

## A31B20\_tI204\_140\_b2gh3m\_ac2fh3l-001

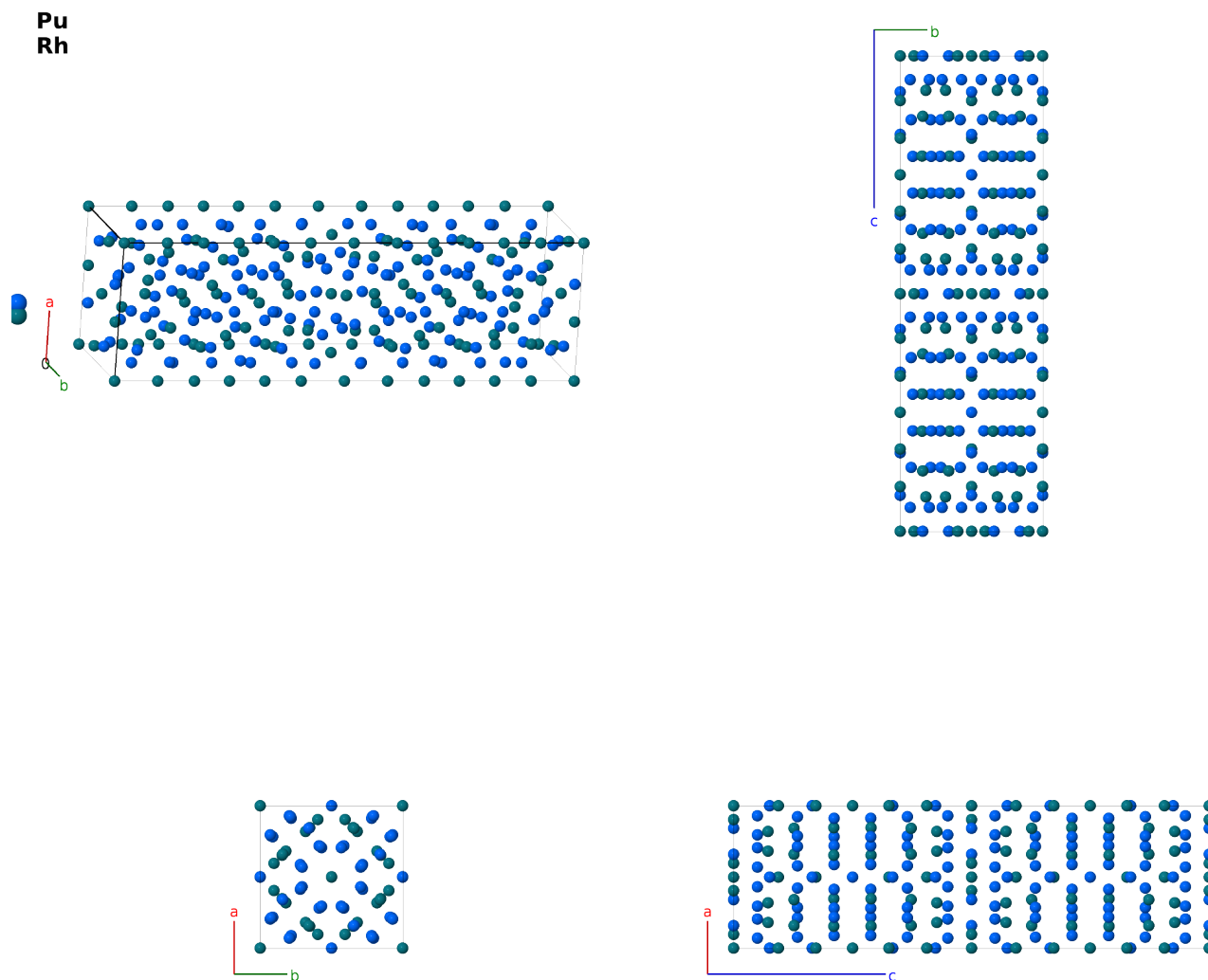
This structure previously used the label(s) `A31B20_tI204_140_b2gh3m_ac2fh3l`. Calls to these addresses will be redirected here.

Cite this page as:

- H. Eckert, S. Divilov, M. J. Mehl, D. Hicks, A. C. Zettel, M. Esters, X. Campilongo, and S. Curtarolo, *The AFLOW Library of Crystallographic Prototypes: Part 4*, Comput. Mater. Sci. **240**, 112988 (2024), doi: 10.1016/j.commatsci.2024.112988.
- D. Hicks, M. J. Mehl, M. Esters, C. Osés, O. Levy, G. L. W. Hart, C. Toher, and S. Curtarolo, *The AFLOW Library of Crystallographic Prototypes: Part 3*, Comput. Mater. Sci. **199**, 110450 (2021), doi: 10.1016/j.commatsci.2021.110450.

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

[https://aflow.org/prototype-encyclopedia/A31B20\\_tI204\\_140\\_b2gh3m\\_ac2fh3l-001](https://aflow.org/prototype-encyclopedia/A31B20_tI204_140_b2gh3m_ac2fh3l-001)



## Prototype

Pu<sub>31</sub>Rh<sub>20</sub>

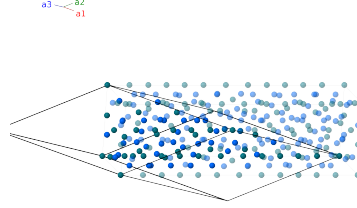
|                         |                                                                                                                                                                                                                               |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AFLOW prototype label   | A31B20_tI204_140_b2gh3m_ac2fh3l-001                                                                                                                                                                                           |
| ICSD                    | 1111                                                                                                                                                                                                                          |
| CCDC                    | 1591301                                                                                                                                                                                                                       |
| Pearson symbol          | tI204                                                                                                                                                                                                                         |
| Space group number      | 140                                                                                                                                                                                                                           |
| Space group symbol      | $I4/mcm$                                                                                                                                                                                                                      |
| AFLOW prototype command | aflow --proto=A31B20_tI204_140_b2gh3m_ac2fh3l-001<br>--params= $a, c/a, z_4, z_5, z_6, z_7, x_8, x_9, x_{10}, z_{10}, x_{11}, z_{11}, x_{12}, z_{12}, x_{13}, y_{13}, z_{13}, x_{14}, y_{14}, z_{14}, x_{15}, y_{15}, z_{15}$ |

