$AlPO_4$-54 Structure: AB2_hP108_193_kl_fg2ijl-001

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https://aflow.org/prototype-encyclopedia/UU4R

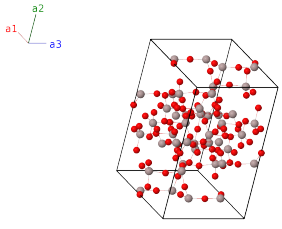
https://aflow.org/prototype-encyclopedia/AB2_hP108_193_kl_fg2ijl-001

Prototype	AlO_4P
AFLOW prototype label	AB2_hP108_193_kl_fg2ijl-001
ICSD	40272
CCDC	1610141
Pearson symbol	hP108
Space group number	193
Space group symbol	$P6_3/mcm$
AFLOW prototype command	`aflow --proto=AB2_hP108_193_kl_fg2ijl-001 --params=`$a, c/a, x_2, x_3, x_4, x_5, y_5, x_6, z_6, x_7, y_7, z_7, x_8, y_8, z_8$

- We take the label $AlPO_4$-54 from (Withers, 2005).
- Related structures can be found on the silica and aluminum phosphate page.
- The (12k) and (24l) sites are a 50-50 mixture of aluminium and phosphorous. We arbitarily label them as aluminum.

Hexagonal primitive vectors

$$\mathbf{a_1} = \frac{1}{2}a\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,\hat{\mathbf{y}}$$
$$\mathbf{a_2} = \frac{1}{2}a\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,\hat{\mathbf{y}}$$
$$\mathbf{a_3} = c\,\hat{\mathbf{z}}$$



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	=	$\frac{1}{2}\,\mathbf{a}_1$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{4}a\,\hat{\mathbf{y}}$	(6f)	O I
$\mathbf{B_2}$	=	$\frac{1}{2}\,\mathbf{a}_2$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{4}a\,\hat{\mathbf{y}}$	(6f)	O I
$\mathbf{B_3}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2$	=	$\frac{1}{2}a\,\hat{\mathbf{x}}$	(6f)	O I
$\mathbf{B_4}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{4}a\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6f)	O I

