Bergman [$Mg_{32}(Al,Zn)_{49}$] Structure: AB32C48_cI162_204_a_2efg_2gh-001

This structure originally had the label `AB32C48_cI162_204_a_2efg_2gh`. Calls to that address will be redirected here.

Cite this page as: M. J. Mehl, D. Hicks, C. Toher, O. Levy, R. M. Hanson, G. Hart, and S. Curtarolo, *The AFLOW Library of Crystallographic Prototypes: Part 1*, Comput. Mater. Sci. **136**, S1-828 (2017). doi: 10.1016/j.commatsci.2017.01.017

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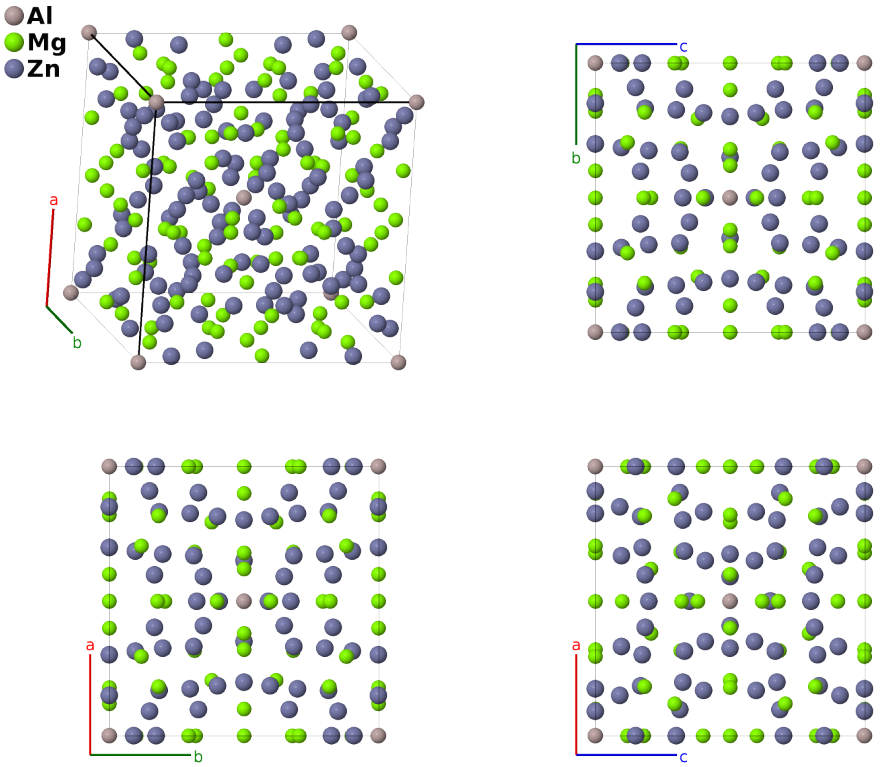
https://aflow.org/p/9AQF

https://aflow.org/p/AB32C48_cI162_204_a_2efg_2gh-001



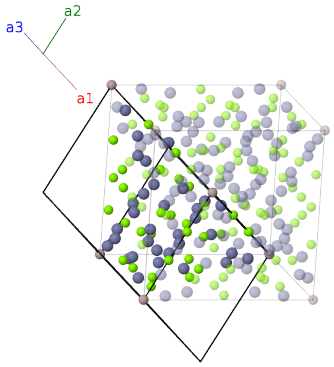
Prototype	$AlMg_{32}Zn_{48}$
AFLOW prototype label	AB32C48_cI162_204_a_2efg_2gh-001
***Strukturbericht* designation**	$D8_e$
Mineral name	bergman structure
ICSD	57968
Pearson symbol	cI162
Space group number	204
Space group symbol	$Im\bar{3}$
AFLOW prototype command	`aflow --proto=AB32C48_cI162_204_a_2efg_2gh-001 --params=`$a, x_2, x_3, x_4, y_5, z_5, y_6, z_6, y_7, z_7, x_8, y_8, z_8$

Other compounds with this structure
$Li_{20}Mg_6Cu_{13}Al_{42}$, Al_5CuLi_3

- Most of the sites in this lattice have random occupancy. In particular, according to (Bergman, 1957): The Al-I (2a) site is only occupied 80% of the time, the Zn-I (24g) site is occupied by Al 19% of the time, the Zn-II (24g) site is occupied by Al 43% of the time, and the Zn-III (48h) site is occupied by Al 36% of the time.
- The $Li_{20}Mg_6Cu_{13}Al_{42}$ structure found by (Pavlyuk, 2019) has all sites fully occupied.

