Cubic Cu_2OSeO_3 Structure: A2B4C_cP56_198_ab_2a2b_2a-001

This structure originally had the label `A2B4C_cP56_198_ab_2a2b_2a`. Calls to that address will be redirected here.

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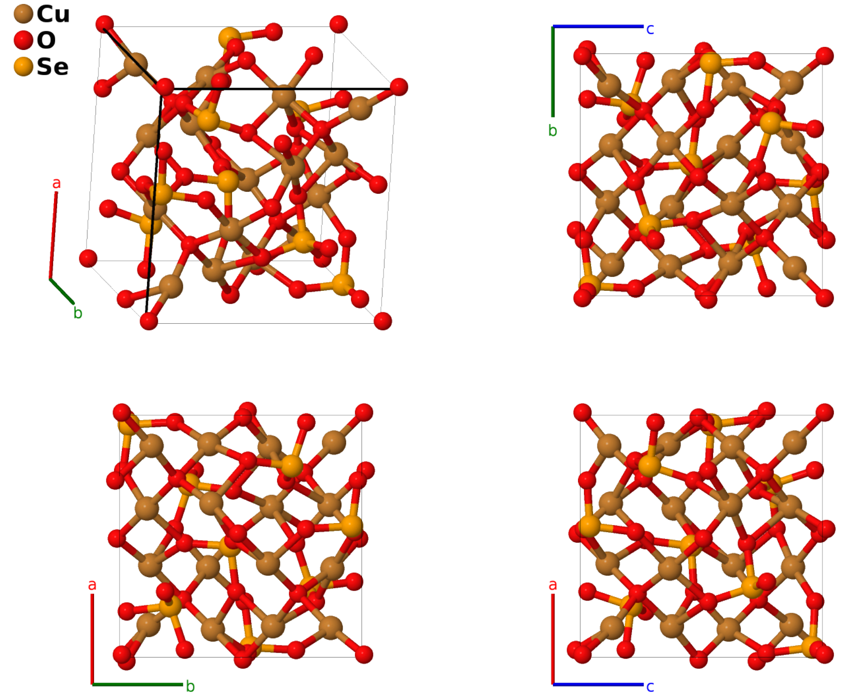
https://aflow.org/p/PZ2V

https://aflow.org/p/A2B4C_cP56_198_ab_2a2b_2a-001

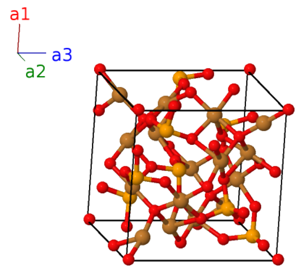


Prototype	Cu_2O_4Se
AFLOW prototype label	A2B4C_cP56_198_ab_2a2b_2a-001
ICSD	60652
Pearson symbol	cP56
Space group number	198
Space group symbol	$P2_13$
AFLOW prototype command	`aflow --proto=A2B4C_cP56_198_ab_2a2b_2a-001` `--params=`$a, x_1, x_2, x_3, x_4, x_5, x_6, y_6, z_6, x_7, y_7, z_7, x_8, y_8, z_8$

- This is the cubic phase of Cu_2OSeO_3. There is also a monoclinic phase.

