

## Introduction

This notebook summarizes the results regarding site symmetries and restrictions on the components of the atomic quadratic mean-square displacement tensors associated with the Wyckoff positions of the 230 space groups (all symmetry equivalent positions are included). The analysis is based on the coordinate settings as given in *International Tables for Crystallography*, Volume A, Space-Group Symmetry, Hahn (2011) (denoted as *ITA*). It is carried out using the software system *Mathematica* version 9.0.1, Wolfram Research (2013).

The analysis follows a four-steps procedure:

- Determination of site symmetry of the special positions based on the following statements by Müller (2013):
  - Every site-symmetry group  $\mathbf{S}$  of a space group  $\mathbf{G}$  is isomorphic to a subgroup of the point group  $\mathbf{P}$  of  $\mathbf{G}$ .
  - The site-symmetry group  $\mathbf{S}_X$  of a point  $X$  is the subgroup of  $\mathbf{G}$  consisting of those symmetry operations of  $\mathbf{G}$  which leave  $X$  unchanged.
- Construction of an invariant second-rank tensor following Janssen (2010):

$$\beta_{\text{inv}} = \frac{1}{|\mathbf{S}|} \sum_{s=1}^{|\mathbf{S}|} R_s \beta R_s^T \quad (1)$$

where  $\beta$  is an arbitrary symmetric second-rank tensor.  $s$  counts the elements of the actual site-symmetry group  $\mathbf{S}$ .  $|\mathbf{S}|$  is the order of the group.

- Establishing the correct reference code (keys: B1 - B29) by applying a look-up table associated with the possible patterns for the tensor-components given by e.g. Kuhs (2010).
- Verifying internal consistency. The set of symmetry restrictions associated with all equivalent Wyckoff positions may be independently deduced from the restrictions imposed on the first listed position.

Table 1 (page 5) gives the general classifications.

It should be compared with Figure 1 in Peterse and Palm (1966) and Table 8.3.1.1 by Prince, Finger and Konnerth (2011). Keys (B1 - B29) as in Johnson and Levy (1974), Kuhs (2010) and Giacovazzo et al. (2011). Numbers in parentheses as in Peterse and Palm (1966) and Willis and Pryor (1975). ( \* ) indicates that the listed site symmetry is not associated with an explicit number in Peterse and Palm (1966). Their analysis only covers the first coordinates in an equivalent set of special (Wyckoff-) positions, hence not all possible site symmetries are involved. Nomenclature for the subgroups of the cubic<sup>1</sup> and hexagonal lattice holohedrals is taken from Janovec and Prívratká (2010). Patterns for the  $\mathbf{U}^j$ - ( $\beta^j$ ) components are presented in a form comparable to those listed by Kuhs (2010). The comments made by Scheringer (1979) are taken into account.

Tables 2a, 2b (page 6 -- 7) give a summary of various symbols used to represent symmetry operations of the cubic and hexagonal holohedrals. The tables are incorporated for the sake of completeness. They should be compared with Tables 3.4.2.5 and 3.4.2.6 by Janovec and Prívratká (2010); Tables 1 and 2 by Glazer, Aroyo and Authier (2014); and Tables 11.2.2.1 and 11.2.2.2 by Fischer, Koch and Arnold (2011).

Table 3 (pages 8 -- 77) gives the reference code for the pattern of  $\mathbf{U}^j$ -components associated with the general<sup>2</sup> and every special positions for all space groups (and settings). It represents an extension of the tables provided by Peterse and Palm (1966) and reproduced by Willis and Pryor (1975), but here the B1-B29 coding scheme is adopted.

Table 4 (pages 78 -- 150) gives the site-symmetry of the general<sup>3</sup> and every special positions for all space groups (and settings). It is represented by subgroups  $\mathbf{H} \leq \mathbf{P}$ .  $\mathbf{P}$  being the point group associated with the actual space group  $\mathbf{G}$ .  $\mathbf{G} \in \{ P1, P\bar{1}, \dots, Ia\bar{3}d \}$ , the 230 crystallographic space groups. Oriented site-symmetry symbols, as they appear in *ITA*, are included for completeness, cf. Hahn and Looijenga-Vos (2011).

Appendix (pages 151 -- 155) provides an example which shows the analysis in some details: Space group  $P4_2/nbc$  (origin choice 2), Wyckoff position  $(x, \frac{1}{4}, 0)$ ; arbitrarily chosen.

<sup>1</sup> Also adopted for the trigonal space groups in rhombohedral setting ( $R3, R\bar{3}, R32, R3m, R3c, R\bar{3}m, R\bar{3}c$ ).

<sup>2</sup> Trivial entry: B29 - no restrictions.

<sup>3</sup> Trivial entry: 1

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Chapter 11.2.: Derivation of symbols and coordinate triplets by W. Fischer and E. Koch. Tables 11.2.2.1 and 11.2.2.2 by H. Arnold.

Table 11.2.2.1.: Matrices for point-group symmetry operations and orientation of corresponding symmetry elements, referred to a cubic, tetragonal, orthorhombic, monoclinic, triclinic or rhombohedral coordinate system.

Table 11.2.2.2.: Matrices for point-group symmetry operations and orientation of corresponding symmetry elements, referred to a hexagonal coordinate system.

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Table 3.B.1.: Site symmetry table giving key for the 29 types of symmetry  $\beta$ -restrictions.

Table 3.B.2.: Symmetry  $\beta$ -restrictions.

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*Seitz symbols for crystallographic symmetry operations.*

Table 1.: Linear parts  $\mathbf{R}$  of the Seitz symbols  $\{\mathbf{R}|\mathbf{v}\}$  for space-group symmetry operations of cubic, tetragonal, orthorhombic, monoclinic and triclinic crystal systems.

Table 2.: Linear parts  $\mathbf{R}$  of the Seitz symbols  $\{\mathbf{R}|\mathbf{v}\}$  for space-group symmetry operations of hexagonal and trigonal crystal systems.

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Table 5.5A.: Site Symmetry Table Giving Key to Tables 5.5B-5.5E for Restrictions on the Symmetry of Various Thermal-Motion Tensors.  
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Table 1.9.3.1.: Site-symmetry table giving key to Tables 1.9.3.2 to 1.9.3.6 for restrictions on the symmetry of various thermal-motion tensors.  
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Fig.1.: Symmetry-imposed  $\beta$ -restrictions for all special positions.  
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Table I. Symmetry restrictions on the components of the second-order (contravariant) displacement tensor and their relations to site symmetries.

ref	Cubic	Hexagonal						
			$U^{11}$	$U^{22}$	$U^{33}$	$2U^{12}$	$2U^{13}$	$2U^{23}$
B1 (17)	$\{\bar{m}\bar{3}m, \bar{4}3m, 432, m\bar{3}, 23\}$		A	A	A	0	0	0
B2 (8)	$\{4_z/m_z m_x m_x y, \bar{4}_z m_x 2_x y, \bar{4}_z 2_x m_x y, 4_z m_x m_x y, 4_z 2_x 2_x y, 4_z/m_z, \bar{4}_z, 4_z\}$		A	A	C	0	0	0
B3 (*)	$\{4_y/m_y m_z m_z x, \bar{4}_y m_z 2_x x, \bar{4}_y 2_x m_z x, 4_y m_z m_z x, 4_y 2_x 2_x x, 4_y/m_y, \bar{4}_y, 4_y\}$		A	B	A	0	0	0
B4 (12)	$\{4_x/m_x m_y m_y z, \bar{4}_x m_y 2_y z, \bar{4}_x 2_y m_y z, 4_x m_y m_y z, 4_x 2_y 2_y z, 4_x/m_x, \bar{4}_x, 4_x\}$		A	B	B	0	0	0
B5 (18)	$\{\bar{3}_p m_x \bar{y}, \bar{3}_p, 3_p m_x \bar{y}, 3_p 2_x \bar{y}, 3_p\}$		A	A	A	D	D	D
B6 (*)	$\{\bar{3}_q m_x \bar{y}, \bar{3}_q, 3_q m_x \bar{y}, 3_q 2_x \bar{y}, 3_q\}$		A	A	A	D	-D	-D
B7 (*)	$\{\bar{3}_s m_x y, \bar{3}_s, 3_s m_x y, 3_s 2_x y, 3_s\}$		A	A	A	-D	D	-D
B8 (*)	$\{\bar{3}_t m_x y, \bar{3}_t, 3_t m_x y, 3_t 2_x y, 3_t\}$		A	A	A	-D	-D	D
B9 (16)		$\{6_z/m_z m_x m_y, \bar{6}_z m_x 2_y, \bar{6}_z 2_x m_y, 6_z m_x m_y, 6_z 2_x 2_y, \bar{3}_z m_y, \bar{3}_z m_x, 6_z/m_z, \bar{6}_z, 6_z, \bar{3}_z, 3_z m_y, 3_z m_x, 3_z 2_y, 3_z 2_x, 3_z\}$	A	A	C	A	0	0
B10 (4)	$\{m_x m_y m_z, m_x 2_y m_z, 2_x m_y m_z, m_x m_y 2_z, 2_x 2_y 2_z\}$		A	B	C	0	0	0
B11 (5)	$\{m_x \bar{y} m_x y m_z, m_x \bar{y} 2_x y m_z, 2_x \bar{y} m_x y m_z, m_x \bar{y} m_x y 2_z, 2_x \bar{y} 2_x y 2_z\}$	$\{m_x \cdot m_y \cdot m_z, m_x \cdot m_y \cdot 2_z, 2_x \cdot m_y \cdot m_z, m_x \cdot 2_y \cdot m_z, 2_x \cdot 2_y \cdot 2_z\}$	A	A	C	D	0	0
B12 (*)	$\{m_z \bar{x} m_z x m_y, m_z \bar{x} 2_x m_y, 2_x \bar{x} m_z x m_y, m_z \bar{x} m_z x 2_y, 2_x \bar{x} 2_x x 2_y\}$		A	B	A	0	E	0
B13 (9)	$\{m_y \bar{z} m_y z m_x, m_y \bar{z} 2_y z m_x, 2_y \bar{z} m_y z m_x, m_y \bar{z} m_y z 2_x, 2_y \bar{z} 2_y z 2_x\}$		A	B	B	0	0	F
B14 (14)		$\{m_x m_y m_z, m_x m_y 2_z, 2_x m_y m_z, m_x 2_y m_z, 2_x 2_y 2_z\}$	A	B	C	B	0	0
B15 (*)		$\{m_x \cdot m_y \cdot m_z, m_x \cdot m_y \cdot 2_z, 2_x \cdot m_y \cdot m_z, m_x \cdot 2_y \cdot m_z, 2_x \cdot 2_y \cdot 2_z\}$	A	B	C	A	0	0
B16 (2)	$\{2_z/m_z, m_z, 2_z\}$	$\{2_z/m_z, m_z, 2_z\}$	A	B	C	D	0	0
B17 (1)	$\{2_y/m_y, m_y, 2_y\}$		A	B	C	0	E	0
B18 (3)	$\{2_x/m_x, m_x, 2_x\}$		A	B	C	0	0	F
B19 (7)	$\{2_x y/m_x y, m_x y, 2_x y\}$	$\{2_x \cdot m_y \cdot m_x \cdot, m_x \cdot, 2_x \cdot\}$	A	A	C	D	E	-E
B20 (6)	$\{2_x \bar{y}/m_x \bar{y}, m_x \bar{y}, 2_x \bar{y}\}$	$\{2_y \cdot m_x \cdot, m_y \cdot, 2_y \cdot\}$	A	A	C	D	E	E
B21 (*)	$\{2_x x/m_x x, m_x x, 2_x x\}$		A	B	A	D	E	-D
B22 (*)	$\{2_x \bar{x}/m_x \bar{x}, m_x \bar{x}, 2_x \bar{x}\}$		A	B	A	D	E	D
B23 (11)	$\{2_y z/m_y z, m_y z, 2_y z\}$		A	B	B	D	-D	F
B24 (10)	$\{2_y \bar{z}/m_y \bar{z}, m_y \bar{z}, 2_y \bar{z}\}$		A	B	B	D	D	F
B25 (15)		$\{2_x/m_x, m_x, 2_x\}$	A	B	C	B	E	2E
B26 (*)		$\{2_y/m_y, m_y, 2_y\}$	A	B	C	A	0	F
B27 (13)		$\{2_y/m_y, m_y, 2_y\}$	A	B	C	B	E	0
B28 (*)		$\{2_x/m_x, m_x, 2_x\}$	A	B	C	A	2E	E
B29 ( )	$\{\bar{1}, 1\}$	$\{\bar{1}, 1\}$	A	B	C	D	E	F

Table 2a. Symbols of symmetry operations of the point group  $m\bar{3}m$ .

J. &amp; P.: Symbols adopted by Janovec, V. &amp; Prívratká, J. (2010).

Seitz : Symbols adopted by Fischer, W., Koch, E. &amp; Arnold, H. (2011), cf. Glazer, A. M., Aroyo, M. I. &amp; Authier, A. (2014).

Jones : Jones faithful representation symbols, Janovec, V. &amp; Prívratká, J. (2010).

J. & P.	Seitz	Jones	J. & P.	Seitz	Jones
1	1	$x, y, z$	$\bar{1}$	$\bar{1}$	$\bar{x}, \bar{y}, \bar{z}$
$2_z$	$2_{[001]}$	$\bar{x}, \bar{y}, z$	$m_z$	$m_{[001]}$	$x, y, \bar{z}$
$2_y$	$2_{[010]}$	$\bar{x}, y, \bar{z}$	$m_y$	$m_{[010]}$	$x, \bar{y}, z$
$2_x$	$2_{[100]}$	$x, \bar{y}, \bar{z}$	$m_x$	$m_{[100]}$	$\bar{x}, y, z$
$3_p$	$3_{[111]}^+$	$z, x, y$	$\bar{3}_p$	$\bar{3}_{[111]}^+$	$\bar{z}, \bar{x}, \bar{y}$
$3_s$	$3_{[\bar{1}\bar{1}\bar{1}]}^+$	$z, \bar{x}, \bar{y}$	$\bar{3}_s$	$\bar{3}_{[\bar{1}\bar{1}\bar{1}]}^+$	$\bar{z}, x, y$
$3_r$	$3_{[1\bar{1}\bar{1}]}^+$	$\bar{z}, \bar{x}, y$	$\bar{3}_r$	$\bar{3}_{[1\bar{1}\bar{1}]}^+$	$z, x, \bar{y}$
$3_q$	$3_{[\bar{1}\bar{1}1]}^+$	$\bar{z}, x, \bar{y}$	$\bar{3}_q$	$\bar{3}_{[\bar{1}\bar{1}1]}^+$	$z, \bar{x}, y$
$3_p^2$	$3_{[\bar{1}\bar{1}\bar{1}]}^-$	$y, z, x$	$\bar{3}_p^5$	$\bar{3}_{[111]}^-$	$\bar{y}, \bar{z}, \bar{x}$
$3_r^2$	$3_{[1\bar{1}\bar{1}]}^-$	$\bar{y}, z, \bar{x}$	$\bar{3}_r^5$	$\bar{3}_{[1\bar{1}\bar{1}]}^-$	$y, \bar{z}, x$
$3_q^2$	$3_{[\bar{1}\bar{1}1]}^-$	$y, \bar{z}, \bar{x}$	$\bar{3}_q^5$	$\bar{3}_{[\bar{1}\bar{1}1]}^-$	$\bar{y}, z, x$
$3_s^2$	$3_{[\bar{1}\bar{1}\bar{1}]}^-$	$\bar{y}, \bar{z}, x$	$\bar{3}_s^5$	$\bar{3}_{[\bar{1}\bar{1}\bar{1}]}^-$	$y, z, \bar{x}$
$2_{xy}$	$2_{[110]}$	$y, x, \bar{z}$	$m_{xy}$	$m_{[110]}$	$\bar{y}, \bar{x}, z$
$2_{x\bar{y}}$	$2_{[1\bar{1}0]}$	$\bar{y}, \bar{x}, \bar{z}$	$m_{x\bar{y}}$	$m_{[1\bar{1}0]}$	$y, x, z$
$4_z^3$	$4_{[001]}^-$	$y, \bar{x}, z$	$\bar{4}_z^3$	$\bar{4}_{[001]}^-$	$\bar{y}, x, \bar{z}$
$4_z$	$4_{[001]}^+$	$\bar{y}, x, z$	$\bar{4}_z$	$\bar{4}_{[001]}^+$	$y, \bar{x}, \bar{z}$
$4_x^3$	$4_{[100]}^-$	$x, z, \bar{y}$	$\bar{4}_x^3$	$\bar{4}_{[100]}^-$	$\bar{x}, \bar{z}, y$
$4_x$	$4_{[100]}^+$	$x, z, y$	$\bar{4}_x$	$\bar{4}_{[100]}^+$	$\bar{x}, z, \bar{y}$
$2_{yz}$	$2_{[011]}$	$\bar{x}, z, y$	$m_{yz}$	$m_{[011]}$	$x, \bar{z}, \bar{y}$
$2_{y\bar{z}}$	$2_{[0\bar{1}\bar{1}]}$	$\bar{x}, \bar{z}, \bar{y}$	$m_{y\bar{z}}$	$m_{[0\bar{1}\bar{1}]}$	$x, z, y$
$4_x^3$	$4_{[100]}^-$	$x, \bar{z}, y$	$\bar{4}_x^3$	$\bar{4}_{[100]}^-$	$\bar{x}, z, \bar{y}$
$4_x$	$4_{[100]}^+$	$x, z, \bar{y}$	$\bar{4}_x$	$\bar{4}_{[100]}^+$	$\bar{x}, \bar{y}, x$
$2_{zx}$	$2_{[101]}$	$z, \bar{y}, x$	$m_{zx}$	$m_{[101]}$	$\bar{z}, y, \bar{x}$
$4_y^3$	$4_{[010]}^-$	$\bar{z}, y, x$	$\bar{4}_y^3$	$\bar{4}_{[010]}^-$	$z, \bar{y}, \bar{x}$
$4_y$	$4_{[010]}^+$	$\bar{z}, y, x$	$\bar{4}_y$	$\bar{4}_{[010]}^+$	$z, y, \bar{x}$
$2_{z\bar{x}}$	$2_{[\bar{1}01]}$	$\bar{z}, \bar{y}, \bar{x}$	$m_{z\bar{x}}$	$m_{[\bar{1}01]}$	$z, y, x$

Table 2b. Symbols of symmetry operations of the point group  $6/mmm$ .

J. & P.	Seitz	Jones	J. & P.	Seitz	Jones
1	1	$x, y, z$	$\bar{1}$	$\bar{1}$	$\bar{x}, \bar{y}, \bar{z}$
$3_z$	$3_{[001]}^+$	$\bar{y}, x-y, z$	$\bar{3}_z$	$\bar{3}_{[001]}^+$	$y, \bar{x}+y, \bar{z}$
$3_z^2$	$3_{[001]}^-$	$\bar{x}+y, \bar{x}, z$	$\bar{3}_z^5$	$\bar{3}_{[001]}^-$	$x-y, x, \bar{z}$
$2_z$	$2_{[001]}$	$\bar{x}, \bar{y}, z$	$m_z$	$m_{[001]}$	$x, y, \bar{z}$
$6_z^5$	$6_{[001]}^-$	$y, \bar{x}+y, z$	$\bar{6}_z^5$	$\bar{6}_{[001]}^-$	$\bar{y}, x-y, \bar{z}$
$6_z$	$6_{[001]}^+$	$x-y, x, z$	$\bar{6}_z$	$\bar{6}_{[001]}^+$	$\bar{x}+y, \bar{x}, \bar{z}$
$2_{x''}$	$2_{[110]}$	$y, x, \bar{z}$	$m_{x''}$	$m_{[110]}$	$\bar{y}, \bar{x}, z$
$2_x$	$2_{[100]}$	$x-y, \bar{y}, \bar{z}$	$m_x$	$m_{[100]}$	$\bar{x}+y, y, z$
$2_{x'}$	$2_{[010]}$	$\bar{x}, \bar{x}+y, \bar{z}$	$m_{x'}$	$m_{[010]}$	$x, x-y, z$
$2_{y''}$	$2_{[1\bar{1}0]}$	$\bar{y}, \bar{x}, \bar{z}$	$m_{y''}$	$m_{[1\bar{1}0]}$	$y, x, z$
$2_y$	$2_{[120]}$	$\bar{x}+y, y, \bar{z}$	$m_y$	$m_{[120]}$	$x-y, \bar{y}, z$
$2_{y'}$	$2_{[210]}$	$x, x-y, \bar{z}$	$m_{y'}$	$m_{[210]}$	$\bar{x}, \bar{x}+y, z$

Table 3. Symmetry restrictions on the atomic anisotropic displacement tensor for all equivalent special positions associated with the Wyckoff letters of the 230 space groups. Order as listed in *International Tables for Crystallography*, Vol **A**, 5th revised edition (2011). Edited by Th. Hahn.

No. 1  $P1$

a  $\overline{B29}$

No. 2  $P\bar{1}$

i  $\overline{B29}$   $B29$

h  $\overline{B29}$

g  $\overline{B29}$

f  $\overline{B29}$

e  $\overline{B29}$

d  $\overline{B29}$

c  $\overline{B29}$

b  $\overline{B29}$

a  $\overline{B29}$

No. 3  $P121$  (unique axis  $b$ )

e  $\overline{B29}$   $B29$

d  $\overline{B17}$

c  $\overline{B17}$

b  $\overline{B17}$

a  $\overline{B17}$

No. 3  $P112$  (unique axis  $c$ )

e  $\overline{B29}$   $B29$

d  $\overline{B16}$

c  $\overline{B16}$

b  $\overline{B16}$

a  $\overline{B16}$

No. 4  $P12_11$  (unique axis  $b$ )

a  $\overline{B29}$   $B29$

No. 4  $P112_1$  (unique axis  $c$ )

a  $\overline{B29}$   $B29$

No. 5  $C121$  (unique axis  $b$ , cell choice 1)

c  $\overline{B29}$   $B29$

b  $\overline{B17}$

a  $\overline{B17}$

No. 5  $A121$  (unique axis  $b$ , cell choice 2)

c  B29  B29

b  B17

a  B17

No. 5  $I12I$  (unique axis  $b$ , cell choice 3)

c  B29  B29

b  B17

a  B17

No. 5  $A1I2$  (unique axis  $c$ , cell choice 1)

c  B29  B29

b  B16

a  B16

No. 5  $B1I2$  (unique axis  $c$ , cell choice 2)

c  B29  B29

b  B16

a  B16

No. 5  $I1I2$  (unique axis  $c$ , cell choice 3)

c  B29  B29

b  B16

a  B16

No. 6  $P1mI$  (unique axis  $b$ )

c  B29  B29

b  B17

a  B17

No. 6  $P1I1m$  (unique axis  $c$ )

c  B29  B29

b  B16

a  B16

No. 7  $P1cI$  (unique axis  $b$ , cell choice 1)

a  B29  B29

No. 7  $P1nI$  (unique axis  $b$ , cell choice 2)

a  B29  B29

No. 7  $P1aI$  (unique axis  $b$ , cell choice 3)

a  B29  B29

No. 7  $P1I1a$  (unique axis  $c$ , cell choice 1)

a  B29  B29

No. 7  $P11n$  (unique axis  $c$ , cell choice 2)

a

No. 7  $P11b$  (unique axis  $c$ , cell choice 3)

a

No. 8  $C1m1$  (unique axis  $b$ , cell choice 1)

b

a

No. 8  $A1m1$  (unique axis  $b$ , cell choice 2)

b

a

No. 8  $I1m1$  (unique axis  $b$ , cell choice 3)

b

a

No. 8  $A11m$  (unique axis  $c$ , cell choice 1)

b

a

No. 8  $B11m$  (unique axis  $c$ , cell choice 2)

b

a

No. 8  $I11m$  (unique axis  $c$ , cell choice 3)

b

a

No. 9  $C1c1$  (unique axis  $b$ , cell choice 1)

a

No. 9  $A1n1$  (unique axis  $b$ , cell choice 2)

a

No. 9  $I1a1$  (unique axis  $b$ , cell choice 3)

a

No. 9  $A11a$  (unique axis  $c$ , cell choice 1)

a

No. 9  $B11n$  (unique axis  $c$ , cell choice 2)

a

No. 9  $I11b$  (unique axis  $c$ , cell choice 3)

a

No. 10  $P12/m1$  (unique axis  $b$ )

o	B29	B29	B29	B29
n	B17	B17		
m	B17	B17		
l	B17	B17		
k	B17	B17		
j	B17	B17		
i	B17	B17		
h	B17			
g	B17			
f	B17			
e	B17			
d	B17			
c	B17			
b	B17			
a	B17			

### No. 10 $P112/m$ (unique axis c)

o	B29	B29	B29	B29
n	B16	B16		
m	B16	B16		
l	B16	B16		
k	B16	B16		
j	B16	B16		
i	B16	B16		
h	B16			
g	B16			
f	B16			
e	B16			
d	B16			
c	B16			
b	B16			
a	B16			

### No. 11 $P12_1/m1$ (unique axis b)

f	B29	B29	B29	B29
e	B17	B17		
d	B29	B29		
c	B29	B29		

b 

B29	B29
-----	-----

a 

B29	B29
-----	-----

No. 11  $P112_1/m$  (unique axis c)f 

B29	B29	B29	B29
-----	-----	-----	-----

e 

B16	B16
-----	-----

d 

B29	B29
-----	-----

c 

B29	B29
-----	-----

b 

B29	B29
-----	-----

a 

B29	B29
-----	-----

No. 12  $C12/m1$  (unique axis b, cell choice 1)j 

B29	B29	B29	B29
-----	-----	-----	-----

i 

B17	B17
-----	-----

h 

B17	B17
-----	-----

g 

B17	B17
-----	-----

f 

B29	B29
-----	-----

e 

B29	B29
-----	-----

d 

B17
-----

c 

B17
-----

b 

B17
-----

a 

B17
-----

No. 12  $A12/m1$  (unique axis b, cell choice 2)j 

B29	B29	B29	B29
-----	-----	-----	-----

i 

B17	B17
-----	-----

h 

B17	B17
-----	-----

g 

B17	B17
-----	-----

f 

B29	B29
-----	-----

e 

B29	B29
-----	-----

d 

B17
-----

c 

B17
-----

b 

B17
-----

a 

B17
-----

No. 12  $I12/m1$  (unique axis b, cell choice 3)j 

B29	B29	B29	B29
-----	-----	-----	-----

i 

B17	B17
-----	-----

h 

B17	B17
-----	-----

g 

B17	B17
-----	-----

f

e

d

c

b

a

### No. 12 $A112/m$ (unique axis $c$ , cell choice 1)

j

i

h

g

f

e

d

c

b

a

### No. 12 $B112/m$ (unique axis $c$ , cell choice 2)

j

i

h

g

f

e

d

c

b

a

### No. 12 $I112/m$ (unique axis $c$ , cell choice 3)

j

i

h

g

f

e

d

c b a No. 13  $P12/c1$  (unique axis  $b$ , cell choice 1)g    f  e  d  c  b  a  No. 13  $P12/n1$  (unique axis  $b$ , cell choice 2)g    f  e  d  c  b  a  No. 13  $P12/a1$  (unique axis  $b$ , cell choice 3)g    f  e  d  c  b  a  No. 13  $P112/a$  (unique axis  $c$ , cell choice 1)g    f  e  d  c  b  a  No. 13  $P112/n$  (unique axis  $c$ , cell choice 2)

g	B29	B29	B29	B29
f	B16	B16		
e	B16	B16		
d	B29	B29		
c	B29	B29		
b	B29	B29		
a	B29	B29		

No. 13  $P112/b$  (unique axis  $c$ , cell choice 3)

g	B29	B29	B29	B29
f	B16	B16		
e	B16	B16		
d	B29	B29		
c	B29	B29		
b	B29	B29		
a	B29	B29		