Body-centered Cubic primitive vectors

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



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	=	0	=	0	(2a)	Al I
$\mathbf{B_2}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_2 + x_2\,\mathbf{a}_3$	=	$ax_2\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(12e)	Mg I
$\mathbf{B_3}$	=	$\frac{1}{2}\,\mathbf{a}_1 - \left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_2 - x_2\,\mathbf{a}_3$	=	$-ax_2\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(12e)	Mg I
$\mathbf{B_4}$	=	$x_2\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + \left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + ax_2\,\hat{\mathbf{y}}$	(12e)	Mg I
$\mathbf{B_5}$	=	$-x_2\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 - \left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - ax_2\,\hat{\mathbf{y}}$	(12e)	Mg I
$\mathbf{B_6}$	=	$\left(x_2 + \frac{1}{2}\right)\,\mathbf{a}_1 + x_2\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{y}} + ax_2\,\hat{\mathbf{z}}$	(12e)	Mg I
$\mathbf{B_7}$	=	$-\left(x_2 - \frac{1}{2}\right)\,\mathbf{a}_1 - x_2\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{y}} - ax_2\,\hat{\mathbf{z}}$	(12e)	Mg I
$\mathbf{B_8}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \left(x_3 + \frac{1}{2}\right)\,\mathbf{a}_2 + x_3\,\mathbf{a}_3$	=	$ax_3\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(12e)	Mg II
$\mathbf{B_9}$	=	$\frac{1}{2}\,\mathbf{a}_1 - \left(x_3 - \frac{1}{2}\right)\,\mathbf{a}_2 - x_3\,\mathbf{a}_3$	=	$-ax_3\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(12e)	Mg II
$\mathbf{B_{10}}$	=	$x_3\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + \left(x_3 + \frac{1}{2}\right)\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + ax_3\,\hat{\mathbf{y}}$	(12e)	Mg II
$\mathbf{B_{11}}$	=	$-x_3\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 - \left(x_3 - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} - ax_3\,\hat{\mathbf{y}}$	(12e)	Mg II
$\mathbf{B_{12}}$	=	$\left(x_3 + \frac{1}{2}\right)\,\mathbf{a}_1 + x_3\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{y}} + ax_3\,\hat{\mathbf{z}}$	(12e)	Mg II
$\mathbf{B_{13}}$	=	$-\left(x_3 - \frac{1}{2}\right)\,\mathbf{a}_1 - x_3\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{y}} - ax_3\,\hat{\mathbf{z}}$	(12e)	Mg II
$\mathbf{B_{14}}$	=	$2x_4\,\mathbf{a}_1 + 2x_4\,\mathbf{a}_2 + 2x_4\,\mathbf{a}_3$	=	$ax_4\,\hat{\mathbf{x}} + ax_4\,\hat{\mathbf{y}} + ax_4\,\hat{\mathbf{z}}$	(16f)	Mg III
$\mathbf{B_{15}}$	=	$-2x_4\,\mathbf{a}_3$	=	$-ax_4\,\hat{\mathbf{x}} - ax_4\,\hat{\mathbf{y}} + ax_4\,\hat{\mathbf{z}}$	(16f)	Mg III
$\mathbf{B_{16}}$	=	$-2x_4\,\mathbf{a}_2$	=	$-ax_4\,\hat{\mathbf{x}} + ax_4\,\hat{\mathbf{y}} - ax_4\,\hat{\mathbf{z}}$	(16f)	Mg III
$\mathbf{B_{17}}$	=	$-2x_4\,\mathbf{a}_1$	=	$ax_4\,\hat{\mathbf{x}} - ax_4\,\hat{\mathbf{y}} - ax_4\,\hat{\mathbf{z}}$	(16f)	Mg III
$\mathbf{B_{18}}$	=	$-2x_4\,\mathbf{a}_1 - 2x_4\,\mathbf{a}_2 - 2x_4\,\mathbf{a}_3$	=	$-ax_4\,\hat{\mathbf{x}} - ax_4\,\hat{\mathbf{y}} - ax_4\,\hat{\mathbf{z}}$	(16f)	Mg III
$\mathbf{B_{19}}$	=	$2x_4\,\mathbf{a}_3$	=	$ax_4\,\hat{\mathbf{x}} + ax_4\,\hat{\mathbf{y}} - ax_4\,\hat{\mathbf{z}}$	(16f)	Mg III
$\mathbf{B_{20}}$	=	$2x_4\,\mathbf{a}_2$	=	$ax_4\,\hat{\mathbf{x}} - ax_4\,\hat{\mathbf{y}} + ax_4\,\hat{\mathbf{z}}$	(16f)	Mg III
$\mathbf{B_{21}}$	=	$2x_4\,\mathbf{a}_1$	=	$-ax_4\,\hat{\mathbf{x}} + ax_4\,\hat{\mathbf{y}} + ax_4\,\hat{\mathbf{z}}$	(16f)	Mg III

