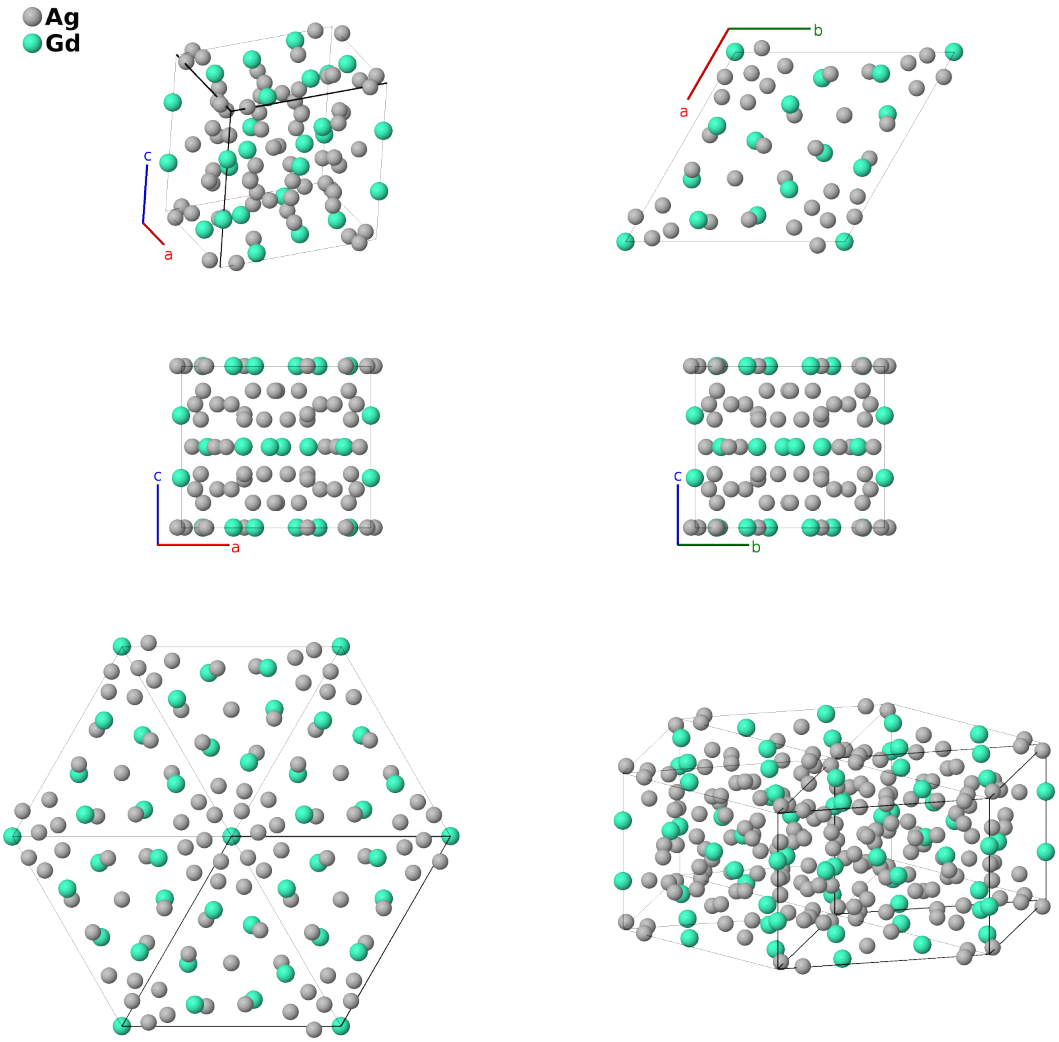
$Ag_{51}Gd_{14}$ Structure: A27B7_hP68_175_chjk3l_ejk-001

Cite this page as: H. Eckert, S. Divilov, A. Zettel, M. J. Mehl, D. Hicks, and S. Curtarolo, *The AFLOW Library of Crystallographic Prototypes: Part 4*. In preparation.