### Other compounds with this structure

$\text{Pu}_{31}\text{Pt}_{20}, \text{Ca}_{31}\text{Sn}_{20}$

### Body-centered Tetragonal primitive vectors

$$\begin{aligned}
\mathbf{a}_1 &= -\frac{1}{2}a \hat{\mathbf{x}} + \frac{1}{2}a \hat{\mathbf{y}} + \frac{1}{2}c \hat{\mathbf{z}} \\
\mathbf{a}_2 &= \frac{1}{2}a \hat{\mathbf{x}} - \frac{1}{2}a \hat{\mathbf{y}} + \frac{1}{2}c \hat{\mathbf{z}} \\
\mathbf{a}_3 &= \frac{1}{2}a \hat{\mathbf{x}} + \frac{1}{2}a \hat{\mathbf{y}} - \frac{1}{2}c \hat{\mathbf{z}}
\end{aligned}$$



### Basis vectors

|                   | Lattice coordinates                                                                            |     | Cartesian coordinates                                           | Wyckoff position | Atom type |
|-------------------|------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------|------------------|-----------|
| $\mathbf{B}_1$    | $= \frac{1}{4} \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2$                                        | $=$ | $\frac{1}{4}c \hat{\mathbf{z}}$                                 | (4a)             | Rh I      |
| $\mathbf{B}_2$    | $= \frac{3}{4} \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2$                                        | $=$ | $\frac{3}{4}c \hat{\mathbf{z}}$                                 | (4a)             | Rh I      |
| $\mathbf{B}_3$    | $= \frac{3}{4} \mathbf{a}_1 + \frac{1}{4} \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$             | $=$ | $\frac{1}{2}a \hat{\mathbf{y}} + \frac{1}{4}c \hat{\mathbf{z}}$ | (4b)             | Pu I      |
| $\mathbf{B}_4$    | $= \frac{1}{4} \mathbf{a}_1 + \frac{3}{4} \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$             | $=$ | $\frac{1}{2}a \hat{\mathbf{x}} + \frac{1}{4}c \hat{\mathbf{z}}$ | (4b)             | Pu I      |
| $\mathbf{B}_5$    | $= 0$                                                                                          | $=$ | $0$                                                             | (4c)             | Rh II     |
| $\mathbf{B}_6$    | $= \frac{1}{2} \mathbf{a}_1 + \frac{1}{2} \mathbf{a}_2$                                        | $=$ | $\frac{1}{2}c \hat{\mathbf{z}}$                                 | (4c)             | Rh II     |
| $\mathbf{B}_7$    | $= z_4 \mathbf{a}_1 + z_4 \mathbf{a}_2$                                                        | $=$ | $cz_4 \hat{\mathbf{z}}$                                         | (8f)             | Rh III    |
| $\mathbf{B}_8$    | $= -\left(z_4 - \frac{1}{2}\right) \mathbf{a}_1 - \left(z_4 - \frac{1}{2}\right) \mathbf{a}_2$ | $=$ | $-c\left(z_4 - \frac{1}{2}\right) \hat{\mathbf{z}}$             | (8f)             | Rh III    |
| $\mathbf{B}_9$    | $= -z_4 \mathbf{a}_1 - z_4 \mathbf{a}_2$                                                       | $=$ | $-cz_4 \hat{\mathbf{z}}$                                        | (8f)             | Rh III    |
| $\mathbf{B}_{10}$ | $= \left(z_4 + \frac{1}{2}\right) \mathbf{a}_1 + \left(z_4 + \frac{1}{2}\right) \mathbf{a}_2$  | $=$ | $c\left(z_4 + \frac{1}{2}\right) \hat{\mathbf{z}}$              | (8f)             | Rh III    |
| $\mathbf{B}_{11}$ | $= z_5 \mathbf{a}_1 + z_5 \mathbf{a}_2$                                                        | $=$ | $cz_5 \hat{\mathbf{z}}$                                         | (8f)             | Rh IV     |
| $\mathbf{B}_{12}$ | $= -\left(z_5 - \frac{1}{2}\right) \mathbf{a}_1 - \left(z_5 - \frac{1}{2}\right) \mathbf{a}_2$ | $=$ | $-c\left(z_5 - \frac{1}{2}\right) \hat{\mathbf{z}}$             | (8f)             | Rh IV     |
| $\mathbf{B}_{13}$ | $= -z_5 \mathbf{a}_1 - z_5 \mathbf{a}_2$                                                       | $=$ | $-cz_5 \hat{\mathbf{z}}$                                        | (8f)             | Rh IV     |
| $\mathbf{B}_{14}$ | $= \left(z_5 + \frac{1}{2}\right) \mathbf{a}_1 + \left(z_5 + \frac{1}{2}\right) \mathbf{a}_2$  | $=$ | $c\left(z_5 + \frac{1}{2}\right) \hat{\mathbf{z}}$              | (8f)             | Rh IV     |
| $\mathbf{B}_{15}$ | $= \left(z_6 + \frac{1}{2}\right) \mathbf{a}_1 + z_6 \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$  | $=$ | $\frac{1}{2}a \hat{\mathbf{y}} + cz_6 \hat{\mathbf{z}}$         | (8g)             | Pu II     |