$\mathbf{B_{22}}$	=	$(y_5 + z_5)\ \mathbf{a}_1 + z_5\,\mathbf{a}_2 + y_5\,\mathbf{a}_3$	=	$ay_5\,\hat{\mathbf{y}} + az_5\,\hat{\mathbf{z}}$	(24g)	Mg IV
$\mathbf{B_{23}}$	=	$-(y_5 - z_5)\ \mathbf{a}_1 + z_5\,\mathbf{a}_2 - y_5\,\mathbf{a}_3$	=	$-ay_5\,\hat{\mathbf{y}} + az_5\,\hat{\mathbf{z}}$	(24g)	Mg IV
$\mathbf{B_{24}}$	=	$(y_5 - z_5)\ \mathbf{a}_1 - z_5\,\mathbf{a}_2 + y_5\,\mathbf{a}_3$	=	$ay_5\,\hat{\mathbf{y}} - az_5\,\hat{\mathbf{z}}$	(24g)	Mg IV
$\mathbf{B_{25}}$	=	$-(y_5 + z_5)\ \mathbf{a}_1 - z_5\,\mathbf{a}_2 - y_5\,\mathbf{a}_3$	=	$-ay_5\,\hat{\mathbf{y}} - az_5\,\hat{\mathbf{z}}$	(24g)	Mg IV
$\mathbf{B_{26}}$	=	$y_5\,\mathbf{a}_1 + (y_5 + z_5)\ \mathbf{a}_2 + z_5\,\mathbf{a}_3$	=	$az_5\,\hat{\mathbf{x}} + ay_5\,\hat{\mathbf{z}}$	(24g)	Mg IV
$\mathbf{B_{27}}$	=	$-y_5\,\mathbf{a}_1 - (y_5 - z_5)\ \mathbf{a}_2 + z_5\,\mathbf{a}_3$	=	$az_5\,\hat{\mathbf{x}} - ay_5\,\hat{\mathbf{z}}$	(24g)	Mg IV
$\mathbf{B_{28}}$	=	$y_5\,\mathbf{a}_1 + (y_5 - z_5)\ \mathbf{a}_2 - z_5\,\mathbf{a}_3$	=	$-az_5\,\hat{\mathbf{x}} + ay_5\,\hat{\mathbf{z}}$	(24g)	Mg IV
$\mathbf{B_{29}}$	=	$-y_5\,\mathbf{a}_1 - (y_5 + z_5)\ \mathbf{a}_2 - z_5\,\mathbf{a}_3$	=	$-az_5\,\hat{\mathbf{x}} - ay_5\,\hat{\mathbf{z}}$	(24g)	Mg IV
$\mathbf{B_{30}}$	=	$z_5\,\mathbf{a}_1 + y_5\,\mathbf{a}_2 + (y_5 + z_5)\ \mathbf{a}_3$	=	$ay_5\,\hat{\mathbf{x}} + az_5\,\hat{\mathbf{y}}$	(24g)	Mg IV
$\mathbf{B_{31}}$	=	$z_5\,\mathbf{a}_1 - y_5\,\mathbf{a}_2 - (y_5 - z_5)\ \mathbf{a}_3$	=	$-ay_5\,\hat{\mathbf{x}} + az_5\,\hat{\mathbf{y}}$	(24g)	Mg IV
$\mathbf{B_{32}}$	=	$-z_5\,\mathbf{a}_1 + y_5\,\mathbf{a}_2 + (y_5 - z_5)\ \mathbf{a}_3$	=	$ay_5\,\hat{\mathbf{x}} - az_5\,\hat{\mathbf{y}}$	(24g)	Mg IV
$\mathbf{B_{33}}$	=	$-z_5\,\mathbf{a}_1 - y_5\,\mathbf{a}_2 - (y_5 + z_5)\ \mathbf{a}_3$	=	$-ay_5\,\hat{\mathbf{x}} - az_5\,\hat{\mathbf{y}}$	(24g)	Mg IV
$\mathbf{B_{34}}$	=	$(y_6 + z_6)\ \mathbf{a}_1 + z_6\,\mathbf{a}_2 + y_6\,\mathbf{a}_3$	=	$ay_6\,\hat{\mathbf{y}} + az_6\,\hat{\mathbf{z}}$	(24g)	Zn I