https://aflow.org/p/V9AH

https://aflow.org/p/A27B7_hP68_175_chjk3l_ejk-001



Prototype	$Ag_{51}Gd_{14}$
AFLOW prototype label	A27B7_hP68_175_chjk3l_ejk-001
ICSD	9085
Pearson symbol	hP68
Space group number	175
Space group symbol	$P6/m$
AFLOW prototype command	`aflow --proto=A27B7_hP68_175_chjk3l_ejk-001 --params=`$a, c/a, z_2, z_3, x_4, y_4, x_5, y_5, x_6, y_6, x_7, y_7, x_8, y_8, z_8, x_9, y_9, z_9, x_{10}, y_{10}, z_{10}$

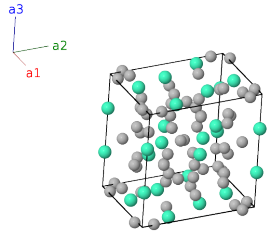
Other compounds with this structure

$Ag_{51}Ce_{14}$, $Ag_{51}Dy_{14}$, $Ag_{51}Er_{14}$, $Ag_{51}Ho_{14}$, $Ag_{51}La_{14}$, $Ag_{51}Nd_{14}$, $Ag_{51}Pr_{14}$, $Ag_{51}Pu_{14}$, $Ag_{51}Sm_{14}$, $Ag_{51}Tb_{14}$, $Ag_{51}Th_{14}$, $Ag_{51}Y_{14}$, $Au_{51}Ce_{14}$, $Au_{51}Dy_{14}$, $Au_{51}Gd_{14}$, $Au_{51}Ho_{14}$, $Au_{51}La_{14}$, $Au_{51}Pd_{14}$, $Au_{51}Pr_{14}$, $Au_{51}Sm_{14}$, $Au_{51}Tb_{14}$, $Au_{51}Th_{14}$, $Au_{51}U_{14}$, $Au_{51}Y_{14}$, $Cd_{51}Cu_{14}$, $Cd_{51}Eu_{14}$, $Cd_{51}Hg_{14}$, $Cd_{51}Th_{14}$, $Cd_{51}Yb_{14}$, $Cu_{51}Hf_{14}$, $Cu_{51}Th_{14}$, $Cu_{51}Zr_{14}$, $Hg_{51}Eu_{14}$, $Hg_{51}Sr_{14}$, $Hg_{51}Yb_{14}$, $Ag_9Au_{42}U_{14}$, $Au_{42}Cu_9U_{14}$, $Au_{51}Th_7U_7$, $Cu_9Au_{42}U_{14}$, $Cu_{38}Ga_{13}Lu_{14}$, $Cu_{46}Ga_5U_{14}$, $Cu_{40}Ga_{11}Er_{14}$

- This is often referred to as $Ag_{3.6}Gd$. Sources such as (Wang, 2008) list this as $Ag_{51}Gd_{14}$, but the exact stoichiometry depends on the occupation of the Ag-III (6j) site. If this site is half-filled we get the preferred stoichiometry. The Al (6j) sites are quite close together, forming a hexagon of side 1.57Å with second neighbors at 2.72Å. When the site is half filled it is likely that the three silver atoms form a triangle with side 2.57Å in one of the two allow orientations.

Hexagonal primitive vectors

$$\begin{aligned}\mathbf{a_1} &= \tfrac{1}{2}a\,\hat{\mathbf{x}} - \tfrac{\sqrt{3}}{2}a\,\hat{\mathbf{y}}\\ \mathbf{a_2} &= \tfrac{1}{2}a\,\hat{\mathbf{x}} + \tfrac{\sqrt{3}}{2}a\,\hat{\mathbf{y}}\\ \mathbf{a_3} &= c\,\hat{\mathbf{z}}\end{aligned}$$