|                     |                                                                                                                              |     |                                                                                                   |       |        |
|---------------------|------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------------------|-------|--------|
| $\mathbf{B}_{16} =$ | $z_6 \mathbf{a}_1 + (z_6 + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                                             | $=$ | $\frac{1}{2} a \hat{\mathbf{x}} + cz_6 \hat{\mathbf{z}}$                                          | (8g)  | Pu II  |
| $\mathbf{B}_{17} =$ | $-z_6 \mathbf{a}_1 - (z_6 - \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                                            | $=$ | $\frac{1}{2} a \hat{\mathbf{x}} - cz_6 \hat{\mathbf{z}}$                                          | (8g)  | Pu II  |
| $\mathbf{B}_{18} =$ | $-(z_6 - \frac{1}{2}) \mathbf{a}_1 - z_6 \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                                            | $=$ | $\frac{1}{2} a \hat{\mathbf{y}} - cz_6 \hat{\mathbf{z}}$                                          | (8g)  | Pu II  |
| $\mathbf{B}_{19} =$ | $(z_7 + \frac{1}{2}) \mathbf{a}_1 + z_7 \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                                             | $=$ | $\frac{1}{2} a \hat{\mathbf{y}} + cz_7 \hat{\mathbf{z}}$                                          | (8g)  | Pu III |
| $\mathbf{B}_{20} =$ | $z_7 \mathbf{a}_1 + (z_7 + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                                             | $=$ | $\frac{1}{2} a \hat{\mathbf{x}} + cz_7 \hat{\mathbf{z}}$                                          | (8g)  | Pu III |
| $\mathbf{B}_{21} =$ | $-z_7 \mathbf{a}_1 - (z_7 - \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                                            | $=$ | $\frac{1}{2} a \hat{\mathbf{x}} - cz_7 \hat{\mathbf{z}}$                                          | (8g)  | Pu III |
| $\mathbf{B}_{22} =$ | $-(z_7 - \frac{1}{2}) \mathbf{a}_1 - z_7 \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                                            | $=$ | $\frac{1}{2} a \hat{\mathbf{y}} - cz_7 \hat{\mathbf{z}}$                                          | (8g)  | Pu III |
| $\mathbf{B}_{23} =$ | $(x_8 + \frac{1}{2}) \mathbf{a}_1 + x_8 \mathbf{a}_2 +$<br>$(2x_8 + \frac{1}{2}) \mathbf{a}_3$                               | $=$ | $ax_8 \hat{\mathbf{x}} + a(x_8 + \frac{1}{2}) \hat{\mathbf{y}}$                                   | (8h)  | Pu IV  |
| $\mathbf{B}_{24} =$ | $-(x_8 - \frac{1}{2}) \mathbf{a}_1 - x_8 \mathbf{a}_2 -$<br>$(2x_8 - \frac{1}{2}) \mathbf{a}_3$                              | $=$ | $-ax_8 \hat{\mathbf{x}} - a(x_8 - \frac{1}{2}) \hat{\mathbf{y}}$                                  | (8h)  | Pu IV  |
| $\mathbf{B}_{25} =$ | $x_8 \mathbf{a}_1 - (x_8 - \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                                             | $=$ | $-a(x_8 - \frac{1}{2}) \hat{\mathbf{x}} + ax_8 \hat{\mathbf{y}}$                                  | (8h)  | Pu IV  |
| $\mathbf{B}_{26} =$ | $-x_8 \mathbf{a}_1 + (x_8 + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                                            | $=$ | $a(x_8 + \frac{1}{2}) \hat{\mathbf{x}} - ax_8 \hat{\mathbf{y}}$                                   | (8h)  | Pu IV  |
| $\mathbf{B}_{27} =$ | $(x_9 + \frac{1}{2}) \mathbf{a}_1 + x_9 \mathbf{a}_2 +$<br>$(2x_9 + \frac{1}{2}) \mathbf{a}_3$                               | $=$ | $ax_9 \hat{\mathbf{x}} + a(x_9 + \frac{1}{2}) \hat{\mathbf{y}}$                                   | (8h)  | Rh V   |
| $\mathbf{B}_{28} =$ | $-(x_9 - \frac{1}{2}) \mathbf{a}_1 - x_9 \mathbf{a}_2 -$<br>$(2x_9 - \frac{1}{2}) \mathbf{a}_3$                              | $=$ | $-ax_9 \hat{\mathbf{x}} - a(x_9 - \frac{1}{2}) \hat{\mathbf{y}}$                                  | (8h)  | Rh V   |