$\mathbf{B_{35}}$	=	$-(y_6 - z_6)\ \mathbf{a}_1 + z_6\,\mathbf{a}_2 - y_6\,\mathbf{a}_3$	=	$-ay_6\,\hat{\mathbf{y}} + az_6\,\hat{\mathbf{z}}$	(24g)	Zn I
$\mathbf{B_{36}}$	=	$(y_6 - z_6)\ \mathbf{a}_1 - z_6\,\mathbf{a}_2 + y_6\,\mathbf{a}_3$	=	$ay_6\,\hat{\mathbf{y}} - az_6\,\hat{\mathbf{z}}$	(24g)	Zn I
$\mathbf{B_{37}}$	=	$-(y_6 + z_6)\ \mathbf{a}_1 - z_6\,\mathbf{a}_2 - y_6\,\mathbf{a}_3$	=	$-ay_6\,\hat{\mathbf{y}} - az_6\,\hat{\mathbf{z}}$	(24g)	Zn I
$\mathbf{B_{38}}$	=	$y_6\,\mathbf{a}_1 + (y_6 + z_6)\ \mathbf{a}_2 + z_6\,\mathbf{a}_3$	=	$az_6\,\hat{\mathbf{x}} + ay_6\,\hat{\mathbf{z}}$	(24g)	Zn I
$\mathbf{B_{39}}$	=	$-y_6\,\mathbf{a}_1 - (y_6 - z_6)\ \mathbf{a}_2 + z_6\,\mathbf{a}_3$	=	$az_6\,\hat{\mathbf{x}} - ay_6\,\hat{\mathbf{z}}$	(24g)	Zn I
$\mathbf{B_{40}}$	=	$y_6\,\mathbf{a}_1 + (y_6 - z_6)\ \mathbf{a}_2 - z_6\,\mathbf{a}_3$	=	$-az_6\,\hat{\mathbf{x}} + ay_6\,\hat{\mathbf{z}}$	(24g)	Zn I
$\mathbf{B_{41}}$	=	$-y_6\,\mathbf{a}_1 - (y_6 + z_6)\ \mathbf{a}_2 - z_6\,\mathbf{a}_3$	=	$-az_6\,\hat{\mathbf{x}} - ay_6\,\hat{\mathbf{z}}$	(24g)	Zn I
$\mathbf{B_{42}}$	=	$z_6\,\mathbf{a}_1 + y_6\,\mathbf{a}_2 + (y_6 + z_6)\ \mathbf{a}_3$	=	$ay_6\,\hat{\mathbf{x}} + az_6\,\hat{\mathbf{y}}$	(24g)	Zn I
$\mathbf{B_{43}}$	=	$z_6\,\mathbf{a}_1 - y_6\,\mathbf{a}_2 - (y_6 - z_6)\ \mathbf{a}_3$	=	$-ay_6\,\hat{\mathbf{x}} + az_6\,\hat{\mathbf{y}}$	(24g)	Zn I
$\mathbf{B_{44}}$	=	$-z_6\,\mathbf{a}_1 + y_6\,\mathbf{a}_2 + (y_6 - z_6)\ \mathbf{a}_3$	=	$ay_6\,\hat{\mathbf{x}} - az_6\,\hat{\mathbf{y}}$	(24g)	Zn I
$\mathbf{B_{45}}$	=	$-z_6\,\mathbf{a}_1 - y_6\,\mathbf{a}_2 - (y_6 + z_6)\ \mathbf{a}_3$	=	$-ay_6\,\hat{\mathbf{x}} - az_6\,\hat{\mathbf{y}}$	(24g)	Zn I
$\mathbf{B_{46}}$	=	$(y_7 + z_7)\ \mathbf{a}_1 + z_7\,\mathbf{a}_2 + y_7\,\mathbf{a}_3$	=	$ay_7\,\hat{\mathbf{y}} + az_7\,\hat{\mathbf{z}}$	(24g)	Zn II
$\mathbf{B_{47}}$	=	$-(y_7 - z_7)\ \mathbf{a}_1 + z_7\,\mathbf{a}_2 - y_7\,\mathbf{a}_3$	=	$-ay_7\,\hat{\mathbf{y}} + az_7\,\hat{\mathbf{z}}$	(24g)	Zn II
$\mathbf{B_{48}}$	=	$(y_7 - z_7)\ \mathbf{a}_1 - z_7\,\mathbf{a}_2 + y_7\,\mathbf{a}_3$	=	$ay_7\,\hat{\mathbf{y}} - az_7\,\hat{\mathbf{z}}$	(24g)	Zn II