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	=	$\frac{1}{3}\,\mathbf{a}_1 + \frac{2}{3}\,\mathbf{a}_2$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{6}a\,\hat{\mathbf{y}}$	(2c)	Ag I
$\mathbf{B_2}$	=	$\frac{2}{3}\,\mathbf{a}_1 + \frac{1}{3}\,\mathbf{a}_2$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{6}a\,\hat{\mathbf{y}}$	(2c)	Ag I
$\mathbf{B_3}$	=	$z_2\,\mathbf{a}_3$	=	$cz_2\,\hat{\mathbf{z}}$	(2e)	Gd I
$\mathbf{B_4}$	=	$-z_2\,\mathbf{a}_3$	=	$-cz_2\,\hat{\mathbf{z}}$	(2e)	Gd I
$\mathbf{B_5}$	=	$\frac{1}{3}\,\mathbf{a}_1 + \frac{2}{3}\,\mathbf{a}_2 + z_3\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{6}a\,\hat{\mathbf{y}} + cz_3\,\hat{\mathbf{z}}$	(4h)	Ag II
$\mathbf{B_6}$	=	$\frac{2}{3}\,\mathbf{a}_1 + \frac{1}{3}\,\mathbf{a}_2 + z_3\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{6}a\,\hat{\mathbf{y}} + cz_3\,\hat{\mathbf{z}}$	(4h)	Ag II
$\mathbf{B_7}$	=	$\frac{2}{3}\,\mathbf{a}_1 + \frac{1}{3}\,\mathbf{a}_2 - z_3\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{6}a\,\hat{\mathbf{y}} - cz_3\,\hat{\mathbf{z}}$	(4h)	Ag II
$\mathbf{B_8}$	=	$\frac{1}{3}\,\mathbf{a}_1 + \frac{2}{3}\,\mathbf{a}_2 - z_3\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{6}a\,\hat{\mathbf{y}} - cz_3\,\hat{\mathbf{z}}$	(4h)	Ag II
$\mathbf{B_9}$	=	$x_4\,\mathbf{a}_1 + y_4\,\mathbf{a}_2$	=	$\frac{1}{2}a\,(x_4 + y_4)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_4 - y_4)\,\hat{\mathbf{y}}$	(6j)	Ag III
$\mathbf{B_{10}}$	=	$-y_4\,\mathbf{a}_1 + (x_4 - y_4)\,\mathbf{a}_2$	=	$\frac{1}{2}a\,(x_4 - 2y_4)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_4\,\hat{\mathbf{y}}$	(6j)	Ag III
$\mathbf{B_{11}}$	=	$-(x_4 - y_4)\,\mathbf{a}_1 - x_4\,\mathbf{a}_2$	=	$-\frac{1}{2}a\,(2x_4 - y_4)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_4\,\hat{\mathbf{y}}$	(6j)	Ag III
$\mathbf{B_{12}}$	=	$-x_4\,\mathbf{a}_1 - y_4\,\mathbf{a}_2$	=	$-\frac{1}{2}a\,(x_4 + y_4)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_4 - y_4)\,\hat{\mathbf{y}}$	(6j)	Ag III
$\mathbf{B_{13}}$	=	$y_4\,\mathbf{a}_1 - (x_4 - y_4)\,\mathbf{a}_2$	=	$\frac{1}{2}a\,(-x_4 + 2y_4)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_4\,\hat{\mathbf{y}}$	(6j)	Ag III
$\mathbf{B_{14}}$	=	$(x_4 - y_4)\,\mathbf{a}_1 + x_4\,\mathbf{a}_2$	=	$\frac{1}{2}a\,(2x_4 - y_4)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_4\,\hat{\mathbf{y}}$	(6j)	Ag III
$\mathbf{B_{15}}$	=	$x_5\,\mathbf{a}_1 + y_5\,\mathbf{a}_2$	=	$\frac{1}{2}a\,(x_5 + y_5)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_5 - y_5)\,\hat{\mathbf{y}}$	(6j)	Gd II
$\mathbf{B_{16}}$	=	$-y_5\,\mathbf{a}_1 + (x_5 - y_5)\,\mathbf{a}_2$	=	$\frac{1}{2}a\,(x_5 - 2y_5)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_5\,\hat{\mathbf{y}}$	(6j)	Gd II
$\mathbf{B_{17}}$	=	$-(x_5 - y_5)\,\mathbf{a}_1 - x_5\,\mathbf{a}_2$	=	$-\frac{1}{2}a\,(2x_5 - y_5)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_5\,\hat{\mathbf{y}}$	(6j)	Gd II
$\mathbf{B_{18}}$	=	$-x_5\,\mathbf{a}_1 - y_5\,\mathbf{a}_2$	=	$-\frac{1}{2}a\,(x_5 + y_5)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_5 - y_5)\,\hat{\mathbf{y}}$	(6j)	Gd II
$\mathbf{B_{19}}$	=	$y_5\,\mathbf{a}_1 - (x_5 - y_5)\,\mathbf{a}_2$	=	$\frac{1}{2}a\,(-x_5 + 2y_5)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_5\,\hat{\mathbf{y}}$	(6j)	Gd II
$\mathbf{B_{20}}$	=	$(x_5 - y_5)\,\mathbf{a}_1 + x_5\,\mathbf{a}_2$	=	$\frac{1}{2}a\,(2x_5 - y_5)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_5\,\hat{\mathbf{y}}$	(6j)	Gd II
$\mathbf{B_{21}}$	=	$x_6\,\mathbf{a}_1 + y_6\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(x_6 + y_6)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_6 - y_6)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Ag IV
$\mathbf{B_{22}}$	=	$-y_6\,\mathbf{a}_1 + (x_6 - y_6)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(x_6 - 2y_6)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_6\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Ag IV