| $\mathbf{B}_{29} =$ | $x_9 \mathbf{a}_1 - (x_9 - \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                                             | $=$ | $-a(x_9 - \frac{1}{2}) \hat{\mathbf{x}} + ax_9 \hat{\mathbf{y}}$                                  | (8h)  | Rh V   |
| $\mathbf{B}_{30} =$ | $-x_9 \mathbf{a}_1 + (x_9 + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                                            | $=$ | $a(x_9 + \frac{1}{2}) \hat{\mathbf{x}} - ax_9 \hat{\mathbf{y}}$                                   | (8h)  | Rh V   |
| $\mathbf{B}_{31} =$ | $(x_{10} + z_{10} + \frac{1}{2}) \mathbf{a}_1 +$<br>$(x_{10} + z_{10}) \mathbf{a}_2 + (2x_{10} + \frac{1}{2}) \mathbf{a}_3$  | $=$ | $ax_{10} \hat{\mathbf{x}} + a(x_{10} + \frac{1}{2}) \hat{\mathbf{y}} + cz_{10} \hat{\mathbf{z}}$  | (16l) | Rh VI  |
| $\mathbf{B}_{32} =$ | $(-x_{10} + z_{10} + \frac{1}{2}) \mathbf{a}_1 -$<br>$(x_{10} - z_{10}) \mathbf{a}_2 - (2x_{10} - \frac{1}{2}) \mathbf{a}_3$ | $=$ | $-ax_{10} \hat{\mathbf{x}} - a(x_{10} - \frac{1}{2}) \hat{\mathbf{y}} + cz_{10} \hat{\mathbf{z}}$ | (16l) | Rh VI  |
| $\mathbf{B}_{33} =$ | $(x_{10} + z_{10}) \mathbf{a}_1 +$<br>$(-x_{10} + z_{10} + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$             | $=$ | $-a(x_{10} - \frac{1}{2}) \hat{\mathbf{x}} + ax_{10} \hat{\mathbf{y}} + cz_{10} \hat{\mathbf{z}}$ | (16l) | Rh VI  |
| $\mathbf{B}_{34} =$ | $-(x_{10} - z_{10}) \mathbf{a}_1 +$<br>$(x_{10} + z_{10} + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$             | $=$ | $a(x_{10} + \frac{1}{2}) \hat{\mathbf{x}} - ax_{10} \hat{\mathbf{y}} + cz_{10} \hat{\mathbf{z}}$  | (16l) | Rh VI  |
| $\mathbf{B}_{35} =$ | $(x_{10} - z_{10}) \mathbf{a}_1 -$<br>$(x_{10} + z_{10} - \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$              | $=$ | $-a(x_{10} - \frac{1}{2}) \hat{\mathbf{x}} + ax_{10} \hat{\mathbf{y}} - cz_{10} \hat{\mathbf{z}}$ | (16l) | Rh VI  |
| $\mathbf{B}_{36} =$ | $-(x_{10} + z_{10}) \mathbf{a}_1 +$<br>$(x_{10} - z_{10} + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$             | $=$ | $a(x_{10} + \frac{1}{2}) \hat{\mathbf{x}} - ax_{10} \hat{\mathbf{y}} - cz_{10} \hat{\mathbf{z}}$  | (16l) | Rh VI  |
| $\mathbf{B}_{37} =$ | $(x_{10} - z_{10} + \frac{1}{2}) \mathbf{a}_1 +$<br>$(x_{10} - z_{10}) \mathbf{a}_2 + (2x_{10} + \frac{1}{2}) \mathbf{a}_3$  | $=$ | $ax_{10} \hat{\mathbf{x}} + a(x_{10} + \frac{1}{2}) \hat{\mathbf{y}} - cz_{10} \hat{\mathbf{z}}$  | (16l) | Rh VI  |
| $\mathbf{B}_{38} =$ | $-(x_{10} + z_{10} - \frac{1}{2}) \mathbf{a}_1 -$<br>$(x_{10} + z_{10}) \mathbf{a}_2 - (2x_{10} - \frac{1}{2}) \mathbf{a}_3$ | $=$ | $-ax_{10} \hat{\mathbf{x}} - a(x_{10} - \frac{1}{2}) \hat{\mathbf{y}} - cz_{10} \hat{\mathbf{z}}$ | (16l) | Rh VI  |
| $\mathbf{B}_{39} =$ | $(x_{11} + z_{11} + \frac{1}{2}) \mathbf{a}_1 +$<br>$(x_{11} + z_{11}) \mathbf{a}_2 + (2x_{11} + \frac{1}{2}) \mathbf{a}_3$  | $=$ | $ax_{11} \hat{\mathbf{x}} + a(x_{11} + \frac{1}{2}) \hat{\mathbf{y}} + cz_{11} \hat{\mathbf{z}}$  | (16l) | Rh VII |
| $\mathbf{B}_{40} =$ | $(-x_{11} + z_{11} + \frac{1}{2}) \mathbf{a}_1 -$<br>$(x_{11} - z_{11}) \mathbf{a}_2 - (2x_{11} - \frac{1}{2}) \mathbf{a}_3$ | $=$ | $-ax_{11} \hat{\mathbf{x}} - a(x_{11} - \frac{1}{2}) \hat{\mathbf{y}} + cz_{11} \hat{\mathbf{z}}$ | (16l) | Rh VII |
| $\mathbf{B}_{41} =$ | $(x_{11} + z_{11}) \mathbf{a}_1 +$<br>$(-x_{11} + z_{11} + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$             | $=$ | $-a(x_{11} - \frac{1}{2}) \hat{\mathbf{x}} + ax_{11} \hat{\mathbf{y}} + cz_{11} \hat{\mathbf{z}}$ | (16l) | Rh VII |
| $\mathbf{B}_{42} =$ | $-(x_{11} - z_{11}) \mathbf{a}_1 +$<br>$(x_{11} + z_{11} + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$             | $=$ | $a(x_{11} + \frac{1}{2}) \hat{\mathbf{x}} - ax_{11} \hat{\mathbf{y}} + cz_{11} \hat{\mathbf{z}}$  | (16l) | Rh VII |
| $\mathbf{B}_{43} =$ | $(x_{11} - z_{11}) \mathbf{a}_1 -$<br>$(x_{11} + z_{11} - \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$              | $=$ | $-a(x_{11} - \frac{1}{2}) \hat{\mathbf{x}} + ax_{11} \hat{\mathbf{y}} - cz_{11} \hat{\mathbf{z}}$ | (16l) | Rh VII |