$\mathbf{B_{49}}$	=	$-(y_7 + z_7)\ \mathbf{a}_1 - z_7\,\mathbf{a}_2 - y_7\,\mathbf{a}_3$	=	$-ay_7\,\hat{\mathbf{y}} - az_7\,\hat{\mathbf{z}}$	(24g)	Zn II
$\mathbf{B_{50}}$	=	$y_7\,\mathbf{a}_1 + (y_7 + z_7)\ \mathbf{a}_2 + z_7\,\mathbf{a}_3$	=	$az_7\,\hat{\mathbf{x}} + ay_7\,\hat{\mathbf{z}}$	(24g)	Zn II
$\mathbf{B_{51}}$	=	$-y_7\,\mathbf{a}_1 - (y_7 - z_7)\ \mathbf{a}_2 + z_7\,\mathbf{a}_3$	=	$az_7\,\hat{\mathbf{x}} - ay_7\,\hat{\mathbf{z}}$	(24g)	Zn II
$\mathbf{B_{52}}$	=	$y_7\,\mathbf{a}_1 + (y_7 - z_7)\ \mathbf{a}_2 - z_7\,\mathbf{a}_3$	=	$-az_7\,\hat{\mathbf{x}} + ay_7\,\hat{\mathbf{z}}$	(24g)	Zn II
$\mathbf{B_{53}}$	=	$-y_7\,\mathbf{a}_1 - (y_7 + z_7)\ \mathbf{a}_2 - z_7\,\mathbf{a}_3$	=	$-az_7\,\hat{\mathbf{x}} - ay_7\,\hat{\mathbf{z}}$	(24g)	Zn II
$\mathbf{B_{54}}$	=	$z_7\,\mathbf{a}_1 + y_7\,\mathbf{a}_2 + (y_7 + z_7)\ \mathbf{a}_3$	=	$ay_7\,\hat{\mathbf{x}} + az_7\,\hat{\mathbf{y}}$	(24g)	Zn II
$\mathbf{B_{55}}$	=	$z_7\,\mathbf{a}_1 - y_7\,\mathbf{a}_2 - (y_7 - z_7)\ \mathbf{a}_3$	=	$-ay_7\,\hat{\mathbf{x}} + az_7\,\hat{\mathbf{y}}$	(24g)	Zn II
$\mathbf{B_{56}}$	=	$-z_7\,\mathbf{a}_1 + y_7\,\mathbf{a}_2 + (y_7 - z_7)\ \mathbf{a}_3$	=	$ay_7\,\hat{\mathbf{x}} - az_7\,\hat{\mathbf{y}}$	(24g)	Zn II
$\mathbf{B_{57}}$	=	$-z_7\,\mathbf{a}_1 - y_7\,\mathbf{a}_2 - (y_7 + z_7)\ \mathbf{a}_3$	=	$-ay_7\,\hat{\mathbf{x}} - az_7\,\hat{\mathbf{y}}$	(24g)	Zn II
$\mathbf{B_{58}}$	=	$(y_8 + z_8)\ \mathbf{a}_1 + (x_8 + z_8)\ \mathbf{a}_2 + (x_8 + y_8)\ \mathbf{a}_3$	=	$ax_8\,\hat{\mathbf{x}} + ay_8\,\hat{\mathbf{y}} + az_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{59}}$	=	$-(y_8 - z_8)\ \mathbf{a}_1 - (x_8 - z_8)\ \mathbf{a}_2 - (x_8 + y_8)\ \mathbf{a}_3$	=	$-ax_8\,\hat{\mathbf{x}} - ay_8\,\hat{\mathbf{y}} + az_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{60}}$	=	$(y_8 - z_8)\ \mathbf{a}_1 - (x_8 + z_8)\ \mathbf{a}_2 - (x_8 - y_8)\ \mathbf{a}_3$	=	$-ax_8\,\hat{\mathbf{x}} + ay_8\,\hat{\mathbf{y}} - az_8\,\hat{\mathbf{z}}$	(48h)	Zn III

