 - \tfrac{1}{2}\right)\,\mathbf{a}_1 + \left(y_9 + \tfrac{1}{2}\right)\,\mathbf{a}_2 + \left(z_9 + \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & -a\left(x_9 - \tfrac{1}{2}\right)\,\hat{\mathbf{x}} + b\left(y_9 + \tfrac{1}{2}\right)\,\hat{\mathbf{y}} + c\left(z_9 + \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VII} \\
\mathbf{B_{49}} & = & x_{10}\,\mathbf{a}_1 + y_{10}\,\mathbf{a}_2 + z_{10}\,\mathbf{a}_3 & = & a x_{10}\,\hat{\mathbf{x}} + b y_{10}\,\hat{\mathbf{y}} + c z_{10}\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VIII} \\
\mathbf{B_{50}} & = & -\left(x_{10} - \tfrac{1}{2}\right)\,\mathbf{a}_1 - y_{10}\,\mathbf{a}_2 + \left(z_{10} + \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & -a\left(x_{10} - \tfrac{1}{2}\right)\,\hat{\mathbf{x}} - b y_{10}\,\hat{\mathbf{y}} + c\left(z_{10} + \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VIII} \\
\mathbf{B_{51}} & = & -x_{10}\,\mathbf{a}_1 + \left(y_{10} + \tfrac{1}{2}\right)\,\mathbf{a}_2 - z_{10}\,\mathbf{a}_3 & = & -a x_{10}\,\hat{\mathbf{x}} + b\left(y_{10} + \tfrac{1}{2}\right)\,\hat{\mathbf{y}} - c z_{10}\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VIII} \\
\mathbf{B_{52}} & = & \left(x_{10} + \tfrac{1}{2}\right)\,\mathbf{a}_1 - \left(y_{10} - \tfrac{1}{2}\right)\,\mathbf{a}_2 - \left(z_{10} - \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(x_{10} + \tfrac{1}{2}\right)\,\hat{\mathbf{x}} - b\left(y_{10} - \tfrac{1}{2}\right)\,\hat{\mathbf{y}} - c\left(z_{10} - \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VIII} \\
\mathbf{B_{53}} & = & -x_{10}\,\mathbf{a}_1 - y_{10}\,\mathbf{a}_2 - z_{10}\,\mathbf{a}_3 & = & -a x_{10}\,\hat{\mathbf{x}} - b y_{10}\,\hat{\mathbf{y}} - c z_{10}\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VIII} \\
\mathbf{B_{54}} & = & \left(x_{10} + \tfrac{1}{2}\right)\,\mathbf{a}_1 + y_{10}\,\mathbf{a}_2 - \left(z_{10} - \tfrac{1}{2}\right)\,\mathbf{a}_3 & = & a\left(x_{10} + \tfrac{1}{2}\right)\,\hat{\mathbf{x}} + b y_{10}\,\hat{\mathbf{y}} - c\left(z_{10} - \tfrac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VIII} \\
\mathbf{B_{55}} & = & x_{10}\,\mathbf{a}_1 - \left(y_{10} - \tfrac{1}{2}\right)\,\mathbf{a}_2 + z_{10}\,\mathbf{a}_3 & = & a x_{10}\,\hat{\mathbf{x}} - b\left(y_{10} - \tfrac{1}{2}\right)\,\hat{\mathbf{y}} + c z_{10}\,\hat{\mathbf{z}} & \text{(8d)} & \text{P VIII}
\end{array}
$$

$$\mathbf{B_{56}} = -\left(x_{10}-\tfrac{1}{2}\right)\mathbf{a}_1+\left(y_{10}+\tfrac{1}{2}\right)\mathbf{a}_2+\left(z_{10}+\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(x_{10}-\tfrac{1}{2}\right)\hat{\mathbf{x}}+b\left(y_{10}+\tfrac{1}{2}\right)\hat{\mathbf{y}}+c\left(z_{10}+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (8d) \quad \text{P VIII}$$

$$\mathbf{B_{57}} = x_{11}\mathbf{a}_1+y_{11}\mathbf{a}_2+z_{11}\mathbf{a}_3 = ax_{11}\hat{\mathbf{x}}+by_{11}\hat{\mathbf{y}}+cz_{11}\hat{\mathbf{z}} \quad (8d) \quad \text{P IX}$$

$$\mathbf{B_{58}} = -\left(x_{11}-\tfrac{1}{2}\right)\mathbf{a}_1-y_{11}\mathbf{a}_2+\left(z_{11}+\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(x_{11}-\tfrac{1}{2}\right)\hat{\mathbf{x}}-by_{11}\hat{\mathbf{y}}+c\left(z_{11}+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (8d) \quad \text{P IX}$$

$$\mathbf{B_{59}} = -x_{11}\mathbf{a}_1+\left(y_{11}+\tfrac{1}{2}\right)\mathbf{a}_2-z_{11}\mathbf{a}_3 = -ax_{11}\hat{\mathbf{x}}+b\left(y_{11}+\tfrac{1}{2}\right)\hat{\mathbf{y}}-cz_{11}\hat{\mathbf{z}} \quad (8d) \quad \text{P IX}$$

$$\mathbf{B_{60}} = \left(x_{11}+\tfrac{1}{2}\right)\mathbf{a}_1-\left(y_{11}-\tfrac{1}{2}\right)\mathbf{a}_2-\left(z_{11}-\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(x_{11}+\tfrac{1}{2}\right)\hat{\mathbf{x}}-b\left(y_{11}-\tfrac{1}{2}\right)\hat{\mathbf{y}}-c\left(z_{11}-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (8d) \quad \text{P IX}$$

$$\mathbf{B_{61}} = -x_{11}\mathbf{a}_1-y_{11}\mathbf{a}_2-z_{11}\mathbf{a}_3 = -ax_{11}\hat{\mathbf{x}}-by_{11}\hat{\mathbf{y}}-cz_{11}\hat{\mathbf{z}} \quad (8d) \quad \text{P IX}$$

$$\mathbf{B_{62}} = \left(x_{11}+\tfrac{1}{2}\right)\mathbf{a}_1+y_{11}\mathbf{a}_2-\left(z_{11}-\tfrac{1}{2}\right)\mathbf{a}_3 = a\left(x_{11}+\tfrac{1}{2}\right)\hat{\mathbf{x}}+by_{11}\hat{\mathbf{y}}-c\left(z_{11}-\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (8d) \quad \text{P IX}$$

$$\mathbf{B_{63}} = x_{11}\mathbf{a}_1-\left(y_{11}-\tfrac{1}{2}\right)\mathbf{a}_2+z_{11}\mathbf{a}_3 = ax_{11}\hat{\mathbf{x}}-b\left(y_{11}-\tfrac{1}{2}\right)\hat{\mathbf{y}}+cz_{11}\hat{\mathbf{z}} \quad (8d) \quad \text{P IX}$$

$$\mathbf{B_{64}} = -\left(x_{11}-\tfrac{1}{2}\right)\mathbf{a}_1+\left(y_{11}+\tfrac{1}{2}\right)\mathbf{a}_2+\left(z_{11}+\tfrac{1}{2}\right)\mathbf{a}_3 = -a\left(x_{11}-\tfrac{1}{2}\right)\hat{\mathbf{x}}+b\left(y_{11}+\tfrac{1}{2}\right)\hat{\mathbf{y}}+c\left(z_{11}+\tfrac{1}{2}\right)\hat{\mathbf{z}} \quad (8d) \quad \text{P IX}$$

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