$Li_{22}Si_5$ Structure: A22B5_cF432_196_abcd6efg4h_2efg-001

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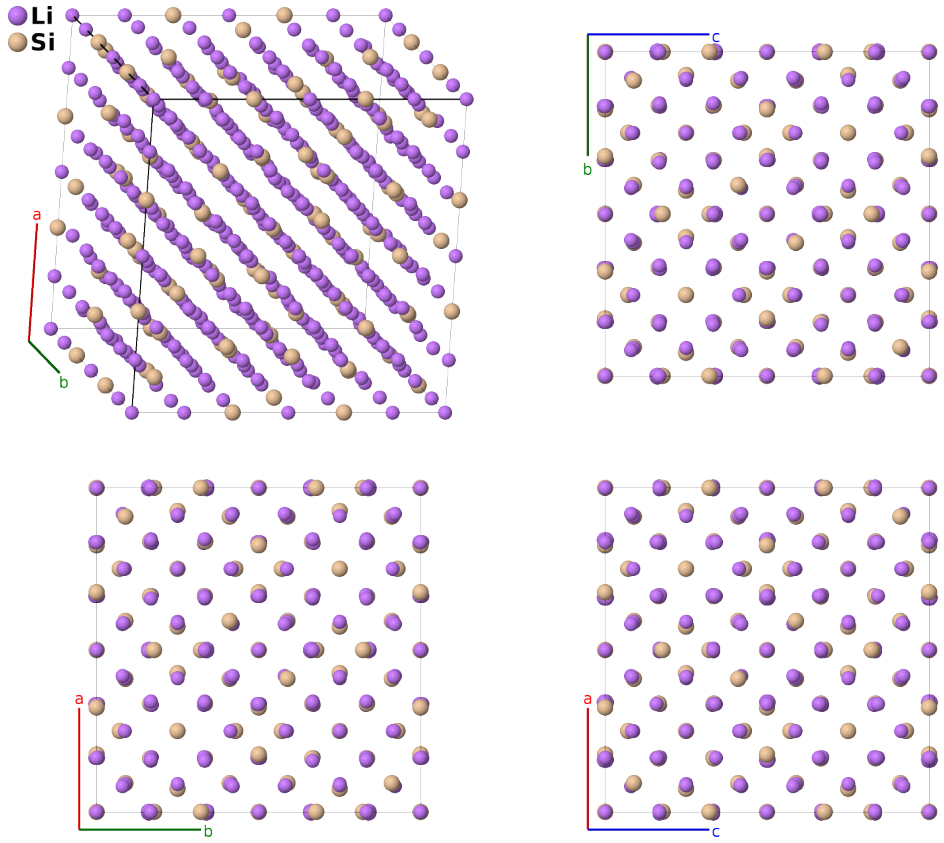
https://aflow.org/p/A22B5_cF432_196_abcd6efg4h_2efg-001



Prototype	$Li_{22}Si_5$
AFLOW prototype label	A22B5_cF432_196_abcd6efg4h_2efg-001
ICSD	24596
Pearson symbol	cF432
Space group number	196
Space group symbol	$F23$
AFLOW prototype command	`aflow --proto=A22B5_cF432_196_abcd6efg4h_2efg-001 --params=`$a, x_5, x_6, x_7, x_8, x_9, x_{10}, x_{11}, x_{12}, x_{13}, x_{14}, x_{15}, x_{16}, x_{17}, y_{17}, z_{17}, x_{18}, y_{18}, z_{18}, x_{19}, y_{19}, z_{19}, x_{20}, y_{20}, z_{20}$

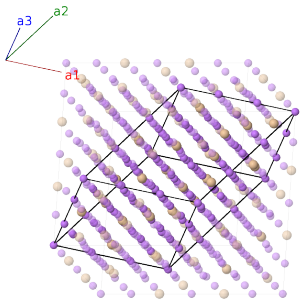
Other compounds with this structure

$Li_{22}Ge_5$, $Li_{22}Pb_5$, $Li_{22}Sn_5$, $Li_{22}Tl_5$

- The ICSD and other authorities use $Li_{22}Pb_5$ as the prototype for this structure, but (Goward, 2001) suggests that the true structure of that compound is $Li_{17}Pb_4$, changing the space group from $F32$ #196 to $F\bar{4}3m$ $Li_{22}Si_5$ as the prototype.
- This is one of the few crystal structures where all of the Wyckoff positions in its space group are occupied.