Simple Cubic primitive vectors

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



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	=	$x_1\,\mathbf{a}_1 + x_1\,\mathbf{a}_2 + x_1\,\mathbf{a}_3$	=	$ax_1\,\hat{\mathbf{x}} + ax_1\,\hat{\mathbf{y}} + ax_1\,\hat{\mathbf{z}}$	(4a)	Cu I
$\mathbf{B_2}$	=	$-\left(x_1 - \frac{1}{2}\right)\,\mathbf{a}_1 - x_1\,\mathbf{a}_2 + \left(x_1 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_1 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - ax_1\,\hat{\mathbf{y}} + a\left(x_1 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4a)	Cu I
$\mathbf{B_3}$	=	$-x_1\,\mathbf{a}_1 + \left(x_1 + \frac{1}{2}\right)\,\mathbf{a}_2 - \left(x_1 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_1\,\hat{\mathbf{x}} + a\left(x_1 + \frac{1}{2}\right)\,\hat{\mathbf{y}} - a\left(x_1 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4a)	Cu I
$\mathbf{B_4}$	=	$\left(x_1 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_1 - \frac{1}{2}\right)\,\mathbf{a}_2 - x_1\,\mathbf{a}_3$	=	$a\left(x_1 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_1 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - ax_1\,\hat{\mathbf{z}}$	(4a)	Cu I
$\mathbf{B_5}$	=	$x_2\,\mathbf{a}_1 + x_2\,\mathbf{a}_2 + x_2\,\mathbf{a}_3$	=	$ax_2\,\hat{\mathbf{x}} + ax_2\,\hat{\mathbf{y}} + ax_2\,\hat{\mathbf{z}}$	(4a)	O I
$\mathbf{B_6}$	=	$-\left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_1 - x_2\,\mathbf{a}_2 + \left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - ax_2\,\hat{\mathbf{y}} + a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4a)	O I
$\mathbf{B_7}$	=	$-x_2\,\mathbf{a}_1 + \left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_2 - \left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_2\,\hat{\mathbf{x}} + a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{y}} - a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4a)	O I
$\mathbf{B_8}$	=	$\left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_2 - x_2\,\mathbf{a}_3$	=	$a\left(x_2 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_2 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - ax_2\,\hat{\mathbf{z}}$	(4a)	O I
$\mathbf{B_9}$	=	$x_3\,\mathbf{a}_1 + x_3\,\mathbf{a}_2 + x_3\,\mathbf{a}_3$	=	$ax_3\,\hat{\mathbf{x}} + ax_3\,\hat{\mathbf{y}} + ax_3\,\hat{\mathbf{z}}$	(4a)	O II
$\mathbf{B_{10}}$	=	$-\left(x_3 - \frac{1}{2}\right)\,\mathbf{a}_1 - x_3\,\mathbf{a}_2 + \left(x_3 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_3 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - ax_3\,\hat{\mathbf{y}} + a\left(x_3 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4a)	O II
$\mathbf{B_{11}}$	=	$-x_3\,\mathbf{a}_1 + \left(x_3 + \frac{1}{2}\right)\,\mathbf{a}_2 - \left(x_3 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_3\,\hat{\mathbf{x}} + a\left(x_3 + \frac{1}{2}\right)\,\hat{\mathbf{y}} - a\left(x_3 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4a)	O II
$\mathbf{B_{12}}$	=	$\left(x_3 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_3 - \frac{1}{2}\right)\,\mathbf{a}_2 - x_3\,\mathbf{a}_3$	=	$a\left(x_3 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_3 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - ax_3\,\hat{\mathbf{z}}$	(4a)	O II
$\mathbf{B_{13}}$	=	$x_4\,\mathbf{a}_1 + x_4\,\mathbf{a}_2 + x_4\,\mathbf{a}_3$	=	$ax_4\,\hat{\mathbf{x}} + ax_4\,\hat{\mathbf{y}} + ax_4\,\hat{\mathbf{z}}$	(4a)	Se I
$\mathbf{B_{14}}$	=	$-\left(x_4 - \frac{1}{2}\right)\,\mathbf{a}_1 - x_4\,\mathbf{a}_2 + \left(x_4 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_4 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - ax_4\,\hat{\mathbf{y}} + a\left(x_4 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4a)	Se I
$\mathbf{B_{15}}$	=	$-x_4\,\mathbf{a}_1 + \left(x_4 + \frac{1}{2}\right)\,\mathbf{a}_2 - \left(x_4 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_4\,\hat{\mathbf{x}} + a\left(x_4 + \frac{1}{2}\right)\,\hat{\mathbf{y}} - a\left(x_4 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4a)	Se I
$\mathbf{B_{16}}$	=	$\left(x_4 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_4 - \frac{1}{2}\right)\,\mathbf{a}_2 - x_4\,\mathbf{a}_3$	=	$a\left(x_4 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_4 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - ax_4\,\hat{\mathbf{z}}$	(4a)	Se I
$\mathbf{B_{17}}$	=	$x_5\,\mathbf{a}_1 + x_5\,\mathbf{a}_2 + x_5\,\mathbf{a}_3$	=	$ax_5\,\hat{\mathbf{x}} + ax_5\,\hat{\mathbf{y}} + ax_5\,\hat{\mathbf{z}}$	(4a)	Se II
$\mathbf{B_{18}}$	=	$-\left(x_5 - \frac{1}{2}\right)\,\mathbf{a}_1 - x_5\,\mathbf{a}_2 + \left(x_5 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_5 - \frac{1}{2}\right)\,\hat{\mathbf{x}} - ax_5\,\hat{\mathbf{y}} + a\left(x_5 + \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4a)	Se II
$\mathbf{B_{19}}$	=	$-x_5\,\mathbf{a}_1 + \left(x_5 + \frac{1}{2}\right)\,\mathbf{a}_2 - \left(x_5 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_5\,\hat{\mathbf{x}} + a\left(x_5 + \frac{1}{2}\right)\,\hat{\mathbf{y}} - a\left(x_5 - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(4a)	Se II
$\mathbf{B_{20}}$	=	$\left(x_5 + \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_5 - \frac{1}{2}\right)\,\mathbf{a}_2 - x_5\,\mathbf{a}_3$	=	$a\left(x_5 + \frac{1}{2}\right)\,\hat{\mathbf{x}} - a\left(x_5 - \frac{1}{2}\right)\,\hat{\mathbf{y}} - ax_5\,\hat{\mathbf{z}}$	(4a)	Se II
$\mathbf{B_{21}}$	=	$x_6\,\mathbf{a}_1 + y_6\,\mathbf{a}_2 + z_6\,\mathbf{a}_3$	=	$ax_6\,\hat{\mathbf{x}} + ay_6\,\hat{\mathbf{y}} + az_6\,\hat{\mathbf{z}}$	(12b)	Cu II