No. 14  $P12_1/c1$  (unique axis  $b$ , cell choice 1)

e	B29	B29	B29	B29
d	B29	B29		
c	B29	B29		
b	B29	B29		
a	B29	B29		

No. 14  $P12_1/n1$  (unique axis  $b$ , cell choice 2)

e	B29	B29	B29	B29
d	B29	B29		
c	B29	B29		
b	B29	B29		
a	B29	B29		

No. 14  $P12_1/a1$  (unique axis  $b$ , cell choice 3)

e	B29	B29	B29	B29
d	B29	B29		
c	B29	B29		
b	B29	B29		
a	B29	B29		

No. 14  $P112/a$  (unique axis  $c$ , cell choice 1)

e	B29	B29	B29	B29
d	B29	B29		

c

b

a

#### No. 14 $P112_1/n$ (unique axis $c$ , cell choice 2)

e

d

c

b

a

#### No. 14 $P112_1/b$ (unique axis $c$ , cell choice 3)

e

d

c

b

a

#### No. 15 $C12/c1$ (unique axis $b$ , cell choice 1)

f

e

d

c

b

a

#### No. 15 $A12/n1$ (unique axis $b$ , cell choice 2)

f

e

d

c

b

a

#### No. 15 $I12/a1$ (unique axis $b$ , cell choice 3)

f

e

d

c

b

a

No. 15  $A112/a$  (unique axis  $c$ , cell choice 1)

$f$	B29	B29	B29	B29
$e$	B16	B16		
$d$	B29	B29		
$c$	B29	B29		
$b$	B29	B29		
$a$	B29	B29		

No. 15  $B112/n$  (unique axis  $c$ , cell choice 2)

$f$	B29	B29	B29	B29
$e$	B16	B16		
$d$	B29	B29		
$c$	B29	B29		
$b$	B29	B29		
$a$	B29	B29		

No. 15  $I112/b$  (unique axis  $c$ , cell choice 3)

$f$	B29	B29	B29	B29
$e$	B16	B16		
$d$	B29	B29		
$c$	B29	B29		
$b$	B29	B29		
$a$	B29	B29		

No. 16  $P222$ 

$u$	B29	B29	B29	B29
$t$	B16	B16		
$s$	B16	B16		
$r$	B16	B16		
$q$	B16	B16		
$p$	B17	B17		
$o$	B17	B17		
$n$	B17	B17		
$m$	B17	B17		
$l$	B18	B18		
$k$	B18	B18		
$j$	B18	B18		
$i$	B18	B18		
$h$	B10			

g 

B10
-----

  
 f 

B10
-----

  
 e 

B10
-----

  
 d 

B10
-----

  
 c 

B10
-----

  
 b 

B10
-----

  
 a 

B10
-----

### No. 17 $P222_1$

e 

B29	B29	B29	B29
-----	-----	-----	-----

  
 d 

B17	B17
-----	-----

  
 c 

B17	B17
-----	-----

  
 b 

B18	B18
-----	-----

  
 a 

B18	B18
-----	-----

### No. 18 $P2_12_12$

c 

B29	B29	B29	B29
-----	-----	-----	-----

  
 b 

B16	B16
-----	-----

  
 a 

B16	B16
-----	-----

### No. 19 $P2_12_12_1$

a 

B29	B29	B29	B29
-----	-----	-----	-----

### No. 20 $C222_1$

c 

B29	B29	B29	B29
-----	-----	-----	-----

  
 b 

B17	B17
-----	-----

  
 a 

B18	B18
-----	-----

### No. 21 $C222$

l 

B29	B29	B29	B29
-----	-----	-----	-----

  
 k 

B16	B16
-----	-----

  
 j 

B16	B16
-----	-----

  
 i 

B16	B16
-----	-----

  
 h 

B17	B17
-----	-----

  
 g 

B17	B17
-----	-----

  
 f 

B18	B18
-----	-----

  
 e 

B18	B18
-----	-----

  
 d 

B10
-----

  
 c 

B10
-----

  
 b 

B10
-----

  
 a 

B10
-----

No. 22  $F222$ 

k	B29	B29	B29	B29
j	B18	B18		
i	B17	B17		
h	B16	B16		
g	B16	B16		
f	B17	B17		
e	B18	B18		
d	B10			
c	B10			
b	B10			
a	B10			

No. 23  $I222$ 

k	B29	B29	B29	B29
j	B16	B16		
i	B16	B16		
h	B17	B17		
g	B17	B17		
f	B18	B18		
e	B18	B18		
d	B10			
c	B10			
b	B10			
a	B10			

No. 24  $I2_12_12_1$ 

d	B29	B29	B29	B29
c	B16	B16		
b	B17	B17		
a	B18	B18		

No. 25  $Pmm2$ 

i	B29	B29	B29	B29
h	B18	B18		
g	B18	B18		
f	B17	B17		
e	B17	B17		
d	B10			

c B10

b B10

a B10

No. 26  $Pmc2_1$ 

c B29 B29 B29 B29

b B18 B18

a B18 B18

No. 27  $Pcc2$ 

e B29 B29 B29 B29

d B16 B16

c B16 B16

b B16 B16

a B16 B16

No. 28  $Pma2$ 

d B29 B29 B29 B29

c B18 B18

b B16 B16

a B16 B16

No. 29  $Pca2_1$ 

a B29 B29 B29 B29

No. 30  $Pnc2$ 

c B29 B29 B29 B29

b B16 B16

a B16 B16

No. 31  $Pmn2_1$ 

b B29 B29 B29 B29

a B18 B18

No. 32  $Pba2$ 

c B29 B29 B29 B29

b B16 B16

a B16 B16

No. 33  $Pna2_1$ 

a B29 B29 B29 B29

No. 34  $Pnn2$ 

c B29 B29 B29 B29

b B16 B16

a B16 B16

No. 35  $Cmm2$ 

$f$	B29	B29	B29	B29
$e$	B18	B18		
$d$	B17	B17		
$c$	B16	B16		
$b$	B10			
$a$	B10			

No. 36  $Cmc2_1$ 

$b$	B29	B29	B29	B29
$a$	B18	B18		

No. 37  $Ccc2$ 

$d$	B29	B29	B29	B29
$c$	B16	B16		
$b$	B16	B16		
$a$	B16	B16		

No. 38  $Amm2$ 

$f$	B29	B29	B29	B29
$e$	B18	B18		
$d$	B18	B18		
$c$	B17	B17		
$b$	B10			
$a$	B10			

No. 39  $Aem2$ 

$d$	B29	B29	B29	B29
$c$	B17	B17		
$b$	B16	B16		
$a$	B16	B16		

No. 40  $Ama2$ 

$c$	B29	B29	B29	B29
$b$	B18	B18		
$a$	B16	B16		

No. 41  $Aea2$ 

$b$	B29	B29	B29	B29
$a$	B16	B16		

No. 42  $Fmm2$ 

$e$	B29	B29	B29	B29
-----	-----	-----	-----	-----

d 

B17	B17
-----	-----

c 

B18	B18
-----	-----

b 

B16	B16
-----	-----

a 

B10
-----

**No. 43 *Fdd2***b 

B29	B29	B29	B29
-----	-----	-----	-----

a 

B16	B16
-----	-----

**No. 44 *Imm2***e 

B29	B29	B29	B29
-----	-----	-----	-----

d 

B18	B18
-----	-----

c 

B17	B17
-----	-----

b 

B10
-----

a 

B10
-----

**No. 45 *Iba2***c 

B29	B29	B29	B29
-----	-----	-----	-----

b 

B16	B16
-----	-----

a 

B16	B16
-----	-----

**No. 46 *Ima2***c 

B29	B29	B29	B29
-----	-----	-----	-----

b 

B18	B18
-----	-----

a 

B16	B16
-----	-----

**No. 47 *P2/m2/m2/m*** $\alpha$ 

B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----

z 

B16	B16	B16	B16
-----	-----	-----	-----

y 

B16	B16	B16	B16
-----	-----	-----	-----

x 

B17	B17	B17	B17
-----	-----	-----	-----

w 

B17	B17	B17	B17
-----	-----	-----	-----

v 

B18	B18	B18	B18
-----	-----	-----	-----

u 

B18	B18	B18	B18
-----	-----	-----	-----

t 

B10	B10
-----	-----

s 

B10	B10
-----	-----

r 

B10	B10
-----	-----

q 

B10	B10
-----	-----

p 

B10	B10
-----	-----

o 

B10	B10
-----	-----

n 

B10	B10
-----	-----

m	B10	B10
l	B10	B10
k	B10	B10
j	B10	B10
i	B10	B10
h	B10	
g	B10	
f	B10	
e	B10	
d	B10	
c	B10	
b	B10	
a	B10	

No. 48  $P2/n2/n2/n$  (origin choice 1)

m	B29	B29	B29	B29	B29	B29	B29	B29
l	B16	B16	B16	B16				
k	B16	B16	B16	B16				
j	B17	B17	B17	B17				
i	B17	B17	B17	B17				
h	B18	B18	B18	B18				
g	B18	B18	B18	B18				
f	B29	B29	B29	B29				
e	B29	B29	B29	B29				
d	B10	B10						
c	B10	B10						
b	B10	B10						
a	B10	B10						

No. 48  $P2/n2/n2/n$  (origin choice 2)

m	B29	B29	B29	B29	B29	B29	B29	B29
l	B16	B16	B16	B16				
k	B16	B16	B16	B16				
j	B17	B17	B17	B17				
i	B17	B17	B17	B17				
h	B18	B18	B18	B18				
g	B18	B18	B18	B18				
f	B29	B29	B29	B29				

e	B29	B29	B29	B29
d	B10	B10		
c	B10	B10		
b	B10	B10		
a	B10	B10		

No. 49  $P2/c2/c2/m$ 

r	B29	B29	B29	B29	B29	B29	B29	B29
q	B16	B16	B16	B16				
p	B16	B16	B16	B16				
o	B16	B16	B16	B16				
n	B16	B16	B16	B16				
m	B16	B16	B16	B16				
l	B17	B17	B17	B17				
k	B17	B17	B17	B17				
j	B18	B18	B18	B18				
i	B18	B18	B18	B18				
h	B10	B10						
g	B10	B10						
f	B10	B10						
e	B10	B10						
d	B16	B16						
c	B16	B16						
b	B16	B16						
a	B16	B16						

No. 50  $P2/b2/a2/n$  (origin choice 1)

m	B29	B29	B29	B29	B29	B29	B29	B29
l	B16	B16	B16	B16				
k	B16	B16	B16	B16				
j	B17	B17	B17	B17				
i	B17	B17	B17	B17				
h	B18	B18	B18	B18				
g	B18	B18	B18	B18				
f	B29	B29	B29	B29				
e	B29	B29	B29	B29				
d	B10	B10						
c	B10	B10						

b B10 B10

a B10 B10

No. 50  $P2/b2/a2/n$  (origin choice 2)

m B29 B29 B29 B29 B29 B29 B29 B29

l B16 B16 B16 B16

k B16 B16 B16 B16

j B17 B17 B17 B17

i B17 B17 B17 B17

h B18 B18 B18 B18

g B18 B18 B18 B18

f B29 B29 B29 B29

e B29 B29 B29 B29

d B10 B10

c B10 B10

b B10 B10

a B10 B10

No. 51  $P2_1/m2/m2/a$ 

l B29 B29 B29 B29 B29 B29 B29 B29

k B18 B18 B18 B18

j B17 B17 B17 B17

i B17 B17 B17 B17

h B17 B17 B17 B17

g B17 B17 B17 B17

f B10 B10

e B10 B10

d B17 B17

c B17 B17

b B17 B17

a B17 B17

No. 52  $P2/n2_1/n2/a$ 

e B29 B29 B29 B29 B29 B29 B29 B29

d B18 B18 B18 B18

c B16 B16 B16 B16

b B29 B29 B29 B29

a B29 B29 B29 B29

No. 53  $P2/m2/n2_1/a$

i	B29	B29	B29	B29	B29	B29	B29	B29
h	B18	B18	B18	B18				
g	B17	B17	B17	B17				
f	B18	B18	B18	B18				
e	B18	B18	B18	B18				
d	B18	B18						
c	B18	B18						
b	B18	B18						
a	B18	B18						

No. 54  $P2_1/c2/c2/a$ 

f	B29	B29	B29	B29	B29	B29	B29	B29
e	B16	B16	B16	B16				
d	B16	B16	B16	B16				
c	B17	B17	B17	B17				
b	B29	B29	B29	B29				
a	B29	B29	B29	B29				

No. 55  $P2_1/b2_1/a2/m$ 

i	B29	B29	B29	B29	B29	B29	B29	B29
h	B16	B16	B16	B16				
g	B16	B16	B16	B16				
f	B16	B16	B16	B16				
e	B16	B16	B16	B16				
d	B16	B16						
c	B16	B16						
b	B16	B16						
a	B16	B16						

No. 56  $P2_1/c2_1/c2/n$ 

e	B29	B29	B29	B29	B29	B29	B29	B29
d	B16	B16	B16	B16				
c	B16	B16	B16	B16				
b	B29	B29	B29	B29				
a	B29	B29	B29	B29				

No. 57  $P2/b2_1/c2_1/m$ 

e	B29	B29	B29	B29	B29	B29	B29	B29
d	B16	B16	B16	B16				
c	B18	B18	B18	B18				

b 

B29	B29	B29	B29
-----	-----	-----	-----

  
a 

B29	B29	B29	B29
-----	-----	-----	-----

### No. 58 $P2_1/n2_1/n2/m$

h 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
g 

B16	B16	B16	B16
-----	-----	-----	-----

  
f 

B16	B16	B16	B16
-----	-----	-----	-----

  
e 

B16	B16	B16	B16
-----	-----	-----	-----

  
d 

B16	B16
-----	-----

  
c 

B16	B16
-----	-----

  
b 

B16	B16
-----	-----

  
a 

B16	B16
-----	-----

### No. 59 $P2_1/m2_1/m2/n$ (origin choice 1)

g 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
f 

B17	B17	B17	B17
-----	-----	-----	-----

  
e 

B18	B18	B18	B18
-----	-----	-----	-----

  
d 

B29	B29	B29	B29
-----	-----	-----	-----

  
c 

B29	B29	B29	B29
-----	-----	-----	-----

  
b 

B10	B10
-----	-----

  
a 

B10	B10
-----	-----

### No. 59 $P2_1/m2_1/m2/n$ (origin choice 2)

g 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
f 

B17	B17	B17	B17
-----	-----	-----	-----

  
e 

B18	B18	B18	B18
-----	-----	-----	-----

  
d 

B29	B29	B29	B29
-----	-----	-----	-----

  
c 

B29	B29	B29	B29
-----	-----	-----	-----

  
b 

B10	B10
-----	-----

  
a 

B10	B10
-----	-----

### No. 60 $P2_1/b2/c2_1/n$

d 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
c 

B17	B17	B17	B17
-----	-----	-----	-----

  
b 

B29	B29	B29	B29
-----	-----	-----	-----

  
a 

B29	B29	B29	B29
-----	-----	-----	-----

### No. 61 $P2_1/b2_1/c2_1/a$

c 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
b 

B29	B29	B29	B29
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a 

B29	B29	B29	B29
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No. 62  $P2_1/n2_1/m2_1/a$ 

d	B29	B29	B29	B29	B29	B29	B29	B29	B29
c	B17	B17	B17	B17					
b	B29	B29	B29	B29					
a	B29	B29	B29	B29					

No. 63  $C2/m2/c2_1/m$ 

h	B29	B29	B29	B29	B29	B29	B29	B29
g	B16	B16	B16	B16				
f	B18	B18	B18	B18				
e	B18	B18	B18	B18				
d	B29	B29	B29	B29				
c	B10	B10						
b	B18	B18						
a	B18	B18						

No. 64  $C2/m2/c2_1/e$ 

g	B29	B29	B29	B29	B29	B29	B29	B29
f	B18	B18	B18	B18				
e	B17	B17	B17	B17				
d	B18	B18	B18	B18				
c	B29	B29	B29	B29				
b	B18	B18						
a	B18	B18						

No. 65  $C2/m2/m2/m$ 

r	B29	B29	B29	B29	B29	B29	B29	B29
q	B16	B16	B16	B16				
p	B16	B16	B16	B16				
o	B17	B17	B17	B17				
n	B18	B18	B18	B18				
m	B16	B16	B16	B16				
l	B10	B10						
k	B10	B10						
j	B10	B10						
i	B10	B10						
h	B10	B10						
g	B10	B10						
f	B16	B16						

e 

B16	B16
-----	-----

  
d 

B10
-----

  
c 

B10
-----

  
b 

B10
-----

  
a 

B10
-----

### No. 66 $C2/c2/c2/m$

m 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
l 

B16	B16	B16	B16
-----	-----	-----	-----

  
k 

B16	B16	B16	B16
-----	-----	-----	-----

  
j 

B16	B16	B16	B16
-----	-----	-----	-----

  
i 

B16	B16	B16	B16
-----	-----	-----	-----

  
h 

B17	B17	B17	B17
-----	-----	-----	-----

  
g 

B18	B18	B18	B18
-----	-----	-----	-----

  
f 

B16	B16
-----	-----

  
e 

B16	B16
-----	-----

  
d 

B16	B16
-----	-----

  
c 

B16	B16
-----	-----

  
b 

B10	B10
-----	-----

  
a 

B10	B10
-----	-----

### No. 67 $C2/m2/m2/e$

o 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
n 

B17	B17	B17	B17
-----	-----	-----	-----

  
m 

B18	B18	B18	B18
-----	-----	-----	-----

  
l 

B16	B16	B16	B16
-----	-----	-----	-----

  
k 

B17	B17	B17	B17
-----	-----	-----	-----

  
j 

B17	B17	B17	B17
-----	-----	-----	-----

  
i 

B18	B18	B18	B18
-----	-----	-----	-----

  
h 

B18	B18	B18	B18
-----	-----	-----	-----

  
g 

B10	B10
-----	-----

  
f 

B17	B17
-----	-----

  
e 

B17	B17
-----	-----

  
d 

B18	B18
-----	-----

  
c 

B18	B18
-----	-----

  
b 

B10	B10
-----	-----

  
a 

B10	B10
-----	-----

### No. 68 $C2/c2/c2/e$ (origin choice 1)

i	B29	B29	B29	B29	B29	B29	B29	B29	B29
h	B16	B16	B16	B16					
g	B16	B16	B16	B16					
f	B17	B17	B17	B17					
e	B18	B18	B18	B18					
d	B29	B29	B29	B29					
c	B29	B29	B29	B29					
b	B10	B10							
a	B10	B10							

No. 68  $C2/c2/c2/e$  (origin choice 2)

i	B29	B29	B29	B29	B29	B29	B29	B29	B29
h	B16	B16	B16	B16					
g	B16	B16	B16	B16					
f	B17	B17	B17	B17					
e	B18	B18	B18	B18					
d	B29	B29	B29	B29					
c	B29	B29	B29	B29					
b	B10	B10							
a	B10	B10							

No. 69  $F2/m2/m2/m$ 

p	B29	B29	B29	B29	B29	B29	B29	B29	B29
o	B16	B16	B16	B16					
n	B17	B17	B17	B17					
m	B18	B18	B18	B18					
l	B18	B18	B18	B18					
k	B17	B17	B17	B17					
j	B16	B16	B16	B16					
i	B10	B10							
h	B10	B10							
g	B10	B10							
f	B10	B10							
e	B16	B16							
d	B17	B17							
c	B18	B18							
b	B10								
a	B10								



j	B16	B16	B16	B16
i	B16	B16	B16	B16
h	B16	B16	B16	B16
g	B17	B17	B17	B17
f	B18	B18	B18	B18
e	B29	B29	B29	B29
d	B16	B16		
c	B16	B16		
b	B10	B10		
a	B10	B10		

No. 73  $I2_1/b2_1/c2_1/a$ 

f	B29	B29	B29	B29	B29	B29	B29	B29
e	B16	B16	B16	B16				
d	B17	B17	B17	B17				
c	B18	B18	B18	B18				
b	B29	B29	B29	B29				
a	B29	B29	B29	B29				

No. 74  $I2_1/m2_1/m2_1/a$ 

j	B29	B29	B29	B29	B29	B29	B29	B29
i	B17	B17	B17	B17				
h	B18	B18	B18	B18				
g	B17	B17	B17	B17				
f	B18	B18	B18	B18				
e	B10	B10						
d	B17	B17						
c	B17	B17						
b	B18	B18						
a	B18	B18						

No. 75  $P4$ 

d	B29	B29	B29	B29
c	B16	B16		
b	B2			
a	B2			

No. 76  $P4_1$ 

a	B29	B29	B29	B29
---	-----	-----	-----	-----

No. 77  $P4_2$

d 

B29	B29	B29	B29
-----	-----	-----	-----

c 

B16	B16
-----	-----

b 

B16	B16
-----	-----

a 

B16	B16
-----	-----

### No. 78 $P4_3$

a 

B29	B29	B29	B29
-----	-----	-----	-----

### No. 79 $I4$

c 

B29	B29	B29	B29
-----	-----	-----	-----

b 

B16	B16
-----	-----

a 

B2
----

### No. 80 $I4_1$

b 

B29	B29	B29	B29
-----	-----	-----	-----

a 

B16	B16
-----	-----

### No. 81 $P\bar{4}$

h 

B29	B29	B29	B29
-----	-----	-----	-----

g 

B16	B16
-----	-----

f 

B16	B16
-----	-----

e 

B16	B16
-----	-----

d 

B2
----

c 

B2
----

b 

B2
----

a 

B2
----

### No. 82 $I\bar{4}$

g 

B29	B29	B29	B29
-----	-----	-----	-----

f 

B16	B16
-----	-----

e 

B16	B16
-----	-----

d 

B2
----

c 

B2
----

b 

B2
----

a 

B2
----

### No. 83 $P4/m$

l 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

k 

B16	B16	B16	B16
-----	-----	-----	-----

j 

B16	B16	B16	B16
-----	-----	-----	-----

i 

B16	B16	B16	B16
-----	-----	-----	-----

h 

B2	B2
----	----

g 

B2	B2
----	----

  
 f 

B16	B16
-----	-----

  
 e 

B16	B16
-----	-----

  
 d 

B2
----

  
 c 

B2
----

  
 b 

B2
----

  
 a 

B2
----

### No. 84 $P4_2/m$

k 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
 j 

B16	B16	B16	B16
-----	-----	-----	-----

  
 i 

B16	B16	B16	B16
-----	-----	-----	-----

  
 h 

B16	B16	B16	B16
-----	-----	-----	-----

  
 g 

B16	B16	B16	B16
-----	-----	-----	-----

  
 f 

B2	B2
----	----

  
 e 

B2	B2
----	----

  
 d 

B16	B16
-----	-----

  
 c 

B16	B16
-----	-----

  
 b 

B16	B16
-----	-----

  
 a 

B16	B16
-----	-----

### No. 85 $P4/n$ (origin choice 1)

g 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
 f 

B16	B16	B16	B16
-----	-----	-----	-----

  
 e 

B29	B29	B29	B29
-----	-----	-----	-----

  
 d 

B29	B29	B29	B29
-----	-----	-----	-----

  
 c 

B2	B2
----	----

  
 b 

B2	B2
----	----

  
 a 

B2	B2
----	----

### No. 85 $P4/n$ (origin choice 2)

g 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
 f 

B16	B16	B16	B16
-----	-----	-----	-----

  
 e 

B29	B29	B29	B29
-----	-----	-----	-----

  
 d 

B29	B29	B29	B29
-----	-----	-----	-----

  
 c 

B2	B2
----	----

  
 b 

B2	B2
----	----

  
 a 

B2	B2
----	----

### No. 86 $P4_2/n$ (origin choice 1)

g	B29	B29	B29	B29	B29	B29	B29	B29
f	B16	B16	B16	B16				
e	B16	B16	B16	B16				
d	B29	B29	B29	B29				
c	B29	B29	B29	B29				
b	B2	B2						
a	B2	B2						

### No. 86 $P4_2/n$ (origin choice 2)

g	B29	B29	B29	B29	B29	B29	B29	B29
f	B16	B16	B16	B16				
e	B16	B16	B16	B16				
d	B29	B29	B29	B29				
c	B29	B29	B29	B29				
b	B2	B2						
a	B2	B2						

### No. 87 $I4/m$

i	B29	B29	B29	B29	B29	B29	B29	B29
h	B16	B16	B16	B16				
g	B16	B16	B16	B16				
f	B29	B29	B29	B29				
e	B2	B2						
d	B2	B2						
c	B16	B16						
b	B2							
a	B2							

### No. 88 $I4_1/a$ (origin choice 1)

f	B29	B29	B29	B29	B29	B29	B29	B29
e	B16	B16	B16	B16				
d	B29	B29	B29	B29				
c	B29	B29	B29	B29				
b	B2	B2						
a	B2	B2						

### No. 88 $I4_1/a$ (origin choice 2)

f	B29	B29	B29	B29	B29	B29	B29
e	B16	B16	B16	B16			
d	B29	B29	B29	B29			

c 

B29	B29	B29	B29
-----	-----	-----	-----

  
 b 

B2	B2
----	----

  
 a 

B2	B2
----	----

### No. 89 P422

p 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
 o 

B18	B18	B17	B17
-----	-----	-----	-----

  
 n 

B18	B18	B17	B17
-----	-----	-----	-----

  
 m 

B18	B18	B17	B17
-----	-----	-----	-----

  
 l 

B18	B18	B17	B17
-----	-----	-----	-----

  
 k 

B19	B19	B20	B20
-----	-----	-----	-----

  
 j 

B19	B19	B20	B20
-----	-----	-----	-----

  
 i 

B16	B16	B16	B16
-----	-----	-----	-----

  
 h 

B2	B2
----	----

  
 g 

B2	B2
----	----

  
 f 

B10	B10
-----	-----

  
 e 

B10	B10
-----	-----

  
 d 

B2
----

  
 c 

B2
----

  
 b 

B2
----

  
 a 

B2
----

### No. 90 P42,2

g 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
 f 

B19	B19	B20	B20
-----	-----	-----	-----

  
 e 

B19	B19	B20	B20
-----	-----	-----	-----

  
 d 

B16	B16	B16	B16
-----	-----	-----	-----

  
 c 

B2	B2
----	----

  
 b 

B11	B11
-----	-----

  
 a 

B11	B11
-----	-----

### No. 91 P4,22

d 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
 c 

B19	B19	B20	B20
-----	-----	-----	-----

  
 b 

B17	B17	B18	B18
-----	-----	-----	-----

  
 a 

B17	B17	B18	B18
-----	-----	-----	-----

### No. 92 P4,2,2

b 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
 a 

B19	B19	B20	B20
-----	-----	-----	-----

No. 93  $P4_222$ 

<i>p</i>	B29	B29	B29	B29	B29	B29	B29	B29
<i>o</i>	B19	B19	B20	B20				
<i>n</i>	B19	B19	B20	B20				
<i>m</i>	B18	B18	B17	B17				
<i>l</i>	B18	B18	B17	B17				
<i>k</i>	B18	B18	B17	B17				
<i>j</i>	B18	B18	B17	B17				
<i>i</i>	B16	B16	B16	B16				
<i>h</i>	B16	B16	B16	B16				
<i>g</i>	B16	B16	B16	B16				
<i>f</i>	B11	B11						
<i>e</i>	B11	B11						
<i>d</i>	B10	B10						
<i>c</i>	B10	B10						
<i>b</i>	B10	B10						
<i>a</i>	B10	B10						

No. 94  $P4_22_12$ 

<i>g</i>	B29	B29	B29	B29	B29	B29	B29	B29
<i>f</i>	B19	B19	B20	B20				
<i>e</i>	B19	B19	B20	B20				
<i>d</i>	B16	B16	B16	B16				
<i>c</i>	B16	B16	B16	B16				
<i>b</i>	B11	B11						
<i>a</i>	B11	B11						