Face-centered Cubic primitive vectors

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



Basis vectors

		Lattice coordinates		Cartesian coordinates	Wyckoff position	Atom type
$\mathbf{B_1}$	=	0	=	0	(4a)	Li I
$\mathbf{B_2}$	=	$\frac{1}{2}\,\mathbf{a}_1 + \frac{1}{2}\,\mathbf{a}_2 + \frac{1}{2}\,\mathbf{a}_3$	=	$\frac{1}{2}a\,\hat{\mathbf{x}} + \frac{1}{2}a\,\hat{\mathbf{y}} + \frac{1}{2}a\,\hat{\mathbf{z}}$	(4b)	Li II
$\mathbf{B_3}$	=	$\frac{1}{4}\,\mathbf{a}_1 + \frac{1}{4}\,\mathbf{a}_2 + \frac{1}{4}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(4c)	Li III
$\mathbf{B_4}$	=	$\frac{3}{4}\,\mathbf{a}_1 + \frac{3}{4}\,\mathbf{a}_2 + \frac{3}{4}\,\mathbf{a}_3$	=	$\frac{3}{4}a\,\hat{\mathbf{x}} + \frac{3}{4}a\,\hat{\mathbf{y}} + \frac{3}{4}a\,\hat{\mathbf{z}}$	(4d)	Li IV
$\mathbf{B_5}$	=	$x_5\,\mathbf{a}_1 + x_5\,\mathbf{a}_2 + x_5\,\mathbf{a}_3$	=	$ax_5\,\hat{\mathbf{x}} + ax_5\,\hat{\mathbf{y}} + ax_5\,\hat{\mathbf{z}}$	(16e)	Li V
$\mathbf{B_6}$	=	$x_5\,\mathbf{a}_1 + x_5\,\mathbf{a}_2 - 3x_5\,\mathbf{a}_3$	=	$-ax_5\,\hat{\mathbf{x}} - ax_5\,\hat{\mathbf{y}} + ax_5\,\hat{\mathbf{z}}$	(16e)	Li V
$\mathbf{B_7}$	=	$x_5\,\mathbf{a}_1 - 3x_5\,\mathbf{a}_2 + x_5\,\mathbf{a}_3$	=	$-ax_5\,\hat{\mathbf{x}} + ax_5\,\hat{\mathbf{y}} - ax_5\,\hat{\mathbf{z}}$	(16e)	Li V
$\mathbf{B_8}$	=	$-3x_5\,\mathbf{a}_1 + x_5\,\mathbf{a}_2 + x_5\,\mathbf{a}_3$	=	$ax_5\,\hat{\mathbf{x}} - ax_5\,\hat{\mathbf{y}} - ax_5\,\hat{\mathbf{z}}$	(16e)	Li V
$\mathbf{B_9}$	=	$x_6\,\mathbf{a}_1 + x_6\,\mathbf{a}_2 + x_6\,\mathbf{a}_3$	=	$ax_6\,\hat{\mathbf{x}} + ax_6\,\hat{\mathbf{y}} + ax_6\,\hat{\mathbf{z}}$	(16e)	Li VI
$\mathbf{B_{10}}$	=	$x_6\,\mathbf{a}_1 + x_6\,\mathbf{a}_2 - 3x_6\,\mathbf{a}_3$	=	$-ax_6\,\hat{\mathbf{x}} - ax_6\,\hat{\mathbf{y}} + ax_6\,\hat{\mathbf{z}}$	(16e)	Li VI
$\mathbf{B_{11}}$	=	$x_6\,\mathbf{a}_1 - 3x_6\,\mathbf{a}_2 + x_6\,\mathbf{a}_3$	=	$-ax_6\,\hat{\mathbf{x}} + ax_6\,\hat{\mathbf{y}} - ax_6\,\hat{\mathbf{z}}$	(16e)	Li VI
$\mathbf{B_{12}}$	=	$-3x_6\,\mathbf{a}_1 + x_6\,\mathbf{a}_2 + x_6\,\mathbf{a}_3$	=	$ax_6\,\hat{\mathbf{x}} - ax_6\,\hat{\mathbf{y}} - ax_6\,\hat{\mathbf{z}}$	(16e)	Li VI
$\mathbf{B_{13}}$	=	$x_7\,\mathbf{a}_1 + x_7\,\mathbf{a}_2 + x_7\,\mathbf{a}_3$	=	$ax_7\,\hat{\mathbf{x}} + ax_7\,\hat{\mathbf{y}} + ax_7\,\hat{\mathbf{z}}$	(16e)	Li VII
$\mathbf{B_{14}}$	=	$x_7\,\mathbf{a}_1 + x_7\,\mathbf{a}_2 - 3x_7\,\mathbf{a}_3$	=	$-ax_7\,\hat{\mathbf{x}} - ax_7\,\hat{\mathbf{y}} + ax_7\,\hat{\mathbf{z}}$	(16e)	Li VII
$\mathbf{B_{15}}$	=	$x_7\,\mathbf{a}_1 - 3x_7\,\mathbf{a}_2 + x_7\,\mathbf{a}_3$	=	$-ax_7\,\hat{\mathbf{x}} + ax_7\,\hat{\mathbf{y}} - ax_7\,\hat{\mathbf{z}}$	(16e)	Li VII
$\mathbf{B_{16}}$	=	$-3x_7\,\mathbf{a}_1 + x_7\,\mathbf{a}_2 + x_7\,\mathbf{a}_3$	=	$ax_7\,\hat{\mathbf{x}} - ax_7\,\hat{\mathbf{y}} - ax_7\,\hat{\mathbf{z}}$	(16e)	Li VII
$\mathbf{B_{17}}$	=	$x_8\,\mathbf{a}_1 + x_8\,\mathbf{a}_2 + x_8\,\mathbf{a}_3$	=	$ax_8\,\hat{\mathbf{x}} + ax_8\,\hat{\mathbf{y}} + ax_8\,\hat{\mathbf{z}}$	(16e)	Li VIII
$\mathbf{B_{18}}$	=	$x_8\,\mathbf{a}_1 + x_8\,\mathbf{a}_2 - 3x_8\,\mathbf{a}_3$	=	$-ax_8\,\hat{\mathbf{x}} - ax_8\,\hat{\mathbf{y}} + ax_8\,\hat{\mathbf{z}}$	(16e)	Li VIII