$\mathbf{B_5}$	=	$\frac{1}{2}\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{4}a\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6f)	O I
$\mathbf{B_6}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6f)	O I
$\mathbf{B_7}$	=	$x_2\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}ax_2\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_2\,\hat{\mathbf{y}} + \frac{1}{4}c\,\hat{\mathbf{z}}$	(6g)	O II
$\mathbf{B_8}$	=	$x_2\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}ax_2\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_2\,\hat{\mathbf{y}} + \frac{1}{4}c\,\hat{\mathbf{z}}$	(6g)	O II
$\mathbf{B_9}$	=	$-x_2\,\mathbf{a}_1 - x_2\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$-ax_2\,\hat{\mathbf{x}} + \frac{1}{4}c\,\hat{\mathbf{z}}$	(6g)	O II
$\mathbf{B_{10}}$	=	$-x_2\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_3$	=	$-\frac{1}{2}ax_2\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_2\,\hat{\mathbf{y}} + \frac{3}{4}c\,\hat{\mathbf{z}}$	(6g)	O II
$\mathbf{B_{11}}$	=	$-x_2\,\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3$	=	$-\frac{1}{2}ax_2\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_2\,\hat{\mathbf{y}} + \frac{3}{4}c\,\hat{\mathbf{z}}$	(6g)	O II
$\mathbf{B_{12}}$	=	$x_2\,\mathbf{a}_1 + x_2\,\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3$	=	$ax_2\,\hat{\mathbf{x}} + \frac{3}{4}c\,\hat{\mathbf{z}}$	(6g)	O II
$\mathbf{B_{13}}$	=	$x_3\,\mathbf{a}_1 + 2x_3\,\mathbf{a}_2$	=	$\frac{3}{2}ax_3\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_3\,\hat{\mathbf{y}}$	(12i)	O III
$\mathbf{B_{14}}$	=	$-2x_3\,\mathbf{a}_1 - x_3\,\mathbf{a}_2$	=	$-\frac{3}{2}ax_3\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_3\,\hat{\mathbf{y}}$	(12i)	O III
$\mathbf{B_{15}}$	=	$x_3\,\mathbf{a}_1 - x_3\,\mathbf{a}_2$	=	$-\sqrt{3}ax_3\,\hat{\mathbf{y}}$	(12i)	O III
$\mathbf{B_{16}}$	=	$-x_3\,\mathbf{a}_1 - 2x_3\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-\frac{3}{2}ax_3\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_3\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O III
$\mathbf{B_{17}}$	=	$2x_3\,\mathbf{a}_1 + x_3\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{3}{2}ax_3\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_3\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O III
$\mathbf{B_{18}}$	=	$-x_3\,\mathbf{a}_1 + x_3\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\sqrt{3}ax_3\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O III
$\mathbf{B_{19}}$	=	$-x_3\,\mathbf{a}_1 - 2x_3\,\mathbf{a}_2$	=	$-\frac{3}{2}ax_3\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_3\,\hat{\mathbf{y}}$	(12i)	O III
$\mathbf{B_{20}}$	=	$2x_3\,\mathbf{a}_1 + x_3\,\mathbf{a}_2$	=	$\frac{3}{2}ax_3\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_3\,\hat{\mathbf{y}}$	(12i)	O III
$\mathbf{B_{21}}$	=	$-x_3\,\mathbf{a}_1 + x_3\,\mathbf{a}_2$	=	$\sqrt{3}ax_3\,\hat{\mathbf{y}}$	(12i)	O III
$\mathbf{B_{22}}$	=	$x_3\,\mathbf{a}_1 + 2x_3\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{3}{2}ax_3\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_3\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O III
$\mathbf{B_{23}}$	=	$-2x_3\,\mathbf{a}_1 - x_3\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-\frac{3}{2}ax_3\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_3\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O III
$\mathbf{B_{24}}$	=	$x_3\,\mathbf{a}_1 - x_3\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-\sqrt{3}ax_3\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O III
$\mathbf{B_{25}}$	=	$x_4\,\mathbf{a}_1 + 2x_4\,\mathbf{a}_2$	=	$\frac{3}{2}ax_4\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_4\,\hat{\mathbf{y}}$	(12i)	O IV
$\mathbf{B_{26}}$	=	$-2x_4\,\mathbf{a}_1 - x_4\,\mathbf{a}_2$	=	$-\frac{3}{2}ax_4\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_4\,\hat{\mathbf{y}}$	(12i)	O IV
$\mathbf{B_{27}}$	=	$x_4\,\mathbf{a}_1 - x_4\,\mathbf{a}_2$	=	$-\sqrt{3}ax_4\,\hat{\mathbf{y}}$	(12i)	O IV