No. 95  $P4_322$ 

<i>d</i>	B29	B29	B29	B29	B29	B29	B29	B29
<i>c</i>	B19	B19	B20	B20				
<i>b</i>	B17	B17	B18	B18				
<i>a</i>	B17	B17	B18	B18				

No. 96  $P4_32_12$ 

<i>b</i>	B29	B29	B29	B29	B29	B29	B29	B29
<i>a</i>	B19	B19	B20	B20				

No. 97  $I422$ 

<i>k</i>	B29	B29	B29	B29	B29	B29	B29	B29
<i>j</i>	B19	B19	B20	B20				

i	B18	B18	B17	B17
h	B18	B18	B17	B17
g	B19	B19	B20	B20
f	B16	B16	B16	B16
e	B2	B2		
d	B11	B11		
c	B10	B10		
b	B2			
a	B2			

No. 98  $I4_122$ 

g	B29	B29	B29	B29	B29	B29	B29	B29
f	B18	B18	B17	B17				
e	B20	B20	B19	B19				
d	B19	B19	B20	B20				
c	B16	B16	B16	B16				
b	B11	B11						
a	B11	B11						

No. 99  $P4mm$ 

g	B29	B29	B29	B29	B29	B29	B29	B29
f	B17	B17	B18	B18				
e	B17	B17	B18	B18				
d	B20	B20	B19	B19				
c	B10	B10						
b	B2							
a	B2							

No. 100  $P4bm$ 

d	B29	B29	B29	B29	B29	B29	B29	B29
c	B20	B20	B19	B19				
b	B11	B11						
a	B2	B2						

No. 101  $P4_2cm$ 

e	B29	B29	B29	B29	B29	B29	B29	B29
d	B20	B20	B19	B19				
c	B16	B16	B16	B16				
b	B11	B11						
a	B11	B11						

No. 102  $P4_2nm$ 

d	B29	B29	B29	B29	B29	B29	B29	B29
c	B20	B20	B19	B19				
b	B16	B16	B16	B16				
a	B11	B11						

No. 103  $P4cc$ 

d	B29	B29	B29	B29	B29	B29	B29	B29
c	B16	B16	B16	B16				
b	B2	B2						
a	B2	B2						

No. 104  $P4nc$ 

c	B29	B29	B29	B29	B29	B29	B29
b	B16	B16	B16	B16			
a	B2	B2					

No. 105  $P4_2mc$ 

f	B29	B29	B29	B29	B29	B29	B29	B29
e	B17	B17	B18	B18				
d	B17	B17	B18	B18				
c	B10	B10						
b	B10	B10						
a	B10	B10						

No. 106  $P4_2bc$ 

c	B29	B29	B29	B29	B29	B29	B29
b	B16	B16	B16	B16			
a	B16	B16	B16	B16			

No. 107  $I4mm$ 

e	B29	B29	B29	B29	B29	B29	B29
d	B17	B17	B18	B18			
c	B20	B20	B19	B19			
b	B10	B10					
a	B2						

No. 108  $I4cm$ 

d	B29	B29	B29	B29	B29	B29	B29
c	B20	B20	B19	B19			
b	B11	B11					
a	B2	B2					

No. 109  $I4_1md$ 

c	B29	B29	B29	B29	B29	B29	B29	B29
b	B18	B18	B17	B17				
a	B10	B10						

No. 110  $I4_1cd$ 

b	B29	B29	B29	B29	B29	B29	B29	B29
a	B16	B16	B16	B16				

No. 111  $P\bar{4}2m$ 

o	B29	B29	B29	B29	B29	B29	B29	B29
n	B20	B20	B19	B19				
m	B16	B16	B16	B16				
l	B18	B18	B17	B17				
k	B18	B18	B17	B17				
j	B18	B18	B17	B17				
i	B18	B18	B17	B17				
h	B11	B11						
g	B11	B11						
f	B10	B10						
e	B10	B10						
d	B2							
c	B2							
b	B2							
a	B2							

No. 112  $P\bar{4}2c$ 

n	B29	B29	B29	B29	B29	B29	B29	B29
m	B16	B16	B16	B16				
l	B16	B16	B16	B16				
k	B16	B16	B16	B16				
j	B17	B17	B18	B18				
i	B18	B18	B17	B17				
h	B17	B17	B18	B18				
g	B18	B18	B17	B17				
f	B2	B2						
e	B2	B2						
d	B10	B10						
c	B10	B10						

b 

B10	B10
-----	-----

a 

B10	B10
-----	-----

### No. 113 $P\bar{4}_1m$

f 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

e 

B20	B20	B19	B19
-----	-----	-----	-----

d 

B16	B16	B16	B16
-----	-----	-----	-----

c 

B11	B11
-----	-----

b 

B2	B2
----	----

a 

B2	B2
----	----

### No. 114 $P\bar{4}_2c$

e 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

d 

B16	B16	B16	B16
-----	-----	-----	-----

c 

B16	B16	B16	B16
-----	-----	-----	-----

b 

B2	B2
----	----

a 

B2	B2
----	----

### No. 115 $P\bar{4}m2$

l 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

k 

B17	B17	B18	B18
-----	-----	-----	-----

j 

B17	B17	B18	B18
-----	-----	-----	-----

i 

B19	B19	B20	B20
-----	-----	-----	-----

h 

B19	B19	B20	B20
-----	-----	-----	-----

g 

B10	B10
-----	-----

f 

B10	B10
-----	-----

e 

B10	B10
-----	-----

d 

B2
----

c 

B2
----

b 

B2
----

a 

B2
----

### No. 116 $P\bar{4}c2$

j 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

i 

B16	B16	B16	B16
-----	-----	-----	-----

h 

B16	B16	B16	B16
-----	-----	-----	-----

g 

B16	B16	B16	B16
-----	-----	-----	-----

f 

B19	B19	B20	B20
-----	-----	-----	-----

e 

B19	B19	B20	B20
-----	-----	-----	-----

d 

B2	B2
----	----

c 

B2	B2
----	----

b 

B11	B11
-----	-----

a 

B11	B11
-----	-----

No. 117  $P\bar{4}b2$ i 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

h 

B19	B19	B20	B20
-----	-----	-----	-----

g 

B19	B19	B20	B20
-----	-----	-----	-----

f 

B16	B16	B16	B16
-----	-----	-----	-----

e 

B16	B16	B16	B16
-----	-----	-----	-----

d 

B11	B11
-----	-----

c 

B11	B11
-----	-----

b 

B2	B2
----	----

a 

B2	B2
----	----

No. 118  $P\bar{4}n2$ i 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

h 

B16	B16	B16	B16
-----	-----	-----	-----

g 

B19	B19	B20	B20
-----	-----	-----	-----

f 

B20	B20	B19	B19
-----	-----	-----	-----

e 

B16	B16	B16	B16
-----	-----	-----	-----

d 

B11	B11
-----	-----

c 

B11	B11
-----	-----

b 

B2	B2
----	----

a 

B2	B2
----	----

No. 119  $I\bar{4}m2$ j 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

i 

B17	B17	B18	B18
-----	-----	-----	-----

h 

B19	B19	B20	B20
-----	-----	-----	-----

g 

B19	B19	B20	B20
-----	-----	-----	-----

f 

B10	B10
-----	-----

e 

B10	B10
-----	-----

d 

B2
----

c 

B2
----

b 

B2
----

a 

B2
----

No. 120  $I\bar{4}c2$ i 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----



k	B11	B11	B11	B11
j	B11	B11	B11	B11
i	B10	B10	B10	B10
h	B2	B2		
g	B2	B2		
f	B10	B10		
e	B10	B10		
d	B2			
c	B2			
b	B2			
a	B2			

No. 124  $P4/m2/c2/c$ 

n	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
m	B16	B16	B16	B16	B16	B16	B16	B16	B16						
l	B18	B18	B17	B17	B18	B18	B17	B17							
k	B18	B18	B17	B17	B18	B18	B17	B17							
j	B19	B19	B20	B20	B19	B19	B20	B20							
i	B16	B16	B16	B16	B16	B16	B16	B16							
h	B2	B2	B2	B2											
g	B2	B2	B2	B2											
f	B10	B10	B10	B10											
e	B16	B16	B16	B16											
d	B2	B2													
c	B2	B2													
b	B2	B2													
a	B2	B2													

No. 125  $P4/n2/b2/m$  (origin choice 1)

n	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
m	B20	B20	B19	B19	B19	B19	B20	B20							
l	B18	B18	B17	B17	B18	B18	B17	B17							
k	B18	B18	B17	B17	B18	B18	B17	B17							
j	B19	B19	B20	B20	B19	B19	B20	B20							
i	B19	B19	B20	B20	B19	B19	B20	B20							
h	B11	B11	B11	B11											
g	B2	B2	B2	B2											
f	B19	B19	B20	B20											

e	B19	B19	B20	B20
d	B2	B2		
c	B2	B2		
b	B2	B2		
a	B2	B2		

### No. 125 $P4/n2/b2/m$ (origin choice 2)

n	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
m	B19	B19	B20	B20	B20	B20	B19	B19								
l	B18	B18	B17	B17	B18	B18	B17	B17								
k	B18	B18	B17	B17	B18	B18	B17	B17								
j	B19	B19	B20	B20	B19	B19	B20	B20								
i	B19	B19	B20	B20	B19	B19	B20	B20								
h	B11	B11	B11	B11												
g	B2	B2	B2	B2												
f	B19	B19	B20	B20												
e	B19	B19	B20	B20												
d	B2	B2														
c	B2	B2														
b	B2	B2														
a	B2	B2														

### No. 126 $P4/n2/n2/c$ (origin choice 1)

k	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
j	B18	B18	B17	B17	B18	B18	B17	B17								
i	B18	B18	B17	B17	B18	B18	B17	B17								
h	B19	B19	B20	B20	B19	B19	B20	B20								
g	B16	B16	B16	B16	B16	B16	B16	B16								
f	B29	B29	B29	B29	B29	B29	B29	B29								
e	B2	B2	B2	B2												
d	B2	B2	B2	B2												
c	B10	B10	B10	B10												
b	B2	B2														
a	B2	B2														

### No. 126 $P4/n2/n2/c$ (origin choice 2)

k	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
j	B18	B18	B17	B17	B18	B18	B17	B17								
i	B18	B18	B17	B17	B18	B18	B17	B17								

h	B19	B19	B20	B20	B19	B19	B20	B20
g	B16	B16	B16	B16	B16	B16	B16	B16
f	B29	B29	B29	B29	B29	B29	B29	B29
e	B2	B2	B2	B2				
d	B2	B2	B2	B2				
c	B10	B10	B10	B10				
b	B2	B2						
a	B2	B2						

No. 127  $P4/m 2_1/b 2/m$ 

l	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
k	B20	B20	B19	B19	B19	B19	B20	B20							
j	B16	B16	B16	B16	B16	B16	B16	B16							
i	B16	B16	B16	B16	B16	B16	B16	B16							
h	B11	B11	B11	B11											
g	B11	B11	B11	B11											
f	B11	B11	B11	B11											
e	B2	B2	B2	B2											
d	B11	B11													
c	B11	B11													
b	B2	B2													
a	B2	B2													

No. 128  $P4/m 2_1/n 2/c$ 

i	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
h	B16	B16	B16	B16	B16	B16	B16	B16							
g	B19	B19	B20	B20	B19	B19	B20	B20							
f	B16	B16	B16	B16	B16	B16	B16	B16							
e	B2	B2	B2	B2											
d	B11	B11	B11	B11											
c	B16	B16	B16	B16											
b	B2	B2													
a	B2	B2													

No. 129  $P4/n 2_1/m 2/m$  (origin choice I)

k	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
j	B20	B20	B19	B19	B19	B19	B20	B20							
i	B18	B18	B17	B17	B18	B18	B17	B17							
h	B19	B19	B20	B20	B19	B19	B20	B20							

g	B19	B19	B20	B20	B19	B19	B20	B20
f	B10	B10	B10	B10				
e	B19	B19	B20	B20				
d	B19	B19	B20	B20				
c	B2	B2						
b	B2	B2						
a	B2	B2						

### No. 129 $P4/n 2_1/m 2/m$ (origin choice 2)

k	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
j	B20	B20	B19	B19	B19	B19	B20	B20									
i	B18	B18	B17	B17	B18	B18	B17	B17									
h	B20	B20	B19	B19	B20	B20	B19	B19									
g	B20	B20	B19	B19	B20	B20	B19	B19									
f	B10	B10	B10	B10													
e	B20	B20	B19	B19													
d	B20	B20	B19	B19													
c	B2	B2															
b	B2	B2															
a	B2	B2															

### No. 130 $P4/n 2_1/c 2/c$ (origin choice 1)

g	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
f	B19	B19	B20	B20	B19	B19	B20	B20									
e	B16	B16	B16	B16	B16	B16	B16	B16									
d	B29	B29	B29	B29	B29	B29	B29	B29									
c	B2	B2	B2	B2													
b	B2	B2	B2	B2													
a	B11	B11	B11	B11													

### No. 130 $P4/n 2_1/c 2/c$ (origin choice 2)

g	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
f	B20	B20	B19	B19	B20	B20	B19	B19									
e	B16	B16	B16	B16	B16	B16	B16	B16									
d	B29	B29	B29	B29	B29	B29	B29	B29									
c	B2	B2	B2	B2													
b	B2	B2	B2	B2													
a	B11	B11	B11	B11													

### No. 131 $P4_2/m 2/m 2/c$

r	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
q	B16	B16	B16	B16	B16	B16	B16	B16	B16	B16	B16					
p	B18	B18	B17	B17	B18	B18	B17	B17								
o	B18	B18	B17	B17	B18	B18	B17	B17								
n	B19	B19	B20	B20	B19	B19	B20	B20								
m	B10	B10	B10	B10												
l	B10	B10	B10	B10												
k	B10	B10	B10	B10												
j	B10	B10	B10	B10												
i	B10	B10	B10	B10												
h	B10	B10	B10	B10												
g	B10	B10	B10	B10												
f	B2	B2														
e	B2	B2														
d	B10	B10														
c	B10	B10														
b	B10	B10														
a	B10	B10														

No. 132  $P4_2/m 2/c 2/m$

p	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
o	B20	B20	B19	B19	B19	B19	B20	B20								
n	B16	B16	B16	B16	B16	B16	B16	B16								
m	B18	B18	B17	B17	B18	B18	B17	B17								
l	B18	B18	B17	B17	B18	B18	B17	B17								
k	B16	B16	B16	B16	B16	B16	B16	B16								
j	B11	B11	B11	B11												
i	B11	B11	B11	B11												
h	B11	B11	B11	B11												
g	B11	B11	B11	B11												
f	B16	B16	B16	B16												
e	B10	B10	B10	B10												
d	B2	B2														
c	B11	B11														
b	B2	B2														
a	B11	B11														

No. 133  $P4_2/n 2/b 2/c$  (origin choice 1)



b 

B2	B2
----	----

a 

B2	B2
----	----

No. 134  $P4_2/n\ 2/n\ 2/m$  (origin choice 2)n 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

m 

B19	B19	B20	B20	B20	B20	B19	B19
-----	-----	-----	-----	-----	-----	-----	-----

l 

B19	B19	B20	B20	B19	B19	B20	B20
-----	-----	-----	-----	-----	-----	-----	-----

k 

B19	B19	B20	B20	B19	B19	B20	B20
-----	-----	-----	-----	-----	-----	-----	-----

j 

B18	B18	B17	B17	B18	B18	B17	B17
-----	-----	-----	-----	-----	-----	-----	-----

i 

B18	B18	B17	B17	B18	B18	B17	B17
-----	-----	-----	-----	-----	-----	-----	-----

h 

B16	B16	B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----	-----	-----

g 

B11	B11	B11	B11
-----	-----	-----	-----

f 

B19	B19	B20	B20
-----	-----	-----	-----

e 

B19	B19	B20	B20
-----	-----	-----	-----

d 

B11	B11	B11	B11
-----	-----	-----	-----

c 

B10	B10	B10	B10
-----	-----	-----	-----

b 

B2	B2
----	----

a 

B2	B2
----	----

No. 135  $P4_2/m\ 2_1/b\ 2/c$ i 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

h 

B16	B16	B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----	-----	-----

g 

B19	B19	B20	B20	B19	B19	B20	B20
-----	-----	-----	-----	-----	-----	-----	-----

f 

B16	B16	B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----	-----	-----

e 

B16	B16	B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----	-----	-----

d 

B11	B11	B11	B11
-----	-----	-----	-----

c 

B16	B16	B16	B16
-----	-----	-----	-----

b 

B2	B2	B2	B2
----	----	----	----

a 

B16	B16	B16	B16
-----	-----	-----	-----

No. 136  $P4_2/m\ 2_1/n\ 2/m$ k 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

j 

B20	B20	B19	B19	B19	B19	B20	B20
-----	-----	-----	-----	-----	-----	-----	-----

i 

B16	B16	B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----	-----	-----

h 

B16	B16	B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----	-----	-----

g 

B11	B11	B11	B11
-----	-----	-----	-----

f 

B11	B11	B11	B11
-----	-----	-----	-----

e 

B11	B11	B11	B11
-----	-----	-----	-----

d 

B2	B2	B2	B2
----	----	----	----

c 

B16	B16	B16	B16
-----	-----	-----	-----

  
 b 

B11	B11
-----	-----

  
 a 

B11	B11
-----	-----

### No. 137 $P4_2/n 2_1/m 2/c$ (origin choice 1)

h 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

  
 g 

B18	B18	B17	B17	B18	B18	B17	B17
-----	-----	-----	-----	-----	-----	-----	-----

  
 f 

B19	B19	B20	B20	B19	B19	B20	B20
-----	-----	-----	-----	-----	-----	-----	-----

  
 e 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
 d 

B10	B10	B10	B10
-----	-----	-----	-----

  
 c 

B10	B10	B10	B10
-----	-----	-----	-----

  
 b 

B2	B2
----	----

  
 a 

B2	B2
----	----

### No. 137 $P4_2/n 2_1/m 2/c$ (origin choice 2)

h 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

  
 g 

B18	B18	B17	B17	B18	B18	B17	B17
-----	-----	-----	-----	-----	-----	-----	-----

  
 f 

B20	B20	B19	B19	B20	B20	B19	B19
-----	-----	-----	-----	-----	-----	-----	-----

  
 e 

B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----

  
 d 

B10	B10	B10	B10
-----	-----	-----	-----

  
 c 

B10	B10	B10	B10
-----	-----	-----	-----

  
 b 

B2	B2
----	----

  
 a 

B2	B2
----	----

### No. 138 $P4_2/n 2_1/c 2/m$ (origin choice 1)

j 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

  
 i 

B20	B20	B19	B19	B19	B19	B20	B20
-----	-----	-----	-----	-----	-----	-----	-----

  
 h 

B19	B19	B20	B20	B19	B19	B20	B20
-----	-----	-----	-----	-----	-----	-----	-----

  
 g 

B19	B19	B20	B20	B19	B19	B20	B20
-----	-----	-----	-----	-----	-----	-----	-----

  
 f 

B16	B16	B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----	-----	-----

  
 e 

B11	B11	B11	B11
-----	-----	-----	-----

  
 d 

B19	B19	B20	B20
-----	-----	-----	-----

  
 c 

B19	B19	B20	B20
-----	-----	-----	-----

  
 b 

B2	B2	B2	B2
----	----	----	----

  
 a 

B11	B11	B11	B11
-----	-----	-----	-----

### No. 138 $P4_2/n 2_1/c 2/m$ (origin choice 2)

j 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

  
 i 

B20	B20	B19	B19	B19	B19	B20	B20
-----	-----	-----	-----	-----	-----	-----	-----

  
 h 

B20	B20	B19	B19	B20	B20	B19	B19
-----	-----	-----	-----	-----	-----	-----	-----

g	B20	B20	B19	B19	B20	B20	B19	B19
f	B16	B16	B16	B16	B16	B16	B16	B16
e	B11	B11	B11	B11				
d	B20	B20	B19	B19				
c	B20	B20	B19	B19				
b	B2	B2	B2	B2				
a	B11	B11	B11	B11				

No. 139  $I4/m\ 2/m\ 2/m$ 

o	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
n	B18	B18	B17	B17	B18	B18	B17	B17								
m	B20	B20	B19	B19	B19	B19	B20	B20								
l	B16	B16	B16	B16	B16	B16	B16	B16								
k	B19	B19	B20	B20	B19	B19	B20	B20								
j	B10	B10	B10	B10												
i	B10	B10	B10	B10												
h	B11	B11	B11	B11												
g	B10	B10	B10	B10												
f	B20	B20	B19	B19												
e	B2	B2														
d	B2	B2														
c	B10	B10														
b	B2															
a	B2															

No. 140  $I4/m\ 2/c\ 2/m$ 

m	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
l	B20	B20	B19	B19	B19	B19	B20	B20								
k	B16	B16	B16	B16	B16	B16	B16	B16								
j	B18	B18	B17	B17	B18	B18	B17	B17								
i	B19	B19	B20	B20	B19	B19	B20	B20								
h	B11	B11	B11	B11												
g	B11	B11	B11	B11												
f	B2	B2	B2	B2												
e	B19	B19	B20	B20												
d	B11	B11														
c	B2	B2														
b	B2	B2														

a B2 B2

No. 141  $I_{4_1/a} 2/m 2/d$  (origin choice 1)

i B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29

h B18 B18 B17 B17 B18 B18 B17 B17

g B19 B19 B20 B20 B19 B19 B20 B20

f B18 B18 B17 B17 B18 B18 B17 B17

e B10 B10 B10 B10

d B18 B18 B17 B17

c B18 B18 B17 B17

b B2 B2

a B2 B2

No. 141  $I_{4_1/a} 2/m 2/d$  (origin choice 2)

i B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29

h B18 B18 B17 B17 B18 B18 B17 B17

g B19 B19 B20 B20 B19 B19 B20 B20

f B18 B18 B17 B17 B18 B18 B17 B17

e B10 B10 B10 B10

d B18 B18 B17 B17

c B18 B18 B17 B17

b B2 B2

a B2 B2

No. 142  $I_{4_1/a} 2/c 2/d$  (origin choice 1)

g B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29

f B19 B19 B20 B20 B19 B19 B20 B20

e B17 B17 B18 B18 B17 B17 B18 B18

d B16 B16 B16 B16 B16 B16 B16 B16

c B29 B29 B29 B29 B29 B29 B29 B29

b B11 B11 B11 B11

a B2 B2 B2 B2

No. 142  $I_{4_1/a} 2/c 2/d$  (origin choice 2)

g B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29

f B19 B19 B20 B20 B19 B19 B20 B20

e B18 B18 B17 B17 B18 B18 B17 B17

d B16 B16 B16 B16 B16 B16 B16 B16

c B29 B29 B29 B29 B29 B29 B29 B29

b B11 B11 B11 B11

a 

B2	B2	B2	B2
----	----	----	----

### No. 143 $P3$

d 

B29	B29	B29
-----	-----	-----

c 

B9
----

b 

B9
----

a 

B9
----

### No. 144 $P3_1$

a 

B29	B29	B29
-----	-----	-----

### No. 145 $P3_2$

a 

B29	B29	B29
-----	-----	-----

### No. 146 $R3$ (hexagonal axes)

b 

B29	B29	B29
-----	-----	-----

a 

B9
----

### No. 146 $R3$ (rhombohedral axes)

b 

B29	B29	B29
-----	-----	-----

a 

B5
----

### No. 147 $P\bar{3}$

g 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

f 

B29	B29	B29
-----	-----	-----

e 

B29	B29	B29
-----	-----	-----

d 

B9	B9
----	----

c 

B9	B9
----	----

b 

B9
----

a 

B9
----

### No. 148 $R\bar{3}$ (hexagonal axes)

f 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

e 

B29	B29	B29
-----	-----	-----

d 

B29	B29	B29
-----	-----	-----

c 

B9	B9
----	----

b 

B9
----

a 

B9
----

### No. 148 $R\bar{3}$ (rhombohedral axes)

f 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

e 

B29	B29	B29
-----	-----	-----

d 

B29	B29	B29
-----	-----	-----

c 

B5	B5
----	----

b B5

a B5

## No. 149 P312

l B29 B29 B29 B29 B29 B29

k B20 B27 B26

j B20 B27 B26

i B9 B9

h B9 B9

g B9 B9

f B9

e B9

d B9

c B9

b B9

a B9

## No. 150 P321

g B29 B29 B29 B29 B29 B29

f B25 B28 B19

e B25 B28 B19

d B9 B9

c B9 B9

b B9

a B9

No. 151 P3<sub>1</sub>12

c B29 B29 B29 B29 B29 B29

b B20 B27 B26

a B20 B27 B26

No. 152 P3<sub>1</sub>21

c B29 B29 B29 B29 B29 B29

b B25 B28 B19

a B25 B28 B19

No. 153 P3<sub>2</sub>12

c B29 B29 B29 B29 B29 B29

b B20 B27 B26

a B20 B27 B26

No. 154 P3<sub>2</sub>21

c 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

  
 b 

B25	B28	B19
-----	-----	-----

  
 a 

B25	B28	B19
-----	-----	-----

### No. 155 $R32$ (hexagonal axes)

f 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

  
 e 

B25	B28	B19
-----	-----	-----

  
 d 

B25	B28	B19
-----	-----	-----

  
 c 

B9	B9
----	----

  
 b 

B9
----

  
 a 

B9
----

### No. 155 $R32$ (rhombohedral axes)

f 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

  
 e 

B24	B22	B20
-----	-----	-----

  
 d 

B24	B22	B20
-----	-----	-----

  
 c 

B5	B5
----	----

  
 b 

B5
----

  
 a 

B5
----

### No. 156 $P3m1$

e 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

  
 d 

B19	B25	B28
-----	-----	-----

  
 c 

B9
----

  
 b 

B9
----

  
 a 

B9
----

### No. 157 $P31m$

d 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

  
 c 

B27	B26	B20
-----	-----	-----

  
 b 

B9	B9
----	----

  
 a 

B9
----

### No. 158 $P3c1$

d 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

  
 c 

B9	B9
----	----

  
 b 

B9	B9
----	----

  
 a 

B9	B9
----	----

### No. 159 $P31c$

c 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

  
 b 

B9	B9
----	----

a 

B9	B9
----	----

No. 160  $R\bar{3}m$  (hexagonal axes)c 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

b 

B19	B25	B28
-----	-----	-----

a 

B9
----

No. 160  $R\bar{3}m$  (rhombohedral axes)c 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

b 

B20	B24	B22
-----	-----	-----

a 

B5
----

No. 161  $R\bar{3}c$  (hexagonal axes)b 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

a 

B9	B9
----	----

No. 161  $R\bar{3}c$  (rhombohedral axes)b 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

a 

B5	B5
----	----

No. 162  $P\bar{3}12/m$ l 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

k 

B27	B26	B20	B26	B27	B20
-----	-----	-----	-----	-----	-----

j 

B20	B27	B26	B20	B27	B26
-----	-----	-----	-----	-----	-----

i 

B20	B27	B26	B20	B27	B26
-----	-----	-----	-----	-----	-----

h 

B9	B9	B9	B9
----	----	----	----

g 

B27	B26	B20
-----	-----	-----

f 

B27	B26	B20
-----	-----	-----

e 

B9	B9
----	----

d 

B9	B9
----	----

c 

B9	B9
----	----

b 

B9
----

a 

B9
----

No. 163  $P\bar{3}12/c$ i 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

h 

B20	B27	B26	B20	B27	B26
-----	-----	-----	-----	-----	-----

g 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

f 

B9	B9	B9	B9
----	----	----	----

e 

B9	B9	B9	B9
----	----	----	----

d 

B9	B9
----	----

c 

B9	B9
----	----

b 

B9	B9
----	----

a 

B9	B9
----	----

No. 164  $P\bar{3}2/m$ j 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

i 

B19	B25	B28	B19	B28	B25
-----	-----	-----	-----	-----	-----

h 

B25	B28	B19	B25	B28	B19
-----	-----	-----	-----	-----	-----

g 

B25	B28	B19	B25	B28	B19
-----	-----	-----	-----	-----	-----

f 

B25	B28	B19
-----	-----	-----

e 

B25	B28	B19
-----	-----	-----

d 

B9	B9
----	----

c 

B9	B9
----	----

b 

B9
----

a 

B9
----

No. 165  $P\bar{3}2/c1$ g 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

f 

B25	B28	B19	B25	B28	B19
-----	-----	-----	-----	-----	-----

e 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

d 

B9	B9	B9	B9
----	----	----	----

c 

B9	B9	B9	B9
----	----	----	----

b 

B9	B9
----	----

a 

B9	B9
----	----

No. 166  $R\bar{3}2/m$  (hexagonal axes)i 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

h 

B19	B25	B28	B19	B28	B25
-----	-----	-----	-----	-----	-----

g 

B25	B28	B19	B25	B28	B19
-----	-----	-----	-----	-----	-----

f 

B25	B28	B19	B25	B28	B19
-----	-----	-----	-----	-----	-----

e 

B25	B28	B19
-----	-----	-----

d 

B25	B28	B19
-----	-----	-----

c 

B9	B9
----	----

b 

B9
----

a 

B9
----

No. 166  $R\bar{3}2/m$  (rhombohedral axes)i 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

h 

B20	B24	B22	B24	B20	B22
-----	-----	-----	-----	-----	-----

g 

B20	B24	B22	B20	B24	B22
-----	-----	-----	-----	-----	-----

f	B20	B24	B22	B20	B24	B22
e	B24	B22	B20			
d	B24	B22	B20			
c	B5	B5				
b	B5					
a	B5					