$\mathbf{B_{19}}$	=	$x_8\,\mathbf{a}_1 - 3x_8\,\mathbf{a}_2 + x_8\,\mathbf{a}_3$	=	$-ax_8\,\hat{\mathbf{x}} + ax_8\,\hat{\mathbf{y}} - ax_8\,\hat{\mathbf{z}}$	(16e)	Li VIII
$\mathbf{B_{20}}$	=	$-3x_8\,\mathbf{a}_1 + x_8\,\mathbf{a}_2 + x_8\,\mathbf{a}_3$	=	$ax_8\,\hat{\mathbf{x}} - ax_8\,\hat{\mathbf{y}} - ax_8\,\hat{\mathbf{z}}$	(16e)	Li VIII
$\mathbf{B_{21}}$	=	$x_9\,\mathbf{a}_1 + x_9\,\mathbf{a}_2 + x_9\,\mathbf{a}_3$	=	$ax_9\,\hat{\mathbf{x}} + ax_9\,\hat{\mathbf{y}} + ax_9\,\hat{\mathbf{z}}$	(16e)	Li IX
$\mathbf{B_{22}}$	=	$x_9\,\mathbf{a}_1 + x_9\,\mathbf{a}_2 - 3x_9\,\mathbf{a}_3$	=	$-ax_9\,\hat{\mathbf{x}} - ax_9\,\hat{\mathbf{y}} + ax_9\,\hat{\mathbf{z}}$	(16e)	Li IX
$\mathbf{B_{23}}$	=	$x_9\,\mathbf{a}_1 - 3x_9\,\mathbf{a}_2 + x_9\,\mathbf{a}_3$	=	$-ax_9\,\hat{\mathbf{x}} + ax_9\,\hat{\mathbf{y}} - ax_9\,\hat{\mathbf{z}}$	(16e)	Li IX
$\mathbf{B_{24}}$	=	$-3x_9\,\mathbf{a}_1 + x_9\,\mathbf{a}_2 + x_9\,\mathbf{a}_3$	=	$ax_9\,\hat{\mathbf{x}} - ax_9\,\hat{\mathbf{y}} - ax_9\,\hat{\mathbf{z}}$	(16e)	Li IX
$\mathbf{B_{25}}$	=	$x_{10}\,\mathbf{a}_1 + x_{10}\,\mathbf{a}_2 + x_{10}\,\mathbf{a}_3$	=	$ax_{10}\,\hat{\mathbf{x}} + ax_{10}\,\hat{\mathbf{y}} + ax_{10}\,\hat{\mathbf{z}}$	(16e)	Li X

$\mathbf{B_{26}}$	=	$x_{10}\,\mathbf{a}_1 + x_{10}\,\mathbf{a}_2 - 3x_{10}\,\mathbf{a}_3$	=	$-ax_{10}\,\hat{\mathbf{x}} - ax_{10}\,\hat{\mathbf{y}} + ax_{10}\,\hat{\mathbf{z}}$	(16e)	Li X
$\mathbf{B_{27}}$	=	$x_{10}\,\mathbf{a}_1 - 3x_{10}\,\mathbf{a}_2 + x_{10}\,\mathbf{a}_3$	=	$-ax_{10}\,\hat{\mathbf{x}} + ax_{10}\,\hat{\mathbf{y}} - ax_{10}\,\hat{\mathbf{z}}$	(16e)	Li X
$\mathbf{B_{28}}$	=	$-3x_{10}\,\mathbf{a}_1 + x_{10}\,\mathbf{a}_2 + x_{10}\,\mathbf{a}_3$	=	$ax_{10}\,\hat{\mathbf{x}} - ax_{10}\,\hat{\mathbf{y}} - ax_{10}\,\hat{\mathbf{z}}$	(16e)	Li X
$\mathbf{B_{29}}$	=	$x_{11}\,\mathbf{a}_1 + x_{11}\,\mathbf{a}_2 + x_{11}\,\mathbf{a}_3$	=	$ax_{11}\,\hat{\mathbf{x}} + ax_{11}\,\hat{\mathbf{y}} + ax_{11}\,\hat{\mathbf{z}}$	(16e)	Si I
$\mathbf{B_{30}}$	=	$x_{11}\,\mathbf{a}_1 + x_{11}\,\mathbf{a}_2 - 3x_{11}\,\mathbf{a}_3$	=	$-ax_{11}\,\hat{\mathbf{x}} - ax_{11}\,\hat{\mathbf{y}} + ax_{11}\,\hat{\mathbf{z}}$	(16e)	Si I
$\mathbf{B_{31}}$	=	$x_{11}\,\mathbf{a}_1 - 3x_{11}\,\mathbf{a}_2 + x_{11}\,\mathbf{a}_3$	=	$-ax_{11}\,\hat{\mathbf{x}} + ax_{11}\,\hat{\mathbf{y}} - ax_{11}\,\hat{\mathbf{z}}$	(16e)	Si I
$\mathbf{B_{32}}$	=	$-3x_{11}\,\mathbf{a}_1 + x_{11}\,\mathbf{a}_2 + x_{11}\,\mathbf{a}_3$	=	$ax_{11}\,\hat{\mathbf{x}} - ax_{11}\,\hat{\mathbf{y}} - ax_{11}\,\hat{\mathbf{z}}$	(16e)	Si I
$\mathbf{B_{33}}$	=	$x_{12}\,\mathbf{a}_1 + x_{12}\,\mathbf{a}_2 + x_{12}\,\mathbf{a}_3$	=	$ax_{12}\,\hat{\mathbf{x}} + ax_{12}\,\hat{\mathbf{y}} + ax_{12}\,\hat{\mathbf{z}}$	(16e)	Si II
$\mathbf{B_{34}}$	=	$x_{12}\,\mathbf{a}_1 + x_{12}\,\mathbf{a}_2 - 3x_{12}\,\mathbf{a}_3$	=	$-ax_{12}\,\hat{\mathbf{x}} - ax_{12}\,\hat{\mathbf{y}} + ax_{12}\,\hat{\mathbf{z}}$	(16e)	Si II
$\mathbf{B_{35}}$	=	$x_{12}\,\mathbf{a}_1 - 3x_{12}\,\mathbf{a}_2 + x_{12}\,\mathbf{a}_3$	=	$-ax_{12}\,\hat{\mathbf{x}} + ax_{12}\,\hat{\mathbf{y}} - ax_{12}\,\hat{\mathbf{z}}$	(16e)	Si II
$\mathbf{B_{36}}$	=	$-3x_{12}\,\mathbf{a}_1 + x_{12}\,\mathbf{a}_2 + x_{12}\,\mathbf{a}_3$	=	$ax_{12}\,\hat{\mathbf{x}} - ax_{12}\,\hat{\mathbf{y}} - ax_{12}\,\hat{\mathbf{z}}$	(16e)	Si II