$\mathbf{B_{28}}$	=	$-x_4\,\mathbf{a}_1 - 2x_4\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-\frac{3}{2}ax_4\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_4\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O IV
$\mathbf{B_{29}}$	=	$2x_4\,\mathbf{a}_1 + x_4\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{3}{2}ax_4\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_4\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O IV
$\mathbf{B_{30}}$	=	$-x_4\,\mathbf{a}_1 + x_4\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\sqrt{3}ax_4\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O IV
$\mathbf{B_{31}}$	=	$-x_4\,\mathbf{a}_1 - 2x_4\,\mathbf{a}_2$	=	$-\frac{3}{2}ax_4\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_4\,\hat{\mathbf{y}}$	(12i)	O IV
$\mathbf{B_{32}}$	=	$2x_4\,\mathbf{a}_1 + x_4\,\mathbf{a}_2$	=	$\frac{3}{2}ax_4\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_4\,\hat{\mathbf{y}}$	(12i)	O IV
$\mathbf{B_{33}}$	=	$-x_4\,\mathbf{a}_1 + x_4\,\mathbf{a}_2$	=	$\sqrt{3}ax_4\,\hat{\mathbf{y}}$	(12i)	O IV
$\mathbf{B_{34}}$	=	$x_4\,\mathbf{a}_1 + 2x_4\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{3}{2}ax_4\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_4\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O IV
$\mathbf{B_{35}}$	=	$-2x_4\,\mathbf{a}_1 - x_4\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-\frac{3}{2}ax_4\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_4\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O IV
$\mathbf{B_{36}}$	=	$x_4\,\mathbf{a}_1 - x_4\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$-\sqrt{3}ax_4\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(12i)	O IV
$\mathbf{B_{37}}$	=	$x_5\,\mathbf{a}_1 + y_5\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(x_5 + y_5)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_5 - y_5)\,\hat{\mathbf{y}} + \frac{1}{4}c\,\hat{\mathbf{z}}$	(12j)	O V
$\mathbf{B_{38}}$	=	$-y_5\,\mathbf{a}_1 + (x_5 - y_5)\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(x_5 - 2y_5)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_5\,\hat{\mathbf{y}} + \frac{1}{4}c\,\hat{\mathbf{z}}$	(12j)	O V
$\mathbf{B_{39}}$	=	$-(x_5 - y_5)\,\mathbf{a}_1 - x_5\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$-\frac{1}{2}a\,(2x_5 - y_5)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_5\,\hat{\mathbf{y}} + \frac{1}{4}c\,\hat{\mathbf{z}}$	(12j)	O V
$\mathbf{B_{40}}$	=	$-x_5\,\mathbf{a}_1 - y_5\,\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3$	=	$-\frac{1}{2}a\,(x_5 + y_5)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_5 - y_5)\,\hat{\mathbf{y}} + \frac{3}{4}c\,\hat{\mathbf{z}}$	(12j)	O V
$\mathbf{B_{41}}$	=	$y_5\,\mathbf{a}_1 - (x_5 - y_5)\,\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(-x_5 + 2y_5)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_5\,\hat{\mathbf{y}} + \frac{3}{4}c\,\hat{\mathbf{z}}$	(12j)	O V
$\mathbf{B_{42}}$	=	$(x_5 - y_5)\,\mathbf{a}_1 + x_5\,\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(2x_5 - y_5)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_5\,\hat{\mathbf{y}} + \frac{3}{4}c\,\hat{\mathbf{z}}$	(12j)	O V
$\mathbf{B_{43}}$	=	$y_5\,\mathbf{a}_1 + x_5\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(x_5 + y_5)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_5 - y_5)\,\hat{\mathbf{y}} + \frac{1}{4}c\,\hat{\mathbf{z}}$	(12j)	O V
$\mathbf{B_{44}}$	=	$(x_5 - y_5)\,\mathbf{a}_1 - y_5\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(x_5 - 2y_5)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_5\,\hat{\mathbf{y}} + \frac{1}{4}c\,\hat{\mathbf{z}}$	(12j)	O V
$\mathbf{B_{45}}$	=	$-x_5\,\mathbf{a}_1 - (x_5 - y_5)\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$-\frac{1}{2}a\,(2x_5 - y_5)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_5\,\hat{\mathbf{y}} + \frac{1}{4}c\,\hat{\mathbf{z}}$	(12j)	O V