### No. 167 $R\bar{3}2/c$ (hexagonal axes)

f	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
e	B25	B28	B19	B25	B28	B19							
d	B29	B29	B29	B29	B29	B29							
c	B9	B9	B9	B9									
b	B9	B9											
a	B9	B9											

### No. 167 $R\bar{3}2/c$ (rhombohedral axes)

f	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
e	B20	B24	B22	B20	B24	B22							
d	B29	B29	B29	B29	B29	B29							
c	B5	B5	B5	B5									
b	B5	B5											
a	B5	B5											

### No. 168 $P6$

d	B29	B29	B29	B29	B29	B29
c	B16	B16	B16			
b	B9	B9				
a	B9					

### No. 169 $P6_1$

a	B29	B29	B29	B29	B29	B29
---	-----	-----	-----	-----	-----	-----

### No. 170 $P6_5$

a	B29	B29	B29	B29	B29	B29
---	-----	-----	-----	-----	-----	-----

### No. 171 $P6_2$

c	B29	B29	B29	B29	B29	B29
b	B16	B16	B16			
a	B16	B16	B16			

### No. 172 $P6_4$

c	B29	B29	B29	B29	B29	B29
b	B16	B16	B16			

a 

B16	B16	B16
-----	-----	-----

### No. 173 $P6_3$

c 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

b 

B9	B9
----	----

a 

B9	B9
----	----

### No. 174 $P\bar{6}$

l 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

k 

B16	B16	B16
-----	-----	-----

j 

B16	B16	B16
-----	-----	-----

i 

B9	B9
----	----

h 

B9	B9
----	----

g 

B9	B9
----	----

f 

B9
----

e 

B9
----

d 

B9
----

c 

B9
----

b 

B9
----

a 

B9
----

### No. 175 $P6/m$

l 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

k 

B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----

j 

B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----

i 

B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----

h 

B9	B9	B9	B9
----	----	----	----

g 

B16	B16	B16
-----	-----	-----

f 

B16	B16	B16
-----	-----	-----

e 

B9	B9
----	----

d 

B9	B9
----	----

c 

B9	B9
----	----

b 

B9
----

a 

B9
----

### No. 176 $P6_3/m$

i 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

h 

B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----

g 

B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----

f 

B9	B9	B9	B9
----	----	----	----

e	B9	B9	B9	B9
d	B9	B9		
c	B9	B9		
b	B9	B9		
a	B9	B9		

## No. 177 P622

n	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
m	B20	B27	B26	B20	B27	B26						
l	B20	B27	B26	B20	B27	B26						
k	B25	B28	B19	B25	B28	B19						
j	B25	B28	B19	B25	B28	B19						
i	B16	B16	B16	B16	B16	B16						
h	B9	B9	B9	B9								
g	B14	B15	B11									
f	B14	B15	B11									
e	B9	B9										
d	B9	B9										
c	B9	B9										
b	B9											
a	B9											

No. 178 P6<sub>1</sub>22

c	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
b	B27	B26	B20	B27	B26	B20						
a	B25	B28	B19	B25	B28	B19						

No. 179 P6<sub>5</sub>22

c	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
b	B27	B26	B20	B27	B26	B20					
a	B25	B28	B19	B25	B28	B19					

No. 180 P6<sub>2</sub>22

k	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
j	B27	B26	B20	B27	B26	B20					
i	B27	B26	B20	B27	B26	B20					
h	B25	B28	B19	B25	B28	B19					
g	B25	B28	B19	B25	B28	B19					
f	B16	B16	B16	B16	B16	B16					
e	B16	B16	B16	B16	B16	B16					

d B14 B15 B11

c B14 B15 B11

b B14 B15 B11

a B14 B15 B11

No. 181  $P6_422$ 

k B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29

j B27 B26 B20 B27 B26 B20

i B27 B26 B20 B27 B26 B20

h B25 B28 B19 B25 B28 B19

g B25 B28 B19 B25 B28 B19

f B16 B16 B16 B16 B16 B16

e B16 B16 B16 B16 B16 B16

d B14 B15 B11

c B14 B15 B11

b B14 B15 B11

a B14 B15 B11

No. 182  $P6_322$ 

i B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29

h B27 B26 B20 B27 B26 B20

g B25 B28 B19 B25 B28 B19

f B9 B9 B9 B9

e B9 B9 B9 B9

d B9 B9

c B9 B9

b B9 B9

a B9 B9

No. 183  $P6mm$ 

f B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29

e B19 B25 B28 B19 B25 B28

d B27 B26 B20 B27 B26 B20

c B14 B15 B11

b B9 B9

a B9

No. 184  $P6cc$ 

d B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29 B29

c B16 B16 B16 B16 B16 B16

b 

B9	B9	B9	B9
----	----	----	----

a 

B9	B9
----	----

No. 185  $P6_3cm$ d 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

c 

B27	B26	B20	B27	B26	B20
-----	-----	-----	-----	-----	-----

b 

B9	B9	B9	B9
----	----	----	----

a 

B9	B9
----	----

No. 186  $P6_3mc$ d 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

c 

B19	B25	B28	B19	B25	B28
-----	-----	-----	-----	-----	-----

b 

B9	B9
----	----

a 

B9	B9
----	----

No. 187  $P\bar{6}m2$ o 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

n 

B19	B25	B28	B19	B25	B28
-----	-----	-----	-----	-----	-----

m 

B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----

l 

B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----

k 

B11	B14	B15
-----	-----	-----

j 

B11	B14	B15
-----	-----	-----

i 

B9	B9
----	----

h 

B9	B9
----	----

g 

B9	B9
----	----

f 

B9
----

e 

B9
----

d 

B9
----

c 

B9
----

b 

B9
----

a 

B9
----

No. 188  $P\bar{6}c2$ l 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

k 

B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----

j 

B20	B27	B26	B20	B27	B26
-----	-----	-----	-----	-----	-----

i 

B9	B9	B9	B9
----	----	----	----

h 

B9	B9	B9	B9
----	----	----	----

g 

B9	B9	B9	B9
----	----	----	----

f 

B9	B9
----	----

e	B9	B9
d	B9	B9
c	B9	B9
b	B9	B9
a	B9	B9

No. 189  $P\bar{6}2m$ 

l	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
k	B16	B16	B16	B16	B16	B16						
j	B16	B16	B16	B16	B16	B16						
i	B27	B26	B20	B27	B26	B20						
h	B9	B9	B9	B9								
g	B14	B15	B11									
f	B14	B15	B11									
e	B9	B9										
d	B9	B9										
c	B9	B9										
b	B9											
a	B9											

No. 190  $P\bar{6}2c$ 

i	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
h	B16	B16	B16	B16	B16	B16						
g	B25	B28	B19	B25	B28	B19						
f	B9	B9	B9	B9								
e	B9	B9	B9	B9								
d	B9	B9										
c	B9	B9										
b	B9	B9										
a	B9	B9										

No. 191  $P6/m2/m2/m$ 

r	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
q	B16	B16	B16	B16	B16	B16	B16	B16	B16	B16	B16	B16										
p	B16	B16	B16	B16	B16	B16	B16	B16	B16	B16	B16	B16										
o	B25	B28	B19	B25	B28	B19	B28	B25	B19	B28	B25	B19										
n	B27	B26	B20	B27	B26	B20	B26	B27	B20	B26	B27	B20										
m	B14	B15	B11	B14	B15	B11																
l	B14	B15	B11	B14	B15	B11																



b 

B9	B9
----	----

a 

B9	B9
----	----

**No. 194**  $P6_3/m2/m2/c$ l 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

k 

B25	B28	B19	B25	B28	B19	B28	B25	B19	B28	B25	B19
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

j 

B16	B16	B16	B16	B16	B16	B16	B16	B16	B16	B16	B16
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

i 

B25	B28	B19	B25	B28	B19	B25	B28	B19	B25	B28	B19
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

h 

B14	B15	B11	B14	B15	B11
-----	-----	-----	-----	-----	-----

g 

B25	B28	B19	B25	B28	B19
-----	-----	-----	-----	-----	-----

f 

B9	B9	B9	B9
----	----	----	----

e 

B9	B9	B9	B9
----	----	----	----

d 

B9	B9
----	----

c 

B9	B9
----	----

b 

B9	B9
----	----

a 

B9	B9
----	----

**No. 195**  $P23$ j 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

i 

B18	B18	B17	B17	B16	B16
-----	-----	-----	-----	-----	-----

h 

B18	B18	B17	B17	B16	B16
-----	-----	-----	-----	-----	-----

g 

B18	B18	B17	B17	B16	B16
-----	-----	-----	-----	-----	-----

f 

B18	B18	B17	B17	B16	B16
-----	-----	-----	-----	-----	-----

e 

B5	B6	B7	B8
----	----	----	----

d 

B10	B10	B10
-----	-----	-----

c 

B10	B10	B10
-----	-----	-----

b 

B1
----

a 

B1
----

**No. 196**  $F23$ h 

B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

g 

B18	B18	B17	B17	B16	B16
-----	-----	-----	-----	-----	-----

f 

B18	B18	B17	B17	B16	B16
-----	-----	-----	-----	-----	-----

e 

B5	B6	B7	B8
----	----	----	----

d 

B1
----

c 

B1
----

b 

B1
----

a 

B1
----

**No. 197**  $I23$

f	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
e	B18	B18	B17	B17	B16	B16						
d	B18	B18	B17	B17	B16	B16						
c	B5	B6	B7	B8								
b	B10	B10	B10									
a	B1											

No. 198  $P2_13$

b	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
a	B5	B6	B7	B8								

No. 199  $I2_13$

c	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
b	B18	B18	B17	B17	B16	B16						
a	B5	B6	B7	B8								

No. 200  $P2/m\bar{3}$

l	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	
k	B18	B18	B18	B18	B17	B17	B17	B17	B16	B16	B16	B16										
j	B18	B18	B18	B18	B17	B17	B17	B17	B16	B16	B16	B16										
i	B5	B6	B7	B8	B5	B6	B7	B8														
h	B10	B10	B10	B10	B10	B10	B10															
g	B10	B10	B10	B10	B10	B10	B10															
f	B10	B10	B10	B10	B10	B10	B10															
e	B10	B10	B10	B10	B10	B10	B10															
d	B10	B10	B10																			
c	B10	B10	B10																			
b	B1																					
a	B1																					

No. 201  $P2/n\bar{3}$  (origin choice 1)

h	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29	B29
g	B18	B18	B17	B17	B16	B16	B18	B18	B17	B17	B16	B16										
f	B18	B18	B17	B17	B16	B16	B18	B18	B17	B17	B16	B16										
e	B5	B6	B7	B8	B5	B6	B7	B8														
d	B10	B10	B10	B10	B10	B10	B10															
c	B5	B6	B7	B8																		
b	B5	B6	B7	B8																		
a	B1	B1																				

No. 201  $P2/n\bar{3}$  (origin choice 2)







d B13 B13 B12 B12 B11 B11  
 c B5 B6 B7 B8  
 b B4 B3 B2  
 a B1

### No. 212 $P_4 3_2$

e B29  
 d B24 B23 B23 B24 B22 B21 B21 B22 B20 B19 B19 B20  
 c B5 B6 B7 B8 B6 B5 B7 B8  
 b B5 B6 B7 B8  
 a B5 B6 B7 B8

### No. 213 $P_4 3_2$

e B29  
 d B23 B24 B24 B23 B21 B22 B22 B21 B19 B20 B20 B19  
 c B5 B6 B7 B8 B6 B5 B7 B8  
 b B5 B6 B7 B8  
 a B5 B6 B7 B8

### No. 214 $I_4 3_2$

i B29  
 h B24 B23 B23 B24 B22 B21 B21 B22 B20 B19 B19 B20  
 g B23 B24 B24 B23 B21 B22 B22 B21 B19 B20 B20 B19  
 f B18 B18 B17 B17 B16 B16 B17 B17 B18 B18 B16 B16  
 e B5 B6 B7 B8 B6 B5 B7 B8  
 d B13 B13 B12 B12 B11 B11  
 c B13 B13 B12 B12 B11 B11  
 b B5 B6 B7 B8  
 a B5 B6 B7 B8

### No. 215 $P\bar{4}3m$

j B29  
 i B20 B20 B19 B19 B24 B24 B23 B23 B22 B22 B21 B21  
 h B18 B18 B17 B17 B16 B16 B17 B17 B18 B18 B16 B16  
 g B13 B13 B12 B12 B11 B11  
 f B13 B13 B12 B12 B11 B11  
 e B5 B6 B7 B8  
 d B4 B3 B2  
 c B4 B3 B2  
 b B1

a B1

### No. 216 $F\bar{4}3m$

i B29

h B20 B20 B19 B19 B24 B24 B23 B23 B22 B22 B21 B21

g B13 B13 B12 B12 B11 B11

f B13 B13 B12 B12 B11 B11

e B5 B6 B7 B8

d B1

c B1

b B1

a B1

### No. 217 $I\bar{4}3m$

h B29

g B20 B20 B19 B19 B24 B24 B23 B23 B22 B22 B21 B21

f B18 B18 B17 B17 B16 B16 B17 B17 B18 B18 B16 B16

e B13 B13 B12 B12 B11 B11

d B4 B4 B3 B3 B2 B2

c B5 B6 B7 B8

b B4 B3 B2

a B1

### No. 218 $P\bar{4}3n$

i B29

h B18 B18 B17 B17 B16 B16 B17 B17 B18 B18 B16 B16

g B18 B18 B17 B17 B16 B16 B17 B17 B18 B18 B16 B16

f B18 B18 B17 B17 B16 B16 B17 B17 B18 B18 B16 B16

e B5 B6 B7 B8 B5 B6 B8 B7

d B4 B4 B3 B3 B2 B2

c B4 B4 B3 B3 B2 B2

b B10 B10 B10 B10 B10 B10

a B1 B1

### No. 219 $F\bar{4}3c$

h B29

g B18 B18 B17 B17 B16 B16 B17 B17 B18 B18 B16 B16

f B18 B18 B17 B17 B16 B16 B17 B17 B18 B18 B16 B16

e B5 B6 B7 B8 B5 B6 B8 B7

d B4 B4 B3 B3 B2 B2











Table 4. Site symmetry of all positions associated with the Wyckoff letters of the 230 space groups.  
 Order as listed in *International Tables for Crystallography*, Vol **A**, 5th revised edition (2011). Edited by Th. Hahn.  
 Oriented site-symmetry symbols together with subgroups symbols (the latter put into frames).

No. 1  $P1$

a 1  $\boxed{1}$

No. 2  $P\bar{1}$

i 1  $\boxed{1\bar{1}}$

h  $\bar{1}$   $\boxed{\bar{1}}$

g  $\bar{1}$   $\boxed{\bar{1}}$

f  $\bar{1}$   $\boxed{\bar{1}}$

e  $\bar{1}$   $\boxed{\bar{1}}$

d  $\bar{1}$   $\boxed{\bar{1}}$

c  $\bar{1}$   $\boxed{\bar{1}}$

b  $\bar{1}$   $\boxed{\bar{1}}$

a  $\bar{1}$   $\boxed{\bar{1}}$

No. 3  $P121$  (unique axis  $b$ )

e 1  $\boxed{1\bar{1}}$

d 2  $\boxed{2_y}$

c 2  $\boxed{2_y}$

b 2  $\boxed{2_y}$

a 2  $\boxed{2_y}$

No. 3  $P112$  (unique axis  $c$ )

e 1  $\boxed{1\bar{1}\bar{1}}$

d 2  $\boxed{2_z}$

c 2  $\boxed{2_z}$

b 2  $\boxed{2_z}$

a 2  $\boxed{2_z}$

No. 4  $P12_11$  (unique axis  $b$ )

a 1  $\boxed{1\bar{1}\bar{1}}$

No. 4  $P112_1$  (unique axis  $c$ )

a 1  $\boxed{1\bar{1}\bar{1}}$

No. 5  $C121$  (unique axis  $b$ , cell choice 1)

c 1  $\boxed{1\bar{1}\bar{1}}$

b 2  $\boxed{2_y}$

a 2

No. 5 *A I 2 I* (unique axis *b*, cell choice 2)

c 1

b 2

a 2

No. 5 *I I 2 I* (unique axis *b*, cell choice 3)

c 1

b 2

a 2

No. 5 *A I I 2* (unique axis *c*, cell choice 1)

c 1

b 2

a 2

No. 5 *B I I 2* (unique axis *c*, cell choice 2)

c 1

b 2

a 2

No. 5 *I I I 2* (unique axis *c*, cell choice 3)

c 1

b 2

a 2

No. 6 *P I m I* (unique axis *b*)

c 1

b *m*

a *m*

No. 6 *P I I m* (unique axis *c*)

c 1

b *m*

a *m*

No. 7 *P I c I* (unique axis *b*, cell choice 1)

a 1

No. 7 *P I n I* (unique axis *b*, cell choice 2)

a 1

No. 7 *P I a I* (unique axis *b*, cell choice 3)

a 1

No. 7  $P11a$  (unique axis  $c$ , cell choice 1)

$a$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

No. 7  $P11n$  (unique axis  $c$ , cell choice 2)

$a$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

No. 7  $P11b$  (unique axis  $c$ , cell choice 3)

$a$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

No. 8  $C1m1$  (unique axis  $b$ , cell choice 1)

$b$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

$a$   $m$   $\overline{m_y}$

No. 8  $A1m1$  (unique axis  $b$ , cell choice 2)

$b$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

$a$   $m$   $\overline{m_y}$

No. 8  $I1m1$  (unique axis  $b$ , cell choice 3)

$b$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

$a$   $m$   $\overline{m_y}$

No. 8  $A11m$  (unique axis  $c$ , cell choice 1)

$b$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

$a$   $m$   $\overline{m_z}$

No. 8  $B11m$  (unique axis  $c$ , cell choice 2)

$b$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

$a$   $m$   $\overline{m_z}$

No. 8  $I11m$  (unique axis  $c$ , cell choice 3)

$b$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

$a$   $m$   $\overline{m_z}$

No. 9  $C1c1$  (unique axis  $b$ , cell choice 1)

$a$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

No. 9  $A1n1$  (unique axis  $b$ , cell choice 2)

$a$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

No. 9  $I1a1$  (unique axis  $b$ , cell choice 3)

$a$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

No. 9  $A11a$  (unique axis  $c$ , cell choice 1)

$a$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

No. 9  $B11n$  (unique axis  $c$ , cell choice 2)

$a$  1  $\begin{bmatrix} 1 & 1 \end{bmatrix}$

No. 9  $I11b$  (unique axis  $c$ , cell choice 3)

a 1  $\boxed{1} \boxed{1}$

**No. 10**  $P \mid 2/m \mid$  (unique axis  $b$ )

o 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1}$

n m  $\boxed{m_y} \boxed{m_y}$

m m  $\boxed{m_y} \boxed{m_y}$

l 2  $\boxed{2_y} \boxed{2_y}$

k 2  $\boxed{2_y} \boxed{2_y}$

j 2  $\boxed{2_y} \boxed{2_y}$

i 2  $\boxed{2_y} \boxed{2_y}$

h  $2/m$   $\boxed{2_y/m_y}$

g  $2/m$   $\boxed{2_y/m_y}$

f  $2/m$   $\boxed{2_y/m_y}$

e  $2/m$   $\boxed{2_y/m_y}$

d  $2/m$   $\boxed{2_y/m_y}$

c  $2/m$   $\boxed{2_y/m_y}$

b  $2/m$   $\boxed{2_y/m_y}$

a  $2/m$   $\boxed{2_y/m_y}$

**No. 10**  $P \mid \mid 2/m$  (unique axis  $c$ )

o 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1}$

n m  $\boxed{m_z} \boxed{m_z}$

m m  $\boxed{m_z} \boxed{m_z}$

l 2  $\boxed{2_z} \boxed{2_z}$

k 2  $\boxed{2_z} \boxed{2_z}$

j 2  $\boxed{2_z} \boxed{2_z}$

i 2  $\boxed{2_z} \boxed{2_z}$

h  $2/m$   $\boxed{2_z/m_z}$

g  $2/m$   $\boxed{2_z/m_z}$

f  $2/m$   $\boxed{2_z/m_z}$

e  $2/m$   $\boxed{2_z/m_z}$

d  $2/m$   $\boxed{2_z/m_z}$

c  $2/m$   $\boxed{2_z/m_z}$

b  $2/m$   $\boxed{2_z/m_z}$

a  $2/m$   $\boxed{2_z/m_z}$

**No. 11**  $P \mid 2_1/m \mid$  (unique axis  $b$ )

f 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1}$

e	m	$m_y$ $m_y$
d	$\bar{1}$	$\bar{1}$ $\bar{1}$
c	$\bar{1}$	$\bar{1}$ $\bar{1}$
b	$\bar{1}$	$\bar{1}$ $\bar{1}$
a	$\bar{1}$	$\bar{1}$ $\bar{1}$

No. 11  $P 1 1 2_1/m$  (unique axis c)

f	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
e	m	$m_z$ $m_z$
d	$\bar{1}$	$\bar{1}$ $\bar{1}$
c	$\bar{1}$	$\bar{1}$ $\bar{1}$
b	$\bar{1}$	$\bar{1}$ $\bar{1}$
a	$\bar{1}$	$\bar{1}$ $\bar{1}$

No. 12  $C 1 2/m 1$  (unique axis b, cell choice 1)

j	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
i	m	$m_y$ $m_y$
h	2	$2_y$ $2_y$
g	2	$2_y$ $2_y$
f	$\bar{1}$	$\bar{1}$ $\bar{1}$
e	$\bar{1}$	$\bar{1}$ $\bar{1}$
d	$2/m$	$2_y/m_y$
c	$2/m$	$2_y/m_y$
b	$2/m$	$2_y/m_y$
a	$2/m$	$2_y/m_y$

No. 12  $A 1 2/m 1$  (unique axis b, cell choice 2)

j	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
i	m	$m_y$ $m_y$
h	2	$2_y$ $2_y$
g	2	$2_y$ $2_y$
f	$\bar{1}$	$\bar{1}$ $\bar{1}$
e	$\bar{1}$	$\bar{1}$ $\bar{1}$
d	$2/m$	$2_y/m_y$
c	$2/m$	$2_y/m_y$
b	$2/m$	$2_y/m_y$
a	$2/m$	$2_y/m_y$

No. 12  $I 2/m 1$  (unique axis  $b$ , cell choice 3)

$j$	1	$1 \ 1 \ 1 \ 1$
$i$	$m$	$m_y \ m_y$
$h$	2	$2_y \ 2_y$
$g$	2	$2_y \ 2_y$
$f$	$\bar{1}$	$\bar{1} \ \bar{1}$
$e$	$\bar{1}$	$\bar{1} \ \bar{1}$
$d$	$2/m$	$2_y/m_y$
$c$	$2/m$	$2_y/m_y$
$b$	$2/m$	$2_y/m_y$
$a$	$2/m$	$2_y/m_y$

No. 12  $A I 2/m$  (unique axis  $c$ , cell choice 1)

$j$	1	$1 \ 1 \ 1 \ 1$
$i$	$m$	$m_z \ m_z$
$h$	2	$2_z \ 2_z$
$g$	2	$2_z \ 2_z$
$f$	$\bar{1}$	$\bar{1} \ \bar{1}$
$e$	$\bar{1}$	$\bar{1} \ \bar{1}$
$d$	$2/m$	$2_z/m_z$
$c$	$2/m$	$2_z/m_z$
$b$	$2/m$	$2_z/m_z$
$a$	$2/m$	$2_z/m_z$

No. 12  $B I 2/m$  (unique axis  $c$ , cell choice 2)

$j$	1	$1 \ 1 \ 1 \ 1$
$i$	$m$	$m_z \ m_z$
$h$	2	$2_z \ 2_z$
$g$	2	$2_z \ 2_z$
$f$	$\bar{1}$	$\bar{1} \ \bar{1}$
$e$	$\bar{1}$	$\bar{1} \ \bar{1}$
$d$	$2/m$	$2_z/m_z$
$c$	$2/m$	$2_z/m_z$
$b$	$2/m$	$2_z/m_z$
$a$	$2/m$	$2_z/m_z$

No. 12  $I 1 2/m$  (unique axis  $c$ , cell choice 3)

$j$	1	$1 \ 1 \ 1 \ 1$
-----	---	-----------------

<i>i</i>	<i>m</i>	$m_x$ $m_z$
<i>h</i>	2	$2_x$ $2_z$
<i>g</i>	2	$2_x$ $2_z$
<i>f</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$
<i>e</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$
<i>d</i>	2/ <i>m</i>	$2_x/m_z$
<i>c</i>	2/ <i>m</i>	$2_x/m_z$
<i>b</i>	2/ <i>m</i>	$2_x/m_z$
<i>a</i>	2/ <i>m</i>	$2_x/m_z$

No. 13 *P* |  $2/c$  | (unique axis *b*, cell choice 1)

<i>g</i>	1	$1$ $1$ $1$ $1$
<i>f</i>	2	$2_y$ $2_y$
<i>e</i>	2	$2_y$ $2_y$
<i>d</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$
<i>c</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$
<i>b</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$
<i>a</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$

No. 13 *P* |  $2/n$  | (unique axis *b*, cell choice 2)

<i>g</i>	1	$1$ $1$ $1$ $1$
<i>f</i>	2	$2_y$ $2_y$
<i>e</i>	2	$2_y$ $2_y$
<i>d</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$
<i>c</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$
<i>b</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$
<i>a</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$

No. 13 *P* |  $2/a$  | (unique axis *b*, cell choice 3)

<i>g</i>	1	$1$ $1$ $1$ $1$
<i>f</i>	2	$2_y$ $2_y$
<i>e</i>	2	$2_y$ $2_y$
<i>d</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$
<i>c</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$
<i>b</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$
<i>a</i>	$\bar{1}$	$\bar{1}$ $\bar{1}$

No. 13 *P* |  $2/a$  | (unique axis *c*, cell choice 1)

$g$	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1}$
$f$	2	$\boxed{2_x} \boxed{2_x}$
$e$	2	$\boxed{2_x} \boxed{2_x}$
$d$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$c$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$b$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$a$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$

No. 13  $P \mid I \mid 2/n$  (unique axis  $c$ , cell choice 2)

$g$	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1}$
$f$	2	$\boxed{2_x} \boxed{2_x}$
$e$	2	$\boxed{2_x} \boxed{2_x}$
$d$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$c$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$b$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$a$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$

