

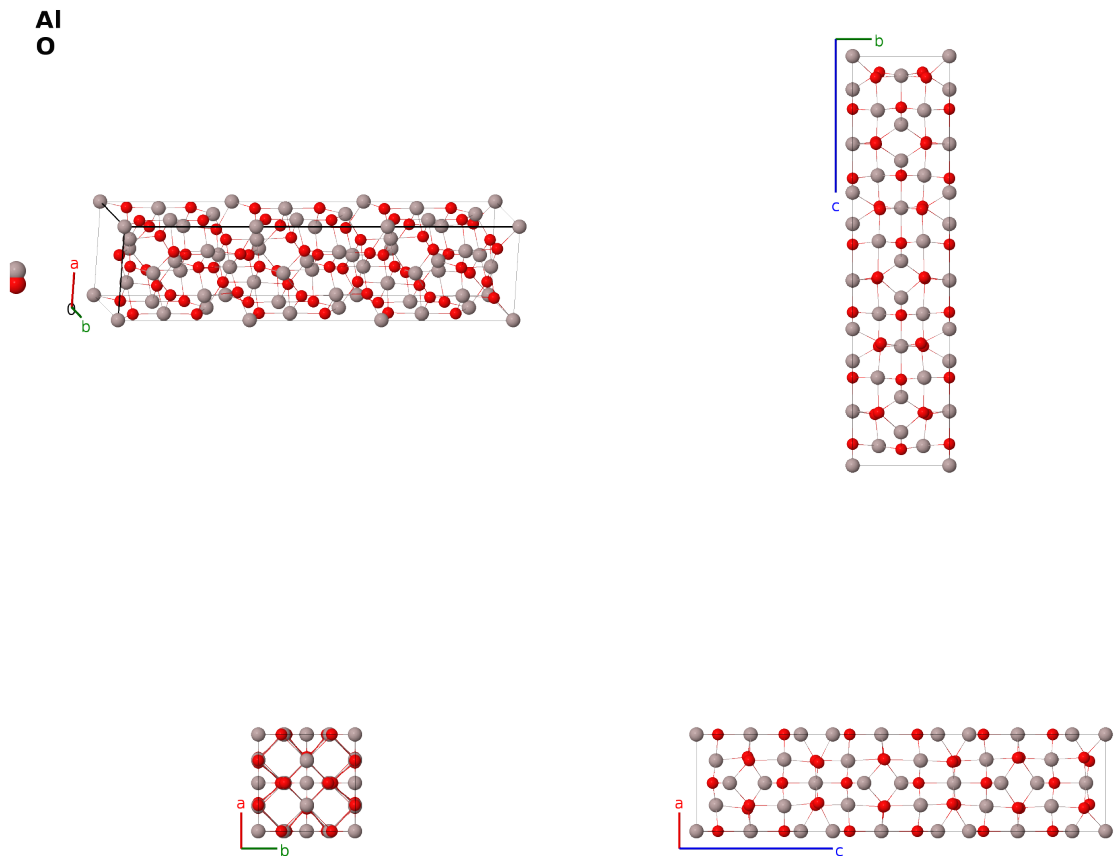
Deltalumite (δ -alumina, Al_2O_3) Structure: A3B4_tP84_115_acef3g3j3k_6j6k-001

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<https://aflow.org/prototype-encyclopedia/YL8L>

https://aflow.org/prototype-encyclopedia/A3B4_tP84_115_acef3g3j3k_6j6k-001



Prototype	Al_2O_3
AFLOW prototype label	A3B4_tP84_115_acef3g3j3k_6j6k-001
Mineral name	deltalumite
ICSD	40200
CCDC	1610105