$$
\begin{array}{lcccccc}
\mathbf{B_{46}} & = & -y_5\,\mathbf{a}_1 - x_5\,\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3 & = & -\frac{1}{2}a\,(x_5+y_5)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_5-y_5)\;\hat{\mathbf{y}} + \frac{3}{4}c\,\hat{\mathbf{z}} & \text{(12j)} & \text{O V} \\
\mathbf{B_{47}} & = & -\,(x_5-y_5)\;\mathbf{a}_1 + y_5\,\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3 & = & \frac{1}{2}a\,(-x_5+2y_5)\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_5\,\hat{\mathbf{y}} + \frac{3}{4}c\,\hat{\mathbf{z}} & \text{(12j)} & \text{O V} \\
\mathbf{B_{48}} & = & x_5\,\mathbf{a}_1 + (x_5-y_5)\;\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3 & = & \frac{1}{2}a\,(2x_5-y_5)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_5\,\hat{\mathbf{y}} + \frac{3}{4}c\,\hat{\mathbf{z}} & \text{(12j)} & \text{O V} \\
\mathbf{B_{49}} & = & x_6\,\mathbf{a}_1 + z_6\,\mathbf{a}_3 & = & \frac{1}{2}ax_6\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_6\,\hat{\mathbf{y}} + cz_6\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{50}} & = & x_6\,\mathbf{a}_2 + z_6\,\mathbf{a}_3 & = & \frac{1}{2}ax_6\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_6\,\hat{\mathbf{y}} + cz_6\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{51}} & = & -x_6\,\mathbf{a}_1 - x_6\,\mathbf{a}_2 + z_6\,\mathbf{a}_3 & = & -ax_6\,\hat{\mathbf{x}} + cz_6\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{52}} & = & -x_6\,\mathbf{a}_1 + \left(z_6+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -\frac{1}{2}ax_6\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_6\,\hat{\mathbf{y}} + c\left(z_6+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{53}} & = & -x_6\,\mathbf{a}_2 + \left(z_6+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -\frac{1}{2}ax_6\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_6\,\hat{\mathbf{y}} + c\left(z_6+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{54}} & = & x_6\,\mathbf{a}_1 + x_6\,\mathbf{a}_2 + \left(z_6+\frac{1}{2}\right)\,\mathbf{a}_3 & = & ax_6\,\hat{\mathbf{x}} + c\left(z_6+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{55}} & = & x_6\,\mathbf{a}_2 - \left(z_6-\frac{1}{2}\right)\,\mathbf{a}_3 & = & \frac{1}{2}ax_6\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_6\,\hat{\mathbf{y}} - c\left(z_6-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{56}} & = & x_6\,\mathbf{a}_1 - \left(z_6-\frac{1}{2}\right)\,\mathbf{a}_3 & = & \frac{1}{2}ax_6\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_6\,\hat{\mathbf{y}} - c\left(z_6-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{57}} & = & -x_6\,\mathbf{a}_1 - x_6\,\mathbf{a}_2 - \left(z_6-\frac{1}{2}\right)\,\mathbf{a}_3 & = & -ax_6\,\hat{\mathbf{x}} - c\left(z_6-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{58}} & = & -x_6\,\mathbf{a}_2 - z_6\,\mathbf{a}_3 & = & -\frac{1}{2}ax_6\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_6\,\hat{\mathbf{y}} - cz_6\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{59}} & = & -x_6\,\mathbf{a}_1 - z_6\,\mathbf{a}_3 & = & -\frac{1}{2}ax_6\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_6\,\hat{\mathbf{y}} - cz_6\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{60}} & = & x_6\,\mathbf{a}_1 + x_6\,\mathbf{a}_2 - z_6\,\mathbf{a}_3 & = & ax_6\,\hat{\mathbf{x}} - cz_6\,\hat{\mathbf{z}} & \text{(12k)} & \text{Al I} \\
\mathbf{B_{61}} & = & x_7\,\mathbf{a}_1 + y_7\,\mathbf{a}_2 + z_7\,\mathbf{a}_3 & = & \frac{1}{2}a\,(x_7+y_7)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_7-y_7)\;\hat{\mathbf{y}} + cz_7\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{62}} & = & -y_7\,\mathbf{a}_1 + (x_7-y_7)\;\mathbf{a}_2 + z_7\,\mathbf{a}_3 & = & \frac{1}{2}a\,(x_7-2y_7)\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_7\,\hat{\mathbf{y}} + cz_7\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{63}} & = & -\,(x_7-y_7)\;\mathbf{a}_1 - x_7\,\mathbf{a}_2 + z_7\,\mathbf{a}_3 & = & -\frac{1}{2}a\,(2x_7-y_7)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_7\,\hat{\mathbf{y}} + cz_7\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{64}} & = & -x_7\,\mathbf{a}_1 - y_7\,\mathbf{a}_2 + \left(z_7+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -\frac{1}{2}a\,(x_7+y_7)\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_7-y_7)\;\hat{\mathbf{y}} + c\left(z_7+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{65}} & = & y_7\,\mathbf{a}_1 - (x_7-y_7)\;\mathbf{a}_2 + \left(z_7+\frac{1}{2}\right)\,\mathbf{a}_3 & = & \frac{1}{2}a\,(-x_7+2y_7)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_7\,\hat{\mathbf{y}} + c\left(z_7+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{66}} & = & (x_7-y_7)\;\mathbf{a}_1 + x_7\,\mathbf{a}_2 + \left(z_7+\frac{1}{2}\right)\,\mathbf{a}_3 & = & \frac{1}{2}a\,(2x_7-y_7)\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_7\,\hat{\mathbf{y}} + c\left(z_7+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{67}} & = & y_7\,\mathbf{a}_1 + x_7\,\mathbf{a}_2 - \left(z_7-\frac{1}{2}\right)\,\mathbf{a}_3 & = & \frac{1}{2}a\,(x_7+y_7)\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_7-y_7)\;\hat{\mathbf{y}} - c\left(z_7-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{68}} & = & (x_7-y_7)\;\mathbf{a}_1 - y_7\,\mathbf{a}_2 - \left(z_7-\frac{1}{2}\right)\,\mathbf{a}_3 & = & \frac{1}{2}a\,(x_7-2y_7)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_7\,\hat{\mathbf{y}} - c\left(z_7-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{69}} & = & -x_7\,\mathbf{a}_1 - (x_7-y_7)\;\mathbf{a}_2 - \left(z_7-\frac{1}{2}\right)\,\mathbf{a}_3 & = & -\frac{1}{2}a\,(2x_7-y_7)\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_7\,\hat{\mathbf{y}} - c\left(z_7-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{70}} & = & -y_7\,\mathbf{a}_1 - x_7\,\mathbf{a}_2 - z_7\,\mathbf{a}_3 & = & -\frac{1}{2}a\,(x_7+y_7)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_7-y_7)\;\hat{\mathbf{y}} - cz_7\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{71}} & = & -\,(x_7-y_7)\;\mathbf{a}_1 + y_7\,\mathbf{a}_2 - z_7\,\mathbf{a}_3 & = & \frac{1}{2}a\,(-x_7+2y_7)\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_7\,\hat{\mathbf{y}} - cz_7\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{72}} & = & x_7\,\mathbf{a}_1 + (x_7-y_7)\;\mathbf{a}_2 - z_7\,\mathbf{a}_3 & = & \frac{1}{2}a\,(2x_7-y_7)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_7\,\hat{\mathbf{y}} - cz_7\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{73}} & = & -x_7\,\mathbf{a}_1 - y_7\,\mathbf{a}_2 - z_7\,\mathbf{a}_3 & = & -\frac{1}{2}a\,(x_7+y_7)\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_7-y_7)\;\hat{\mathbf{y}} - cz_7\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{74}} & = & y_7\,\mathbf{a}_1 - (x_7-y_7)\;\mathbf{a}_2 - z_7\,\mathbf{a}_3 & = & \frac{1}{2}a\,(-x_7+2y_7)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_7\,\hat{\mathbf{y}} - cz_7\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{75}} & = & (x_7-y_7)\;\mathbf{a}_1 + x_7\,\mathbf{a}_2 - z_7\,\mathbf{a}_3 & = & \frac{1}{2}a\,(2x_7-y_7)\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_7\,\hat{\mathbf{y}} - cz_7\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{76}} & = & x_7\,\mathbf{a}_1 + y_7\,\mathbf{a}_2 - \left(z_7-\frac{1}{2}\right)\,\mathbf{a}_3 & = & \frac{1}{2}a\,(x_7+y_7)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_7-y_7)\;\hat{\mathbf{y}} - c\left(z_7-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{77}} & = & -y_7\,\mathbf{a}_1 + (x_7-y_7)\;\mathbf{a}_2 - \left(z_7-\frac{1}{2}\right)\,\mathbf{a}_3 & = & \frac{1}{2}a\,(x_7-2y_7)\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_7\,\hat{\mathbf{y}} - c\left(z_7-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{78}} & = & -\,(x_7-y_7)\;\mathbf{a}_1 - x_7\,\mathbf{a}_2 - \left(z_7-\frac{1}{2}\right)\,\mathbf{a}_3 & = & -\frac{1}{2}a\,(2x_7-y_7)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_7\,\hat{\mathbf{y}} - c\left(z_7-\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{79}} & = & -y_7\,\mathbf{a}_1 - x_7\,\mathbf{a}_2 + \left(z_7+\frac{1}{2}\right)\,\mathbf{a}_3 & = & -\frac{1}{2}a\,(x_7+y_7)\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_7-y_7)\;\hat{\mathbf{y}} + c\left(z_7+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II} \\
\mathbf{B_{80}} & = & -\,(x_7-y_7)\;\mathbf{a}_1 + y_7\,\mathbf{a}_2 + \left(z_7+\frac{1}{2}\right)\,\mathbf{a}_3 & = & \frac{1}{2}a\,(-x_7+2y_7)\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_7\,\hat{\mathbf{y}} + c\left(z_7+\frac{1}{2}\right)\,\hat{\mathbf{z}} & \text{(24l)} & \text{Al II}
\end{array}
$$