$\mathbf{B_{23}}$	$= -(x_6 - y_6)\,\mathbf{a}_1 - x_6\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(2x_6 - y_6)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_6\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Ag IV
$\mathbf{B_{24}}$	$= -x_6\,\mathbf{a}_1 - y_6\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(x_6 + y_6)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_6 - y_6)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Ag IV
$\mathbf{B_{25}}$	$= y_6\,\mathbf{a}_1 - (x_6 - y_6)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(-x_6 + 2y_6)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_6\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Ag IV
$\mathbf{B_{26}}$	$= (x_6 - y_6)\,\mathbf{a}_1 + x_6\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(2x_6 - y_6)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_6\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Ag IV
$\mathbf{B_{27}}$	$= x_7\,\mathbf{a}_1 + y_7\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_7 + y_7)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_7 - y_7)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Gd III
$\mathbf{B_{28}}$	$= -y_7\,\mathbf{a}_1 + (x_7 - y_7)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_7 - 2y_7)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_7\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Gd III
$\mathbf{B_{29}}$	$= -(x_7 - y_7)\,\mathbf{a}_1 - x_7\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(2x_7 - y_7)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_7\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Gd III
$\mathbf{B_{30}}$	$= -x_7\,\mathbf{a}_1 - y_7\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(x_7 + y_7)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_7 - y_7)\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Gd III
$\mathbf{B_{31}}$	$= y_7\,\mathbf{a}_1 - (x_7 - y_7)\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(-x_7 + 2y_7)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_7\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Gd III
$\mathbf{B_{32}}$	$= (x_7 - y_7)\,\mathbf{a}_1 + x_7\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(2x_7 - y_7)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_7\,\hat{\mathbf{y}} + \frac{1}{2}c\,\hat{\mathbf{z}}$	(6k)	Gd III
$\mathbf{B_{33}}$	$= x_8\,\mathbf{a}_1 + y_8\,\mathbf{a}_2 + z_8\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_8 + y_8)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_8 - y_8)\,\hat{\mathbf{y}} + cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{34}}$	$= -y_8\,\mathbf{a}_1 + (x_8 - y_8)\,\mathbf{a}_2 + z_8\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_8 - 2y_8)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}} + cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{35}}$	$= -(x_8 - y_8)\,\mathbf{a}_1 - x_8\,\mathbf{a}_2 + z_8\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(2x_8 - y_8)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}} + cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{36}}$	$= -x_8\,\mathbf{a}_1 - y_8\,\mathbf{a}_2 + z_8\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(x_8 + y_8)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_8 - y_8)\,\hat{\mathbf{y}} + cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{37}}$	$= y_8\,\mathbf{a}_1 - (x_8 - y_8)\,\mathbf{a}_2 + z_8\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(-x_8 + 2y_8)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}} + cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{38}}$	$= (x_8 - y_8)\,\mathbf{a}_1 + x_8\,\mathbf{a}_2 + z_8\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(2x_8 - y_8)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}} + cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{39}}$	$= -x_8\,\mathbf{a}_1 - y_8\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(x_8 + y_8)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_8 - y_8)\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{40}}$	$= y_8\,\mathbf{a}_1 - (x_8 - y_8)\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(-x_8 + 2y_8)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{41}}$	$= (x_8 - y_8)\,\mathbf{a}_1 + x_8\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(2x_8 - y_8)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{42}}$	$= x_8\,\mathbf{a}_1 + y_8\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_8 + y_8)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_8 - y_8)\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{43}}$	$= -y_8\,\mathbf{a}_1 + (x_8 - y_8)\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_8 - 2y_8)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_8\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{44}}$	$= -(x_8 - y_8)\,\mathbf{a}_1 - x_8\,\mathbf{a}_2 - z_8\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(2x_8 - y_8)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_8\,\hat{\mathbf{y}} - cz_8\,\hat{\mathbf{z}}$	(12l)	Ag V
