Deltalumite (δ-alumina, Al_2O_3) Structure: A3B4_tP84_115_acef3g3j3k_6j6k-001

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https://aflow.org/p/YL8L

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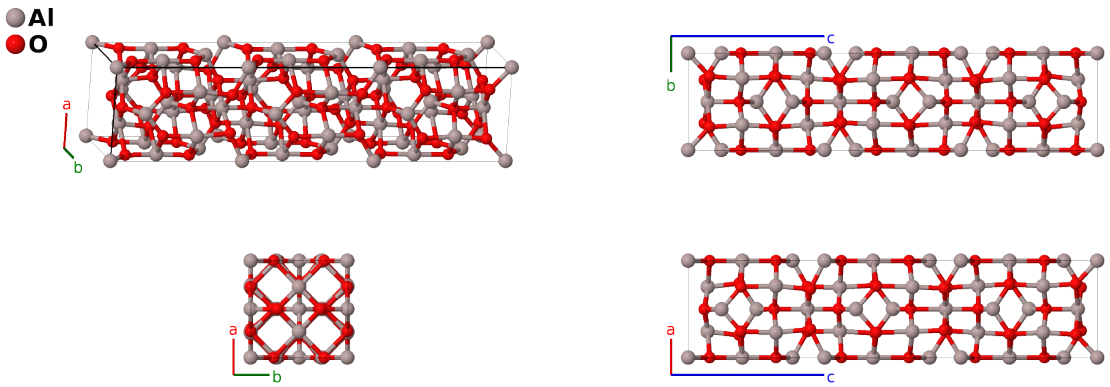
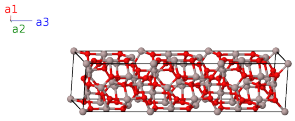


Prototype	Al_2O_3
AFLOW prototype label	A3B4_tP84_115_acef3g3j3k_6j6k-001
Mineral name	deltalumite
ICSD	40200
Pearson symbol	tP84
Space group number	115
Space group symbol	$P\bar{4}m2$
AFLOW prototype command	`aflow --proto=A3B4_tP84_115_acef3g3j3k_6j6k-001 --params=`$a, c/a, z_3, z_4, z_5, z_6, z_7, x_8, z_8, x_9, z_9, x_{10}, z_{10}, x_{11}, z_{11}, x_{12}, z_{12}, x_{13}, z_{13}, x_{14}, z_{14}, x_{15}, z_{15}, x_{16}, z_{16}, x_{17}, z_{17}, x_{18}, z_{18}, x_{19}, z_{19}, x_{20}, z_{20}, x_{21}, z_{21}, x_{22}, z_{22}, x_{23}, z_{23}, x_{24}, z_{24}, x_{25}, z_{25}$

- Alumina comes in a variety of forms. In the Encyclopedia we have:
  - Corundum, or α-alumina ($D5_1$) is the mineral usual found in nature.
  - β-alumina ($D5_6$)
  - We describe γ-alumina ($D5_7$) using Fe_2O_3 as the prototype.
  - δ-alumina (this structure) is a tetragonal distortion of the spinel structure. It is found in nature as deltalumite.
  - κ-Al_2O_3.
- Only 5/6 of the aluminum (4j) and (4k) sites in deltalumite are occupied, giving the observed alumina stoichiometry, Al_2O_3.