No. 13  $P \mid I \mid 2/b$  (unique axis  $c$ , cell choice 3)

$g$	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1}$
$f$	2	$\boxed{2_x} \boxed{2_x}$
$e$	2	$\boxed{2_x} \boxed{2_x}$
$d$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$c$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$b$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$a$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$

No. 14  $P \mid 2_1/c \mid$  (unique axis  $b$ , cell choice 1)

$e$	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1}$
$d$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$c$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$b$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$a$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$

No. 14  $P \mid 2_1/n \mid$  (unique axis  $b$ , cell choice 2)

$e$	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1}$
$d$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$c$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$
$b$	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}}$

a  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

No. 14  $P12_1/a1$  (unique axis  $b$ , cell choice 3)

e 1  $\begin{array}{|c|c|c|c|} \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$

d  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

c  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

b  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

a  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

No. 14  $P112_1/a$  (unique axis  $c$ , cell choice 1)

e 1  $\begin{array}{|c|c|c|c|} \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$

d  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

c  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

b  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

a  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

No. 14  $P112_1/n$  (unique axis  $c$ , cell choice 2)

e 1  $\begin{array}{|c|c|c|c|} \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$

d  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

c  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

b  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

a  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

No. 14  $P112_1/b$  (unique axis  $c$ , cell choice 3)

e 1  $\begin{array}{|c|c|c|c|} \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$

d  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

c  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

b  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

a  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

No. 15  $C12/c1$  (unique axis  $b$ , cell choice 1)

f 1  $\begin{array}{|c|c|c|c|} \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$

e 2  $\begin{array}{|c|c|} \hline 2_y & 2_y \\ \hline \end{array}$

d  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

c  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

b  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

a  $\bar{1}$   $\begin{array}{|c|c|} \hline \bar{1} & \bar{1} \\ \hline \end{array}$

No. 15  $A12/n1$  (unique axis  $b$ , cell choice 2)

$f$	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
$e$	2	$2_y$ $2_y$
$d$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$c$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$b$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$a$	$\bar{1}$	$\bar{1}$ $\bar{1}$

No. 15  $I 1 2/a$  (unique axis  $b$ , cell choice 3)

$f$	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
$e$	2	$2_y$ $2_y$
$d$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$c$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$b$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$a$	$\bar{1}$	$\bar{1}$ $\bar{1}$

No. 15  $A 1 1 2/a$  (unique axis  $c$ , cell choice 1)

$f$	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
$e$	2	$2_z$ $2_z$
$d$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$c$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$b$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$a$	$\bar{1}$	$\bar{1}$ $\bar{1}$

No. 15  $B 1 1 2/n$  (unique axis  $c$ , cell choice 2)

$f$	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
$e$	2	$2_z$ $2_z$
$d$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$c$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$b$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$a$	$\bar{1}$	$\bar{1}$ $\bar{1}$

No. 15  $I 1 1 2/b$  (unique axis  $c$ , cell choice 3)

$f$	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
$e$	2	$2_x$ $2_x$
$d$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$c$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$b$	$\bar{1}$	$\bar{1}$ $\bar{1}$
$a$	$\bar{1}$	$\bar{1}$ $\bar{1}$

**No. 16**  $P222$ 

u	1	$\begin{array}{ c c c c } \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$
t	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
s	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
r	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
q	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
p	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
o	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
n	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
m	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
l	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
k	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
j	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
i	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
h	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
g	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
f	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
e	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
d	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
c	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
b	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
a	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$

**No. 17**  $P222_1$ 

e	1	$\begin{array}{ c c c c } \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$
d	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
c	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
b	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
a	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$

**No. 18**  $P2_12_12$ 

c	1	$\begin{array}{ c c c c } \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$
b	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
a	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$

**No. 19**  $P2_12_12_1$ 

a	1	$\begin{array}{ c c c c } \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$
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**No. 20**  $C222_1$

c	1	$\begin{array}{ c c c c } \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$
b	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
a	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$

**No. 21 C222**

l	1	$\begin{array}{ c c c c } \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$
k	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
j	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
i	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
h	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
g	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
f	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
e	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
d	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
c	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
b	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
a	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$

**No. 22 F222**

k	1	$\begin{array}{ c c c c } \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$
j	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
i	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
h	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
g	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
f	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
e	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
d	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
c	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
b	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$
a	222	$\begin{array}{ c c c } \hline 2_x & 2_y & 2_x \\ \hline \end{array}$

**No. 23 I222**

k	1	$\begin{array}{ c c c c } \hline 1 & 1 & 1 & 1 \\ \hline \end{array}$
j	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
i	..2	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$
h	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
g	.2.	$\begin{array}{ c c } \hline 2_y & 2_y \\ \hline \end{array}$
f	2..	$\begin{array}{ c c } \hline 2_x & 2_x \\ \hline \end{array}$

e	2..	$\overline{2_x \ 2_x}$
d	222	$\overline{2_x 2_y 2_z}$
c	222	$\overline{2_x 2_y 2_z}$
b	222	$\overline{2_x 2_y 2_z}$
a	222	$\overline{2_x 2_y 2_z}$

No. 24  $I2_1 2_1 2_1$ 

d	1	$\overline{1 \ 1 \ 1 \ 1}$
c	..2	$\overline{2_z \ 2_z}$
b	.2.	$\overline{2_y \ 2_y}$
a	2..	$\overline{2_x \ 2_x}$

No. 25  $Pmm2$ 

i	1	$\overline{1 \ 1 \ 1 \ 1}$
h	m..	$\overline{m_x \ m_x}$
g	m..	$\overline{m_x \ m_x}$
f	.m.	$\overline{m_y \ m_y}$
e	.m.	$\overline{m_y \ m_y}$
d	mm2	$\overline{m_x m_y 2_z}$
c	nm2	$\overline{m_x m_y 2_z}$
b	nm2	$\overline{m_x m_y 2_z}$
a	nm2	$\overline{m_x m_y 2_z}$

No. 26  $Pmc2_1$ 

c	1	$\overline{1 \ 1 \ 1 \ 1}$
b	m..	$\overline{m_x \ m_x}$
a	m..	$\overline{m_x \ m_x}$

No. 27  $Pcc2$ 

e	1	$\overline{1 \ 1 \ 1 \ 1}$
d	..2	$\overline{2_z \ 2_z}$
c	..2	$\overline{2_z \ 2_z}$
b	..2	$\overline{2_z \ 2_z}$
a	..2	$\overline{2_z \ 2_z}$

No. 28  $Pma2$ 

d	1	$\overline{1 \ 1 \ 1 \ 1}$
c	m..	$\overline{m_x \ m_x}$
b	..2	$\overline{2_z \ 2_z}$
a	..2	$\overline{2_z \ 2_z}$

No. 29  $Pca2_1$

a 1 

1	1	1	1
---	---	---	---

### No. 30 *Pnc2*

c 1 

1	1	1	1
---	---	---	---

b ..2 

$2_z$	$2_x$
-------	-------

a ..2 

$2_z$	$2_x$
-------	-------

### No. 31 *Pmn2<sub>1</sub>*

b 1 

1	1	1	1
---	---	---	---

a m.. 

$m_x$	$m_x$
-------	-------

### No. 32 *Pba2*

c 1 

1	1	1	1
---	---	---	---

b ..2 

$2_x$	$2_x$
-------	-------

a ..2 

$2_x$	$2_x$
-------	-------

### No. 33 *Pna2<sub>1</sub>*

a 1 

1	1	1	1
---	---	---	---

### No. 34 *Pnn2*

c 1 

1	1	1	1
---	---	---	---

b ..2 

$2_x$	$2_x$
-------	-------

a ..2 

$2_x$	$2_x$
-------	-------

### No. 35 *Cmm2*

f 1 

1	1	1	1
---	---	---	---

e m.. 

$m_x$	$m_x$
-------	-------

d .m. 

$m_y$	$m_y$
-------	-------

c ..2 

$2_x$	$2_x$
-------	-------

b mm2 

$m_x m_y 2_z$
---------------

a mm2 

$m_x m_y 2_x$
---------------

### No. 36 *Cmc2<sub>1</sub>*

b 1 

1	1	1	1
---	---	---	---

a m.. 

$m_x$	$m_x$
-------	-------

### No. 37 *Ccc2*

d 1 

1	1	1	1
---	---	---	---

c ..2 

$2_x$	$2_x$
-------	-------

b ..2 

$2_x$	$2_x$
-------	-------

a ..2 

$2_x$	$2_x$
-------	-------

### No. 38 *Amm2*

f 1 

1	1	1	1
---	---	---	---

e m.. 

$m_x$	$m_x$
-------	-------

d	m..	$\overline{m_x} \quad m_x$
c	.m.	$m_y \quad m_y$
b	nm2	$\overline{m_x m_y} \quad 2_x$
a	mm2	$\overline{m_x m_y} \quad 2_x$

No. 39 *Aem2*

d	1	$1 \quad 1 \quad 1 \quad 1$
c	.m.	$m_y \quad m_y$
b	..2	$2_x \quad 2_x$
a	..2	$2_x \quad 2_x$

No. 40 *Ama2*

c	1	$1 \quad 1 \quad 1 \quad 1$
b	m..	$\overline{m_x} \quad m_x$
a	..2	$2_x \quad 2_x$

No. 41 *Aea2*

b	1	$1 \quad 1 \quad 1 \quad 1$
a	..2	$2_x \quad 2_x$

No. 42 *Fmm2*

e	1	$1 \quad 1 \quad 1 \quad 1$
d	.m.	$m_y \quad m_y$
c	m..	$\overline{m_x} \quad m_x$
b	..2	$2_x \quad 2_x$
a	nm2	$\overline{m_x m_y} \quad 2_x$

No. 43 *Fdd2*

b	1	$1 \quad 1 \quad 1 \quad 1$
a	..2	$2_x \quad 2_x$

No. 44 *Imm2*

e	1	$1 \quad 1 \quad 1 \quad 1$
d	m..	$\overline{m_x} \quad m_x$
c	.m.	$m_y \quad m_y$
b	nm2	$\overline{m_x m_y} \quad 2_x$
a	mm2	$\overline{m_x m_y} \quad 2_x$

No. 45 *Iba2*

c	1	$1 \quad 1 \quad 1 \quad 1$
b	..2	$2_x \quad 2_x$
a	..2	$2_x \quad 2_x$

No. 46 *Ima2*



j	.2.	$\begin{array}{ c c c c } \hline 2_y & 2_y & 2_y & 2_y \\ \hline \end{array}$
i	.2.	$\begin{array}{ c c c c } \hline 2_y & 2_y & 2_y & 2_y \\ \hline \end{array}$
h	2..	$\begin{array}{ c c c c } \hline 2_x & 2_x & 2_x & 2_x \\ \hline \end{array}$
g	2..	$\begin{array}{ c c c c } \hline 2_x & 2_x & 2_x & 2_x \\ \hline \end{array}$
f	$\bar{1}$	$\begin{array}{ c c c c } \hline \bar{1} & \bar{1} & \bar{1} & \bar{1} \\ \hline \end{array}$
e	$\bar{1}$	$\begin{array}{ c c c c } \hline \bar{1} & \bar{1} & \bar{1} & \bar{1} \\ \hline \end{array}$
d	222	$\begin{array}{ c c c } \hline 2_x 2_y 2_z & 2_x 2_y 2_z & \\ \hline \end{array}$
c	222	$\begin{array}{ c c c } \hline 2_x 2_y 2_z & 2_x 2_y 2_z & \\ \hline \end{array}$
b	222	$\begin{array}{ c c c } \hline 2_x 2_y 2_z & 2_x 2_y 2_z & \\ \hline \end{array}$
a	222	$\begin{array}{ c c c } \hline 2_x 2_y 2_z & 2_x 2_y 2_z & \\ \hline \end{array}$

### No. 48 $P2/n 2/n 2/n$ (origin choice 2)

m	1	$\begin{array}{ c c c c c c c c } \hline 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ \hline \end{array}$
l	..2	$\begin{array}{ c c c c } \hline 2_z & 2_z & 2_z & 2_z \\ \hline \end{array}$
k	..2	$\begin{array}{ c c c c } \hline 2_z & 2_z & 2_z & 2_z \\ \hline \end{array}$
j	.2.	$\begin{array}{ c c c c } \hline 2_y & 2_y & 2_y & 2_y \\ \hline \end{array}$
i	.2.	$\begin{array}{ c c c c } \hline 2_y & 2_y & 2_y & 2_y \\ \hline \end{array}$
h	2..	$\begin{array}{ c c c c } \hline 2_x & 2_x & 2_x & 2_x \\ \hline \end{array}$
g	2..	$\begin{array}{ c c c c } \hline 2_x & 2_x & 2_x & 2_x \\ \hline \end{array}$
f	$\bar{1}$	$\begin{array}{ c c c c } \hline \bar{1} & \bar{1} & \bar{1} & \bar{1} \\ \hline \end{array}$
e	$\bar{1}$	$\begin{array}{ c c c c } \hline \bar{1} & \bar{1} & \bar{1} & \bar{1} \\ \hline \end{array}$
d	222	$\begin{array}{ c c c } \hline 2_x 2_y 2_z & 2_x 2_y 2_z & \\ \hline \end{array}$
c	222	$\begin{array}{ c c c } \hline 2_x 2_y 2_z & 2_x 2_y 2_z & \\ \hline \end{array}$
b	222	$\begin{array}{ c c c } \hline 2_x 2_y 2_z & 2_x 2_y 2_z & \\ \hline \end{array}$
a	222	$\begin{array}{ c c c } \hline 2_x 2_y 2_z & 2_x 2_y 2_z & \\ \hline \end{array}$

### No. 49 $P2/c 2/c 2/m$

r	1	$\begin{array}{ c c c c c c c c } \hline 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ \hline \end{array}$
q	..m	$\begin{array}{ c c c c } \hline m_z & m_z & m_z & m_z \\ \hline \end{array}$
p	..2	$\begin{array}{ c c c c } \hline 2_z & 2_z & 2_z & 2_z \\ \hline \end{array}$
o	..2	$\begin{array}{ c c c c } \hline 2_z & 2_z & 2_z & 2_z \\ \hline \end{array}$
n	..2	$\begin{array}{ c c c c } \hline 2_z & 2_z & 2_z & 2_z \\ \hline \end{array}$
m	..2	$\begin{array}{ c c c c } \hline 2_z & 2_z & 2_z & 2_z \\ \hline \end{array}$
l	.2.	$\begin{array}{ c c c c } \hline 2_y & 2_y & 2_y & 2_y \\ \hline \end{array}$
k	.2.	$\begin{array}{ c c c c } \hline 2_y & 2_y & 2_y & 2_y \\ \hline \end{array}$
j	2..	$\begin{array}{ c c c c } \hline 2_x & 2_x & 2_x & 2_x \\ \hline \end{array}$
i	2..	$\begin{array}{ c c c c } \hline 2_x & 2_x & 2_x & 2_x \\ \hline \end{array}$

h	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$
g	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$
f	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$
e	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$
d	..2/m	$2_x / m_z$	$2_x / m_z$
c	..2/m	$2_x / m_z$	$2_x / m_z$
b	..2/m	$2_x / m_z$	$2_x / m_z$
a	..2/m	$2_x / m_z$	$2_x / m_z$

### No. 50 $P2/b 2/a 2/n$ (origin choice 1)

m	1	$1$	$1$	$1$	$1$	$1$	$1$	$1$	$1$
l	..2	$2_x$	$2_x$	$2_x$	$2_x$				
k	..2	$2_x$	$2_x$	$2_x$	$2_x$				
j	.2.	$2_y$	$2_y$	$2_y$	$2_y$				
i	.2.	$2_y$	$2_y$	$2_y$	$2_y$				
h	2..	$2_x$	$2_x$	$2_x$	$2_x$				
g	2..	$2_x$	$2_x$	$2_x$	$2_x$				
f	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$				
e	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$				
d	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$						
c	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$						
b	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$						
a	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$						

### No. 50 $P2/b 2/a 2/n$ (origin choice 2)

m	1	$1$	$1$	$1$	$1$	$1$	$1$	$1$	$1$
l	..2	$2_x$	$2_x$	$2_x$	$2_x$				
k	..2	$2_x$	$2_x$	$2_x$	$2_x$				
j	.2.	$2_y$	$2_y$	$2_y$	$2_y$				
i	.2.	$2_y$	$2_y$	$2_y$	$2_y$				
h	2..	$2_x$	$2_x$	$2_x$	$2_x$				
g	2..	$2_x$	$2_x$	$2_x$	$2_x$				
f	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$				
e	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$				
d	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$						
c	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$						

b	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$
a	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$

**No. 51**  $P2_1/m 2/m 2/a$

l	1	1	1	1	1	1	1	1	1
k	m..	$m_x$	$m_x$	$m_x$	$m_x$				
j	.m.	$m_y$	$m_y$	$m_y$	$m_y$				
i	.m.	$m_y$	$m_y$	$m_y$	$m_y$				
h	.2.	$2_y$	$2_y$	$2_y$	$2_y$				
g	.2.	$2_y$	$2_y$	$2_y$	$2_y$				
f	mm2	$m_x m_y 2_z$	$m_x m_y 2_z$						
e	mm2	$m_x m_y 2_z$	$m_x m_y 2_z$						
d	.2/m.	$2_y / m_y$	$2_y / m_y$						
c	.2/m.	$2_y / m_y$	$2_y / m_y$						
b	.2/m.	$2_y / m_y$	$2_y / m_y$						
a	.2/m.	$2_y / m_y$	$2_y / m_y$						

**No. 52**  $P2/n 2_1/n 2/a$

e	1	1	1	1	1	1	1	1	1
d	2..	$2_x$	$2_x$	$2_x$	$2_x$				
c	..2	$2_z$	$2_z$	$2_z$	$2_z$				
b	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$				
a	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$				

**No. 53**  $P2/m 2/n 2_1/a$

i	1	1	1	1	1	1	1	1	1
h	m..	$m_x$	$m_x$	$m_x$	$m_x$				
g	.2.	$2_y$	$2_y$	$2_y$	$2_y$				
f	2..	$2_x$	$2_x$	$2_x$	$2_x$				
e	2..	$2_x$	$2_x$	$2_x$	$2_x$				
d	2/m..	$2_x / m_x$	$2_x / m_x$						
c	2/m..	$2_x / m_x$	$2_x / m_x$						
b	2/m..	$2_x / m_x$	$2_x / m_x$						
a	2/m..	$2_x / m_x$	$2_x / m_x$						

**No. 54**  $P2_1/c 2/c 2/a$

f	1	1	1	1	1	1	1	1	1
e	..2	$2_z$	$2_z$	$2_z$	$2_z$				
d	..2	$2_z$	$2_z$	$2_z$	$2_z$				

c .2. 

2 <sub>y</sub>	2 <sub>y</sub>	2 <sub>y</sub>	2 <sub>y</sub>
----------------	----------------	----------------	----------------

b  $\bar{1}$ 

$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$
-----------	-----------	-----------	-----------

a  $\bar{1}$ 

$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$
-----------	-----------	-----------	-----------

**No. 55**  $P2_1/b2_1/a2/m$ i 1 

1	1	1	1	1	1	1	1
---	---	---	---	---	---	---	---

h ..m 

m <sub>z</sub>	m <sub>z</sub>	m <sub>z</sub>	m <sub>z</sub>
----------------	----------------	----------------	----------------

g ..m 

m <sub>z</sub>	m <sub>z</sub>	m <sub>z</sub>	m <sub>z</sub>
----------------	----------------	----------------	----------------

f ..2 

2 <sub>x</sub>	2 <sub>x</sub>	2 <sub>x</sub>	2 <sub>x</sub>
----------------	----------------	----------------	----------------

e ..2 

2 <sub>z</sub>	2 <sub>z</sub>	2 <sub>z</sub>	2 <sub>z</sub>
----------------	----------------	----------------	----------------

d ..2/m 

2 <sub>x</sub> /m <sub>z</sub>	2 <sub>x</sub> /m <sub>z</sub>
--------------------------------	--------------------------------

c ..2/m 

2 <sub>x</sub> /m <sub>z</sub>	2 <sub>x</sub> /m <sub>z</sub>
--------------------------------	--------------------------------

b ..2/m 

2 <sub>x</sub> /m <sub>z</sub>	2 <sub>x</sub> /m <sub>z</sub>
--------------------------------	--------------------------------

a ..2/m 

2 <sub>x</sub> /m <sub>z</sub>	2 <sub>x</sub> /m <sub>z</sub>
--------------------------------	--------------------------------

**No. 56**  $P2_1/c2_1/c2/n$ e 1 

1	1	1	1	1	1	1	1
---	---	---	---	---	---	---	---

d ..2 

2 <sub>x</sub>	2 <sub>x</sub>	2 <sub>x</sub>	2 <sub>x</sub>
----------------	----------------	----------------	----------------

c ..2 

2 <sub>x</sub>	2 <sub>x</sub>	2 <sub>x</sub>	2 <sub>x</sub>
----------------	----------------	----------------	----------------

b  $\bar{1}$ 

$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$
-----------	-----------	-----------	-----------

a  $\bar{1}$ 

$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$
-----------	-----------	-----------	-----------

**No. 57**  $P2/b2_1/c2_1/m$ e 1 

1	1	1	1	1	1	1	1
---	---	---	---	---	---	---	---

d ..m 

m <sub>z</sub>	m <sub>z</sub>	m <sub>z</sub>	m <sub>z</sub>
----------------	----------------	----------------	----------------

c 2.. 

2 <sub>x</sub>	2 <sub>x</sub>	2 <sub>x</sub>	2 <sub>x</sub>
----------------	----------------	----------------	----------------

b  $\bar{1}$ 

$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$
-----------	-----------	-----------	-----------

a  $\bar{1}$ 

$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$
-----------	-----------	-----------	-----------

**No. 58**  $P2_1/n2_1/n2/m$ h 1 

1	1	1	1	1	1	1	1
---	---	---	---	---	---	---	---

g ..m 

m <sub>z</sub>	m <sub>z</sub>	m <sub>z</sub>	m <sub>z</sub>
----------------	----------------	----------------	----------------

f ..2 

2 <sub>x</sub>	2 <sub>x</sub>	2 <sub>x</sub>	2 <sub>x</sub>
----------------	----------------	----------------	----------------

e ..2 

2 <sub>z</sub>	2 <sub>z</sub>	2 <sub>z</sub>	2 <sub>z</sub>
----------------	----------------	----------------	----------------

d ..2/m 

2 <sub>x</sub> /m <sub>z</sub>	2 <sub>x</sub> /m <sub>z</sub>
--------------------------------	--------------------------------

c ..2/m 

2 <sub>x</sub> /m <sub>z</sub>	2 <sub>x</sub> /m <sub>z</sub>
--------------------------------	--------------------------------

b ..2/m 

2 <sub>x</sub> /m <sub>z</sub>	2 <sub>x</sub> /m <sub>z</sub>
--------------------------------	--------------------------------

a ..2/m 

2 <sub>x</sub> /m <sub>z</sub>	2 <sub>x</sub> /m <sub>z</sub>
--------------------------------	--------------------------------

**No. 59**  $P2_1/m2_1/m2/n$  (origin choice 1)

g	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
f	.m.	$\boxed{m_y} \boxed{m_y} \boxed{m_y} \boxed{m_y}$
e	m..	$\boxed{m_x} \boxed{m_x} \boxed{m_x} \boxed{m_x}$
d	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$
c	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$
b	mm2	$\boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$
a	nm2	$\boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$

### No. 59 $P2_1/m 2_1/m 2_1/n$ (origin choice 2)

g	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
f	.m.	$\boxed{m_y} \boxed{m_y} \boxed{m_y} \boxed{m_y}$
e	m..	$\boxed{m_x} \boxed{m_x} \boxed{m_x} \boxed{m_x}$
d	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$
c	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$
b	mm2	$\boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$
a	nm2	$\boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$

### No. 60 $P2_1/b 2/c 2_1/n$

d	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
c	.2.	$\boxed{2_y} \boxed{2_y} \boxed{2_y} \boxed{2_y}$
b	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$
a	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$

### No. 61 $P2_1/b 2_1/c 2_1/a$

c	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
b	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$
a	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$

### No. 62 $P2_1/n 2_1/m 2_1/a$

d	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
c	.m.	$\boxed{m_y} \boxed{m_y} \boxed{m_y} \boxed{m_y}$
b	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$
a	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$

### No. 63 $C2/m 2/c 2_1/m$

h	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
g	..m	$\boxed{m_z} \boxed{m_z} \boxed{m_z} \boxed{m_z}$
f	m..	$\boxed{m_x} \boxed{m_x} \boxed{m_x} \boxed{m_x}$
e	2..	$\boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x}$
d	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$

c	m2m	$m_x 2_y m_z$	$m_x 2_y m_z$
b	2/m..	$2_x / m_x$	$2_x / m_x$
a	2/m..	$2_x / m_x$	$2_x / m_x$

### No. 64 C 2/m 2/c 2<sub>1</sub>/e

g	1	1	1	1	1	1	1	1	1
f	m..	$m_x$	$m_x$	$m_x$	$m_x$				
e	.2.	$2_y$	$2_y$	$2_y$	$2_y$				
d	2..	$2_x$	$2_x$	$2_x$	$2_x$				
c	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$				
b	2/m..	$2_x / m_x$	$2_x / m_x$						
a	2/m..	$2_x / m_x$	$2_x / m_x$						

### No. 65 C 2/m 2/m 2/m

r	1	1	1	1	1	1	1	1	1
q	..m	$m_z$	$m_z$	$m_z$	$m_z$				
p	..m	$m_z$	$m_z$	$m_z$	$m_z$				
o	.m.	$m_y$	$m_y$	$m_y$	$m_y$				
n	m..	$m_x$	$m_x$	$m_x$	$m_x$				
m	..2	$2_z$	$2_z$	$2_z$	$2_z$				
l	nm2	$m_x m_y 2_z$	$m_x m_y 2_z$						
k	nm2	$m_x m_y 2_z$	$m_x m_y 2_z$						
j	m2m	$m_x 2_y m_z$	$m_x 2_y m_z$						
i	m2m	$m_x 2_y m_z$	$m_x 2_y m_z$						
h	2mm	$2_x m_y m_z$	$2_x m_y m_z$						
g	2mm	$2_x m_y m_z$	$2_x m_y m_z$						
f	..2/m	$2_z / m_z$	$2_z / m_z$						
e	..2/m	$2_z / m_z$	$2_z / m_z$						
d	mmm	$m_x m_y m_z$							
c	mmm	$m_x m_y m_z$							
b	mmm	$m_x m_y m_z$							
a	mmm	$m_x m_y m_z$							

### No. 66 C 2/c 2/c 2/m

m	1	1	1	1	1	1	1	1	1
l	..m	$m_z$	$m_z$	$m_z$	$m_z$				
k	..2	$2_z$	$2_z$	$2_z$	$2_z$				
j	..2	$2_z$	$2_z$	$2_z$	$2_z$				

i	..2	$2_x$	$2_x$	$2_x$	$2_x$
h	.2.	$2_y$	$2_y$	$2_y$	$2_y$
g	2..	$2_x$	$2_x$	$2_x$	$2_x$
f	..2/m	$2_x/m_x$	$2_x/m_x$		
e	..2/m	$2_x/m_x$	$2_x/m_x$		
d	..2/m	$2_x/m_x$	$2_x/m_x$		
c	..2/m	$2_x/m_x$	$2_x/m_x$		
b	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$		
a	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$		