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



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

$B_{12} =$	$\frac{1}{2} \mathbf{a}_1 - z_7 \mathbf{a}_3$	$=$	$\frac{1}{2} a \hat{\mathbf{x}} - cz_7 \hat{\mathbf{z}}$	(2g)	Al VII
$B_{13} =$	$x_8 \mathbf{a}_1 + z_8 \mathbf{a}_3$	$=$	$ax_8 \hat{\mathbf{x}} + cz_8 \hat{\mathbf{z}}$	(4j)	Al VIII
$B_{14} =$	$-x_8 \mathbf{a}_1 + z_8 \mathbf{a}_3$	$=$	$-ax_8 \hat{\mathbf{x}} + cz_8 \hat{\mathbf{z}}$	(4j)	Al VIII
$B_{15} =$	$-x_8 \mathbf{a}_2 - z_8 \mathbf{a}_3$	$=$	$-ax_8 \hat{\mathbf{y}} - cz_8 \hat{\mathbf{z}}$	(4j)	Al VIII
$B_{16} =$	$x_8 \mathbf{a}_2 - z_8 \mathbf{a}_3$	$=$	$ax_8 \hat{\mathbf{y}} - cz_8 \hat{\mathbf{z}}$	(4j)	Al VIII
$B_{17} =$	$x_9 \mathbf{a}_1 + z_9 \mathbf{a}_3$	$=$	$ax_9 \hat{\mathbf{x}} + cz_9 \hat{\mathbf{z}}$	(4j)	Al IX
$B_{18} =$	$-x_9 \mathbf{a}_1 + z_9 \mathbf{a}_3$	$=$	$-ax_9 \hat{\mathbf{x}} + cz_9 \hat{\mathbf{z}}$	(4j)	Al IX
$B_{19} =$	$-x_9 \mathbf{a}_2 - z_9 \mathbf{a}_3$	$=$	$-ax_9 \hat{\mathbf{y}} - cz_9 \hat{\mathbf{z}}$	(4j)	Al IX
$B_{20} =$	$x_9 \mathbf{a}_2 - z_9 \mathbf{a}_3$	$=$	$ax_9 \hat{\mathbf{y}} - cz_9 \hat{\mathbf{z}}$	(4j)	Al IX
$B_{21} =$	$x_{10} \mathbf{a}_1 + z_{10} \mathbf{a}_3$	$=$	$ax_{10} \hat{\mathbf{x}} + cz_{10} \hat{\mathbf{z}}$	(4j)	Al X
$B_{22} =$	$-x_{10} \mathbf{a}_1 + z_{10} \mathbf{a}_3$	$=$	$-ax_{10} \hat{\mathbf{x}} + cz_{10} \hat{\mathbf{z}}$	(4j)	Al X
$B_{23} =$	$-x_{10} \mathbf{a}_2 - z_{10} \mathbf{a}_3$	$=$	$-ax_{10} \hat{\mathbf{y}} - cz_{10} \hat{\mathbf{z}}$	(4j)	Al X
$B_{24} =$	$x_{10} \mathbf{a}_2 - z_{10} \mathbf{a}_3$	$=$	$ax_{10} \hat{\mathbf{y}} - cz_{10} \hat{\mathbf{z}}$	(4j)	Al X
$B_{25} =$	$x_{11} \mathbf{a}_1 + z_{11} \mathbf{a}_3$	$=$	$ax_{11} \hat{\mathbf{x}} + cz_{11} \hat{\mathbf{z}}$	(4j)	O I
$B_{26} =$	$-x_{11} \mathbf{a}_1 + z_{11} \mathbf{a}_3$	$=$	$-ax_{11} \hat{\mathbf{x}} + cz_{11} \hat{\mathbf{z}}$	(4j)	O I
$B_{27} =$	$-x_{11} \mathbf{a}_2 - z_{11} \mathbf{a}_3$	$=$	$-ax_{11} \hat{\mathbf{y}} - cz_{11} \hat{\mathbf{z}}$	(4j)	O I
$B_{28} =$	$x_{11} \mathbf{a}_2 - z_{11} \mathbf{a}_3$	$=$	$ax_{11} \hat{\mathbf{y}} - cz_{11} \hat{\mathbf{z}}$	(4j)	O I
$B_{29} =$	$x_{12} \mathbf{a}_1 + z_{12} \mathbf{a}_3$	$=$	$ax_{12} \hat{\mathbf{x}} + cz_{12} \hat{\mathbf{z}}$	(4j)	O II
$B_{30} =$	$-x_{12} \mathbf{a}_1 + z_{12} \mathbf{a}_3$	$=$	$-ax_{12} \hat{\mathbf{x}} + cz_{12} \hat{\mathbf{z}}$	(4j)	O II
$B_{31} =$	$-x_{12} \mathbf{a}_2 - z_{12} \mathbf{a}_3$	$=$	$-ax_{12} \hat{\mathbf{y}} - cz_{12} \hat{\mathbf{z}}$	(4j)	O II
$B_{32} =$	$x_{12} \mathbf{a}_2 - z_{12} \mathbf{a}_3$	$=$	$ax_{12} \hat{\mathbf{y}} - cz_{12} \hat{\mathbf{z}}$	(4j)	O II
$B_{33} =$	$x_{13} \mathbf{a}_1 + z_{13} \mathbf{a}_3$	$=$	$ax_{13} \hat{\mathbf{x}} + cz_{13} \hat{\mathbf{z}}$	(4j)	O III