Simple Tetragonal primitive vectors

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



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	=	0	=	0	(1a)	Al I
$\mathbf{B_2}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(1c)	Al II
$\mathbf{B_3}$	=	$z_3\,\mathbf{a}_3$	=	$cz_3\,\hat{\mathbf{z}}$	(2e)	Al III
$\mathbf{B_4}$	=	$-z_3\,\mathbf{a}_3$	=	$-cz_3\,\hat{\mathbf{z}}$	(2e)	Al III
$\mathbf{B_5}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_4\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_4\,\hat{\mathbf{z}}$	(2f)	Al IV
$\mathbf{B_6}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 - z_4\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} - cz_4\,\hat{\mathbf{z}}$	(2f)	Al IV
$\mathbf{B_7}$	=	$\frac{1}{2}\,\mathbf{a}_2 + z_5\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{y}} + cz_5\,\hat{\mathbf{z}}$	(2g)	Al V
$\mathbf{B_8}$	=	$\frac{1}{2}\,\mathbf{a}_1 - z_5\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - cz_5\,\hat{\mathbf{z}}$	(2g)	Al V
$\mathbf{B_9}$	=	$\frac{1}{2}\,\mathbf{a}_2 + z_6\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{y}} + cz_6\,\hat{\mathbf{z}}$	(2g)	Al VI
$\mathbf{B_{10}}$	=	$\frac{1}{2}\,\mathbf{a}_1 - z_6\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - cz_6\,\hat{\mathbf{z}}$	(2g)	Al VI
$\mathbf{B_{11}}$	=	$\frac{1}{2}\,\mathbf{a}_2 + z_7\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{y}} + cz_7\,\hat{\mathbf{z}}$	(2g)	Al VII
$\mathbf{B_{12}}$	=	$\frac{1}{2}\,\mathbf{a}_1 - z_7\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - cz_7\,\hat{\mathbf{z}}$	(2g)	Al VII
$\mathbf{B_{13}}$	=	$x_8\,\mathbf{a}_1 + z_8\,\mathbf{a}_3$	=	$ax_8\,\hat{\mathbf{x}} + cz_8\,\hat{\mathbf{z}}$	(4j)	Al VIII
$\mathbf{B_{14}}$	=	$-x_8\,\mathbf{a}_1 + z_8\,\mathbf{a}_3$	=	$-ax_8\,\hat{\mathbf{x}} + cz_8\,\hat{\mathbf{z}}$	(4j)	Al VIII
$\mathbf{B_{15}}$	=	$-x_8\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	=	$-ax_8\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(4j)	Al VIII
$\mathbf{B_{16}}$	=	$x_8\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	=	$ax_8\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(4j)	Al VIII
$\mathbf{B_{17}}$	=	$x_9\,\mathbf{a}_1 + z_9\,\mathbf{a}_3$	=	$ax_9\,\hat{\mathbf{x}} + cz_9\,\hat{\mathbf{z}}$	(4j)	Al IX
$\mathbf{B_{18}}$	=	$-x_9\,\mathbf{a}_1 + z_9\,\mathbf{a}_3$	=	$-ax_9\,\hat{\mathbf{x}} + cz_9\,\hat{\mathbf{z}}$	(4j)	Al IX
$\mathbf{B_{19}}$	=	$-x_9\,\mathbf{a}_2 - z_9\,\mathbf{a}_3$	=	$-ax_9\,\hat{\mathbf{y}} - cz_9\,\hat{\mathbf{z}}$	(4j)	Al IX
$\mathbf{B_{20}}$	=	$x_9\,\mathbf{a}_2 - z_9\,\mathbf{a}_3$	=	$ax_9\,\hat{\mathbf{y}} - cz_9\,\hat{\mathbf{z}}$	(4j)	Al IX
$\mathbf{B_{21}}$	=	$x_{10}\,\mathbf{a}_1 + z_{10}\,\mathbf{a}_3$	=	$ax_{10}\,\hat{\mathbf{x}} + cz_{10}\,\hat{\mathbf{z}}$	(4j)	Al X