No. 67  $C2/m2/m2/e$ 

o	1	1	1	1	1	1	1	1	1
n	.m.	$m_y$	$m_y$	$m_y$	$m_y$				
m	m..	$m_x$	$m_x$	$m_x$	$m_x$				
l	..2	$2_x$	$2_x$	$2_x$	$2_x$				
k	.2.	$2_y$	$2_y$	$2_y$	$2_y$				
j	.2.	$2_y$	$2_y$	$2_y$	$2_y$				
i	2..	$2_x$	$2_x$	$2_x$	$2_x$				
h	2..	$2_x$	$2_x$	$2_x$	$2_x$				
g	mm2	$m_x m_y 2_z$	$m_x m_y 2_z$						
f	.2/m.	$2_y/m_y$	$2_y/m_y$						
e	.2/m.	$2_y/m_y$	$2_y/m_y$						
d	2/m..	$2_x/m_x$	$2_x/m_x$						
c	2/m..	$2_x/m_x$	$2_x/m_x$						
b	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$						
a	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$						

No. 68  $C2/c2/c2/e$  (origin choice 1)

i	1	1	1	1	1	1	1	1	1
h	..2	$2_x$	$2_x$	$2_x$	$2_x$				
g	..2	$2_x$	$2_x$	$2_x$	$2_x$				
f	.2.	$2_y$	$2_y$	$2_y$	$2_y$				
e	2..	$2_x$	$2_x$	$2_x$	$2_x$				
d	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$					
c	$\bar{1}$	$\bar{1}$	$\bar{1}$	$\bar{1}$					
b	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$						
a	222	$2_x 2_y 2_z$	$2_x 2_y 2_z$						

No. 68  $C2/c2/c2/e$  (origin choice 2)

i	1	$\bar{1} \bar{1} \bar{1} \bar{1} \bar{1} \bar{1} \bar{1} \bar{1} \bar{1}$
h	..2	$2_x \ 2_x \ 2_x \ 2_x$
g	..2	$2_x \ 2_x \ 2_x \ 2_x$
f	.2.	$2_y \ 2_y \ 2_y \ 2_y$
e	2..	$2_x \ 2_x \ 2_x \ 2_x$
d	$\bar{1}$	$\bar{1} \ \bar{1} \ \bar{1} \ \bar{1}$
c	$\bar{1}$	$\bar{1} \ \bar{1} \ \bar{1} \ \bar{1}$
b	222	$2_x 2_y 2_x \ 2_x 2_y 2_x$
a	222	$2_x 2_y 2_x \ 2_x 2_y 2_x$

No. 69  $F2/m2/m2/m$ 

p	1	$\bar{1} \ \bar{1} \ \bar{1} \ \bar{1} \ \bar{1} \ \bar{1} \ \bar{1} \ \bar{1} \ \bar{1}$
o	..m	$m_x \ m_x \ m_x \ m_x$
n	.m.	$m_y \ m_y \ m_y \ m_y$
m	m..	$m_x \ m_x \ m_x \ m_x$
l	2..	$2_x \ 2_x \ 2_x \ 2_x$
k	.2.	$2_y \ 2_y \ 2_y \ 2_y$
j	..2	$2_x \ 2_x \ 2_x \ 2_x$
i	nm2	$m_x m_y 2_x \ m_x m_y 2_x$
h	m2m	$m_x 2_y m_x \ m_x 2_y m_x$
g	2mm	$2_x m_y m_x \ 2_x m_y m_x$
f	222	$2_x 2_y 2_x \ 2_x 2_y 2_x$
e	..2/m	$2_x / m_x \ 2_x / m_x$
d	.2/m.	$2_y / m_y \ 2_y / m_y$
c	2/m..	$2_x / m_x \ 2_x / m_x$
b	mmm	$m_x m_y m_x$
a	mmm	$m_x m_y m_x$

No. 70  $F2/d2/d2/d$  (origin choice 1)

h	1	$\bar{1} \ \bar{1} \ \bar{1} \ \bar{1} \ \bar{1} \ \bar{1} \ \bar{1} \ \bar{1} \ \bar{1}$
g	..2	$2_x \ 2_x \ 2_x \ 2_x$
f	.2.	$2_y \ 2_y \ 2_y \ 2_y$
e	2..	$2_x \ 2_x \ 2_x \ 2_x$
d	$\bar{1}$	$\bar{1} \ \bar{1} \ \bar{1} \ \bar{1}$
c	$\bar{1}$	$\bar{1} \ \bar{1} \ \bar{1} \ \bar{1}$
b	222	$2_x 2_y 2_x \ 2_x 2_y 2_x$

a 222  $\overline{2_x 2_y 2_z} \quad \overline{2_x 2_y 2_z}$

### No. 70 $F 2/d 2/d 2/d$ (origin choice 2)

h 1  $\overline{1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1}$

g ..2  $\overline{2_x \quad 2_x \quad 2_x \quad 2_x}$

f .2.  $\overline{2_y \quad 2_y \quad 2_y \quad 2_y}$

e 2..  $\overline{2_x \quad 2_x \quad 2_x \quad 2_x}$

d  $\bar{1}$   $\overline{\bar{1} \quad \bar{1} \quad \bar{1} \quad \bar{1}}$

c  $\bar{1}$   $\overline{\bar{1} \quad \bar{1} \quad \bar{1} \quad \bar{1}}$

b 222  $\overline{2_x 2_y 2_z} \quad \overline{2_x 2_y 2_z}$

a 222  $\overline{2_x 2_y 2_z} \quad \overline{2_x 2_y 2_z}$

### No. 71 $I 2/m 2/m 2/m$

o 1  $\overline{1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1}$

n ..m  $\overline{m_x \quad m_x \quad m_x \quad m_x}$

m .m.  $\overline{m_y \quad m_y \quad m_y \quad m_y}$

l m..  $\overline{m_x \quad m_x \quad m_x \quad m_x}$

k  $\bar{1}$   $\overline{\bar{1} \quad \bar{1} \quad \bar{1} \quad \bar{1}}$

j mm2  $\overline{m_x m_y 2_x} \quad \overline{m_x m_y 2_x}$

i mm2  $\overline{m_x m_y 2_x} \quad \overline{m_x m_y 2_x}$

h m2m  $\overline{m_x 2_y m_z} \quad \overline{m_x 2_y m_z}$

g m2m  $\overline{m_x 2_y m_z} \quad \overline{m_x 2_y m_z}$

f 2mm  $\overline{2_x m_y m_z} \quad \overline{2_x m_y m_z}$

e 2mm  $\overline{2_x m_y m_z} \quad \overline{2_x m_y m_z}$

d mmm  $\overline{m_x m_y m_z}$

c mmm  $\overline{m_x m_y m_z}$

b mmm  $\overline{m_x m_y m_z}$

a mmm  $\overline{m_x m_y m_z}$

### No. 72 $I 2/b 2/a 2/m$

k 1  $\overline{1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1}$

j ..m  $\overline{m_x \quad m_x \quad m_x \quad m_x}$

i ..2  $\overline{2_x \quad 2_x \quad 2_x \quad 2_x}$

h ..2  $\overline{2_x \quad 2_x \quad 2_x \quad 2_x}$

g .2.  $\overline{2_y \quad 2_y \quad 2_y \quad 2_y}$

f 2..  $\overline{2_x \quad 2_x \quad 2_x \quad 2_x}$

e  $\bar{1}$   $\overline{\bar{1} \quad \bar{1} \quad \bar{1} \quad \bar{1}}$

d ..2/m  $\overline{2_x / m_z} \quad \overline{2_x / m_z}$

c	..2/m	$2_x/m_x$ $2_z/m_z$
b	222	$2_x2_y2_z$ $2_x2_y2_z$
a	222	$2_x2_y2_z$ $2_x2_y2_z$

### No. 73 $I2_1/b2_1/c2_1/a$

f	1	1 1 1 1 1 1 1 1 1 1
e	..2	$2_x$ $2_x$ $2_x$ $2_x$
d	.2.	$2_y$ $2_y$ $2_y$ $2_y$
c	2..	$2_x$ $2_x$ $2_x$ $2_x$
b	$\bar{1}$	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
a	$\bar{1}$	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$

### No. 74 $I2_1/m2_1/m2_1/a$

j	1	1 1 1 1 1 1 1 1 1 1
i	.m.	$m_y$ $m_y$ $m_y$ $m_y$
h	m..	$m_x$ $m_x$ $m_x$ $m_x$
g	.2.	$2_y$ $2_y$ $2_y$ $2_y$
f	2..	$2_x$ $2_x$ $2_x$ $2_x$
e	mm2	$m_xm_y2_z$ $m_xm_y2_z$
d	.2/m.	$2_y/m_y$ $2_y/m_y$
c	.2/m.	$2_y/m_y$ $2_y/m_y$
b	2/m..	$2_x/m_x$ $2_x/m_x$
a	2/m..	$2_x/m_x$ $2_x/m_x$

### No. 75 $P4$

d	1	1 1 1 1
c	2..	$2_x$ $2_x$
b	4..	$4_x$
a	4..	$4_x$

### No. 76 $P4_1$

a	1	1 1 1 1
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### No. 77 $P4_2$

d	1	1 1 1 1
c	2..	$2_x$ $2_x$
b	2..	$2_x$ $2_x$
a	2..	$2_x$ $2_x$

### No. 78 $P4_3$

a	1	1 1 1 1
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### No. 79 $I4$

c	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1}$
b	2..	$\boxed{2_x} \boxed{2_x}$
a	4..	$\boxed{4_x}$

No. 80  $I4_1$ 

b	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1}$
a	2..	$\boxed{2_x} \boxed{2_x}$

No. 81  $P\bar{4}$ 

h	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1}$
g	2..	$\boxed{2_x} \boxed{2_x}$
f	2..	$\boxed{2_x} \boxed{2_x}$
e	2..	$\boxed{2_x} \boxed{2_x}$
d	$\bar{4}..$	$\boxed{\bar{4}_x}$
c	$\bar{4}..$	$\boxed{\bar{4}_x}$
b	$\bar{4}..$	$\boxed{\bar{4}_x}$
a	$\bar{4}..$	$\boxed{\bar{4}_x}$

No. 82  $I\bar{4}$ 

g	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1}$
f	2..	$\boxed{2_x} \boxed{2_x}$
e	2..	$\boxed{2_x} \boxed{2_x}$
d	$\bar{4}..$	$\boxed{\bar{4}_x}$
c	$\bar{4}..$	$\boxed{\bar{4}_x}$
b	$\bar{4}..$	$\boxed{\bar{4}_x}$
a	$\bar{4}..$	$\boxed{\bar{4}_x}$

No. 83  $P4/m$ 

l	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
k	m..	$\boxed{m_z} \boxed{m_z} \boxed{m_z} \boxed{m_z}$
j	m..	$\boxed{m_z} \boxed{m_z} \boxed{m_z} \boxed{m_z}$
i	2..	$\boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x}$
h	4..	$\boxed{4_x} \boxed{4_x}$
g	4..	$\boxed{4_x} \boxed{4_x}$
f	2/m..	$\boxed{2_x/m_z} \boxed{2_x/m_z}$
e	2/m..	$\boxed{2_x/m_z} \boxed{2_x/m_z}$
d	4/m..	$\boxed{4_x/m_z}$
c	4/m..	$\boxed{4_x/m_z}$
b	4/m..	$\boxed{4_x/m_z}$

a  $4/m..$   $\boxed{4_x/m_x}$

### No. 84 $P4_2/m$

k 1  $\boxed{1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1}$

j  $m..$   $\boxed{m_x\ m_x\ m_x\ m_x}$

i  $2..$   $\boxed{2_x\ 2_x\ 2_x\ 2_x}$

h  $2..$   $\boxed{2_x\ 2_x\ 2_x\ 2_x}$

g  $2..$   $\boxed{2_x\ 2_x\ 2_x\ 2_x}$

f  $\bar{4}..$   $\boxed{\bar{4}_x\ \bar{4}_x}$

e  $\bar{4}..$   $\boxed{\bar{4}_x\ \bar{4}_x}$

d  $2/m..$   $\boxed{2_x/m_x\ 2_x/m_x}$

c  $2/m..$   $\boxed{2_x/m_x\ 2_x/m_x}$

b  $2/m..$   $\boxed{2_x/m_x\ 2_x/m_x}$

a  $2/m..$   $\boxed{2_x/m_x\ 2_x/m_x}$

### No. 85 $P4/n$ (origin choice 1)

g 1  $\boxed{1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1}$

f  $2..$   $\boxed{2_x\ 2_x\ 2_x\ 2_x}$

e  $\bar{1}$   $\boxed{\bar{1}\ \bar{1}\ \bar{1}\ \bar{1}}$

d  $\bar{1}$   $\boxed{\bar{1}\ \bar{1}\ \bar{1}\ \bar{1}}$

c  $4..$   $\boxed{4_x\ 4_x}$

b  $\bar{4}..$   $\boxed{\bar{4}_x\ \bar{4}_x}$

a  $\bar{4}..$   $\boxed{\bar{4}_x\ \bar{4}_x}$

### No. 85 $P4/n$ (origin choice 2)

g 1  $\boxed{1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1}$

f  $2..$   $\boxed{2_x\ 2_x\ 2_x\ 2_x}$

e  $\bar{1}$   $\boxed{\bar{1}\ \bar{1}\ \bar{1}\ \bar{1}}$

d  $\bar{1}$   $\boxed{\bar{1}\ \bar{1}\ \bar{1}\ \bar{1}}$

c  $4..$   $\boxed{4_x\ 4_x}$

b  $\bar{4}..$   $\boxed{\bar{4}_x\ \bar{4}_x}$

a  $\bar{4}..$   $\boxed{\bar{4}_x\ \bar{4}_x}$

### No. 86 $P4_2/n$ (origin choice 1)

g 1  $\boxed{1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1}$

f  $2..$   $\boxed{2_x\ 2_x\ 2_x\ 2_x}$

e  $2..$   $\boxed{2_x\ 2_x\ 2_x\ 2_x}$

d  $\bar{1}$   $\boxed{\bar{1}\ \bar{1}\ \bar{1}\ \bar{1}}$

c  $\bar{1}$   $\boxed{\bar{1}\ \bar{1}\ \bar{1}\ \bar{1}}$

b  $\bar{4}..$   $\boxed{\bar{4}_z} \boxed{\bar{4}_z}$

a  $\bar{4}..$   $\boxed{\bar{4}_z} \boxed{\bar{4}_z}$

No. 86  $P4_2/n$  (origin choice 2)

g 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$

f  $2..$   $\boxed{2_z} \boxed{2_z} \boxed{2_z} \boxed{2_z}$

e  $2..$   $\boxed{2_z} \boxed{2_z} \boxed{2_z} \boxed{2_z}$

d  $\bar{1}$   $\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$

c  $\bar{1}$   $\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$

b  $\bar{4}..$   $\boxed{\bar{4}_z} \boxed{\bar{4}_z}$

a  $\bar{4}..$   $\boxed{\bar{4}_z} \boxed{\bar{4}_z}$

No. 87  $I4/m$

i 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$

h  $m..$   $\boxed{m_z} \boxed{m_z} \boxed{m_z} \boxed{m_z}$

g  $2..$   $\boxed{2_z} \boxed{2_z} \boxed{2_z} \boxed{2_z}$

f  $\bar{1}$   $\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$

e  $4..$   $\boxed{4_z} \boxed{4_z}$

d  $\bar{4}..$   $\boxed{\bar{4}_z} \boxed{\bar{4}_z}$

c  $2/m..$   $\boxed{2_z/m_z} \boxed{2_z/m_z}$

b  $4/m..$   $\boxed{4_z/m_z}$

a  $4/m..$   $\boxed{4_z/m_z}$

No. 88  $I4_1/a$  (origin choice 1)

f 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$

e  $2..$   $\boxed{2_z} \boxed{2_z} \boxed{2_z} \boxed{2_z}$

d  $\bar{1}$   $\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$

c  $\bar{1}$   $\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$

b  $\bar{4}..$   $\boxed{\bar{4}_z} \boxed{\bar{4}_z}$

a  $\bar{4}..$   $\boxed{\bar{4}_z} \boxed{\bar{4}_z}$

No. 88  $I4_1/a$  (origin choice 2)

f 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$

e  $2..$   $\boxed{2_z} \boxed{2_z} \boxed{2_z} \boxed{2_z}$

d  $\bar{1}$   $\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$

c  $\bar{1}$   $\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$

b  $\bar{4}..$   $\boxed{\bar{4}_z} \boxed{\bar{4}_z}$

a  $\bar{4}..$   $\boxed{\bar{4}_z} \boxed{\bar{4}_z}$

No. 89  $P422$ 

$p$	1	$\boxed{1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1}$
$o$	.2.	$\boxed{2_x \ 2_x \ 2_y \ 2_y}$
$n$	.2.	$\boxed{2_x \ 2_x \ 2_y \ 2_y}$
$m$	.2.	$\boxed{2_x \ 2_x \ 2_y \ 2_y}$
$l$	.2.	$\boxed{2_x \ 2_x \ 2_y \ 2_y}$
$k$	..2	$\boxed{2_{xy} \ 2_{xy} \ 2_{x\bar{y}} \ 2_{x\bar{y}}}$
$j$	..2	$\boxed{2_{xy} \ 2_{xy} \ 2_{x\bar{y}} \ 2_{x\bar{y}}}$
$i$	2..	$\boxed{2_z \ 2_z \ 2_z \ 2_z}$
$h$	4..	$\boxed{4_z \ 4_z}$
$g$	4..	$\boxed{4_z \ 4_z}$
$f$	222.	$\boxed{2_x 2_y 2_z \ 2_x 2_y 2_z}$
$e$	222.	$\boxed{2_x 2_y 2_z \ 2_x 2_y 2_z}$
$d$	422	$\boxed{4_z 2_x 2_{xy}}$
$c$	422	$\boxed{4_z 2_x 2_{xy}}$
$b$	422	$\boxed{4_z 2_x 2_{xy}}$
$a$	422	$\boxed{4_z 2_x 2_{xy}}$

No. 90  $P42_12$ 

$g$	1	$\boxed{1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1}$
$f$	..2	$\boxed{2_{xy} \ 2_{xy} \ 2_{x\bar{y}} \ 2_{x\bar{y}}}$
$e$	..2	$\boxed{2_{xy} \ 2_{xy} \ 2_{x\bar{y}} \ 2_{x\bar{y}}}$
$d$	2..	$\boxed{2_z \ 2_z \ 2_z \ 2_z}$
$c$	4..	$\boxed{4_z \ 4_z}$
$b$	2.22	$\boxed{2_{x\bar{y}} 2_{xy} 2_z \ 2_{x\bar{y}} 2_{xy} 2_z}$
$a$	2.22	$\boxed{2_{x\bar{y}} 2_{xy} 2_z \ 2_{x\bar{y}} 2_{xy} 2_z}$

No. 91  $P4_122$ 

$d$	1	$\boxed{1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1}$
$c$	..2	$\boxed{2_{xy} \ 2_{xy} \ 2_{x\bar{y}} \ 2_{x\bar{y}}}$
$b$	.2.	$\boxed{2_y \ 2_y \ 2_x \ 2_x}$
$a$	.2.	$\boxed{2_y \ 2_y \ 2_x \ 2_x}$

No. 92  $P4_12_12$ 

$b$	1	$\boxed{1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1}$
$a$	..2	$\boxed{2_{xy} \ 2_{xy} \ 2_{x\bar{y}} \ 2_{x\bar{y}}}$

No. 93  $P4_222$ 

$p$	1	$\boxed{1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1}$
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o	..2	$2_{xy}$	$2_{xy}$	$2_{x\bar{y}}$	$2_{x\bar{y}}$
n	..2	$2_{xy}$	$2_{xy}$	$2_{x\bar{y}}$	$2_{x\bar{y}}$
m	.2.	$2_x$	$2_x$	$2_y$	$2_y$
l	.2.	$2_x$	$2_x$	$2_y$	$2_y$
k	.2.	$2_x$	$2_x$	$2_y$	$2_y$
j	.2.	$2_x$	$2_x$	$2_y$	$2_y$
i	2..	$2_z$	$2_z$	$2_z$	$2_z$
h	2..	$2_z$	$2_z$	$2_z$	$2_z$
g	2..	$2_z$	$2_z$	$2_z$	$2_z$
f	2.22	$2_{x\bar{y}}2_{xy}2_z$	$2_{x\bar{y}}2_{xy}2_z$		
e	2.22	$2_{x\bar{y}}2_{xy}2_z$	$2_{x\bar{y}}2_{xy}2_z$		
d	222.	$2_x2_y2_z$	$2_x2_y2_z$		
c	222.	$2_x2_y2_z$	$2_x2_y2_z$		
b	222.	$2_x2_y2_z$	$2_x2_y2_z$		
a	222.	$2_x2_y2_z$	$2_x2_y2_z$		

No. 94  $P4_22_12$ 

g	1	1	1	1	1	1	1	1	1
f	..2	$2_{xy}$	$2_{xy}$	$2_{x\bar{y}}$	$2_{x\bar{y}}$				
e	..2	$2_{xy}$	$2_{xy}$	$2_{x\bar{y}}$	$2_{x\bar{y}}$				
d	2..	$2_z$	$2_z$	$2_z$	$2_z$				
c	2..	$2_z$	$2_z$	$2_z$	$2_z$				
b	2.22	$2_{x\bar{y}}2_{xy}2_z$	$2_{x\bar{y}}2_{xy}2_z$						
a	2.22	$2_{x\bar{y}}2_{xy}2_z$	$2_{x\bar{y}}2_{xy}2_z$						

No. 95  $P4_322$ 

d	1	1	1	1	1	1	1	1	1
c	..2	$2_{xy}$	$2_{xy}$	$2_{x\bar{y}}$	$2_{x\bar{y}}$				
b	.2.	$2_y$	$2_y$	$2_x$	$2_x$				
a	.2.	$2_y$	$2_y$	$2_x$	$2_x$				

No. 96  $P4_32_12$ 

b	1	1	1	1	1	1	1	1	1
a	..2	$2_{xy}$	$2_{xy}$	$2_{x\bar{y}}$	$2_{x\bar{y}}$				

No. 97  $I422$ 

k	1	1	1	1	1	1	1	1	1
j	..2	$2_{xy}$	$2_{xy}$	$2_{x\bar{y}}$	$2_{x\bar{y}}$				
i	.2.	$2_x$	$2_x$	$2_y$	$2_y$				

h	.2.	$2_x$   $2_x$   $2_y$   $2_y$
g	..2	$2_{xy}$   $2_{xy}$   $2_{x\bar{y}}$   $2_{x\bar{y}}$
f	2..	$2_z$   $2_z$   $2_z$   $2_z$
e	4..	$4_z$   $4_z$
d	2.22	$2_{x\bar{y}}2_{xy}2_z$   $2_{x\bar{y}}2_{xy}2_z$
c	222.	$2_x2_y2_z$   $2_x2_y2_z$
b	422	$4_z2_x2_{xy}$
a	422	$4_z2_x2_{xy}$

No. 98  $I4_122$ 

g	1	1   1   1   1   1   1   1   1
f	.2.	$2_x$   $2_x$   $2_y$   $2_y$
e	..2	$2_{x\bar{y}}$   $2_{x\bar{y}}$   $2_{xy}$   $2_{xy}$
d	..2	$2_{xy}$   $2_{xy}$   $2_{x\bar{y}}$   $2_{x\bar{y}}$
c	2..	$2_z$   $2_z$   $2_z$   $2_z$
b	2.22	$2_{x\bar{y}}2_{xy}2_z$   $2_{x\bar{y}}2_{xy}2_z$
a	2.22	$2_{x\bar{y}}2_{xy}2_z$   $2_{x\bar{y}}2_{xy}2_z$

No. 99  $P4mm$ 

g	1	1   1   1   1   1   1   1   1
f	.m.	$m_y$   $m_y$   $m_x$   $m_x$
e	.m.	$m_y$   $m_y$   $m_x$   $m_x$
d	..m	$m_{x\bar{y}}$   $m_{x\bar{y}}$   $m_{xy}$   $m_{xy}$
c	2mm.	$m_xm_y2_z$   $m_xm_y2_z$
b	4mm	$4_zm_xm_{xy}$
a	4mm	$4_zm_xm_{xy}$

No. 100  $P4bm$ 

d	1	1   1   1   1   1   1   1   1
c	..m	$m_{x\bar{y}}$   $m_{x\bar{y}}$   $m_{xy}$   $m_{xy}$
b	2.mmm	$m_{x\bar{y}}m_{xy}2_z$   $m_{x\bar{y}}m_{xy}2_z$
a	4..	$4_z$   $4_z$

No. 101  $P4_2cm$ 

e	1	1   1   1   1   1   1   1   1
d	..m	$m_{x\bar{y}}$   $m_{x\bar{y}}$   $m_{xy}$   $m_{xy}$
c	2..	$2_z$   $2_z$   $2_z$   $2_z$
b	2.mmm	$m_{x\bar{y}}m_{xy}2_z$   $m_{x\bar{y}}m_{xy}2_z$
a	2.mmm	$m_{x\bar{y}}m_{xy}2_z$   $m_{x\bar{y}}m_{xy}2_z$

**No. 102**  $P4_2nm$ 

d	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
c	. . m	$\boxed{m_x \bar{y}} \boxed{m_x \bar{y}} \boxed{m_x y} \boxed{m_x y}$
b	2 . .	$\boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x}$
a	2 . mm	$\boxed{m_x \bar{y} m_x y 2_x} \boxed{m_x \bar{y} m_x y 2_x}$

**No. 103**  $P4cc$ 

d	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
c	2 . .	$\boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x}$
b	4 . .	$\boxed{4_x} \boxed{4_x}$
a	4 . .	$\boxed{4_x} \boxed{4_x}$

**No. 104**  $P4nc$ 

c	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
b	2 . .	$\boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x}$
a	4 . .	$\boxed{4_x} \boxed{4_x}$

**No. 105**  $P4_2mc$ 

f	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
e	. m .	$\boxed{m_y} \boxed{m_y} \boxed{m_x} \boxed{m_x}$
d	. m .	$\boxed{m_y} \boxed{m_y} \boxed{m_x} \boxed{m_x}$
c	2mm .	$\boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$
b	2mm .	$\boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$
a	2mm .	$\boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$

**No. 106**  $P4_2bc$ 

c	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
b	2 . .	$\boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x}$
a	2 . .	$\boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x}$

**No. 107**  $I4mm$ 

e	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
d	. m .	$\boxed{m_y} \boxed{m_y} \boxed{m_x} \boxed{m_x}$
c	. . m	$\boxed{m_x \bar{y}} \boxed{m_x \bar{y}} \boxed{m_x y} \boxed{m_x y}$
b	2mm .	$\boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$
a	4mm	$\boxed{4_x m_x m_x y}$

**No. 108**  $I4cm$ 

d	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
c	. . m	$\boxed{m_x \bar{y}} \boxed{m_x \bar{y}} \boxed{m_x y} \boxed{m_x y}$
b	2 . mm	$\boxed{m_x \bar{y} m_x y 2_x} \boxed{m_x \bar{y} m_x y 2_x}$
a	4 . .	$\boxed{4_x} \boxed{4_x}$

No. 109  $I4_1md$ 

c	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
b	.m.	$\boxed{m_x} \boxed{m_x} \boxed{m_y} \boxed{m_y}$
a	2mm.	$\boxed{m_x m_y 2_z} \boxed{m_x m_y 2_z}$

No. 110  $I4_1cd$ 

b	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
a	2..	$\boxed{2_x} \boxed{2_x} \boxed{2_z} \boxed{2_z}$