$\mathbf{B_{22}}$	=	$-\left(x_6-\frac{1}{2}\right)\,\mathbf{a}_1-y_6\,\mathbf{a}_2+\left(z_6+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_6-\frac{1}{2}\right)\,\hat{\mathbf{x}}-ay_6\,\hat{\mathbf{y}}+a\left(z_6+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	Cu II
$\mathbf{B_{23}}$	=	$-x_6\,\mathbf{a}_1+\left(y_6+\frac{1}{2}\right)\,\mathbf{a}_2-\left(z_6-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_6\,\hat{\mathbf{x}}+a\left(y_6+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(z_6-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	Cu II
$\mathbf{B_{24}}$	=	$\left(x_6+\frac{1}{2}\right)\,\mathbf{a}_1-\left(y_6-\frac{1}{2}\right)\,\mathbf{a}_2-z_6\,\mathbf{a}_3$	=	$a\left(x_6+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(y_6-\frac{1}{2}\right)\,\hat{\mathbf{y}}-az_6\,\hat{\mathbf{z}}$	(12b)	Cu II
$\mathbf{B_{25}}$	=	$z_6\,\mathbf{a}_1+x_6\,\mathbf{a}_2+y_6\,\mathbf{a}_3$	=	$az_6\,\hat{\mathbf{x}}+ax_6\,\hat{\mathbf{y}}+ay_6\,\hat{\mathbf{z}}$	(12b)	Cu II
$\mathbf{B_{26}}$	=	$\left(z_6+\frac{1}{2}\right)\,\mathbf{a}_1-\left(x_6-\frac{1}{2}\right)\,\mathbf{a}_2-y_6\,\mathbf{a}_3$	=	$a\left(z_6+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(x_6-\frac{1}{2}\right)\,\hat{\mathbf{y}}-ay_6\,\hat{\mathbf{z}}$	(12b)	Cu II
$\mathbf{B_{27}}$	=	$-\left(z_6-\frac{1}{2}\right)\,\mathbf{a}_1-x_6\,\mathbf{a}_2+\left(y_6+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(z_6-\frac{1}{2}\right)\,\hat{\mathbf{x}}-ax_6\,\hat{\mathbf{y}}+a\left(y_6+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	Cu II
$\mathbf{B_{28}}$	=	$-z_6\,\mathbf{a}_1+\left(x_6+\frac{1}{2}\right)\,\mathbf{a}_2-\left(y_6-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-az_6\,\hat{\mathbf{x}}+a\left(x_6+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(y_6-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	Cu II
$\mathbf{B_{29}}$	=	$y_6\,\mathbf{a}_1+z_6\,\mathbf{a}_2+x_6\,\mathbf{a}_3$	=	$ay_6\,\hat{\mathbf{x}}+az_6\,\hat{\mathbf{y}}+ax_6\,\hat{\mathbf{z}}$	(12b)	Cu II
$\mathbf{B_{30}}$	=	$-y_6\,\mathbf{a}_1+\left(z_6+\frac{1}{2}\right)\,\mathbf{a}_2-\left(x_6-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ay_6\,\hat{\mathbf{x}}+a\left(z_6+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(x_6-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	Cu II
$\mathbf{B_{31}}$	=	$\left(y_6+\frac{1}{2}\right)\,\mathbf{a}_1-\left(z_6-\frac{1}{2}\right)\,\mathbf{a}_2-x_6\,\mathbf{a}_3$	=	$a\left(y_6+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(z_6-\frac{1}{2}\right)\,\hat{\mathbf{y}}-ax_6\,\hat{\mathbf{z}}$	(12b)	Cu II
$\mathbf{B_{32}}$	=	$-\left(y_6-\frac{1}{2}\right)\,\mathbf{a}_1-z_6\,\mathbf{a}_2+\left(x_6+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(y_6-\frac{1}{2}\right)\,\hat{\mathbf{x}}-az_6\,\hat{\mathbf{y}}+a\left(x_6+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	Cu II
$\mathbf{B_{33}}$	=	$x_7\,\mathbf{a}_1+y_7\,\mathbf{a}_2+z_7\,\mathbf{a}_3$	=	$ax_7\,\hat{\mathbf{x}}+ay_7\,\hat{\mathbf{y}}+az_7\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{34}}$	=	$-\left(x_7-\frac{1}{2}\right)\,\mathbf{a}_1-y_7\,\mathbf{a}_2+\left(z_7+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_7-\frac{1}{2}\right)\,\hat{\mathbf{x}}-ay_7\,\hat{\mathbf{y}}+a\left(z_7+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{35}}$	=	$-x_7\,\mathbf{a}_1+\left(y_7+\frac{1}{2}\right)\,\mathbf{a}_2-\left(z_7-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_7\,\hat{\mathbf{x}}+a\left(y_7+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(z_7-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{36}}$	=	$\left(x_7+\frac{1}{2}\right)\,\mathbf{a}_1-\left(y_7-\frac{1}{2}\right)\,\mathbf{a}_2-z_7\,\mathbf{a}_3$	=	