$\mathbf{B_{22}}$	=	$-x_{10}\,\mathbf{a}_1 + z_{10}\,\mathbf{a}_3$	=	$-ax_{10}\,\hat{\mathbf{x}} + cz_{10}\,\hat{\mathbf{z}}$	(4j)	Al X
$\mathbf{B_{23}}$	=	$-x_{10}\,\mathbf{a}_2 - z_{10}\,\mathbf{a}_3$	=	$-ax_{10}\,\hat{\mathbf{y}} - cz_{10}\,\hat{\mathbf{z}}$	(4j)	Al X
$\mathbf{B_{24}}$	=	$x_{10}\,\mathbf{a}_2 - z_{10}\,\mathbf{a}_3$	=	$ax_{10}\,\hat{\mathbf{y}} - cz_{10}\,\hat{\mathbf{z}}$	(4j)	Al X
$\mathbf{B_{25}}$	=	$x_{11}\,\mathbf{a}_1 + z_{11}\,\mathbf{a}_3$	=	$ax_{11}\,\hat{\mathbf{x}} + cz_{11}\,\hat{\mathbf{z}}$	(4j)	O I
$\mathbf{B_{26}}$	=	$-x_{11}\,\mathbf{a}_1 + z_{11}\,\mathbf{a}_3$	=	$-ax_{11}\,\hat{\mathbf{x}} + cz_{11}\,\hat{\mathbf{z}}$	(4j)	O I
$\mathbf{B_{27}}$	=	$-x_{11}\,\mathbf{a}_2 - z_{11}\,\mathbf{a}_3$	=	$-ax_{11}\,\hat{\mathbf{y}} - cz_{11}\,\hat{\mathbf{z}}$	(4j)	O I
$\mathbf{B_{28}}$	=	$x_{11}\,\mathbf{a}_2 - z_{11}\,\mathbf{a}_3$	=	$ax_{11}\,\hat{\mathbf{y}} - cz_{11}\,\hat{\mathbf{z}}$	(4j)	O I
$\mathbf{B_{29}}$	=	$x_{12}\,\mathbf{a}_1 + z_{12}\,\mathbf{a}_3$	=	$ax_{12}\,\hat{\mathbf{x}} + cz_{12}\,\hat{\mathbf{z}}$	(4j)	O II
$\mathbf{B_{30}}$	=	$-x_{12}\,\mathbf{a}_1 + z_{12}\,\mathbf{a}_3$	=	$-ax_{12}\,\hat{\mathbf{x}} + cz_{12}\,\hat{\mathbf{z}}$	(4j)	O II
$\mathbf{B_{31}}$	=	$-x_{12}\,\mathbf{a}_2 - z_{12}\,\mathbf{a}_3$	=	$-ax_{12}\,\hat{\mathbf{y}} - cz_{12}\,\hat{\mathbf{z}}$	(4j)	O II
$\mathbf{B_{32}}$	=	$x_{12}\,\mathbf{a}_2 - z_{12}\,\mathbf{a}_3$	=	$ax_{12}\,\hat{\mathbf{y}} - cz_{12}\,\hat{\mathbf{z}}$	(4j)	O II

$\mathbf{B_{33}}$	=	$x_{13}\,\mathbf{a}_1 + z_{13}\,\mathbf{a}_3$	=	$ax_{13}\,\hat{\mathbf{x}} + cz_{13}\,\hat{\mathbf{z}}$	(4j)	O III
$\mathbf{B_{34}}$	=	$-x_{13}\,\mathbf{a}_1 + z_{13}\,\mathbf{a}_3$	=	$-ax_{13}\,\hat{\mathbf{x}} + cz_{13}\,\hat{\mathbf{z}}$	(4j)	O III
$\mathbf{B_{35}}$	=	$-x_{13}\,\mathbf{a}_2 - z_{13}\,\mathbf{a}_3$	=	$-ax_{13}\,\hat{\mathbf{y}} - cz_{13}\,\hat{\mathbf{z}}$	(4j)	O III
$\mathbf{B_{36}}$	=	$x_{13}\,\mathbf{a}_2 - z_{13}\,\mathbf{a}_3$	=	$ax_{13}\,\hat{\mathbf{y}} - cz_{13}\,\hat{\mathbf{z}}$	(4j)	O III
$\mathbf{B_{37}}$	=	$x_{14}\,\mathbf{a}_1 + z_{14}\,\mathbf{a}_3$	=	$ax_{14}\,\hat{\mathbf{x}} + cz_{14}\,\hat{\mathbf{z}}$	(4j)	O IV
$\mathbf{B_{38}}$	=	$-x_{14}\,\mathbf{a}_1 + z_{14}\,\mathbf{a}_3$	=	$-ax_{14}\,\hat{\mathbf{x}} + cz_{14}\,\hat{\mathbf{z}}$	(4j)	O IV
$\mathbf{B_{39}}$	=	$-x_{14}\,\mathbf{a}_2 - z_{14}\,\mathbf{a}_3$	=	$-ax_{14}\,\hat{\mathbf{y}} - cz_{14}\,\hat{\mathbf{z}}$	(4j)	O IV
$\mathbf{B_{40}}$	=	$x_{14}\,\mathbf{a}_2 - z_{14}\,\mathbf{a}_3$	=	$ax_{14}\,\hat{\mathbf{y}} - cz_{14}\,\hat{\mathbf{z}}$	(4j)	O IV
$\mathbf{B_{41}}$	=	$x_{15}\,\mathbf{a}_1 + z_{15}\,\mathbf{a}_3$	=	$ax_{15}\,\hat{\mathbf{x}} + cz_{15}\,\hat{\mathbf{z}}$	(4j)	O V