No. 111  $P\bar{4}2m$ 

o	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
n	..m	$\boxed{m_x \bar{y}} \boxed{m_x \bar{y}} \boxed{m_{xy}} \boxed{m_{xy}}$
m	2..	$\boxed{2_x} \boxed{2_x} \boxed{2_z} \boxed{2_z}$
l	.2.	$\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y}$
k	.2.	$\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y}$
j	.2.	$\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y}$
i	.2.	$\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y}$
h	2.mm	$\boxed{m_x \bar{y} m_{xy} 2_z} \boxed{m_x \bar{y} m_{xy} 2_z}$
g	2.mm	$\boxed{m_x \bar{y} m_{xy} 2_z} \boxed{m_x \bar{y} m_{xy} 2_z}$
f	222.	$\boxed{2_x 2_y 2_z} \boxed{2_x 2_y 2_z}$
e	222.	$\boxed{2_x 2_y 2_z} \boxed{2_x 2_y 2_z}$
d	$\bar{4}2m$	$\boxed{\bar{4}_z 2_y m_{xy}}$
c	$\bar{4}2m$	$\boxed{\bar{4}_z 2_x m_{xy}}$
b	$\bar{4}2m$	$\boxed{\bar{4}_z 2_x m_{xy}}$
a	$\bar{4}2m$	$\boxed{\bar{4}_z 2_y m_{xy}}$

No. 112  $P\bar{4}2c$ 

n	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
m	2..	$\boxed{2_x} \boxed{2_x} \boxed{2_z} \boxed{2_z}$
l	2..	$\boxed{2_x} \boxed{2_x} \boxed{2_z} \boxed{2_z}$
k	2..	$\boxed{2_x} \boxed{2_x} \boxed{2_z} \boxed{2_z}$
j	.2.	$\boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x}$
i	.2.	$\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y}$
h	.2.	$\boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x}$
g	.2.	$\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y}$
f	$\bar{4}..$	$\boxed{\bar{4}_z} \boxed{\bar{4}_z}$
e	$\bar{4}..$	$\boxed{\bar{4}_z} \boxed{\bar{4}_z}$

d	222.	$2_x 2_y 2_z$   $2_x 2_y 2_z$
c	222.	$2_x 2_y 2_z$   $2_x 2_y 2_z$
b	222.	$2_x 2_y 2_z$   $2_x 2_y 2_z$
a	222.	$2_x 2_y 2_z$   $2_x 2_y 2_z$

**No. 113**  $P\bar{4}2_1m$ 

f	1	$1$   $1$   $1$   $1$   $1$   $1$   $1$   $1$
e	. . m	$m_x \bar{y}$   $m_x \bar{y}$   $m_x y$   $m_x y$
d	2..	$2_x$   $2_x$   $2_x$   $2_x$
c	2. mm	$m_x \bar{y} m_x y 2_z$   $m_x \bar{y} m_x y 2_z$
b	$\bar{4}$ ..	$\bar{4}_z$   $\bar{4}_z$
a	$\bar{4}$ ..	$\bar{4}_z$   $\bar{4}_z$

**No. 114**  $P\bar{4}2_1c$ 

e	1	$1$   $1$   $1$   $1$   $1$   $1$   $1$   $1$
d	2..	$2_x$   $2_x$   $2_x$   $2_x$
c	2..	$2_x$   $2_x$   $2_x$   $2_x$
b	$\bar{4}$ ..	$\bar{4}_z$   $\bar{4}_z$
a	$\bar{4}$ ..	$\bar{4}_z$   $\bar{4}_z$

**No. 115**  $P\bar{4}m2$ 

l	1	$1$   $1$   $1$   $1$   $1$   $1$   $1$   $1$
k	.m.	$m_y$   $m_y$   $m_x$   $m_x$
j	.m.	$m_y$   $m_y$   $m_x$   $m_x$
i	..2	$2_x y$   $2_x y$   $2_x \bar{y}$   $2_x \bar{y}$
h	..2	$2_x y$   $2_x y$   $2_x \bar{y}$   $2_x \bar{y}$
g	2mm.	$m_x m_y 2_z$   $m_x m_y 2_z$
f	2mm.	$m_x m_y 2_z$   $m_x m_y 2_z$
e	2mm.	$m_x m_y 2_z$   $m_x m_y 2_z$
d	$\bar{4}m2$	$\bar{4}_z m_x 2_x y$
c	$\bar{4}m2$	$\bar{4}_z m_x 2_x y$
b	$\bar{4}m2$	$\bar{4}_z m_x 2_x y$
a	$\bar{4}m2$	$\bar{4}_z m_x 2_x y$

**No. 116**  $P\bar{4}c2$ 

j	1	$1$   $1$   $1$   $1$   $1$   $1$   $1$   $1$
i	2..	$2_x$   $2_x$   $2_x$   $2_x$
h	2..	$2_x$   $2_x$   $2_x$   $2_x$

<i>g</i>	2..	$2_x$   $2_x$   $2_x$   $2_x$
<i>f</i>	..2	$2_{xy}$   $2_{xy}$   $2_{x\bar{y}}$   $2_{x\bar{y}}$
<i>e</i>	..2	$2_{xy}$   $2_{xy}$   $2_{x\bar{y}}$   $2_{x\bar{y}}$
<i>d</i>	$\bar{4}$ ..	$\bar{4}_x$   $\bar{4}_z$
<i>c</i>	$\bar{4}$ ..	$\bar{4}_x$   $\bar{4}_z$
<i>b</i>	2.22	$2_{x\bar{y}}2_{xy}2_z$   $2_{x\bar{y}}2_{xy}2_z$
<i>a</i>	2.22	$2_{x\bar{y}}2_{xy}2_z$   $2_{x\bar{y}}2_{xy}2_z$

No. 117  $P\bar{4}b2$ 

<i>i</i>	1	1   1   1   1   1   1   1   1
<i>h</i>	..2	$2_{xy}$   $2_{xy}$   $2_{x\bar{y}}$   $2_{x\bar{y}}$
<i>g</i>	..2	$2_{xy}$   $2_{xy}$   $2_{x\bar{y}}$   $2_{x\bar{y}}$
<i>f</i>	2..	$2_x$   $2_x$   $2_x$   $2_x$
<i>e</i>	2..	$2_x$   $2_x$   $2_x$   $2_x$
<i>d</i>	2.22	$2_{x\bar{y}}2_{xy}2_z$   $2_{x\bar{y}}2_{xy}2_z$
<i>c</i>	2.22	$2_{x\bar{y}}2_{xy}2_z$   $2_{x\bar{y}}2_{xy}2_z$
<i>b</i>	$\bar{4}$ ..	$\bar{4}_x$   $\bar{4}_z$
<i>a</i>	$\bar{4}$ ..	$\bar{4}_x$   $\bar{4}_z$

No. 118  $P\bar{4}n2$ 

<i>i</i>	1	1   1   1   1   1   1   1   1
<i>h</i>	2..	$2_x$   $2_x$   $2_x$   $2_x$
<i>g</i>	..2	$2_{xy}$   $2_{xy}$   $2_{x\bar{y}}$   $2_{x\bar{y}}$
<i>f</i>	..2	$2_{x\bar{y}}$   $2_{x\bar{y}}$   $2_{xy}$   $2_{xy}$
<i>e</i>	2..	$2_x$   $2_x$   $2_x$   $2_x$
<i>d</i>	2.22	$2_{x\bar{y}}2_{xy}2_z$   $2_{x\bar{y}}2_{xy}2_z$
<i>c</i>	2.22	$2_{x\bar{y}}2_{xy}2_z$   $2_{x\bar{y}}2_{xy}2_z$
<i>b</i>	$\bar{4}$ ..	$\bar{4}_x$   $\bar{4}_z$
<i>a</i>	$\bar{4}$ ..	$\bar{4}_x$   $\bar{4}_z$

No. 119  $I\bar{4}m2$ 

<i>j</i>	1	1   1   1   1   1   1   1   1
<i>i</i>	.m.	$m_y$   $m_y$   $m_x$   $m_x$
<i>h</i>	..2	$2_{xy}$   $2_{xy}$   $2_{x\bar{y}}$   $2_{x\bar{y}}$
<i>g</i>	..2	$2_{xy}$   $2_{xy}$   $2_{x\bar{y}}$   $2_{x\bar{y}}$
<i>f</i>	2mm.	$m_xm_y2_x$   $m_xm_y2_x$
<i>e</i>	2mm.	$m_xm_y2_x$   $m_xm_y2_x$

d	$\bar{4}m2$	$\bar{4}_x m_x 2_{xy}$
c	$\bar{4}m2$	$\bar{4}_z m_x 2_{xy}$
b	$\bar{4}m2$	$\bar{4}_x m_x 2_{xy}$
a	$\bar{4}m2$	$\bar{4}_z m_x 2_{xy}$

**No. 120**  $I\bar{4}c2$ 

i	1	1 1 1 1 1 1 1 1
h	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
g	2..	$2_x$ $2_x$ $2_z$ $2_z$
f	2..	$2_x$ $2_x$ $2_z$ $2_z$
e	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
d	2.22	$2_{x\bar{y}} 2_{xy} 2_x$ $2_{x\bar{y}} 2_{xy} 2_x$
c	$\bar{4}..$	$\bar{4}_x$ $\bar{4}_z$
b	$\bar{4}..$	$\bar{4}_x$ $\bar{4}_z$
a	2.22	$2_{x\bar{y}} 2_{xy} 2_x$ $2_{x\bar{y}} 2_{xy} 2_x$

**No. 121**  $I\bar{4}2m$ 

j	1	1 1 1 1 1 1 1 1
i	..m	$m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$
h	2..	$2_x$ $2_x$ $2_z$ $2_z$
g	.2.	$2_x$ $2_x$ $2_y$ $2_y$
f	.2.	$2_x$ $2_x$ $2_y$ $2_y$
e	2.mm	$m_{x\bar{y}} m_{xy} 2_x$ $m_{x\bar{y}} m_{xy} 2_x$
d	$\bar{4}..$	$\bar{4}_x$ $\bar{4}_z$
c	222.	$2_x 2_y 2_x$ $2_x 2_y 2_x$
b	$\bar{4}2m$	$\bar{4}_z 2_x m_{xy}$
a	$\bar{4}2m$	$\bar{4}_z 2_x m_{xy}$

**No. 122**  $I\bar{4}2d$ 

e	1	1 1 1 1 1 1 1 1
d	.2.	$2_x$ $2_x$ $2_y$ $2_y$
c	2..	$2_x$ $2_x$ $2_z$ $2_z$
b	$\bar{4}..$	$\bar{4}_x$ $\bar{4}_z$
a	$\bar{4}..$	$\bar{4}_x$ $\bar{4}_z$

**No. 123**  $P4/m2/m2/m$ 

u	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
t	.m.	$m_y$ $m_y$ $m_x$ $m_x$ $m_y$ $m_y$ $m_x$ $m_x$



n	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
m	..m	$m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$
l	.2.	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
k	.2.	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
j	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
i	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
h	2.mm	$m_{x\bar{y}}m_{x\bar{y}}2_z$ $m_{x\bar{y}}m_{x\bar{y}}2_z$ $m_{x\bar{y}}m_{x\bar{y}}2_z$ $m_{x\bar{y}}m_{x\bar{y}}2_z$
g	4..	$4_z$ $4_z$ $4_z$ $4_z$
f	..2/m	$2_{xy}/m_{x\bar{y}}$ $2_{xy}/m_{x\bar{y}}$ $2_{x\bar{y}}/m_{xy}$ $2_{x\bar{y}}/m_{xy}$
e	..2/m	$2_{xy}/m_{x\bar{y}}$ $2_{xy}/m_{x\bar{y}}$ $2_{x\bar{y}}/m_{xy}$ $2_{x\bar{y}}/m_{xy}$
d	$\bar{4}2m$	$\bar{4}_z2_xm_{xy}$ $\bar{4}_z2_xm_{xy}$
c	$\bar{4}2m$	$\bar{4}_z2_xm_{xy}$ $\bar{4}_z2_xm_{xy}$
b	422	$4_z2_x2_xy$ $4_z2_x2_xy$
a	422	$4_z2_x2_xy$ $4_z2_x2_xy$

### No. 125 $P4/n2/b2/m$ (origin choice 2)

n	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
m	..m	$m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$
l	.2.	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
k	.2.	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
j	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
i	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
h	2.mm	$m_{x\bar{y}}m_{x\bar{y}}2_z$ $m_{x\bar{y}}m_{x\bar{y}}2_z$ $m_{x\bar{y}}m_{x\bar{y}}2_z$ $m_{x\bar{y}}m_{x\bar{y}}2_z$
g	4..	$4_z$ $4_z$ $4_z$ $4_z$
f	..2/m	$2_{xy}/m_{x\bar{y}}$ $2_{xy}/m_{x\bar{y}}$ $2_{x\bar{y}}/m_{xy}$ $2_{x\bar{y}}/m_{xy}$
e	..2/m	$2_{xy}/m_{x\bar{y}}$ $2_{xy}/m_{x\bar{y}}$ $2_{x\bar{y}}/m_{xy}$ $2_{x\bar{y}}/m_{xy}$
d	$\bar{4}2m$	$\bar{4}_z2_xm_{xy}$ $\bar{4}_z2_xm_{xy}$
c	$\bar{4}2m$	$\bar{4}_z2_xm_{xy}$ $\bar{4}_z2_xm_{xy}$
b	422	$4_z2_x2_xy$ $4_z2_x2_xy$
a	422	$4_z2_x2_xy$ $4_z2_x2_xy$

### No. 126 $P4/n2/n2/c$ (origin choice 1)

k	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
j	.2.	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
i	.2.	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
h	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$

g	2..	$2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$
f	$\bar{1}$	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
e	4..	$4_x$ $4_x$ $4_x$ $4_x$
d	$\bar{4}$ ..	$\bar{4}_x$ $\bar{4}_x$ $\bar{4}_x$ $\bar{4}_x$
c	222.	$2_x 2_y 2_x$ $2_x 2_y 2_x$ $2_x 2_y 2_x$ $2_x 2_y 2_x$
b	422	$4_x 2_y 2_x y$ $4_x 2_x 2_x y$
a	422	$4_x 2_x 2_x y$ $4_x 2_x 2_x y$

### No. 126 $P4/n\ 2/n\ 2/c$ (origin choice 2)

k	1	$1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$
j	.2.	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
i	.2.	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
h	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
g	2..	$2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$
f	$\bar{1}$	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
e	4..	$4_x$ $4_x$ $4_x$ $4_x$
d	$\bar{4}$ ..	$\bar{4}_x$ $\bar{4}_x$ $\bar{4}_x$ $\bar{4}_x$
c	222.	$2_x 2_y 2_x$ $2_x 2_y 2_x$ $2_x 2_y 2_x$ $2_x 2_y 2_x$
b	422	$4_x 2_x 2_x y$ $4_x 2_x 2_x y$
a	422	$4_x 2_x 2_x y$ $4_x 2_x 2_x y$

### No. 127 $P4/m\ 2_1/b\ 2/m$

l	1	$1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$
k	..m	$m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$
j	m..	$m_x$ $m_x$ $m_z$ $m_z$ $m_x$ $m_x$ $m_z$ $m_z$
i	m..	$m_x$ $m_x$ $m_z$ $m_z$ $m_x$ $m_x$ $m_z$ $m_z$
h	m.2m	$m_{x\bar{y}} 2_{xy} m_x$ $m_{x\bar{y}} 2_{xy} m_x$ $2_{x\bar{y}} m_{xy} m_x$ $2_{x\bar{y}} m_{xy} m_x$
g	m.2m	$m_{x\bar{y}} 2_{xy} m_x$ $m_{x\bar{y}} 2_{xy} m_x$ $2_{x\bar{y}} m_{xy} m_x$ $2_{x\bar{y}} m_{xy} m_x$
f	2.mm	$m_{x\bar{y}} m_{xy} 2_z$ $m_{x\bar{y}} m_{xy} 2_z$ $m_{x\bar{y}} m_{xy} 2_z$ $m_{x\bar{y}} m_{xy} 2_z$
e	4..	$4_x$ $4_x$ $4_x$ $4_x$
d	m.mm	$m_{x\bar{y}} m_{xy} m_z$ $m_{x\bar{y}} m_{xy} m_z$
c	m.mm	$m_{x\bar{y}} m_{xy} m_z$ $m_{x\bar{y}} m_{xy} m_z$
b	4/m..	$4_x / m_x$ $4_x / m_x$
a	4/m..	$4_x / m_x$ $4_x / m_x$

### No. 128 $P4/m\ 2_1/n\ 2/c$

i	1	$1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$
h	m..	$m_x$ $m_x$ $m_z$ $m_z$ $m_x$ $m_x$ $m_z$ $m_z$

g	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
f	2..	$2_z$ $2_z$ $2_z$ $2_z$ $2_z$ $2_z$ $2_z$ $2_z$
e	4..	$4_z$ $4_z$ $4_z$ $4_z$
d	2.22	$2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$
c	2/m..	$2_z/m_z$ $2_z/m_z$ $2_z/m_z$ $2_z/m_z$
b	4/m..	$4_z/m_z$ $4_z/m_z$
a	4/m..	$4_z/m_z$ $4_z/m_z$

### No. 129 $P4/n 2_1/m 2/m$ (origin choice 1)

k	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
j	..m	$m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$
i	.m.	$m_x$ $m_x$ $m_y$ $m_y$ $m_x$ $m_x$ $m_y$ $m_y$
h	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
g	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
f	2mm.	$m_xm_y2_z$ $m_xm_y2_z$ $m_xm_y2_z$ $m_xm_y2_z$
e	..2/m	$2_{xy}/m_{x\bar{y}}$ $2_{xy}/m_{x\bar{y}}$ $2_{x\bar{y}}/m_{xy}$ $2_{x\bar{y}}/m_{xy}$
d	..2/m	$2_{xy}/m_{x\bar{y}}$ $2_{xy}/m_{x\bar{y}}$ $2_{x\bar{y}}/m_{xy}$ $2_{x\bar{y}}/m_{xy}$
c	4mm	$4_zm_xm_{x\bar{y}}$ $4_zm_xm_{x\bar{y}}$
b	$\bar{4}m2$	$\bar{4}_zm_x2_{xy}$ $\bar{4}_zm_x2_{xy}$
a	$\bar{4}m2$	$\bar{4}_zm_x2_{xy}$ $\bar{4}_zm_x2_{xy}$

### No. 129 $P4/n 2_1/m 2/m$ (origin choice 2)

k	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
j	..m	$m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$
i	.m.	$m_x$ $m_x$ $m_y$ $m_y$ $m_x$ $m_x$ $m_y$ $m_y$
h	..2	$2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$
g	..2	$2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$
f	2mm.	$m_xm_y2_z$ $m_xm_y2_z$ $m_xm_y2_z$ $m_xm_y2_z$
e	..2/m	$2_{x\bar{y}}/m_{xy}$ $2_{x\bar{y}}/m_{xy}$ $2_{xy}/m_{x\bar{y}}$ $2_{xy}/m_{x\bar{y}}$
d	..2/m	$2_{x\bar{y}}/m_{xy}$ $2_{x\bar{y}}/m_{xy}$ $2_{xy}/m_{x\bar{y}}$ $2_{xy}/m_{x\bar{y}}$
c	4mm	$4_zm_xm_{x\bar{y}}$ $4_zm_xm_{x\bar{y}}$
b	$\bar{4}m2$	$\bar{4}_zm_x2_{xy}$ $\bar{4}_zm_x2_{xy}$
a	$\bar{4}m2$	$\bar{4}_zm_x2_{xy}$ $\bar{4}_zm_x2_{xy}$

### No. 130 $P4/n 2_1/c 2/c$ (origin choice 1)

g	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
f	..2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$

e	2..	$2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$
d	$\bar{1}$	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
c	4..	$4_x$ $4_x$ $4_x$ $4_x$
b	$\bar{4}$ ..	$\bar{4}_x$ $\bar{4}_x$ $\bar{4}_x$ $\bar{4}_x$
a	2..22	$2_x \bar{y} 2_{xy} 2_x$ $2_x \bar{y} 2_{xy} 2_x$ $2_x \bar{y} 2_{xy} 2_x$ $2_x \bar{y} 2_{xy} 2_x$

### No. 130 $P4/n 2_1/c 2/c$ (origin choice 2)

g	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
f	..2	$2_x \bar{y}$ $2_{xy}$ $2_{xy}$ $2_{xy}$ $2_x \bar{y}$ $2_x \bar{y}$ $2_x \bar{y}$ $2_x \bar{y}$
e	2..	$2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$ $2_x$
d	$\bar{1}$	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
c	4..	$4_x$ $4_x$ $4_x$ $4_x$
b	$\bar{4}$ ..	$\bar{4}_x$ $\bar{4}_x$ $\bar{4}_x$ $\bar{4}_x$
a	2..22	$2_x \bar{y} 2_{xy} 2_x$ $2_x \bar{y} 2_{xy} 2_x$ $2_x \bar{y} 2_{xy} 2_x$ $2_x \bar{y} 2_{xy} 2_x$

### No. 131 $P4_2/m 2/m 2/c$

r	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
q	m..	$m_x$ $m_x$ $m_x$ $m_x$ $m_x$ $m_x$ $m_x$ $m_x$
p	.m.	$m_x$ $m_x$ $m_y$ $m_y$ $m_x$ $m_x$ $m_y$ $m_y$
o	.m.	$m_x$ $m_x$ $m_y$ $m_y$ $m_x$ $m_x$ $m_y$ $m_y$
n	..2	$2_{xy}$ $2_{xy}$ $2_x \bar{y}$ $2_x \bar{y}$ $2_{xy}$ $2_{xy}$ $2_x \bar{y}$ $2_x \bar{y}$
m	m2m.	$2_x m_y m_x$ $2_x m_y m_x$ $m_x 2_y m_x$ $m_x 2_y m_x$
l	m2m.	$2_x m_y m_x$ $2_x m_y m_x$ $m_x 2_y m_x$ $m_x 2_y m_x$
k	m2m.	$2_x m_y m_x$ $2_x m_y m_x$ $m_x 2_y m_x$ $m_x 2_y m_x$
j	m2m.	$2_x m_y m_x$ $2_x m_y m_x$ $m_x 2_y m_x$ $m_x 2_y m_x$
i	2mm.	$m_x m_y 2_x$ $m_x m_y 2_x$ $m_x m_y 2_x$ $m_x m_y 2_x$
h	2mm.	$m_x m_y 2_x$ $m_x m_y 2_x$ $m_x m_y 2_x$ $m_x m_y 2_x$
g	2mm.	$m_x m_y 2_x$ $m_x m_y 2_x$ $m_x m_y 2_x$ $m_x m_y 2_x$
f	$\bar{4}m2$	$\bar{4}_x m_x 2_{xy}$ $\bar{4}_x m_x 2_{xy}$
e	$\bar{4}m2$	$\bar{4}_x m_x 2_{xy}$ $\bar{4}_x m_x 2_{xy}$
d	mmm.	$m_x m_y m_x$ $m_x m_y m_x$
c	mmm.	$m_x m_y m_x$ $m_x m_y m_x$
b	mmm.	$m_x m_y m_x$ $m_x m_y m_x$
a	mmm.	$m_x m_y m_x$ $m_x m_y m_x$

### No. 132 $P4_2/m 2/c 2/m$

p	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
o	..m	$m_x \bar{y}$ $m_x \bar{y}$ $m_{xy}$ $m_{xy}$ $m_{xy}$ $m_{xy}$ $m_x \bar{y}$ $m_x \bar{y}$



d	$\bar{4}$ . .	$\bar{4}_z$ $\bar{4}_z$ $\bar{4}_z$ $\bar{4}_z$
c	2 . 22	$2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$
b	222 .	$2_x2_y2_z$ $2_x2_y2_z$ $2_x2_y2_z$ $2_x2_y2_z$
a	222 .	$2_x2_y2_z$ $2_x2_y2_z$ $2_x2_y2_z$ $2_x2_y2_z$

### No. 134 $P4_2/n\ 2/n\ 2/m$ (origin choice 1)

n	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
m	. . m	$m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$
l	. . 2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
k	. . 2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
j	. 2 .	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
i	. 2 .	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
h	2 . .	$2_z$ $2_z$ $2_z$ $2_z$ $2_z$ $2_z$ $2_z$ $2_z$
g	2 . mm	$m_{x\bar{y}}m_{xy}2_z$ $m_{x\bar{y}}m_{xy}2_z$ $m_{x\bar{y}}m_{xy}2_z$ $m_{x\bar{y}}m_{xy}2_z$
f	. . 2/m	$2_{x\bar{y}}/m_{x\bar{y}}$ $2_{x\bar{y}}/m_{x\bar{y}}$ $2_{xy}/m_{xy}$ $2_{xy}/m_{xy}$
e	. . 2/m	$2_{x\bar{y}}/m_{x\bar{y}}$ $2_{x\bar{y}}/m_{x\bar{y}}$ $2_{xy}/m_{xy}$ $2_{xy}/m_{xy}$
d	2 . 22	$2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$
c	222 .	$2_x2_y2_z$ $2_x2_y2_z$ $2_x2_y2_z$ $2_x2_y2_z$
b	$\bar{4}2m$	$\bar{4}_z2_xm_{xy}$ $\bar{4}_z2_xm_{xy}$
a	$\bar{4}2m$	$\bar{4}_z2_ym_{xy}$ $\bar{4}_z2_ym_{xy}$

### No. 134 $P4_2/n\ 2/n\ 2/m$ (origin choice 2)

n	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
m	. . m	$m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$ $m_{xy}$ $m_{xy}$ $m_{x\bar{y}}$ $m_{x\bar{y}}$
l	. . 2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
k	. . 2	$2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$ $2_{xy}$ $2_{xy}$ $2_{x\bar{y}}$ $2_{x\bar{y}}$
j	. 2 .	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
i	. 2 .	$2_x$ $2_x$ $2_y$ $2_y$ $2_x$ $2_x$ $2_y$ $2_y$
h	2 . .	$2_z$ $2_z$ $2_z$ $2_z$ $2_z$ $2_z$ $2_z$ $2_z$
g	2 . mm	$m_{xy}m_{xy}2_z$ $m_{xy}m_{xy}2_z$ $m_{xy}m_{xy}2_z$ $m_{xy}m_{xy}2_z$
f	. . 2/m	$2_{xy}/m_{xy}$ $2_{xy}/m_{xy}$ $2_{x\bar{y}}/m_{x\bar{y}}$ $2_{x\bar{y}}/m_{x\bar{y}}$
e	. . 2/m	$2_{xy}/m_{xy}$ $2_{xy}/m_{xy}$ $2_{x\bar{y}}/m_{x\bar{y}}$ $2_{x\bar{y}}/m_{x\bar{y}}$
d	2 . 22	$2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$ $2_{x\bar{y}}2_{xy}2_z$
c	222 .	$2_x2_y2_z$ $2_x2_y2_z$ $2_x2_y2_z$ $2_x2_y2_z$
b	$\bar{4}2m$	$\bar{4}_z2_xm_{xy}$ $\bar{4}_z2_xm_{xy}$
a	$\bar{4}2m$	$\bar{4}_z2_ym_{xy}$ $\bar{4}_z2_ym_{xy}$

No. 135  $P4_2/m\ 2_1/b\ 2/c$ 

i	1	$\boxed{1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1}$
h	m..	$\boxed{m_x\ m_x\ m_x\ m_x\ m_x\ m_x\ m_x\ m_x}$
g	..2	$\boxed{2_{xy}\ 2_{xy}\ 2_{x\bar{y}}\ 2_{x\bar{y}}\ 2_{xy}\ 2_{xy}\ 2_{x\bar{y}}\ 2_{x\bar{y}}}$
f	2..	$\boxed{2_x\ 2_x\ 2_x\ 2_x\ 2_x\ 2_x\ 2_x\ 2_x}$
e	2..	$\boxed{2_x\ 2_x\ 2_x\ 2_x\ 2_x\ 2_x\ 2_x\ 2_x}$
d	2.22	$\boxed{2_{x\bar{y}}2_{xy}2_x\ 2_{x\bar{y}}2_{xy}2_x\ 2_{x\bar{y}}2_{xy}2_x\ 2_{x\bar{y}}2_{xy}2_x}$
c	2/m..	$\boxed{2_x/m_x\ 2_x/m_x\ 2_x/m_x\ 2_x/m_x}$
b	$\bar{4}$ ..	$\boxed{\bar{4}_x\ \bar{4}_x\ \bar{4}_x\ \bar{4}_x}$
a	2/m..	$\boxed{2_x/m_x\ 2_x/m_x\ 2_x/m_x\ 2_x/m_x}$