$$\mathbf{B_{81}} = x_7\,\mathbf{a}_1+(x_7-y_7)\,\mathbf{a}_2+\left(z_7+\tfrac{1}{2}\right)\,\mathbf{a}_3 = \tfrac{1}{2}a\,(2x_7-y_7)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}ay_7\,\hat{\mathbf{y}}+c\left(z_7+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{Al II}$$

$$\mathbf{B_{82}} = y_7\,\mathbf{a}_1+x_7\,\mathbf{a}_2+z_7\,\mathbf{a}_3 = \tfrac{1}{2}a\,(x_7+y_7)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}a\,(x_7-y_7)\,\hat{\mathbf{y}}+cz_7\,\hat{\mathbf{z}} \quad (24l) \quad \text{Al II}$$

$$\mathbf{B_{83}} = (x_7-y_7)\,\mathbf{a}_1-y_7\,\mathbf{a}_2+z_7\,\mathbf{a}_3 = \tfrac{1}{2}a\,(x_7-2y_7)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}ax_7\,\hat{\mathbf{y}}+cz_7\,\hat{\mathbf{z}} \quad (24l) \quad \text{Al II}$$

$$\mathbf{B_{84}} = -x_7\,\mathbf{a}_1-(x_7-y_7)\,\mathbf{a}_2+z_7\,\mathbf{a}_3 = -\tfrac{1}{2}a\,(2x_7-y_7)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}ay_7\,\hat{\mathbf{y}}+cz_7\,\hat{\mathbf{z}} \quad (24l) \quad \text{Al II}$$