$\mathbf{B_{42}}$	=	$-x_{15}\,\mathbf{a}_1 + z_{15}\,\mathbf{a}_3$	=	$-ax_{15}\,\hat{\mathbf{x}} + cz_{15}\,\hat{\mathbf{z}}$	(4j)	O V
$\mathbf{B_{43}}$	=	$-x_{15}\,\mathbf{a}_2 - z_{15}\,\mathbf{a}_3$	=	$-ax_{15}\,\hat{\mathbf{y}} - cz_{15}\,\hat{\mathbf{z}}$	(4j)	O V
$\mathbf{B_{44}}$	=	$x_{15}\,\mathbf{a}_2 - z_{15}\,\mathbf{a}_3$	=	$ax_{15}\,\hat{\mathbf{y}} - cz_{15}\,\hat{\mathbf{z}}$	(4j)	O V
$\mathbf{B_{45}}$	=	$x_{16}\,\mathbf{a}_1 + z_{16}\,\mathbf{a}_3$	=	$ax_{16}\,\hat{\mathbf{x}} + cz_{16}\,\hat{\mathbf{z}}$	(4j)	O VI
$\mathbf{B_{46}}$	=	$-x_{16}\,\mathbf{a}_1 + z_{16}\,\mathbf{a}_3$	=	$-ax_{16}\,\hat{\mathbf{x}} + cz_{16}\,\hat{\mathbf{z}}$	(4j)	O VI
$\mathbf{B_{47}}$	=	$-x_{16}\,\mathbf{a}_2 - z_{16}\,\mathbf{a}_3$	=	$-ax_{16}\,\hat{\mathbf{y}} - cz_{16}\,\hat{\mathbf{z}}$	(4j)	O VI
$\mathbf{B_{48}}$	=	$x_{16}\,\mathbf{a}_2 - z_{16}\,\mathbf{a}_3$	=	$ax_{16}\,\hat{\mathbf{y}} - cz_{16}\,\hat{\mathbf{z}}$	(4j)	O VI
$\mathbf{B_{49}}$	=	$x_{17}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{17}\,\mathbf{a}_3$	=	$ax_{17}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{17}\,\hat{\mathbf{z}}$	(4k)	Al XI
$\mathbf{B_{50}}$	=	$-x_{17}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{17}\,\mathbf{a}_3$	=	$-ax_{17}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{17}\,\hat{\mathbf{z}}$	(4k)	Al XI
$\mathbf{B_{51}}$	=	$\frac{1}{2}\,\mathbf{a}_1 - x_{17}\,\mathbf{a}_2 - z_{17}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - ax_{17}\,\hat{\mathbf{y}} - cz_{17}\,\hat{\mathbf{z}}$	(4k)	Al XI
$\mathbf{B_{52}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + x_{17}\,\mathbf{a}_2 - z_{17}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + ax_{17}\,\hat{\mathbf{y}} - cz_{17}\,\hat{\mathbf{z}}$	(4k)	Al XI
$\mathbf{B_{53}}$	=	$x_{18}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{18}\,\mathbf{a}_3$	=	$ax_{18}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{18}\,\hat{\mathbf{z}}$	(4k)	Al XII
$\mathbf{B_{54}}$	=	$-x_{18}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{18}\,\mathbf{a}_3$	=	$-ax_{18}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{18}\,\hat{\mathbf{z}}$	(4k)	Al XII
$\mathbf{B_{55}}$	=	$\frac{1}{2}\,\mathbf{a}_1 - x_{18}\,\mathbf{a}_2 - z_{18}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - ax_{18}\,\hat{\mathbf{y}} - cz_{18}\,\hat{\mathbf{z}}$	(4k)	Al XII
$\mathbf{B_{56}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + x_{18}\,\mathbf{a}_2 - z_{18}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + ax_{18}\,\hat{\mathbf{y}} - cz_{18}\,\hat{\mathbf{z}}$	(4k)	Al XII
$\mathbf{B_{57}}$	=	$x_{19}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{19}\,\mathbf{a}_3$	=	$ax_{19}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{19}\,\hat{\mathbf{z}}$	(4k)	Al XIII