$\mathbf{B_{45}}$	$= x_9\,\mathbf{a}_1 + y_9\,\mathbf{a}_2 + z_9\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_9 + y_9)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_9 - y_9)\,\hat{\mathbf{y}} + cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{46}}$	$= -y_9\,\mathbf{a}_1 + (x_9 - y_9)\,\mathbf{a}_2 + z_9\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_9 - 2y_9)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_9\,\hat{\mathbf{y}} + cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{47}}$	$= -(x_9 - y_9)\,\mathbf{a}_1 - x_9\,\mathbf{a}_2 + z_9\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(2x_9 - y_9)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_9\,\hat{\mathbf{y}} + cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{48}}$	$= -x_9\,\mathbf{a}_1 - y_9\,\mathbf{a}_2 + z_9\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(x_9 + y_9)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_9 - y_9)\,\hat{\mathbf{y}} + cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{49}}$	$= y_9\,\mathbf{a}_1 - (x_9 - y_9)\,\mathbf{a}_2 + z_9\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(-x_9 + 2y_9)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_9\,\hat{\mathbf{y}} + cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{50}}$	$= (x_9 - y_9)\,\mathbf{a}_1 + x_9\,\mathbf{a}_2 + z_9\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(2x_9 - y_9)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_9\,\hat{\mathbf{y}} + cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{51}}$	$= -x_9\,\mathbf{a}_1 - y_9\,\mathbf{a}_2 - z_9\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(x_9 + y_9)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_9 - y_9)\,\hat{\mathbf{y}} - cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{52}}$	$= y_9\,\mathbf{a}_1 - (x_9 - y_9)\,\mathbf{a}_2 - z_9\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(-x_9 + 2y_9)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_9\,\hat{\mathbf{y}} - cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{53}}$	$= (x_9 - y_9)\,\mathbf{a}_1 + x_9\,\mathbf{a}_2 - z_9\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(2x_9 - y_9)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_9\,\hat{\mathbf{y}} - cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{54}}$	$= x_9\,\mathbf{a}_1 + y_9\,\mathbf{a}_2 - z_9\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_9 + y_9)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_9 - y_9)\,\hat{\mathbf{y}} - cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{55}}$	$= -y_9\,\mathbf{a}_1 + (x_9 - y_9)\,\mathbf{a}_2 - z_9\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_9 - 2y_9)\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_9\,\hat{\mathbf{y}} - cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{56}}$	$= -(x_9 - y_9)\,\mathbf{a}_1 - x_9\,\mathbf{a}_2 - z_9\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(2x_9 - y_9)\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_9\,\hat{\mathbf{y}} - cz_9\,\hat{\mathbf{z}}$	(12l)	Ag VI
$\mathbf{B_{57}}$	$= x_{10}\,\mathbf{a}_1 + y_{10}\,\mathbf{a}_2 + z_{10}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_{10} + y_{10})\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_{10} - y_{10})\,\hat{\mathbf{y}} + cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII
$\mathbf{B_{58}}$	$= -y_{10}\,\mathbf{a}_1 + (x_{10} - y_{10})\,\mathbf{a}_2 + z_{10}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(x_{10} - 2y_{10})\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_{10}\,\hat{\mathbf{y}} + cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII
$\mathbf{B_{59}}$	$= -(x_{10} - y_{10})\,\mathbf{a}_1 - x_{10}\,\mathbf{a}_2 + z_{10}\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(2x_{10} - y_{10})\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_{10}\,\hat{\mathbf{y}} + cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII
$\mathbf{B_{60}}$	$= -x_{10}\,\mathbf{a}_1 - y_{10}\,\mathbf{a}_2 + z_{10}\,\mathbf{a}_3$	$=$	$-\frac{1}{2}a\,(x_{10} + y_{10})\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_{10} - y_{10})\,\hat{\mathbf{y}} + cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII
$\mathbf{B_{61}}$	$= y_{10}\,\mathbf{a}_1 - (x_{10} - y_{10})\,\mathbf{a}_2 + z_{10}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(-x_{10} + 2y_{10})\,\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_{10}\,\hat{\mathbf{y}} + cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII
$\mathbf{B_{62}}$	$= (x_{10} - y_{10})\,\mathbf{a}_1 + x_{10}\,\mathbf{a}_2 + z_{10}\,\mathbf{a}_3$	$=$	$\frac{1}{2}a\,(2x_{10} - y_{10})\,\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_{10}\,\hat{\mathbf{y}} + cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII

$\mathbf{B_{63}}$	=	$-x_{10}\,\mathbf{a}_1 - y_{10}\,\mathbf{a}_2 - z_{10}\,\mathbf{a}_3$	=	$-\frac{1}{2}a\,(x_{10}+y_{10})\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}a\,(x_{10}-y_{10})\;\hat{\mathbf{y}} - cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII
$\mathbf{B_{64}}$	=	$y_{10}\,\mathbf{a}_1 - (x_{10}-y_{10})\;\mathbf{a}_2 - z_{10}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(-x_{10}+2y_{10})\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ax_{10}\,\hat{\mathbf{y}} - cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII
$\mathbf{B_{65}}$	=	$(x_{10}-y_{10})\;\mathbf{a}_1 + x_{10}\,\mathbf{a}_2 - z_{10}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(2x_{10}-y_{10})\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ay_{10}\,\hat{\mathbf{y}} - cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII
$\mathbf{B_{66}}$	=	$x_{10}\,\mathbf{a}_1 + y_{10}\,\mathbf{a}_2 - z_{10}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(x_{10}+y_{10})\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}a\,(x_{10}-y_{10})\;\hat{\mathbf{y}} - cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII
$\mathbf{B_{67}}$	=	$-y_{10}\,\mathbf{a}_1 + (x_{10}-y_{10})\;\mathbf{a}_2 - z_{10}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,(x_{10}-2y_{10})\;\hat{\mathbf{x}} + \frac{\sqrt{3}}{2}ax_{10}\,\hat{\mathbf{y}} - cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII
$\mathbf{B_{68}}$	=	$-(x_{10}-y_{10})\;\mathbf{a}_1 - x_{10}\,\mathbf{a}_2 - z_{10}\,\mathbf{a}_3$	=	$-\frac{1}{2}a\,(2x_{10}-y_{10})\;\hat{\mathbf{x}} - \frac{\sqrt{3}}{2}ay_{10}\,\hat{\mathbf{y}} - cz_{10}\,\hat{\mathbf{z}}$	(12l)	Ag VII

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