$a\left(x_7+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(y_7-\frac{1}{2}\right)\,\hat{\mathbf{y}}-az_7\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{37}}$	=	$z_7\,\mathbf{a}_1+x_7\,\mathbf{a}_2+y_7\,\mathbf{a}_3$	=	$az_7\,\hat{\mathbf{x}}+ax_7\,\hat{\mathbf{y}}+ay_7\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{38}}$	=	$\left(z_7+\frac{1}{2}\right)\,\mathbf{a}_1-\left(x_7-\frac{1}{2}\right)\,\mathbf{a}_2-y_7\,\mathbf{a}_3$	=	$a\left(z_7+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(x_7-\frac{1}{2}\right)\,\hat{\mathbf{y}}-ay_7\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{39}}$	=	$-\left(z_7-\frac{1}{2}\right)\,\mathbf{a}_1-x_7\,\mathbf{a}_2+\left(y_7+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(z_7-\frac{1}{2}\right)\,\hat{\mathbf{x}}-ax_7\,\hat{\mathbf{y}}+a\left(y_7+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{40}}$	=	$-z_7\,\mathbf{a}_1+\left(x_7+\frac{1}{2}\right)\,\mathbf{a}_2-\left(y_7-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-az_7\,\hat{\mathbf{x}}+a\left(x_7+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(y_7-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{41}}$	=	$y_7\,\mathbf{a}_1+z_7\,\mathbf{a}_2+x_7\,\mathbf{a}_3$	=	$ay_7\,\hat{\mathbf{x}}+az_7\,\hat{\mathbf{y}}+ax_7\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{42}}$	=	$-y_7\,\mathbf{a}_1+\left(z_7+\frac{1}{2}\right)\,\mathbf{a}_2-\left(x_7-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ay_7\,\hat{\mathbf{x}}+a\left(z_7+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(x_7-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{43}}$	=	$\left(y_7+\frac{1}{2}\right)\,\mathbf{a}_1-\left(z_7-\frac{1}{2}\right)\,\mathbf{a}_2-x_7\,\mathbf{a}_3$	=	$a\left(y_7+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(z_7-\frac{1}{2}\right)\,\hat{\mathbf{y}}-ax_7\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{44}}$	=	$-\left(y_7-\frac{1}{2}\right)\,\mathbf{a}_1-z_7\,\mathbf{a}_2+\left(x_7+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(y_7-\frac{1}{2}\right)\,\hat{\mathbf{x}}-az_7\,\hat{\mathbf{y}}+a\left(x_7+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	O III
$\mathbf{B_{45}}$	=	$x_8\,\mathbf{a}_1+y_8\,\mathbf{a}_2+z_8\,\mathbf{a}_3$	=	$ax_8\,\hat{\mathbf{x}}+ay_8\,\hat{\mathbf{y}}+az_8\,\hat{\mathbf{z}}$	(12b)	O IV
$\mathbf{B_{46}}$	=	$-\left(x_8-\frac{1}{2}\right)\,\mathbf{a}_1-y_8\,\mathbf{a}_2+\left(z_8+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_8-\frac{1}{2}\right)\,\hat{\mathbf{x}}-ay_8\,\hat{\mathbf{y}}+a\left(z_8+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	O IV
$\mathbf{B_{47}}$	=	$-x_8\,\mathbf{a}_1+\left(y_8+\frac{1}{2}\right)\,\mathbf{a}_2-\left(z_8-\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-ax_8\,\hat{\mathbf{x}}+a\left(y_8+\frac{1}{2}\right)\,\hat{\mathbf{y}}-a\left(z_8-\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	O IV
$\mathbf{B_{48}}$	=	$\left(x_8+\frac{1}{2}\right)\,\mathbf{a}_1-\left(y_8-\frac{1}{2}\right)\,\mathbf{a}_2-z_8\,\mathbf{a}_3$	=	$a\left(x_8+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(y_8-\frac{1}{2}\right)\,\hat{\mathbf{y}}-az_8\,\hat{\mathbf{z}}$	(12b)	O IV
$\mathbf{B_{49}}$	=	$z_8\,\mathbf{a}_1+x_8\,\mathbf{a}_2+y_8\,\mathbf{a}_3$	=	$az_8\,\hat{\mathbf{x}}+ax_8\,\hat{\mathbf{y}}+ay_8\,\hat{\mathbf{z}}$	(12b)	O IV
$\mathbf{B_{50}}$	=	$\left(z_8+\frac{1}{2}\right)\,\mathbf{a}_1-\left(x_8-\frac{1}{2}\right)\,\mathbf{a}_2-y_8\,\mathbf{a}_3$	=	$a\left(z_8+\frac{1}{2}\right)\,\hat{\mathbf{x}}-a\left(x_8-\frac{1}{2}\right)\,\hat{\mathbf{y}}-ay_8\,\hat{\mathbf{z}}$	(12b)	O IV
$\mathbf{B_{51}}$	=	$-\left(z_8-\frac{1}{2}\right)\,\mathbf{a}_1-x_8\,\mathbf{a}_2+\left(y_8+\frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(z_8-\frac{1}{2}\right)\,\hat{\mathbf{x}}-ax_8\,\hat{\mathbf{y}}+a\left(y_8+\frac{1}{2}\right)\,\hat{\mathbf{z}}$	(12b)	O IV