$\mathbf{B_{58}}$	=	$-x_{19}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{19}\,\mathbf{a}_3$	=	$-ax_{19}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{19}\,\hat{\mathbf{z}}$	(4k)	Al XIII
$\mathbf{B_{59}}$	=	$\frac{1}{2}\,\mathbf{a}_1 - x_{19}\,\mathbf{a}_2 - z_{19}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - ax_{19}\,\hat{\mathbf{y}} - cz_{19}\,\hat{\mathbf{z}}$	(4k)	Al XIII
$\mathbf{B_{60}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + x_{19}\,\mathbf{a}_2 - z_{19}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + ax_{19}\,\hat{\mathbf{y}} - cz_{19}\,\hat{\mathbf{z}}$	(4k)	Al XIII
$\mathbf{B_{61}}$	=	$x_{20}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{20}\,\mathbf{a}_3$	=	$ax_{20}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{20}\,\hat{\mathbf{z}}$	(4k)	O VII
$\mathbf{B_{62}}$	=	$-x_{20}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{20}\,\mathbf{a}_3$	=	$-ax_{20}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{20}\,\hat{\mathbf{z}}$	(4k)	O VII
$\mathbf{B_{63}}$	=	$\frac{1}{2}\,\mathbf{a}_1 - x_{20}\,\mathbf{a}_2 - z_{20}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - ax_{20}\,\hat{\mathbf{y}} - cz_{20}\,\hat{\mathbf{z}}$	(4k)	O VII
$\mathbf{B_{64}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + x_{20}\,\mathbf{a}_2 - z_{20}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + ax_{20}\,\hat{\mathbf{y}} - cz_{20}\,\hat{\mathbf{z}}$	(4k)	O VII
$\mathbf{B_{65}}$	=	$x_{21}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{21}\,\mathbf{a}_3$	=	$ax_{21}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{21}\,\hat{\mathbf{z}}$	(4k)	O VIII
$\mathbf{B_{66}}$	=	$-x_{21}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{21}\,\mathbf{a}_3$	=	$-ax_{21}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{21}\,\hat{\mathbf{z}}$	(4k)	O VIII
$\mathbf{B_{67}}$	=	$\frac{1}{2}\,\mathbf{a}_1 - x_{21}\,\mathbf{a}_2 - z_{21}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - ax_{21}\,\hat{\mathbf{y}} - cz_{21}\,\hat{\mathbf{z}}$	(4k)	O VIII
$\mathbf{B_{68}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + x_{21}\,\mathbf{a}_2 - z_{21}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + ax_{21}\,\hat{\mathbf{y}} - cz_{21}\,\hat{\mathbf{z}}$	(4k)	O VIII
$\mathbf{B_{69}}$	=	$x_{22}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{22}\,\mathbf{a}_3$	=	$ax_{22}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{22}\,\hat{\mathbf{z}}$	(4k)	O IX
$\mathbf{B_{70}}$	=	$-x_{22}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{22}\,\mathbf{a}_3$	=	$-ax_{22}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{22}\,\hat{\mathbf{z}}$	(4k)	O IX
$\mathbf{B_{71}}$	=	$\frac{1}{2}\,\mathbf{a}_1 - x_{22}\,\mathbf{a}_2 - z_{22}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - ax_{22}\,\hat{\mathbf{y}} - cz_{22}\,\hat{\mathbf{z}}$	(4k)	O IX