|                     |                                                                                                                                           |     |                                                                                                   |       |         |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------------------|-------|---------|
| $\mathbf{B}_{44} =$ | $-(x_{11} + z_{11}) \mathbf{a}_1 +$<br>$(x_{11} - z_{11} + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                          | $=$ | $a(x_{11} + \frac{1}{2}) \hat{\mathbf{x}} - ax_{11} \hat{\mathbf{y}} - cz_{11} \hat{\mathbf{z}}$  | (16l) | Rh VII  |
| $\mathbf{B}_{45} =$ | $(x_{11} - z_{11} + \frac{1}{2}) \mathbf{a}_1 +$<br>$(x_{11} - z_{11}) \mathbf{a}_2 + (2x_{11} + \frac{1}{2}) \mathbf{a}_3$               | $=$ | $ax_{11} \hat{\mathbf{x}} + a(x_{11} + \frac{1}{2}) \hat{\mathbf{y}} - cz_{11} \hat{\mathbf{z}}$  | (16l) | Rh VII  |
| $\mathbf{B}_{46} =$ | $-(x_{11} + z_{11} - \frac{1}{2}) \mathbf{a}_1 -$<br>$(x_{11} + z_{11}) \mathbf{a}_2 - (2x_{11} - \frac{1}{2}) \mathbf{a}_3$              | $=$ | $-ax_{11} \hat{\mathbf{x}} - a(x_{11} - \frac{1}{2}) \hat{\mathbf{y}} - cz_{11} \hat{\mathbf{z}}$ | (16l) | Rh VII  |
| $\mathbf{B}_{47} =$ | $(x_{12} + z_{12} + \frac{1}{2}) \mathbf{a}_1 +$<br>$(x_{12} + z_{12}) \mathbf{a}_2 + (2x_{12} + \frac{1}{2}) \mathbf{a}_3$               | $=$ | $ax_{12} \hat{\mathbf{x}} + a(x_{12} + \frac{1}{2}) \hat{\mathbf{y}} + cz_{12} \hat{\mathbf{z}}$  | (16l) | Rh VIII |
| $\mathbf{B}_{48} =$ | $(-x_{12} + z_{12} + \frac{1}{2}) \mathbf{a}_1 -$<br>$(x_{12} - z_{12}) \mathbf{a}_2 - (2x_{12} - \frac{1}{2}) \mathbf{a}_3$              | $=$ | $-ax_{12} \hat{\mathbf{x}} - a(x_{12} - \frac{1}{2}) \hat{\mathbf{y}} + cz_{12} \hat{\mathbf{z}}$ | (16l) | Rh VIII |
| $\mathbf{B}_{49} =$ | $(x_{12} + z_{12}) \mathbf{a}_1 +$<br>$(-x_{12} + z_{12} + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                          | $=$ | $-a(x_{12} - \frac{1}{2}) \hat{\mathbf{x}} + ax_{12} \hat{\mathbf{y}} + cz_{12} \hat{\mathbf{z}}$ | (16l) | Rh VIII |
| $\mathbf{B}_{50} =$ | $-(x_{12} - z_{12}) \mathbf{a}_1 +$<br>$(x_{12} + z_{12} + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                          | $=$ | $a(x_{12} + \frac{1}{2}) \hat{\mathbf{x}} - ax_{12} \hat{\mathbf{y}} + cz_{12} \hat{\mathbf{z}}$  | (16l) | Rh VIII |
| $\mathbf{B}_{51} =$ | $(x_{12} - z_{12}) \mathbf{a}_1 -$<br>$(x_{12} + z_{12} - \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                           | $=$ | $-a(x_{12} - \frac{1}{2}) \hat{\mathbf{x}} + ax_{12} \hat{\mathbf{y}} - cz_{12} \hat{\mathbf{z}}$ | (16l) | Rh VIII |
| $\mathbf{B}_{52} =$ | $-(x_{12} + z_{12}) \mathbf{a}_1 +$<br>$(x_{12} - z_{12} + \frac{1}{2}) \mathbf{a}_2 + \frac{1}{2} \mathbf{a}_3$                          | $=$ | $a(x_{12} + \frac{1}{2}) \hat{\mathbf{x}} - ax_{12} \hat{\mathbf{y}} - cz_{12} \hat{\mathbf{z}}$  | (16l) | Rh VIII |
| $\mathbf{B}_{53} =$ | $(x_{12} - z_{12} + \frac{1}{2}) \mathbf{a}_1 +$<br>$(x_{12} - z_{12}) \mathbf{a}_2 + (2x_{12} + \frac{1}{2}) \mathbf{a}_3$               | $=$ | $ax_{12} \hat{\mathbf{x}} + a(x_{12} + \frac{1}{2}) \hat{\mathbf{y}} - cz_{12} \hat{\mathbf{z}}$  | (16l) | Rh VIII |