$\mathbf{B_{61}}$	=	$-(y_8+z_8)\,\mathbf{a}_1+(x_8-z_8)\,\mathbf{a}_2+(x_8-y_8)\,\mathbf{a}_3$	=	$ax_8\,\hat{\mathbf{x}}-ay_8\,\hat{\mathbf{y}}-az_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{62}}$	=	$(x_8+y_8)\,\mathbf{a}_1+(y_8+z_8)\,\mathbf{a}_2+(x_8+z_8)\,\mathbf{a}_3$	=	$az_8\,\hat{\mathbf{x}}+ax_8\,\hat{\mathbf{y}}+ay_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{63}}$	=	$-(x_8+y_8)\,\mathbf{a}_1-(y_8-z_8)\,\mathbf{a}_2-(x_8-z_8)\,\mathbf{a}_3$	=	$az_8\,\hat{\mathbf{x}}-ax_8\,\hat{\mathbf{y}}-ay_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{64}}$	=	$-(x_8-y_8)\,\mathbf{a}_1+(y_8-z_8)\,\mathbf{a}_2-(x_8+z_8)\,\mathbf{a}_3$	=	$-az_8\,\hat{\mathbf{x}}-ax_8\,\hat{\mathbf{y}}+ay_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{65}}$	=	$(x_8-y_8)\,\mathbf{a}_1-(y_8+z_8)\,\mathbf{a}_2+(x_8-z_8)\,\mathbf{a}_3$	=	$-az_8\,\hat{\mathbf{x}}+ax_8\,\hat{\mathbf{y}}-ay_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{66}}$	=	$(x_8+z_8)\,\mathbf{a}_1+(x_8+y_8)\,\mathbf{a}_2+(y_8+z_8)\,\mathbf{a}_3$	=	$ay_8\,\hat{\mathbf{x}}+az_8\,\hat{\mathbf{y}}+ax_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{67}}$	=	$-(x_8-z_8)\,\mathbf{a}_1-(x_8+y_8)\,\mathbf{a}_2-(y_8-z_8)\,\mathbf{a}_3$	=	$-ay_8\,\hat{\mathbf{x}}+az_8\,\hat{\mathbf{y}}-ax_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{68}}$	=	$-(x_8+z_8)\,\mathbf{a}_1-(x_8-y_8)\,\mathbf{a}_2+(y_8-z_8)\,\mathbf{a}_3$	=	$ay_8\,\hat{\mathbf{x}}-az_8\,\hat{\mathbf{y}}-ax_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{69}}$	=	$(x_8-z_8)\,\mathbf{a}_1+(x_8-y_8)\,\mathbf{a}_2-(y_8+z_8)\,\mathbf{a}_3$	=	$-ay_8\,\hat{\mathbf{x}}-az_8\,\hat{\mathbf{y}}+ax_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{70}}$	=	$-(y_8+z_8)\,\mathbf{a}_1-(x_8+z_8)\,\mathbf{a}_2-(x_8+y_8)\,\mathbf{a}_3$	=	$-ax_8\,\hat{\mathbf{x}}-ay_8\,\hat{\mathbf{y}}-az_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{71}}$	=	$(y_8-z_8)\,\mathbf{a}_1+(x_8-z_8)\,\mathbf{a}_2+(x_8+y_8)\,\mathbf{a}_3$	=	