$$\mathbf{B_{85}} = x_8\,\mathbf{a}_1+y_8\,\mathbf{a}_2+z_8\,\mathbf{a}_3 = \tfrac{1}{2}a\,(x_8+y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}a\,(x_8-y_8)\,\hat{\mathbf{y}}+cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{86}} = -y_8\,\mathbf{a}_1+(x_8-y_8)\,\mathbf{a}_2+z_8\,\mathbf{a}_3 = \tfrac{1}{2}a\,(x_8-2y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}}+cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{87}} = -(x_8-y_8)\,\mathbf{a}_1-x_8\,\mathbf{a}_2+z_8\,\mathbf{a}_3 = -\tfrac{1}{2}a\,(2x_8-y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}}+cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{88}} = -x_8\,\mathbf{a}_1-y_8\,\mathbf{a}_2+\left(z_8+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -\tfrac{1}{2}a\,(x_8+y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}a\,(x_8-y_8)\,\hat{\mathbf{y}}+c\left(z_8+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{89}} = y_8\,\mathbf{a}_1-(x_8-y_8)\,\mathbf{a}_2+\left(z_8+\tfrac{1}{2}\right)\,\mathbf{a}_3 = \tfrac{1}{2}a\,(-x_8+2y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}}+c\left(z_8+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{90}} = (x_8-y_8)\,\mathbf{a}_1+x_8\,\mathbf{a}_2+\left(z_8+\tfrac{1}{2}\right)\,\mathbf{a}_3 = \tfrac{1}{2}a\,(2x_8-y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}}+c\left(z_8+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{91}} = y_8\,\mathbf{a}_1+x_8\,\mathbf{a}_2-\left(z_8-\tfrac{1}{2}\right)\,\mathbf{a}_3 = \tfrac{1}{2}a\,(x_8+y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}a\,(x_8-y_8)\,\hat{\mathbf{y}}-c\left(z_8-\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{92}} = (x_8-y_8)\,\mathbf{a}_1-y_8\,\mathbf{a}_2-\left(z_8-\tfrac{1}{2}\right)\,\mathbf{a}_3 = \tfrac{1}{2}a\,(x_8-2y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}}-c\left(z_8-\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{93}} = -x_8\,\mathbf{a}_1-(x_8-y_8)\,\mathbf{a}_2-\left(z_8-\tfrac{1}{2}\right)\,\mathbf{a}_3 = -\tfrac{1}{2}a\,(2x_8-y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}}-c\left(z_8-\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{94}} = -y_8\,\mathbf{a}_1-x_8\,\mathbf{a}_2-z_8\,\mathbf{a}_3 = -\tfrac{1}{2}a\,(x_8+y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}a\,(x_8-y_8)\,\hat{\mathbf{y}}-cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{95}} = -(x_8-y_8)\,\mathbf{a}_1+y_8\,\mathbf{a}_2-z_8\,\mathbf{a}_3 = \tfrac{1}{2}a\,(-x_8+2y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}}-cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{96}} = x_8\,\mathbf{a}_1+(x_8-y_8)\,\mathbf{a}_2-z_8\,\mathbf{a}_3 = \tfrac{1}{2}a\,(2x_8-y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}}-cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{97}} = -x_8\,\mathbf{a}_1-y_8\,\mathbf{a}_2-z_8\,\mathbf{a}_3 = -\tfrac{1}{2}a\,(x_8+y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}a\,(x_8-y_8)\,\hat{\mathbf{y}}-cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{98}} = y_8\,\mathbf{a}_1-(x_8-y_8)\,\mathbf{a}_2-z_8\,\mathbf{a}_3 = \tfrac{1}{2}a\,(-x_8+2y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}}-cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{99}} = (x_8-y_8)\,\mathbf{a}_1+x_8\,\mathbf{a}_2-z_8\,\mathbf{a}_3 = \tfrac{1}{2}a\,(2x_8-y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}}-cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{100}} = x_8\,\mathbf{a}_1+y_8\,\mathbf{a}_2-\left(z_8-\tfrac{1}{2}\right)\,\mathbf{a}_3 = \tfrac{1}{2}a\,(x_8+y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}a\,(x_8-y_8)\,\hat{\mathbf{y}}-c\left(z_8-\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{101}} = -y_8\,\mathbf{a}_1+(x_8-y_8)\,\mathbf{a}_2-\left(z_8-\tfrac{1}{2}\right)\,\mathbf{a}_3 = \tfrac{1}{2}a\,(x_8-2y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}}-c\left(z_8-\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{102}} = -(x_8-y_8)\,\mathbf{a}_1-x_8\,\mathbf{a}_2-\left(z_8-\tfrac{1}{2}\right)\,\mathbf{a}_3 = -\tfrac{1}{2}a\,(2x_8-y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}}-c\left(z_8-\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{103}} = -y_8\,\mathbf{a}_1-x_8\,\mathbf{a}_2+\left(z_8+\tfrac{1}{2}\right)\,\mathbf{a}_3 = -\tfrac{1}{2}a\,(x_8+y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}a\,(x_8-y_8)\,\hat{\mathbf{y}}+c\left(z_8+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{104}} = -(x_8-y_8)\,\mathbf{a}_1+y_8\,\mathbf{a}_2+\left(z_8+\tfrac{1}{2}\right)\,\mathbf{a}_3 = \tfrac{1}{2}a\,(-x_8+2y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}}+c\left(z_8+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{105}} = x_8\,\mathbf{a}_1+(x_8-y_8)\,\mathbf{a}_2+\left(z_8+\tfrac{1}{2}\right)\,\mathbf{a}_3 = \tfrac{1}{2}a\,(2x_8-y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}}+c\left(z_8+\tfrac{1}{2}\right)\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{106}} = y_8\,\mathbf{a}_1+x_8\,\mathbf{a}_2+z_8\,\mathbf{a}_3 = \tfrac{1}{2}a\,(x_8+y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}a\,(x_8-y_8)\,\hat{\mathbf{y}}+cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{107}} = (x_8-y_8)\,\mathbf{a}_1-y_8\,\mathbf{a}_2+z_8\,\mathbf{a}_3 = \tfrac{1}{2}a\,(x_8-2y_8)\,\hat{\mathbf{x}}-\tfrac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}}+cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