$\mathbf{B_{37}}$	=	$-x_{13}\,\mathbf{a}_1 + x_{13}\,\mathbf{a}_2 + x_{13}\,\mathbf{a}_3$	=	$ax_{13}\,\hat{\mathbf{x}}$	(24f)	Li XI
$\mathbf{B_{38}}$	=	$x_{13}\,\mathbf{a}_1 - x_{13}\,\mathbf{a}_2 - x_{13}\,\mathbf{a}_3$	=	$-ax_{13}\,\hat{\mathbf{x}}$	(24f)	Li XI
$\mathbf{B_{39}}$	=	$x_{13}\,\mathbf{a}_1 - x_{13}\,\mathbf{a}_2 + x_{13}\,\mathbf{a}_3$	=	$ax_{13}\,\hat{\mathbf{y}}$	(24f)	Li XI
$\mathbf{B_{40}}$	=	$-x_{13}\,\mathbf{a}_1 + x_{13}\,\mathbf{a}_2 - x_{13}\,\mathbf{a}_3$	=	$-ax_{13}\,\hat{\mathbf{y}}$	(24f)	Li XI
$\mathbf{B_{41}}$	=	$x_{13}\,\mathbf{a}_1 + x_{13}\,\mathbf{a}_2 - x_{13}\,\mathbf{a}_3$	=	$ax_{13}\,\hat{\mathbf{z}}$	(24f)	Li XI
$\mathbf{B_{42}}$	=	$-x_{13}\,\mathbf{a}_1 - x_{13}\,\mathbf{a}_2 + x_{13}\,\mathbf{a}_3$	=	$-ax_{13}\,\hat{\mathbf{z}}$	(24f)	Li XI
$\mathbf{B_{43}}$	=	$-x_{14}\,\mathbf{a}_1 + x_{14}\,\mathbf{a}_2 + x_{14}\,\mathbf{a}_3$	=	$ax_{14}\,\hat{\mathbf{x}}$	(24f)	Si III
$\mathbf{B_{44}}$	=	$x_{14}\,\mathbf{a}_1 - x_{14}\,\mathbf{a}_2 - x_{14}\,\mathbf{a}_3$	=	$-ax_{14}\,\hat{\mathbf{x}}$	(24f)	Si III
$\mathbf{B_{45}}$	=	$x_{14}\,\mathbf{a}_1 - x_{14}\,\mathbf{a}_2 + x_{14}\,\mathbf{a}_3$	=	$ax_{14}\,\hat{\mathbf{y}}$	(24f)	Si III
$\mathbf{B_{46}}$	=	$-x_{14}\,\mathbf{a}_1 + x_{14}\,\mathbf{a}_2 - x_{14}\,\mathbf{a}_3$	=	$-ax_{14}\,\hat{\mathbf{y}}$	(24f)	Si III
$\mathbf{B_{47}}$	=	$x_{14}\,\mathbf{a}_1 + x_{14}\,\mathbf{a}_2 - x_{14}\,\mathbf{a}_3$	=	$ax_{14}\,\hat{\mathbf{z}}$	(24f)	Si III
$\mathbf{B_{48}}$	=	$-x_{14}\,\mathbf{a}_1 - x_{14}\,\mathbf{a}_2 + x_{14}\,\mathbf{a}_3$	=	$-ax_{14}\,\hat{\mathbf{z}}$	(24f)	Si III
$\mathbf{B_{49}}$	=	$-\left(x_{15} - \frac{1}{2}\right)\,\mathbf{a}_1 + x_{15}\,\mathbf{a}_2 + x_{15}\,\mathbf{a}_3$	=	$ax_{15}\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24g)	Li XII
$\mathbf{B_{50}}$	=	$x_{15}\,\mathbf{a}_1 - \left(x_{15} - \frac{1}{2}\right)\,\mathbf{a}_2 - \left(x_{15} - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_{15} - \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24g)	Li XII
$\mathbf{B_{51}}$	=	$x_{15}\,\mathbf{a}_1 - \left(x_{15} - \frac{1}{2}\right)\,\mathbf{a}_2 + x_{15}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + ax_{15}\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24g)	Li XII
$\mathbf{B_{52}}$	=	$-\left(x_{15} - \frac{1}{2}\right)\,\mathbf{a}_1 + x_{15}\,\mathbf{a}_2 - \left(x_{15} - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} - a\left(x_{15} - \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24g)	Li XII
$\mathbf{B_{53}}$	=	$x_{15}\,\mathbf{a}_1 + x_{15}\,\mathbf{a}_2 - \left(x_{15} - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}} + ax_{15}\,\hat{\mathbf{z}}$	(24g)	Li XII
$\mathbf{B_{54}}$	=	$-\left(x_{15} - \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_{15} - \frac{1}{2}\right)\,\mathbf{a}_2 + x_{15}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}} - a\left(x_{15} - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(24g)	Li XII
$\mathbf{B_{55}}$	=	$-\left(x_{16} - \frac{1}{2}\right)\,\mathbf{a}_1 + x_{16}\,\mathbf{a}_2 + x_{16}\,\mathbf{a}_3$	=	$ax_{16}\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24g)	Si IV
$\mathbf{B_{56}}$	=	$x_{16}\,\mathbf{a}_1 - \left(x_{16} - \frac{1}{2}\right)\,\mathbf{a}_2 - \left(x_{16} - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$-a\left(x_{16} - \frac{1}{2}\right)\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24g)	Si IV