$$\mathbf{B_{52}} = -z_8\,\mathbf{a}_1 + \left(x_8 + \tfrac{1}{2}\right)\,\mathbf{a}_2 - \left(y_8 - \tfrac{1}{2}\right)\,\mathbf{a}_3 = -az_8\,\mathbf{\hat{x}} + a\left(x_8 + \tfrac{1}{2}\right)\,\mathbf{\hat{y}} - a\left(y_8 - \tfrac{1}{2}\right)\,\mathbf{\hat{z}} \quad \text{(12b)} \quad \text{O IV}$$

$$\mathbf{B_{53}} = y_8\,\mathbf{a}_1 + z_8\,\mathbf{a}_2 + x_8\,\mathbf{a}_3 = ay_8\,\mathbf{\hat{x}} + az_8\,\mathbf{\hat{y}} + ax_8\,\mathbf{\hat{z}} \quad \text{(12b)} \quad \text{O IV}$$

$$\mathbf{B_{54}} = -y_8\,\mathbf{a}_1 + \left(z_8 + \tfrac{1}{2}\right)\,\mathbf{a}_2 - \left(x_8 - \tfrac{1}{2}\right)\,\mathbf{a}_3 = -ay_8\,\mathbf{\hat{x}} + a\left(z_8 + \tfrac{1}{2}\right)\,\mathbf{\hat{y}} - a\left(x_8 - \tfrac{1}{2}\right)\,\mathbf{\hat{z}} \quad \text{(12b)} \quad \text{O IV}$$

$$\mathbf{B_{55}} = \left(y_8 + \tfrac{1}{2}\right)\,\mathbf{a}_1 - \left(z_8 - \tfrac{1}{2}\right)\,\mathbf{a}_2 - x_8\,\mathbf{a}_3 = a\left(y_8 + \tfrac{1}{2}\right)\,\mathbf{\hat{x}} - a\left(z_8 - \tfrac{1}{2}\right)\,\mathbf{\hat{y}} - ax_8\,\mathbf{\hat{z}} \quad \text{(12b)} \quad \text{O IV}$$

$$\mathbf{B_{56}} = -\left(y_8 - \tfrac{1}{2}\right)\,\mathbf{a}_1 - z_8\,\mathbf{a}_2 + \left(x_8 + \tfrac{1}{2}\right)\,\mathbf{a}_3 = -a\left(y_8 - \tfrac{1}{2}\right)\,\mathbf{\hat{x}} - az_8\,\mathbf{\hat{y}} + a\left(x_8 + \tfrac{1}{2}\right)\,\mathbf{\hat{z}} \quad \text{(12b)} \quad \text{O IV}$$

References

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