$$\mathbf{B_{108}} = -x_8\,\mathbf{a}_1-(x_8-y_8)\,\mathbf{a}_2+z_8\,\mathbf{a}_3 = -\tfrac{1}{2}a\,(2x_8-y_8)\,\hat{\mathbf{x}}+\tfrac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}}+cz_8\,\hat{\mathbf{z}} \quad (24l) \quad \text{O VI}$$

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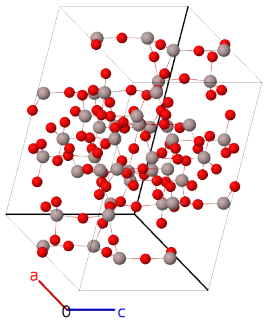
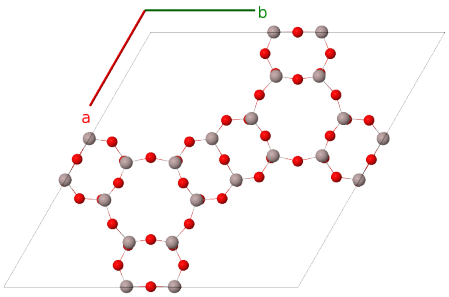
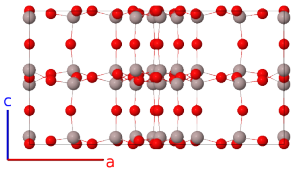
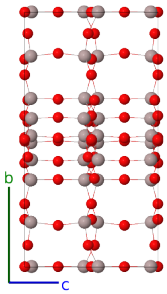
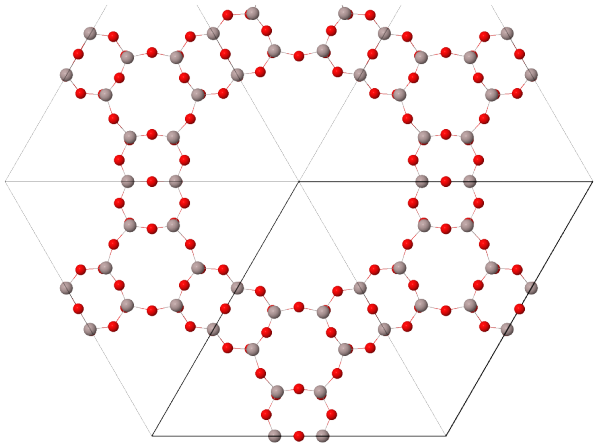
Al
O

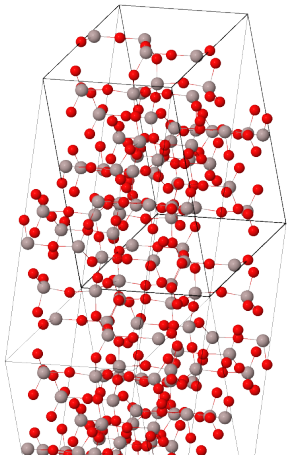












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