$\mathbf{B_{57}}$	=	$x_{16}\,\mathbf{a}_1 - \left(x_{16} - \frac{1}{2}\right)\,\mathbf{a}_2 + x_{16}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + ax_{16}\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24g)	Si IV
$\mathbf{B_{58}}$	=	$-\left(x_{16} - \frac{1}{2}\right)\,\mathbf{a}_1 + x_{16}\,\mathbf{a}_2 - \left(x_{16} - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} - a\left(x_{16} - \frac{1}{2}\right)\,\hat{\mathbf{y}} + \frac{1}{4}a\,\hat{\mathbf{z}}$	(24g)	Si IV
$\mathbf{B_{59}}$	=	$x_{16}\,\mathbf{a}_1 + x_{16}\,\mathbf{a}_2 - \left(x_{16} - \frac{1}{2}\right)\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}} + ax_{16}\,\hat{\mathbf{z}}$	(24g)	Si IV
$\mathbf{B_{60}}$	=	$-\left(x_{16} - \frac{1}{2}\right)\,\mathbf{a}_1 - \left(x_{16} - \frac{1}{2}\right)\,\mathbf{a}_2 + x_{16}\,\mathbf{a}_3$	=	$\frac{1}{4}a\,\hat{\mathbf{x}} + \frac{1}{4}a\,\hat{\mathbf{y}} - a\left(x_{16} - \frac{1}{2}\right)\,\hat{\mathbf{z}}$	(24g)	Si IV

$\mathbf{B_{61}}$	=	$(-x_{17}+y_{17}+z_{17})\,\mathbf{a}_1+(x_{17}-y_{17}+z_{17})\,\mathbf{a}_2+(x_{17}+y_{17}-z_{17})\,\mathbf{a}_3$	=	$ax_{17}\,\hat{\mathbf{x}}+ay_{17}\,\hat{\mathbf{y}}+az_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{62}}$	=	$(x_{17}-y_{17}+z_{17})\,\mathbf{a}_1+(-x_{17}+y_{17}+z_{17})\,\mathbf{a}_2-(x_{17}+y_{17}+z_{17})\,\mathbf{a}_3$	=	$-ax_{17}\,\hat{\mathbf{x}}-ay_{17}\,\hat{\mathbf{y}}+az_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{63}}$	=	$(x_{17}+y_{17}-z_{17})\,\mathbf{a}_1-(x_{17}+y_{17}+z_{17})\,\mathbf{a}_2+(-x_{17}+y_{17}+z_{17})\,\mathbf{a}_3$	=	$-ax_{17}\,\hat{\mathbf{x}}+ay_{17}\,\hat{\mathbf{y}}-az_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{64}}$	=	$-(x_{17}+y_{17}+z_{17})\,\mathbf{a}_1+(x_{17}+y_{17}-z_{17})\,\mathbf{a}_2+(x_{17}-y_{17}+z_{17})\,\mathbf{a}_3$	=	$ax_{17}\,\hat{\mathbf{x}}-ay_{17}\,\hat{\mathbf{y}}-az_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{65}}$	=	$(x_{17}+y_{17}-z_{17})\,\mathbf{a}_1+(-x_{17}+y_{17}+z_{17})\,\mathbf{a}_2+(x_{17}-y_{17}+z_{17})\,\mathbf{a}_3$	=	$az_{17}\,\hat{\mathbf{x}}+ax_{17}\,\hat{\mathbf{y}}+ay_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{66}}$	=	$-(x_{17}+y_{17}+z_{17})\,\mathbf{a}_1+(x_{17}-y_{17}+z_{17})\,\mathbf{a}_2+(-x_{17}+y_{17}+z_{17})\,\mathbf{a}_3$	=	$az_{17}\,\hat{\mathbf{x}}-ax_{17}\,\hat{\mathbf{y}}-ay_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{67}}$	=	$(-x_{17}+y_{17}+z_{17})\,\mathbf{a}_1+(x_{17}+y_{17}-z_{17})\,\mathbf{a}_2-(x_{17}+y_{17}+z_{17})\,\mathbf{a}_3$	=	$-az_{17}\,\hat{\mathbf{x}}-ax_{17}\,\hat{\mathbf{y}}+ay_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{68}}$	=	$(x_{17}-y_{17}+z_{17})\,\mathbf{a}_1-(x_{17}+y_{17}+z_{17})\,\mathbf{a}_2+(x_{17}+y_{17}-z_{17})\,\mathbf{a}_3$	=	$-az_{17}\,\hat{\mathbf{x}}+ax_{17}\,\hat{\mathbf{y}}-ay_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{69}}$	=	$(x_{17}-y_{17}+z_{17})\,\mathbf{a}_1+(x_{17}+y_{17}-z_{17})\,\mathbf{a}_2+(-x_{17}+y_{17}+z_{17})\,\mathbf{a}_3$	=	$ay_{17}\,\hat{\mathbf{x}}+az_{17}\,\hat{\mathbf{y}}+ax_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{70}}$	=	