$ax_8\,\hat{\mathbf{x}}+ay_8\,\hat{\mathbf{y}}-az_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{72}}$	=	$-(y_8-z_8)\,\mathbf{a}_1+(x_8+z_8)\,\mathbf{a}_2+(x_8-y_8)\,\mathbf{a}_3$	=	$ax_8\,\hat{\mathbf{x}}-ay_8\,\hat{\mathbf{y}}+az_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{73}}$	=	$(y_8+z_8)\,\mathbf{a}_1-(x_8-z_8)\,\mathbf{a}_2-(x_8-y_8)\,\mathbf{a}_3$	=	$-ax_8\,\hat{\mathbf{x}}+ay_8\,\hat{\mathbf{y}}+az_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{74}}$	=	$-(x_8+y_8)\,\mathbf{a}_1-(y_8+z_8)\,\mathbf{a}_2-(x_8+z_8)\,\mathbf{a}_3$	=	$-az_8\,\hat{\mathbf{x}}-ax_8\,\hat{\mathbf{y}}-ay_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{75}}$	=	$(x_8+y_8)\,\mathbf{a}_1+(y_8-z_8)\,\mathbf{a}_2+(x_8-z_8)\,\mathbf{a}_3$	=	$-az_8\,\hat{\mathbf{x}}+ax_8\,\hat{\mathbf{y}}+ay_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{76}}$	=	$(x_8-y_8)\,\mathbf{a}_1-(y_8-z_8)\,\mathbf{a}_2+(x_8+z_8)\,\mathbf{a}_3$	=	$az_8\,\hat{\mathbf{x}}+ax_8\,\hat{\mathbf{y}}-ay_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{77}}$	=	$-(x_8-y_8)\,\mathbf{a}_1+(y_8+z_8)\,\mathbf{a}_2-(x_8-z_8)\,\mathbf{a}_3$	=	$az_8\,\hat{\mathbf{x}}-ax_8\,\hat{\mathbf{y}}+ay_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{78}}$	=	$-(x_8+z_8)\,\mathbf{a}_1-(x_8+y_8)\,\mathbf{a}_2-(y_8+z_8)\,\mathbf{a}_3$	=	$-ay_8\,\hat{\mathbf{x}}-az_8\,\hat{\mathbf{y}}-ax_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{79}}$	=	$(x_8-z_8)\,\mathbf{a}_1+(x_8+y_8)\,\mathbf{a}_2+(y_8-z_8)\,\mathbf{a}_3$	=	$ay_8\,\hat{\mathbf{x}}-az_8\,\hat{\mathbf{y}}+ax_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{80}}$	=	$(x_8+z_8)\,\mathbf{a}_1+(x_8-y_8)\,\mathbf{a}_2-(y_8-z_8)\,\mathbf{a}_3$	=	$-ay_8\,\hat{\mathbf{x}}+az_8\,\hat{\mathbf{y}}+ax_8\,\hat{\mathbf{z}}$	(48h)	Zn III
$\mathbf{B_{81}}$	=	$-(x_8-z_8)\,\mathbf{a}_1-(x_8-y_8)\,\mathbf{a}_2+(y_8+z_8)\,\mathbf{a}_3$	=	$ay_8\,\hat{\mathbf{x}}+az_8\,\hat{\mathbf{y}}-ax_8\,\hat{\mathbf{z}}$	(48h)	Zn III

References

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