| $\mathbf{B}_{54} =$ | $-(x_{12} + z_{12} - \frac{1}{2}) \mathbf{a}_1 -$<br>$(x_{12} + z_{12}) \mathbf{a}_2 - (2x_{12} - \frac{1}{2}) \mathbf{a}_3$              | $=$ | $-ax_{12} \hat{\mathbf{x}} - a(x_{12} - \frac{1}{2}) \hat{\mathbf{y}} - cz_{12} \hat{\mathbf{z}}$ | (16l) | Rh VIII |
| $\mathbf{B}_{55} =$ | $(y_{13} + z_{13}) \mathbf{a}_1 + (x_{13} + z_{13}) \mathbf{a}_2 +$<br>$(x_{13} + y_{13}) \mathbf{a}_3$                                   | $=$ | $ax_{13} \hat{\mathbf{x}} + ay_{13} \hat{\mathbf{y}} + cz_{13} \hat{\mathbf{z}}$                  | (32m) | Pu V    |
| $\mathbf{B}_{56} =$ | $-(y_{13} - z_{13}) \mathbf{a}_1 -$<br>$(x_{13} - z_{13}) \mathbf{a}_2 - (x_{13} + y_{13}) \mathbf{a}_3$                                  | $=$ | $-ax_{13} \hat{\mathbf{x}} - ay_{13} \hat{\mathbf{y}} + cz_{13} \hat{\mathbf{z}}$                 | (32m) | Pu V    |
| $\mathbf{B}_{57} =$ | $(x_{13} + z_{13}) \mathbf{a}_1 - (y_{13} - z_{13}) \mathbf{a}_2 +$<br>$(x_{13} - y_{13}) \mathbf{a}_3$                                   | $=$ | $-ay_{13} \hat{\mathbf{x}} + ax_{13} \hat{\mathbf{y}} + cz_{13} \hat{\mathbf{z}}$                 | (32m) | Pu V    |
| $\mathbf{B}_{58} =$ | $-(x_{13} - z_{13}) \mathbf{a}_1 +$<br>$(y_{13} + z_{13}) \mathbf{a}_2 - (x_{13} - y_{13}) \mathbf{a}_3$                                  | $=$ | $ay_{13} \hat{\mathbf{x}} - ax_{13} \hat{\mathbf{y}} + cz_{13} \hat{\mathbf{z}}$                  | (32m) | Pu V    |
| $\mathbf{B}_{59} =$ | $(y_{13} - z_{13} + \frac{1}{2}) \mathbf{a}_1 -$<br>$(x_{13} + z_{13} - \frac{1}{2}) \mathbf{a}_2 -$<br>$(x_{13} - y_{13}) \mathbf{a}_3$  | $=$ | $-ax_{13} \hat{\mathbf{x}} + ay_{13} \hat{\mathbf{y}} - c(z_{13} - \frac{1}{2}) \hat{\mathbf{z}}$ | (32m) | Pu V    |
| $\mathbf{B}_{60} =$ | $-(y_{13} + z_{13} - \frac{1}{2}) \mathbf{a}_1 +$<br>$(x_{13} - z_{13} + \frac{1}{2}) \mathbf{a}_2 +$<br>$(x_{13} - y_{13}) \mathbf{a}_3$ | $=$ | $ax_{13} \hat{\mathbf{x}} - ay_{13} \hat{\mathbf{y}} - c(z_{13} - \frac{1}{2}) \hat{\mathbf{z}}$  | (32m) | Pu V    |
| $\mathbf{B}_{61} =$ | $(x_{13} - z_{13} + \frac{1}{2}) \mathbf{a}_1 +$<br>$(y_{13} - z_{13} + \frac{1}{2}) \mathbf{a}_2 +$<br>$(x_{13} + y_{13}) \mathbf{a}_3$  | $=$ | $ay_{13} \hat{\mathbf{x}} + ax_{13} \hat{\mathbf{y}} - c(z_{13} - \frac{1}{2}) \hat{\mathbf{z}}$  | (32m) | Pu V    |
| $\mathbf{B}_{62} =$ | $-(x_{13} + z_{13} - \frac{1}{2}) \mathbf{a}_1 -$<br>$(y_{13} + z_{13} - \frac{1}{2}) \mathbf{a}_2 -$<br>$(x_{13} + y_{13}) \mathbf{a}_3$ | $=$ | $-ay_{13} \hat{\mathbf{x}} - ax_{13} \hat{\mathbf{y}} - c(z_{13} - \frac{1}{2}) \hat{\mathbf{z}}$ | (32m) | Pu V    |
| $\mathbf{B}_{63} =$ | $-(y_{13} + z_{13}) \mathbf{a}_1 -$<br>$(x_{13} + z_{13}) \mathbf{a}_2 - (x_{13} + y_{13}) \mathbf{a}_3$                                  | $=$ | $-ax_{13} \hat{\mathbf{x}} - ay_{13} \hat{\mathbf{y}} - cz_{13} \hat{\mathbf{z}}$                 | (32m) | Pu V    |
| $\mathbf{B}_{64} =$ | $(y_{13} - z_{13}) \mathbf{a}_1 + (x_{13} - z_{13}) \mathbf{a}_2 +$<br>$(x_{13} + y_{13}) \mathbf{a}_3$                                   | $=$ | $ax_{13} \hat{\mathbf{x}} + ay_{13} \hat{\mathbf{y}} - cz_{13} \hat{\mathbf{z}}$                  | (32m) | Pu V    |
| $\mathbf{B}_{65} =$ | $-(x_{13} + z_{13}) \mathbf{a}_1 +$<br>$(y_{13} - z_{13}) \mathbf{a}_2 - (x_{13} - y_{13}) \mathbf{a}_3$                                  | $=$ | $ay_{13} \hat{\mathbf{x}} - ax_{13} \hat{\mathbf{y}} - cz_{13} \hat{\mathbf{z}}$                  | (32m) | Pu V    |