$(-x_{17}+y_{17}+z_{17})\,\mathbf{a}_1-(x_{17}+y_{17}+z_{17})\,\mathbf{a}_2+(x_{17}-y_{17}+z_{17})\,\mathbf{a}_3$	=	$-ay_{17}\,\hat{\mathbf{x}}+az_{17}\,\hat{\mathbf{y}}-ax_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{71}}$	=	$-(x_{17}+y_{17}+z_{17})\,\mathbf{a}_1+(-x_{17}+y_{17}+z_{17})\,\mathbf{a}_2+(x_{17}+y_{17}-z_{17})\,\mathbf{a}_3$	=	$ay_{17}\,\hat{\mathbf{x}}-az_{17}\,\hat{\mathbf{y}}-ax_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{72}}$	=	$(x_{17}+y_{17}-z_{17})\,\mathbf{a}_1+(x_{17}-y_{17}+z_{17})\,\mathbf{a}_2-(x_{17}+y_{17}+z_{17})\,\mathbf{a}_3$	=	$-ay_{17}\,\hat{\mathbf{x}}-az_{17}\,\hat{\mathbf{y}}+ax_{17}\,\hat{\mathbf{z}}$	(48h)	Li XIII
$\mathbf{B_{73}}$	=	$(-x_{18}+y_{18}+z_{18})\,\mathbf{a}_1+(x_{18}-y_{18}+z_{18})\,\mathbf{a}_2+(x_{18}+y_{18}-z_{18})\,\mathbf{a}_3$	=	$ax_{18}\,\hat{\mathbf{x}}+ay_{18}\,\hat{\mathbf{y}}+az_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV
$\mathbf{B_{74}}$	=	$(x_{18}-y_{18}+z_{18})\,\mathbf{a}_1+(-x_{18}+y_{18}+z_{18})\,\mathbf{a}_2-(x_{18}+y_{18}+z_{18})\,\mathbf{a}_3$	=	$-ax_{18}\,\hat{\mathbf{x}}-ay_{18}\,\hat{\mathbf{y}}+az_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV
$\mathbf{B_{75}}$	=	$(x_{18}+y_{18}-z_{18})\,\mathbf{a}_1-(x_{18}+y_{18}+z_{18})\,\mathbf{a}_2+(-x_{18}+y_{18}+z_{18})\,\mathbf{a}_3$	=	$-ax_{18}\,\hat{\mathbf{x}}+ay_{18}\,\hat{\mathbf{y}}-az_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV
$\mathbf{B_{76}}$	=	$-(x_{18}+y_{18}+z_{18})\,\mathbf{a}_1+(x_{18}+y_{18}-z_{18})\,\mathbf{a}_2+(x_{18}-y_{18}+z_{18})\,\mathbf{a}_3$	=	$ax_{18}\,\hat{\mathbf{x}}-ay_{18}\,\hat{\mathbf{y}}-az_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV
$\mathbf{B_{77}}$	=	$(x_{18}+y_{18}-z_{18})\,\mathbf{a}_1+(-x_{18}+y_{18}+z_{18})\,\mathbf{a}_2+(x_{18}-y_{18}+z_{18})\,\mathbf{a}_3$	=	$az_{18}\,\hat{\mathbf{x}}+ax_{18}\,\hat{\mathbf{y}}+ay_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV

$\mathbf{B_{78}}$	=	$-(x_{18}+y_{18}+z_{18})\,\mathbf{a}_1+(x_{18}-y_{18}+z_{18})\,\mathbf{a}_2+(-x_{18}+y_{18}+z_{18})\,\mathbf{a}_3$	=	$az_{18}\,\hat{\mathbf{x}}-ax_{18}\,\hat{\mathbf{y}}-ay_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV
$\mathbf{B_{79}}$	=	$(-x_{18}+y_{18}+z_{18})\,\mathbf{a}_1+(x_{18}+y_{18}-z_{18})\,\mathbf{a}_2-(x_{18}+y_{18}+z_{18})\,\mathbf{a}_3$	=	$-az_{18}\,\hat{\mathbf{x}}-ax_{18}\,\hat{\mathbf{y}}+ay_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV
$\mathbf{B_{80}}$	=	$(x_{18}-y_{18}+z_{18})\,\mathbf{a}_1-(x_{18}+y_{18}+z_{18})\,\mathbf{a}_2+(x_{18}+y_{18}-z_{18})\,\mathbf{a}_3$	=	$-az_{18}\,\hat{\mathbf{x}}+ax_{18}\,\hat{\mathbf{y}}-ay_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV
$\mathbf{B_{81}}$	=	$(x_{18}-y_{18}+z_{18})\,\mathbf{a}_1+(x_{18}+y_{18}-z_{18})\,\mathbf{a}_2+(-x_{18}+y_{18}+z_{18})\,\mathbf{a}_3$	=	$ay_{18}\,\hat{\mathbf{x}}+az_{18}\,\hat{\mathbf{y}}+ax_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV
$\mathbf{B_{82}}$	=	$(-x_{18}+y_{18}+z_{18})\,\mathbf{a}_1-(x_{18}+y_{18}+z_{18})\,\mathbf{a}_2+(x_{18}-y_{18}+z_{18})\,\mathbf{a}_3$	=	$-ay_{18}\,\hat{\mathbf{x}}+az_{18}\,\hat{\mathbf{y}}-ax_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV
$\mathbf{B_{83}}$	=	$-(x_{18}+y_{18}+z_{18})\,\mathbf{a}_1+(-x_{18}+y_{18}+z_{18})\,\mathbf{a}_2+(x_{18}+y_{18}-z_{18})\,\mathbf{a}_3$	=	$ay_{18}\,\hat{\mathbf{x}}-az_{18}\,\hat{\mathbf{y}}-ax_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV
$\mathbf{B_{84}}$	=	$(x_{18}+y_{18}-z_{18})\,\mathbf{a}_1+(x_{18}-y_{18}+z_{18})\,\mathbf{a}_2-(x_{18}+y_{18}+z_{18})\,\mathbf{a}_3$	=	$-ay_{18}\,\hat{\mathbf{x}}-az_{18}\,\hat{\mathbf{y}}+ax_{18}\,\hat{\mathbf{z}}$	(48h)	Li XIV
$\mathbf{B_{85}}$	=	$(-x_{19}+y_{19}+z_{19})\,\mathbf{a}_1+(x_{19}-y_{19}+z_{19})\,\mathbf{a}_2+(x_{19}+y_{19}-z_{19})\,\mathbf{a}_3$	=	$ax_{19}\,\hat{\mathbf{x}}+ay_{19}\,\hat{\mathbf{y}}+az_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV
$\mathbf{B_{86}}$	=	$(x_{19}-y_{19}+z_{19})\,\mathbf{a}_1+(-x_{19}+y_{19}+z_{19})\,\mathbf{a}_2-(x_{19}+y_{19}+z_{19})\,\mathbf{a}_3$	=	$-ax_{19}\,\hat{\mathbf{x}}-ay_{19}\,\hat{\mathbf{y}}+az_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV
$\mathbf{B_{87}}$	=	$(x_{19}+y_{19}-z_{19})\,\mathbf{a}_1-(x_{19}+y_{19}+z_{19})\,\mathbf{a}_2+(-x_{19}+y_{19}+z_{19})\,\mathbf{a}_3$	=	$-ax_{19}\,\hat{\mathbf{x}}+ay_{19}\,\hat{\mathbf{y}}-az_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV
$\mathbf{B_{88}}$	=	$-(x_{19}+y_{19}+z_{19})\,\mathbf{a}_1+(x_{19}+y_{19}-z_{19})\,\mathbf{a}_2+(x_{19}-y_{19}+z_{19})\,\mathbf{a}_3$	=	$ax_{19}\,\hat{\mathbf{x}}-ay_{19}\,\hat{\mathbf{y}}-az_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV
$\mathbf{B_{89}}$	=	$(x_{19}+y_{19}-z_{19})\,\mathbf{a}_1+(-x_{19}+y_{19}+z_{19})\,\mathbf{a}_2+(x_{19}-y_{19}+z_{19})\,\mathbf{a}_3$	=	$az_{19}\,\hat{\mathbf{x}}+ax_{19}\,\hat{\mathbf{y}}+ay_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV
$\mathbf{B_{90}}$	=	$-(x_{19}+y_{19}+z_{19})\,\mathbf{a}_1+(x_{19}-y_{19}+z_{19})\,\mathbf{a}_2+(-x_{19}+y_{19}+z_{19})\,\mathbf{a}_3$	=	$az_{19}\,\hat{\mathbf{x}}-ax_{19}\,\hat{\mathbf{y}}-ay_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV
$\mathbf{B_{91}}$	=	$(-x_{19}+y_{19}+z_{19})\,\mathbf{a}_1+(x_{19}+y_{19}-z_{19})\,\mathbf{a}_2-(x_{19}+y_{19}+z_{19})\,\mathbf{a}_3$	=	$-az_{19}\,\hat{\mathbf{x}}-ax_{19}\,\hat{\mathbf{y}}+ay_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV
$\mathbf{B_{92}}$	=	$(x_{19}-y_{19}+z_{19})\,\mathbf{a}_1-(x_{19}+y_{19}+z_{19})\,\mathbf{a}_2+(x_{19}+y_{19}-z_{19})\,\mathbf{a}_3$	=	$-az_{19}\,\hat{\mathbf{x}}+ax_{19}\,\hat{\mathbf{y}}-ay_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV
$\mathbf{B_{93}}$	=	$(x_{19}-y_{19}+z_{19})\,\mathbf{a}_1+(x_{19}+y_{19}-z_{19})\,\mathbf{a}_2+(-x_{19}+y_{19}+z_{19})\,\mathbf{a}_3$	=	$ay_{19}\,\hat{\mathbf{x}}+az_{19}\,\hat{\mathbf{y}}+ax_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV
$\mathbf{B_{94}}$	=	$(-x_{19}+y_{19}+z_{19})\,\mathbf{a}_1-(x_{19}+y_{19}+z_{19})\,\mathbf{a}_2+(x_{19}-y_{19}+z_{19})\,\mathbf{a}_3$	=	$-ay_{19}\,\hat{\mathbf{x}}+az_{19}\,\hat{\mathbf{y}}-ax_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV

$\mathbf{B_{95}}$	$= -(x_{19}+y_{19}+z_{19})\,\mathbf{a}_1 + (-x_{19}+y_{19}+z_{19})\,\mathbf{a}_2 + (x_{19}+y_{19}-z_{19})\,\mathbf{a}_3$	$= a y_{19}\,\hat{\mathbf{x}} - a z_{19}\,\hat{\mathbf{y}} - a x_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV
$\mathbf{B_{96}}$	$= (x_{19}+y_{19}-z_{19})\,\mathbf{a}_1 + (x_{19}-y_{19}+z_{19})\,\mathbf{a}_2 - (x_{19}+y_{19}+z_{19})\,\mathbf{a}_3$	$= -a y_{19}\,\hat{\mathbf{x}} - a z_{19}\,\hat{\mathbf{y}} + a x_{19}\,\hat{\mathbf{z}}$	(48h)	Li XV