$\mathbf{B_{72}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + x_{22}\,\mathbf{a}_2 - z_{22}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + ax_{22}\,\hat{\mathbf{y}} - cz_{22}\,\hat{\mathbf{z}}$	(4k)	O IX
$\mathbf{B_{73}}$	=	$x_{23}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{23}\,\mathbf{a}_3$	=	$ax_{23}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{23}\,\hat{\mathbf{z}}$	(4k)	O X

$\mathbf{B_{74}}$	=	$-x_{23}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{23}\,\mathbf{a}_3$	=	$-ax_{23}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{23}\,\hat{\mathbf{z}}$	(4k)	O X
$\mathbf{B_{75}}$	=	$\frac{1}{2}\,\mathbf{a}_1 - x_{23}\,\mathbf{a}_2 - z_{23}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - ax_{23}\,\hat{\mathbf{y}} - cz_{23}\,\hat{\mathbf{z}}$	(4k)	O X
$\mathbf{B_{76}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + x_{23}\,\mathbf{a}_2 - z_{23}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + ax_{23}\,\hat{\mathbf{y}} - cz_{23}\,\hat{\mathbf{z}}$	(4k)	O X
$\mathbf{B_{77}}$	=	$x_{24}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{24}\,\mathbf{a}_3$	=	$ax_{24}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{24}\,\hat{\mathbf{z}}$	(4k)	O XI
$\mathbf{B_{78}}$	=	$-x_{24}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{24}\,\mathbf{a}_3$	=	$-ax_{24}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{24}\,\hat{\mathbf{z}}$	(4k)	O XI
$\mathbf{B_{79}}$	=	$\frac{1}{2}\,\mathbf{a}_1 - x_{24}\,\mathbf{a}_2 - z_{24}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - ax_{24}\,\hat{\mathbf{y}} - cz_{24}\,\hat{\mathbf{z}}$	(4k)	O XI
$\mathbf{B_{80}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + x_{24}\,\mathbf{a}_2 - z_{24}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + ax_{24}\,\hat{\mathbf{y}} - cz_{24}\,\hat{\mathbf{z}}$	(4k)	O XI
$\mathbf{B_{81}}$	=	$x_{25}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{25}\,\mathbf{a}_3$	=	$ax_{25}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{25}\,\hat{\mathbf{z}}$	(4k)	O XII
$\mathbf{B_{82}}$	=	$-x_{25}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + z_{25}\,\mathbf{a}_3$	=	$-ax_{25}\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + cz_{25}\,\hat{\mathbf{z}}$	(4k)	O XII
$\mathbf{B_{83}}$	=	$\frac{1}{2}\,\mathbf{a}_1 - x_{25}\,\mathbf{a}_2 - z_{25}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - ax_{25}\,\hat{\mathbf{y}} - cz_{25}\,\hat{\mathbf{z}}$	(4k)	O XII
$\mathbf{B_{84}}$	=	$\frac{1}{2}\,\mathbf{a}_1 + x_{25}\,\mathbf{a}_2 - z_{25}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + ax_{25}\,\hat{\mathbf{y}} - cz_{25}\,\hat{\mathbf{z}}$	(4k)	O XII

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