$$\begin{aligned}
\mathbf{B}_{66} &= \begin{pmatrix} (x_{13} - z_{13}) \mathbf{a}_1 - (y_{13} + z_{13}) \mathbf{a}_2 + \\ (x_{13} - y_{13}) \mathbf{a}_3 \end{pmatrix} = -ay_{13} \hat{\mathbf{x}} + ax_{13} \hat{\mathbf{y}} - cz_{13} \hat{\mathbf{z}} & (32m) & \text{Pu V} \\
\mathbf{B}_{67} &= \begin{pmatrix} (-y_{13} + z_{13} + \frac{1}{2}) \mathbf{a}_1 + \\ (x_{13} + z_{13} + \frac{1}{2}) \mathbf{a}_2 + \\ (x_{13} - y_{13}) \mathbf{a}_3 \end{pmatrix} = ax_{13} \hat{\mathbf{x}} - ay_{13} \hat{\mathbf{y}} + c(z_{13} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu V} \\
\mathbf{B}_{68} &= \begin{pmatrix} (y_{13} + z_{13} + \frac{1}{2}) \mathbf{a}_1 + \\ (-x_{13} + z_{13} + \frac{1}{2}) \mathbf{a}_2 - \\ (x_{13} - y_{13}) \mathbf{a}_3 \end{pmatrix} = -ax_{13} \hat{\mathbf{x}} + ay_{13} \hat{\mathbf{y}} + c(z_{13} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu V} \\
\mathbf{B}_{69} &= \begin{pmatrix} (-x_{13} + z_{13} + \frac{1}{2}) \mathbf{a}_1 + \\ (-y_{13} + z_{13} + \frac{1}{2}) \mathbf{a}_2 - \\ (x_{13} + y_{13}) \mathbf{a}_3 \end{pmatrix} = -ay_{13} \hat{\mathbf{x}} - ax_{13} \hat{\mathbf{y}} + c(z_{13} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu V} \\
\mathbf{B}_{70} &= \begin{pmatrix} (x_{13} + z_{13} + \frac{1}{2}) \mathbf{a}_1 + \\ (y_{13} + z_{13} + \frac{1}{2}) \mathbf{a}_2 + \\ (x_{13} + y_{13}) \mathbf{a}_3 \end{pmatrix} = ay_{13} \hat{\mathbf{x}} + ax_{13} \hat{\mathbf{y}} + c(z_{13} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu V} \\
\mathbf{B}_{71} &= \begin{pmatrix} (y_{14} + z_{14}) \mathbf{a}_1 + (x_{14} + z_{14}) \mathbf{a}_2 + \\ (x_{14} + y_{14}) \mathbf{a}_3 \end{pmatrix} = ax_{14} \hat{\mathbf{x}} + ay_{14} \hat{\mathbf{y}} + cz_{14} \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{72} &= \begin{pmatrix} -(y_{14} - z_{14}) \mathbf{a}_1 - \\ (x_{14} - z_{14}) \mathbf{a}_2 - (x_{14} + y_{14}) \mathbf{a}_3 \end{pmatrix} = -ax_{14} \hat{\mathbf{x}} - ay_{14} \hat{\mathbf{y}} + cz_{14} \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{73} &= \begin{pmatrix} (x_{14} + z_{14}) \mathbf{a}_1 - (y_{14} - z_{14}) \mathbf{a}_2 + \\ (x_{14} - y_{14}) \mathbf{a}_3 \end{pmatrix} = -ay_{14} \hat{\mathbf{x}} + ax_{14} \hat{\mathbf{y}} + cz_{14} \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{74} &= \begin{pmatrix} -(x_{14} - z_{14}) \mathbf{a}_1 + \\ (y_{14} + z_{14}) \mathbf{a}_2 - (x_{14} - y_{14}) \mathbf{a}_3 \end{pmatrix} = ay_{14} \hat{\mathbf{x}} - ax_{14} \hat{\mathbf{y}} + cz_{14} \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{75} &= \begin{pmatrix} (y_{14} - z_{14} + \frac{1}{2}) \mathbf{a}_1 - \\ (x_{14} + z_{14} - \frac{1}{2}) \mathbf{a}_2 - \\ (x_{14} - y_{14}) \mathbf{a}_3 \end{pmatrix} = -ax_{14} \hat{\mathbf{x}} + ay_{14} \hat{\mathbf{y}} - c(z_{14} - \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{76} &= \begin{pmatrix} -(y_{14} + z_{14} - \frac{1}{2}) \mathbf{a}_1 + \\ (x_{14} - z_{14} + \frac{1}{2}) \mathbf{a}_2 + \\ (x_{14} - y_{14}) \mathbf{a}_3 \end{pmatrix} = ax_{14} \hat{\mathbf{x}} - ay_{14} \hat{\mathbf{y}} - c(z_{14} - \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{77} &= \begin{pmatrix} (x_{14} - z_{14} + \frac{1}{2}) \mathbf{a}_1 + \\ (y_{14} - z_{14} + \frac{1}{2}) \mathbf{a}_2 + \\ (x_{14} + y_{14}) \mathbf{a}_3 \end{pmatrix} = ay_{14} \hat{\mathbf{x}} + ax_{14} \hat{\mathbf{y}} - c(z_{14} - \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{78} &= \begin{pmatrix} -(x_{14} + z_{14} - \frac{1}{2}) \mathbf{a}_1 - \\ (y_{14} + z_{14} - \frac{1}{2}) \mathbf{a}_2 - \\ (x_{14} + y_{14}) \mathbf{a}_3 \end{pmatrix} = -ay_{14} \hat{\mathbf{x}} - ax_{14} \hat{\mathbf{y}} - c(z_{14} - \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{79} &= \begin{pmatrix} -(y_{14} + z_{14}) \mathbf{a}_1 - \\ (x_{14} + z_{14}) \mathbf{a}_2 - (x_{14} + y_{14}) \mathbf{a}_3 \end{pmatrix} = -ax_{14} \hat{\mathbf{x}} - ay_{14} \hat{\mathbf{y}} - cz_{14} \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{80} &= \begin{pmatrix} (y_{14} - z_{14}) \mathbf{a}_1 + (x_{14} - z_{14}) \mathbf{a}_2 + \\ (x_{14} + y_{14}) \mathbf{a}_3 \end{pmatrix} = ax_{14} \hat{\mathbf{x}} + ay_{14} \hat{\mathbf{y}} - cz_{14} \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{81} &= \begin{pmatrix} -(x_{14} + z_{14}) \mathbf{a}_1 + \\ (y_{14} - z_{14}) \mathbf{a}_2 - (x_{14} - y_{14}) \mathbf{a}_3 \end{pmatrix} = ay_{14} \hat{\mathbf{x}} - ax_{14} \hat{\mathbf{y}} - cz_{14} \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{82} &= \begin{pmatrix} (x_{14} - z_{14}) \mathbf{a}_1 - (y_{14} + z_{14}) \mathbf{a}_2 + \\ (x_{14} - y_{14}) \mathbf{a}_3 \end{pmatrix} = -ay_{14} \hat{\mathbf{x}} + ax_{14} \hat{\mathbf{y}} - cz_{14} \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{83} &= \begin{pmatrix} (-y_{14} + z_{14} + \frac{1}{2}) \mathbf{a}_1 + \\ (x_{14} + z_{14} + \frac{1}{2}) \mathbf{a}_2 + \\ (x_{14} - y_{14}) \mathbf{a}_3 \end{pmatrix} = ax_{14} \hat{\mathbf{x}} - ay_{14} \hat{\mathbf{y}} + c(z_{14} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{84} &= \begin{pmatrix} (y_{14} + z_{14} + \frac{1}{2}) \mathbf{a}_1 + \\ (-x_{14} + z_{14} + \frac{1}{2}) \mathbf{a}_2 - \\ (x_{14} - y_{14}) \mathbf{a}_3 \end{pmatrix} = -ax_{14} \hat{\mathbf{x}} + ay_{14} \hat{\mathbf{y}} + c(z_{14} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VI}
\end{aligned}$$