$\mathbf{B_{97}}$	$= (-x_{20}+y_{20}+z_{20})\,\mathbf{a}_1 + (x_{20}-y_{20}+z_{20})\,\mathbf{a}_2 + (x_{20}+y_{20}-z_{20})\,\mathbf{a}_3$	$= a x_{20}\,\hat{\mathbf{x}} + a y_{20}\,\hat{\mathbf{y}} + a z_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI
$\mathbf{B_{98}}$	$= (x_{20}-y_{20}+z_{20})\,\mathbf{a}_1 + (-x_{20}+y_{20}+z_{20})\,\mathbf{a}_2 - (x_{20}+y_{20}+z_{20})\,\mathbf{a}_3$	$= -a x_{20}\,\hat{\mathbf{x}} - a y_{20}\,\hat{\mathbf{y}} + a z_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI
$\mathbf{B_{99}}$	$= (x_{20}+y_{20}-z_{20})\,\mathbf{a}_1 - (x_{20}+y_{20}+z_{20})\,\mathbf{a}_2 + (-x_{20}+y_{20}+z_{20})\,\mathbf{a}_3$	$= -a x_{20}\,\hat{\mathbf{x}} + a y_{20}\,\hat{\mathbf{y}} - a z_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI
$\mathbf{B_{100}}$	$= -(x_{20}+y_{20}+z_{20})\,\mathbf{a}_1 + (x_{20}+y_{20}-z_{20})\,\mathbf{a}_2 + (x_{20}-y_{20}+z_{20})\,\mathbf{a}_3$	$= a x_{20}\,\hat{\mathbf{x}} - a y_{20}\,\hat{\mathbf{y}} - a z_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI
$\mathbf{B_{101}}$	$= (x_{20}+y_{20}-z_{20})\,\mathbf{a}_1 + (-x_{20}+y_{20}+z_{20})\,\mathbf{a}_2 + (x_{20}-y_{20}+z_{20})\,\mathbf{a}_3$	$= a z_{20}\,\hat{\mathbf{x}} + a x_{20}\,\hat{\mathbf{y}} + a y_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI
$\mathbf{B_{102}}$	$= -(x_{20}+y_{20}+z_{20})\,\mathbf{a}_1 + (x_{20}-y_{20}+z_{20})\,\mathbf{a}_2 + (-x_{20}+y_{20}+z_{20})\,\mathbf{a}_3$	$= a z_{20}\,\hat{\mathbf{x}} - a x_{20}\,\hat{\mathbf{y}} - a y_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI
$\mathbf{B_{103}}$	$= (-x_{20}+y_{20}+z_{20})\,\mathbf{a}_1 + (x_{20}+y_{20}-z_{20})\,\mathbf{a}_2 - (x_{20}+y_{20}+z_{20})\,\mathbf{a}_3$	$= -a z_{20}\,\hat{\mathbf{x}} - a x_{20}\,\hat{\mathbf{y}} + a y_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI
$\mathbf{B_{104}}$	$= (x_{20}-y_{20}+z_{20})\,\mathbf{a}_1 - (x_{20}+y_{20}+z_{20})\,\mathbf{a}_2 + (x_{20}+y_{20}-z_{20})\,\mathbf{a}_3$	$= -a z_{20}\,\hat{\mathbf{x}} + a x_{20}\,\hat{\mathbf{y}} - a y_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI
$\mathbf{B_{105}}$	$= (x_{20}-y_{20}+z_{20})\,\mathbf{a}_1 + (x_{20}+y_{20}-z_{20})\,\mathbf{a}_2 + (-x_{20}+y_{20}+z_{20})\,\mathbf{a}_3$	$= a y_{20}\,\hat{\mathbf{x}} + a z_{20}\,\hat{\mathbf{y}} + a x_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI
$\mathbf{B_{106}}$	$= (-x_{20}+y_{20}+z_{20})\,\mathbf{a}_1 - (x_{20}+y_{20}+z_{20})\,\mathbf{a}_2 + (x_{20}-y_{20}+z_{20})\,\mathbf{a}_3$	$= -a y_{20}\,\hat{\mathbf{x}} + a z_{20}\,\hat{\mathbf{y}} - a x_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI
$\mathbf{B_{107}}$	$= -(x_{20}+y_{20}+z_{20})\,\mathbf{a}_1 + (-x_{20}+y_{20}+z_{20})\,\mathbf{a}_2 + (x_{20}+y_{20}-z_{20})\,\mathbf{a}_3$	$= a y_{20}\,\hat{\mathbf{x}} - a z_{20}\,\hat{\mathbf{y}} - a x_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI
$\mathbf{B_{108}}$	$= (x_{20}+y_{20}-z_{20})\,\mathbf{a}_1 + (x_{20}-y_{20}+z_{20})\,\mathbf{a}_2 - (x_{20}+y_{20}+z_{20})\,\mathbf{a}_3$	$= -a y_{20}\,\hat{\mathbf{x}} - a z_{20}\,\hat{\mathbf{y}} + a x_{20}\,\hat{\mathbf{z}}$	(48h)	Li XVI

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