$B_{34} =$	$-x_{13} \mathbf{a}_1 + z_{13} \mathbf{a}_3$	$=$	$-ax_{13} \hat{\mathbf{x}} + cz_{13} \hat{\mathbf{z}}$	(4j)	O III
$B_{35} =$	$-x_{13} \mathbf{a}_2 - z_{13} \mathbf{a}_3$	$=$	$-ax_{13} \hat{\mathbf{y}} - cz_{13} \hat{\mathbf{z}}$	(4j)	O III
$B_{36} =$	$x_{13} \mathbf{a}_2 - z_{13} \mathbf{a}_3$	$=$	$ax_{13} \hat{\mathbf{y}} - cz_{13} \hat{\mathbf{z}}$	(4j)	O III
$B_{37} =$	$x_{14} \mathbf{a}_1 + z_{14} \mathbf{a}_3$	$=$	$ax_{14} \hat{\mathbf{x}} + cz_{14} \hat{\mathbf{z}}$	(4j)	O IV
$B_{38} =$	$-x_{14} \mathbf{a}_1 + z_{14} \mathbf{a}_3$	$=$	$-ax_{14} \hat{\mathbf{x}} + cz_{14} \hat{\mathbf{z}}$	(4j)	O IV
$B_{39} =$	$-x_{14} \mathbf{a}_2 - z_{14} \mathbf{a}_3$	$=$	$-ax_{14} \hat{\mathbf{y}} - cz_{14} \hat{\mathbf{z}}$	(4j)	O IV
$B_{40} =$	$x_{14} \mathbf{a}_2 - z_{14} \mathbf{a}_3$	$=$	$ax_{14} \hat{\mathbf{y}} - cz_{14} \hat{\mathbf{z}}$	(4j)	O IV
$B_{41} =$	$x_{15} \mathbf{a}_1 + z_{15} \mathbf{a}_3$	$=$	$ax_{15} \hat{\mathbf{x}} + cz_{15} \hat{\mathbf{z}}$	(4j)	O V
$B_{42} =$	$-x_{15} \mathbf{a}_1 + z_{15} \mathbf{a}_3$	$=$	$-ax_{15} \hat{\mathbf{x}} + cz_{15} \hat{\mathbf{z}}$	(4j)	O V
$B_{43} =$	$-x_{15} \mathbf{a}_2 - z_{15} \mathbf{a}_3$	$=$	$-ax_{15} \hat{\mathbf{y}} - cz_{15} \hat{\mathbf{z}}$	(4j)	O V
$B_{44} =$	$x_{15} \mathbf{a}_2 - z_{15} \mathbf{a}_3$	$=$	$ax_{15} \hat{\mathbf{y}} - cz_{15} \hat{\mathbf{z}}$	(4j)	O V
$B_{45} =$	$x_{16} \mathbf{a}_1 + z_{16} \mathbf{a}_3$	$=$	$ax_{16} \hat{\mathbf{x}} + cz_{16} \hat{\mathbf{z}}$	(4j)	O VI
$B_{46} =$	$-x_{16} \mathbf{a}_1 + z_{16} \mathbf{a}_3$	$=$	$-ax_{16} \hat{\mathbf{x}} + cz_{16} \hat{\mathbf{z}}$	(4j)	O VI
$B_{47} =$	$-x_{16} \mathbf{a}_2 - z_{16} \mathbf{a}_3$	$=$	$-ax_{16} \hat{\mathbf{y}} - cz_{16} \hat{\mathbf{z}}$	(4j)	O VI
$B_{48} =$	$x_{16} \mathbf{a}_2 - z_{16} \mathbf{a}_3$	$=$	$ax_{16} \hat{\mathbf{y}} - cz_{16} \hat{\mathbf{z}}$	(4j)	O VI
$B_{49} =$	$x_{17} \mathbf{a}_1 + \frac{1}{2} \mathbf{a}_2 + z_{17} \mathbf{a}_3$	$=$	$ax_{17} \hat{\mathbf{x}} + \frac{1}{2} a \hat{\mathbf{y}} + cz_{17} \hat{\mathbf{z}}$	(4k)	Al XI
$B_{50} =$	$-x_{17} \mathbf{a}_1 + \frac{1}{2} \mathbf{a}_2 + z_{17} \mathbf{a}_3$	$=$	$-ax_{17} \hat{\mathbf{x}} + \frac{1}{2} a \hat{\mathbf{y}} + cz_{17} \hat{\mathbf{z}}$	(4k)	Al XI
$B_{51} =$	$\frac{1}{2} \mathbf{a}_1 - x_{17} \mathbf{a}_2 - z_{17} \mathbf{a}_3$	$=$	$\frac{1}{2} a \hat{\mathbf{x}} - ax_{17} \hat{\mathbf{y}} - cz_{17} \hat{\mathbf{z}}$	(4k)	Al XI
$B_{52} =$	$\frac{1}{2} \mathbf{a}_1 + x_{17} \mathbf{a}_2 - z_{17} \mathbf{a}_3$	$=$	$\frac{1}{2} a \hat{\mathbf{x}} + ax_{17} \hat{\mathbf{y}} - cz_{17} \hat{\mathbf{z}}$	(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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