$$\begin{aligned}
\mathbf{B}_{85} &= \begin{pmatrix} (-x_{14} + z_{14} + \frac{1}{2}) \mathbf{a}_1 + \\ (-y_{14} + z_{14} + \frac{1}{2}) \mathbf{a}_2 - \\ (x_{14} + y_{14}) \mathbf{a}_3 \end{pmatrix} = -ay_{14} \hat{\mathbf{x}} - ax_{14} \hat{\mathbf{y}} + c(z_{14} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{86} &= \begin{pmatrix} (x_{14} + z_{14} + \frac{1}{2}) \mathbf{a}_1 + \\ (y_{14} + z_{14} + \frac{1}{2}) \mathbf{a}_2 + \\ (x_{14} + y_{14}) \mathbf{a}_3 \end{pmatrix} = ay_{14} \hat{\mathbf{x}} + ax_{14} \hat{\mathbf{y}} + c(z_{14} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VI} \\
\mathbf{B}_{87} &= \begin{pmatrix} (y_{15} + z_{15}) \mathbf{a}_1 + (x_{15} + z_{15}) \mathbf{a}_2 + \\ (x_{15} + y_{15}) \mathbf{a}_3 \end{pmatrix} = ax_{15} \hat{\mathbf{x}} + ay_{15} \hat{\mathbf{y}} + cz_{15} \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{88} &= \begin{pmatrix} -(y_{15} - z_{15}) \mathbf{a}_1 - \\ (x_{15} - z_{15}) \mathbf{a}_2 - (x_{15} + y_{15}) \mathbf{a}_3 \end{pmatrix} = -ax_{15} \hat{\mathbf{x}} - ay_{15} \hat{\mathbf{y}} + cz_{15} \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{89} &= \begin{pmatrix} (x_{15} + z_{15}) \mathbf{a}_1 - (y_{15} - z_{15}) \mathbf{a}_2 + \\ (x_{15} - y_{15}) \mathbf{a}_3 \end{pmatrix} = -ay_{15} \hat{\mathbf{x}} + ax_{15} \hat{\mathbf{y}} + cz_{15} \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{90} &= \begin{pmatrix} -(x_{15} - z_{15}) \mathbf{a}_1 + \\ (y_{15} + z_{15}) \mathbf{a}_2 - (x_{15} - y_{15}) \mathbf{a}_3 \end{pmatrix} = ay_{15} \hat{\mathbf{x}} - ax_{15} \hat{\mathbf{y}} + cz_{15} \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{91} &= \begin{pmatrix} (y_{15} - z_{15} + \frac{1}{2}) \mathbf{a}_1 - \\ (x_{15} + z_{15} - \frac{1}{2}) \mathbf{a}_2 - \\ (x_{15} - y_{15}) \mathbf{a}_3 \end{pmatrix} = -ax_{15} \hat{\mathbf{x}} + ay_{15} \hat{\mathbf{y}} - c(z_{15} - \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{92} &= \begin{pmatrix} -(y_{15} + z_{15} - \frac{1}{2}) \mathbf{a}_1 + \\ (x_{15} - z_{15} + \frac{1}{2}) \mathbf{a}_2 + \\ (x_{15} - y_{15}) \mathbf{a}_3 \end{pmatrix} = ax_{15} \hat{\mathbf{x}} - ay_{15} \hat{\mathbf{y}} - c(z_{15} - \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{93} &= \begin{pmatrix} (x_{15} - z_{15} + \frac{1}{2}) \mathbf{a}_1 + \\ (y_{15} - z_{15} + \frac{1}{2}) \mathbf{a}_2 + \\ (x_{15} + y_{15}) \mathbf{a}_3 \end{pmatrix} = ay_{15} \hat{\mathbf{x}} + ax_{15} \hat{\mathbf{y}} - c(z_{15} - \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{94} &= \begin{pmatrix} -(x_{15} + z_{15} - \frac{1}{2}) \mathbf{a}_1 - \\ (y_{15} + z_{15} - \frac{1}{2}) \mathbf{a}_2 - \\ (x_{15} + y_{15}) \mathbf{a}_3 \end{pmatrix} = -ay_{15} \hat{\mathbf{x}} - ax_{15} \hat{\mathbf{y}} - c(z_{15} - \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{95} &= \begin{pmatrix} -(y_{15} + z_{15}) \mathbf{a}_1 - \\ (x_{15} + z_{15}) \mathbf{a}_2 - (x_{15} + y_{15}) \mathbf{a}_3 \end{pmatrix} = -ax_{15} \hat{\mathbf{x}} - ay_{15} \hat{\mathbf{y}} - cz_{15} \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{96} &= \begin{pmatrix} (y_{15} - z_{15}) \mathbf{a}_1 + (x_{15} - z_{15}) \mathbf{a}_2 + \\ (x_{15} + y_{15}) \mathbf{a}_3 \end{pmatrix} = ax_{15} \hat{\mathbf{x}} + ay_{15} \hat{\mathbf{y}} - cz_{15} \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{97} &= \begin{pmatrix} -(x_{15} + z_{15}) \mathbf{a}_1 + \\ (y_{15} - z_{15}) \mathbf{a}_2 - (x_{15} - y_{15}) \mathbf{a}_3 \end{pmatrix} = ay_{15} \hat{\mathbf{x}} - ax_{15} \hat{\mathbf{y}} - cz_{15} \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{98} &= \begin{pmatrix} (x_{15} - z_{15}) \mathbf{a}_1 - (y_{15} + z_{15}) \mathbf{a}_2 + \\ (x_{15} - y_{15}) \mathbf{a}_3 \end{pmatrix} = -ay_{15} \hat{\mathbf{x}} + ax_{15} \hat{\mathbf{y}} - cz_{15} \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{99} &= \begin{pmatrix} (-y_{15} + z_{15} + \frac{1}{2}) \mathbf{a}_1 + \\ (x_{15} + z_{15} + \frac{1}{2}) \mathbf{a}_2 + \\ (x_{15} - y_{15}) \mathbf{a}_3 \end{pmatrix} = ax_{15} \hat{\mathbf{x}} - ay_{15} \hat{\mathbf{y}} + c(z_{15} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{100} &= \begin{pmatrix} (y_{15} + z_{15} + \frac{1}{2}) \mathbf{a}_1 + \\ (-x_{15} + z_{15} + \frac{1}{2}) \mathbf{a}_2 - \\ (x_{15} - y_{15}) \mathbf{a}_3 \end{pmatrix} = -ax_{15} \hat{\mathbf{x}} + ay_{15} \hat{\mathbf{y}} + c(z_{15} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{101} &= \begin{pmatrix} (-x_{15} + z_{15} + \frac{1}{2}) \mathbf{a}_1 + \\ (-y_{15} + z_{15} + \frac{1}{2}) \mathbf{a}_2 - \\ (x_{15} + y_{15}) \mathbf{a}_3 \end{pmatrix} = -ay_{15} \hat{\mathbf{x}} - ax_{15} \hat{\mathbf{y}} + c(z_{15} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VII} \\
\mathbf{B}_{102} &= \begin{pmatrix} (x_{15} + z_{15} + \frac{1}{2}) \mathbf{a}_1 + \\ (y_{15} + z_{15} + \frac{1}{2}) \mathbf{a}_2 + \\ (x_{15} + y_{15}) \mathbf{a}_3 \end{pmatrix} = ay_{15} \hat{\mathbf{x}} + ax_{15} \hat{\mathbf{y}} + c(z_{15} + \frac{1}{2}) \hat{\mathbf{z}} & (32m) & \text{Pu VII}
\end{aligned}$$

## References

- [1] D. T. Cromer and A. C. Larson, *The Crystal Structure of  $Pu_{31}Pt_{20}$  and  $Pu_{31}Rh_{20}$* , Acta Crystallogr. Sect. B **33**, 2620–2627 (1977), doi:10.1107/S0567740877009030.

## First cited in

D. Hicks, M. J. Mehl, M. Esters, C. Oses, O. Levy, G. L. W. Hart, C. Toher, and S. Curtarolo, *The AFLOW Library of Crystallographic Prototypes: Part 3*, Comput. Mater. Sci. **199**, 110450 (2021), doi: 10.1016/j.commatsci.2021.110450.