No. 136  $P4_2/m\ 2_1/n\ 2/m$ 

k	1	$\boxed{1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1}$
j	..m	$\boxed{m_{x\bar{y}}\ m_{x\bar{y}}\ m_{xy}\ m_{xy}\ m_{x\bar{y}}\ m_{x\bar{y}}\ m_{xy}\ m_{xy}}$
i	m..	$\boxed{m_x\ m_x\ m_x\ m_x\ m_x\ m_x\ m_x\ m_x}$
h	2..	$\boxed{2_x\ 2_x\ 2_x\ 2_x\ 2_x\ 2_x\ 2_x\ 2_x}$
g	m.2m	$\boxed{2_{x\bar{y}}m_{xy}m_x\ 2_{x\bar{y}}m_{xy}m_x\ m_{x\bar{y}}2_{xy}m_x\ m_{x\bar{y}}2_{xy}m_x}$
f	m.2m	$\boxed{m_{x\bar{y}}2_{xy}m_x\ m_{x\bar{y}}2_{xy}m_x\ 2_{x\bar{y}}m_{xy}m_x\ 2_{x\bar{y}}m_{xy}m_x}$
e	2.nm	$\boxed{m_{x\bar{y}}m_{xy}2_x\ m_{x\bar{y}}m_{xy}2_x\ m_{x\bar{y}}m_{xy}2_x\ m_{x\bar{y}}m_{xy}2_x}$
d	$\bar{4}$ ..	$\boxed{\bar{4}_x\ \bar{4}_x\ \bar{4}_x\ \bar{4}_x}$
c	2/m..	$\boxed{2_x/m_x\ 2_x/m_x\ 2_x/m_x\ 2_x/m_x}$
b	m.nm	$\boxed{m_{x\bar{y}}m_{xy}m_x\ m_{x\bar{y}}m_{xy}m_x}$
a	m.nm	$\boxed{m_{x\bar{y}}m_{xy}m_x\ m_{x\bar{y}}m_{xy}m_x}$

No. 137  $P4_2/n\ 2_1/m\ 2/c$  (origin choice 1)

h	1	$\boxed{1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1}$
g	.m.	$\boxed{m_x\ m_x\ m_y\ m_y\ m_x\ m_x\ m_y\ m_y}$
f	..2	$\boxed{2_{xy}\ 2_{xy}\ 2_{x\bar{y}}\ 2_{x\bar{y}}\ 2_{xy}\ 2_{xy}\ 2_{x\bar{y}}\ 2_{x\bar{y}}}$
e	$\bar{1}$	$\boxed{\bar{1}\ \bar{1}\ \bar{1}\ \bar{1}\ \bar{1}\ \bar{1}\ \bar{1}\ \bar{1}}$
d	2mm.	$\boxed{m_xm_y2_x\ m_xm_y2_x\ m_xm_y2_x\ m_xm_y2_x}$
c	2mm.	$\boxed{m_xm_y2_x\ m_xm_y2_x\ m_xm_y2_x\ m_xm_y2_x}$
b	$\bar{4}m2$	$\boxed{\bar{4}_x m_x 2_{xy}\ \bar{4}_x m_x 2_{xy}}$
a	$\bar{4}m2$	$\boxed{\bar{4}_x m_x 2_{xy}\ \bar{4}_x m_x 2_{xy}}$

No. 137  $P4_2/n\ 2_1/m\ 2/c$  (origin choice 2)

h	1	$\boxed{1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1}$
g	.m.	$\boxed{m_x\ m_x\ m_y\ m_y\ m_x\ m_x\ m_y\ m_y}$
f	..2	$\boxed{2_{x\bar{y}}\ 2_{x\bar{y}}\ 2_{xy}\ 2_{xy}\ 2_{x\bar{y}}\ 2_{x\bar{y}}\ 2_{xy}\ 2_{xy}}$

e	$\bar{1}$	$\bar{1} \bar{1} \bar{1} \bar{1} \bar{1} \bar{1} \bar{1} \bar{1}$
d	$2mm$	$m_x m_y 2_x \quad m_x m_y 2_x \quad m_x m_y 2_x \quad m_x m_y 2_x$
c	$2mm$	$m_x m_y 2_x \quad m_x m_y 2_x \quad m_x m_y 2_x \quad m_x m_y 2_x$
b	$\bar{4}m2$	$\bar{4}_x m_x 2_{xy} \quad \bar{4}_x m_x 2_{xy}$
a	$\bar{4}m2$	$\bar{4}_z m_x 2_{xy} \quad \bar{4}_z m_x 2_{xy}$

### No. 138 $P4_2/n 2_1/c 2/m$ (origin choice 1)

j	1	$1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1$
i	$..m$	$m_x \bar{y} \quad m_x \bar{y} \quad m_x y \quad m_x y \quad m_x \bar{y} \quad m_x \bar{y} \quad m_x y \quad m_x y \quad m_x \bar{y} \quad m_x \bar{y}$
h	$..2$	$2_{xy} \quad 2_{xy} \quad 2_{x\bar{y}} \quad 2_{x\bar{y}} \quad 2_{xy} \quad 2_{xy} \quad 2_{x\bar{y}} \quad 2_{x\bar{y}} \quad 2_{xy} \quad 2_{xy}$
g	$..2$	$2_{xy} \quad 2_{xy} \quad 2_{x\bar{y}} \quad 2_{x\bar{y}} \quad 2_{xy} \quad 2_{xy} \quad 2_{x\bar{y}} \quad 2_{x\bar{y}}$
f	$2..$	$2_x \quad 2_x \quad 2_x \quad 2_x \quad 2_x \quad 2_x \quad 2_x \quad 2_x$
e	$2.mmm$	$m_x \bar{y} m_x y 2_x \quad m_x \bar{y} m_x y 2_x \quad m_x \bar{y} m_x y 2_x \quad m_x \bar{y} m_x y 2_x$
d	$..2/m$	$2_{xy}/m_x y \quad 2_{xy}/m_x y \quad 2_{x\bar{y}}/m_x \bar{y} \quad 2_{x\bar{y}}/m_x \bar{y}$
c	$..2/m$	$2_{xy}/m_x y \quad 2_{xy}/m_x y \quad 2_{x\bar{y}}/m_x \bar{y} \quad 2_{x\bar{y}}/m_x \bar{y}$
b	$\bar{4}..$	$\bar{4}_x \quad \bar{4}_x \quad \bar{4}_x \quad \bar{4}_x$
a	$2.22$	$2_{x\bar{y}} 2_{xy} 2_x \quad 2_{x\bar{y}} 2_{xy} 2_x \quad 2_{x\bar{y}} 2_{xy} 2_x \quad 2_{x\bar{y}} 2_{xy} 2_x$

### No. 138 $P4_2/n 2_1/c 2/m$ (origin choice 2)

j	1	$1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1$
i	$..m$	$m_x \bar{y} \quad m_x \bar{y} \quad m_x y \quad m_x y \quad m_x \bar{y} \quad m_x \bar{y} \quad m_x y \quad m_x y \quad m_x \bar{y} \quad m_x \bar{y}$
h	$..2$	$2_{x\bar{y}} \quad 2_{x\bar{y}} \quad 2_{xy} \quad 2_{xy} \quad 2_{x\bar{y}} \quad 2_{x\bar{y}} \quad 2_{xy} \quad 2_{xy}$
g	$..2$	$2_{x\bar{y}} \quad 2_{x\bar{y}} \quad 2_{xy} \quad 2_{xy} \quad 2_{x\bar{y}} \quad 2_{x\bar{y}} \quad 2_{xy} \quad 2_{xy}$
f	$2..$	$2_x \quad 2_x \quad 2_x \quad 2_x \quad 2_x \quad 2_x \quad 2_x \quad 2_x$
e	$2.mmm$	$m_x \bar{y} m_x y 2_x \quad m_x \bar{y} m_x y 2_x \quad m_x \bar{y} m_x y 2_x \quad m_x \bar{y} m_x y 2_x$
d	$..2/m$	$2_{x\bar{y}}/m_x \bar{y} \quad 2_{x\bar{y}}/m_x \bar{y} \quad 2_{xy}/m_x y \quad 2_{xy}/m_x y$
c	$..2/m$	$2_{x\bar{y}}/m_x \bar{y} \quad 2_{x\bar{y}}/m_x \bar{y} \quad 2_{xy}/m_x y \quad 2_{xy}/m_x y$
b	$\bar{4}..$	$\bar{4}_x \quad \bar{4}_x \quad \bar{4}_x \quad \bar{4}_x$
a	$2.22$	$2_{x\bar{y}} 2_{xy} 2_x \quad 2_{x\bar{y}} 2_{xy} 2_x \quad 2_{x\bar{y}} 2_{xy} 2_x \quad 2_{x\bar{y}} 2_{xy} 2_x$

### No. 139 $I4/m 2/m 2/m$

o	1	$1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1$
n	$.m$	$m_x \quad m_x \quad m_y \quad m_y \quad m_x \quad m_x \quad m_y \quad m_y$
m	$..m$	$m_x \bar{y} \quad m_x \bar{y} \quad m_x y \quad m_x y \quad m_x \bar{y} \quad m_x \bar{y} \quad m_x y \quad m_x y$
l	$m..$	$m_z \quad m_z \quad m_z \quad m_z \quad m_z \quad m_z \quad m_z \quad m_z$
k	$..2$	$2_{xy} \quad 2_{xy} \quad 2_{x\bar{y}} \quad 2_{x\bar{y}} \quad 2_{xy} \quad 2_{xy} \quad 2_{x\bar{y}} \quad 2_{x\bar{y}}$
j	$m2m$	$2_x m_y m_z \quad 2_x m_y m_z \quad m_x 2_y m_z \quad m_x 2_y m_z$

i	$m2m$ .	$2_x m_y m_z$	$2_x m_y m_z$	$m_x 2_y m_z$	$m_x 2_y m_z$	
h	$m$ .	$2m$	$m_x \bar{y} 2_x y m_z$	$m_x \bar{y} 2_x y m_z$	$2_x \bar{y} m_x y m_z$	$2_x \bar{y} m_x y m_z$
g	$2mm$ .	$m_x m_y 2_x$	$m_x m_y 2_x$	$m_x m_y 2_x$	$m_x m_y 2_x$	
f	$. . 2/m$	$2_x \bar{y} / m_x \bar{y}$	$2_x \bar{y} / m_x \bar{y}$	$2_x y / m_x y$	$2_x y / m_x y$	
e	$4mm$	$4_x m_x m_x y$	$4_x m_x m_x y$			
d	$\bar{4}m2$	$\bar{4}_x m_x 2_x y$	$\bar{4}_x m_x 2_x y$			
c	$mmm$ .	$m_x m_y m_z$	$m_x m_y m_z$			
b	$4/mmm$	$4_x / m_x m_x m_x y$				
a	$4/mmm$	$4_x / m_x m_x m_x y$				

No. 140  $I4/m 2/c 2/m$ 

m	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
l	$. . m$	$m_x \bar{y}$	$m_x \bar{y}$	$m_x y$	$m_x y$	$m_x y$	$m_x y$	$m_x \bar{y}$	$m_x \bar{y}$	$m_x \bar{y}$	$m_x \bar{y}$						
k	$m . .$	$m_z$	$m_z$	$m_z$	$m_z$	$m_z$	$m_z$	$m_z$	$m_z$								
j	$. 2 .$	$2_x$	$2_x$	$2_y$	$2_x$	$2_x$	$2_y$	$2_y$									
i	$. . 2$	$2_x y$	$2_x y$	$2_x \bar{y}$	$2_x \bar{y}$	$2_x y$	$2_x y$	$2_x \bar{y}$	$2_x \bar{y}$								
h	$m$ .	$2m$	$m_x \bar{y} 2_x y m_z$	$m_x \bar{y} 2_x y m_z$	$2_x \bar{y} m_x y m_z$	$2_x \bar{y} m_x y m_z$											
g	$2 . mm$	$m_x \bar{y} m_x y 2_x$	$m_x \bar{y} m_x y 2_x$	$m_x \bar{y} m_x y 2_x$	$m_x \bar{y} m_x y 2_x$	$m_x \bar{y} m_x y 2_x$											
f	$4 . .$	$4_x$	$4_x$	$4_x$	$4_x$												
e	$. . 2/m$	$2_x y / m_x y$	$2_x y / m_x y$	$2_x \bar{y} / m_x \bar{y}$	$2_x \bar{y} / m_x \bar{y}$												
d	$m . mm$	$m_x \bar{y} m_x y m_z$	$m_x \bar{y} m_x y m_z$														
c	$4/m . .$	$4_x / m_z$	$4_x / m_z$														
b	$\bar{4}2m$	$\bar{4}_x 2_x m_x y$	$\bar{4}_x 2_x m_x y$														
a	$422$	$4_x 2_x 2_x y$	$4_x 2_x 2_x y$														

No. 141  $I4_1/a 2/m 2/d$  (origin choice 1)

i	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
h	$. m$ .	$m_x$	$m_x$	$m_y$	$m_y$	$m_x$	$m_x$	$m_y$	$m_y$								
g	$. . 2$	$2_x y$	$2_x y$	$2_x \bar{y}$	$2_x \bar{y}$	$2_x y$	$2_x y$	$2_x \bar{y}$	$2_x \bar{y}$								
f	$. 2 .$	$2_x$	$2_x$	$2_y$	$2_x$	$2_x$	$2_y$	$2_y$									
e	$2mm$ .	$m_x m_y 2_x$	$m_x m_y 2_x$	$m_x m_y 2_x$	$m_x m_y 2_x$												
d	$. 2/m$ .	$2_x / m_x$	$2_x / m_x$	$2_y / m_y$	$2_y / m_y$												
c	$. 2/m$ .	$2_x / m_x$	$2_x / m_x$	$2_y / m_y$	$2_y / m_y$												
b	$\bar{4}m2$	$\bar{4}_x m_x 2_x y$	$\bar{4}_x m_x 2_x y$														
a	$\bar{4}m2$	$\bar{4}_x m_x 2_x y$	$\bar{4}_x m_x 2_x y$														

No. 141  $I4_1/a 2/m 2/d$  (origin choice 2)

i	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
h	.m.	$\boxed{m_x} \boxed{m_x} \boxed{m_y} \boxed{m_y} \boxed{m_x} \boxed{m_x} \boxed{m_y} \boxed{m_y}$
g	..2	$\boxed{2_{xy}} \boxed{2_{xy}} \boxed{2_{x\bar{y}}} \boxed{2_{x\bar{y}}} \boxed{2_{xy}} \boxed{2_{xy}} \boxed{2_{x\bar{y}}} \boxed{2_{x\bar{y}}}$
f	.2.	$\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y}$
e	2mm.	$\boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$
d	.2/m.	$\boxed{2_x/m_x} \boxed{2_x/m_x} \boxed{2_y/m_y} \boxed{2_y/m_y}$
c	.2/m.	$\boxed{2_x/m_x} \boxed{2_x/m_x} \boxed{2_y/m_y} \boxed{2_y/m_y}$
b	$\bar{4}m2$	$\boxed{\bar{4}_x m_x 2_{xy}} \boxed{\bar{4}_x m_x 2_{xy}}$
a	$\bar{4}m2$	$\boxed{\bar{4}_x m_x 2_{xy}} \boxed{\bar{4}_x m_x 2_{xy}}$

### No. 142 $I4_1/a\ 2/c\ 2/d$ (origin choice 1)

g	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
f	..2	$\boxed{2_{xy}} \boxed{2_{xy}} \boxed{2_{x\bar{y}}} \boxed{2_{x\bar{y}}} \boxed{2_{xy}} \boxed{2_{xy}} \boxed{2_{x\bar{y}}} \boxed{2_{x\bar{y}}}$
e	.2.	$\boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x}$
d	2..	$\boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x}$
c	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$
b	2.22	$\boxed{2_{x\bar{y}} 2_{xy} 2_x} \boxed{2_{x\bar{y}} 2_{xy} 2_x} \boxed{2_{x\bar{y}} 2_{xy} 2_x} \boxed{2_{x\bar{y}} 2_{xy} 2_x}$
a	$\bar{4}..$	$\boxed{\bar{4}_x} \boxed{\bar{4}_x} \boxed{\bar{4}_x} \boxed{\bar{4}_x}$

### No. 142 $I4_1/a\ 2/c\ 2/d$ (origin choice 2)

g	1	$\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$
f	..2	$\boxed{2_{xy}} \boxed{2_{xy}} \boxed{2_{x\bar{y}}} \boxed{2_{x\bar{y}}} \boxed{2_{xy}} \boxed{2_{xy}} \boxed{2_{x\bar{y}}} \boxed{2_{x\bar{y}}}$
e	.2.	$\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y}$
d	2..	$\boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x}$
c	$\bar{1}$	$\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$
b	2.22	$\boxed{2_{x\bar{y}} 2_{xy} 2_x} \boxed{2_{x\bar{y}} 2_{xy} 2_x} \boxed{2_{x\bar{y}} 2_{xy} 2_x} \boxed{2_{x\bar{y}} 2_{xy} 2_x}$
a	$\bar{4}..$	$\boxed{\bar{4}_x} \boxed{\bar{4}_x} \boxed{\bar{4}_x} \boxed{\bar{4}_x}$

### No. 143 $P3$

d	1	$\boxed{1} \boxed{1} \boxed{1}$
c	3..	$\boxed{3_x}$
b	3..	$\boxed{3_x}$
a	3..	$\boxed{3_x}$

### No. 144 $P3_1$

a	1	$\boxed{1} \boxed{1} \boxed{1}$
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### No. 145 $P3_2$

a	1	$\boxed{1} \boxed{1} \boxed{1}$
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### No. 146 $R3$ (hexagonal axes)

b 1  $\boxed{1} \boxed{1} \boxed{1}$   
 a 3.  $\boxed{3_2}$

No. 146  $R\bar{3}$  (rhombohedral axes)

b 1  $\boxed{R1} \boxed{R1} \boxed{R1}$   
 a 3.  $\boxed{R3_p}$

No. 147  $P\bar{3}$

g 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$   
 f  $\bar{1}$   $\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$   
 e  $\bar{1}$   $\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$   
 d 3..  $\boxed{3_2} \boxed{3_2}$   
 c 3..  $\boxed{3_2} \boxed{3_2}$   
 b  $\bar{3}..$   $\boxed{\bar{3}_2}$   
 a  $\bar{3}..$   $\boxed{\bar{3}_2}$

No. 148  $R\bar{3}$  (hexagonal axes)

f 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$   
 e  $\bar{1}$   $\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$   
 d  $\bar{1}$   $\boxed{\bar{1}} \boxed{\bar{1}} \boxed{\bar{1}}$   
 c 3.  $\boxed{3_2} \boxed{3_2}$   
 b  $\bar{3}.$   $\boxed{\bar{3}_2}$   
 a  $\bar{3}.$   $\boxed{\bar{3}_2}$

No. 148  $R\bar{3}$  (rhombohedral axes)

f 1  $\boxed{R1} \boxed{R1} \boxed{R1} \boxed{R1} \boxed{R1} \boxed{R1}$   
 e  $\bar{1}$   $\boxed{R\bar{1}} \boxed{R\bar{1}} \boxed{R\bar{1}}$   
 d  $\bar{1}$   $\boxed{R\bar{1}} \boxed{R\bar{1}} \boxed{R\bar{1}}$   
 c 3.  $\boxed{R3_p} \boxed{R3_p}$   
 b  $\bar{3}.$   $\boxed{R\bar{3}_p}$   
 a  $\bar{3}.$   $\boxed{R\bar{3}_p}$

No. 149  $P312$

l 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$   
 k ..2  $\boxed{2_{y'}} \boxed{2_{y'}} \boxed{2_{y'}}$   
 j ..2  $\boxed{2_{y''}} \boxed{2_{y''}} \boxed{2_{y''}}$   
 i 3..  $\boxed{3_x} \boxed{3_x}$   
 h 3..  $\boxed{3_x} \boxed{3_x}$   
 g 3..  $\boxed{3_x} \boxed{3_x}$

f	3.2	$3_2 2_y$
e	3.2	$3_2 2_y$
d	3.2	$3_2 2_y$
c	3.2	$3_2 2_y$
b	3.2	$3_2 2_y$
a	3.2	$3_2 2_y$

**No. 150**  $P321$ 

g	1	$1\ 1\ 1\ 1\ 1\ 1\ 1$
f	.2.	$2_x\ 2_{x'}\ 2_{x''}$
e	.2.	$2_x\ 2_{x'}\ 2_{x''}$
d	3..	$3_x\ 3_x$
c	3..	$3_x\ 3_x$
b	32.	$3_2 2_x$
a	32.	$3_2 2_x$

**No. 151**  $P3_1 12$ 

c	1	$1\ 1\ 1\ 1\ 1\ 1\ 1$
b	..2	$2_{y''}\ 2_y\ 2_{y'}$
a	..2	$2_{y''}\ 2_y\ 2_{y'}$

**No. 152**  $P3_1 21$ 

c	1	$1\ 1\ 1\ 1\ 1\ 1\ 1$
b	.2.	$2_x\ 2_{x'}\ 2_{x''}$
a	.2.	$2_x\ 2_{x'}\ 2_{x''}$

**No. 153**  $P3_2 12$ 

c	1	$1\ 1\ 1\ 1\ 1\ 1\ 1$
b	..2	$2_{y''}\ 2_y\ 2_{y'}$
a	..2	$2_{y''}\ 2_y\ 2_{y'}$

**No. 154**  $P3_2 21$ 

c	1	$1\ 1\ 1\ 1\ 1\ 1\ 1$
b	.2.	$2_x\ 2_{x'}\ 2_{x''}$
a	.2.	$2_x\ 2_{x'}\ 2_{x''}$

**No. 155**  $R32$  (hexagonal axes)

f	1	$1\ 1\ 1\ 1\ 1\ 1\ 1$
e	.2	$2_x\ 2_{x'}\ 2_{x''}$
d	.2	$2_x\ 2_{x'}\ 2_{x''}$
c	3.	$3_x\ 3_x$
b	32	$3_2 2_x$

a 32  $\overline{3_2 2_x}$

### No. 155 $R\overline{3}2$ (rhombohedral axes)

f 1  $R1 \ R1 \ R1 \ R1 \ R1 \ R1$

e .2  $R2_y \bar{z} \ R2_x \bar{z} \ R2_x \bar{y}$

d .2  $R2_y \bar{z} \ R2_x \bar{z} \ R2_x \bar{y}$

c 3.  $R3_p \ R3_p$

b 32  $R3_p \ 2_x \bar{y}$

a 32  $R3_p \ 2_x \bar{y}$

### No. 156 $P\overline{3}m1$

e 1  $1 \ 1 \ 1 \ 1 \ 1 \ 1$

d .m.  $m_x \cdot \cdot \ m_x \cdot \cdot \ m_x \cdot \cdot$

c 3m.  $\overline{3_2 m_x}$

b 3m.  $\overline{3_2 m_x}$

a 3m.  $\overline{3_2 m_x}$

### No. 157 $P\overline{3}1m$

d 1  $1 \ 1 \ 1 \ 1 \ 1 \ 1$

c .m  $m_y \cdot \cdot \ m_y \cdot \cdot \ m_y \cdot \cdot$

b 3..  $\overline{3_x} \ \overline{3_x}$

a 3.m  $\overline{3_2 m_y}$

### No. 158 $P\overline{3}c1$

d 1  $1 \ 1 \ 1 \ 1 \ 1 \ 1$

c 3..  $\overline{3_x} \ \overline{3_x}$

b 3..  $\overline{3_x} \ \overline{3_x}$

a 3..  $\overline{3_x} \ \overline{3_x}$

### No. 159 $P\overline{3}1c$

c 1  $1 \ 1 \ 1 \ 1 \ 1 \ 1$

b 3..  $\overline{3_x} \ \overline{3_x}$

a 3..  $\overline{3_x} \ \overline{3_x}$

### No. 160 $R\overline{3}m$ (hexagonal axes)

c 1  $1 \ 1 \ 1 \ 1 \ 1 \ 1$

b .m  $m_x \cdot \cdot \ m_x \cdot \cdot \ m_x \cdot \cdot$

a 3m  $\overline{3_2 m_x}$

### No. 160 $R\overline{3}m$ (rhombohedral axes)

c 1  $R1 \ R1 \ R1 \ R1 \ R1 \ R1$

b .m  $Rm_x \bar{y} \ Rm_y \bar{z} \ Rm_z \bar{x}$

a 3m  $R\overline{3_p} m_x \bar{y}$

**No. 161 R3c (hexagonal axes)**

b	1	$\overline{1} \ 1 \ 1 \ 1 \ 1 \ 1$
a	3.	$\overline{3}_x \ 3_x$

**No. 161 R3c (rhombohedral axes)**

b	1	$\overline{R1} \ \overline{R1} \ \overline{R1} \ \overline{R1} \ \overline{R1} \ \overline{R1}$
a	3.	$\overline{R3}_p \ \overline{R3}_p$

**No. 162  $P\overline{3}12/m$** 

l	1	$\overline{1} \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1$
k	..m	$\overline{m}_y \ \overline{m}_y \ \overline{m}_y \ \overline{m}_y \ \overline{m}_y \ \overline{m}_y$
j	..2	$\overline{2}_y \ \overline{2}_y \ \overline{2}_y \ \overline{2}_y \ \overline{2}_y \ \overline{2}_y$
i	..2	$\overline{2}_y \ \overline{2}_y \ \overline{2}_y \ \overline{2}_y \ \overline{2}_y \ \overline{2}_y$
h	3..	$\overline{3}_x \ \overline{3}_x \ \overline{3}_x \ \overline{3}_x$
g	..2/m	$\overline{2}_y / \overline{m}_y \ \overline{2}_y / \overline{m}_y \ \overline{2}_y / \overline{m}_y$
f	..2/m	$\overline{2}_y / \overline{m}_y \ \overline{2}_y / \overline{m}_y \ \overline{2}_y / \overline{m}_y$
e	3.m	$\overline{3}_x \overline{m}_y \ \overline{3}_x \overline{m}_y$
d	3.2	$\overline{3}_x \overline{2}_y \ \overline{3}_x \overline{2}_y$
c	3.2	$\overline{3}_x \overline{2}_y \ \overline{3}_x \overline{2}_y$
b	$\overline{3}.m$	$\overline{3}_x \overline{m}_y$
a	$\overline{3}.m$	$\overline{3}_x \overline{m}_y$

**No. 163  $P\overline{3}12/c$** 

i	1	$\overline{1} \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1$
h	..2	$\overline{2}_y \ \overline{2}_y \ \overline{2}_y \ \overline{2}_y \ \overline{2}_y \ \overline{2}_y$
g	$\overline{1}$	$\overline{1} \ \overline{1} \ \overline{1} \ \overline{1} \ \overline{1} \ \overline{1}$
f	3..	$\overline{3}_x \ \overline{3}_x \ \overline{3}_x \ \overline{3}_x$
e	3..	$\overline{3}_x \ \overline{3}_x \ \overline{3}_x \ \overline{3}_x$
d	3.2	$\overline{3}_x \overline{2}_y \ \overline{3}_x \overline{2}_y$
c	3.2	$\overline{3}_x \overline{2}_y \ \overline{3}_x \overline{2}_y$
b	$\overline{3}..$	$\overline{3}_x \ \overline{3}_x$
a	3.2	$\overline{3}_x \overline{2}_y \ \overline{3}_x \overline{2}_y$

**No. 164  $P\overline{3}2/m1$** 

j	1	$\overline{1} \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1 \ 1$
i	.m.	$\overline{m}_x \ \overline{m}_x \ \overline{m}_x \ \overline{m}_x \ \overline{m}_x \ \overline{m}_x$
h	.2.	$\overline{2}_x \ \overline{2}_x \ \overline{2}_x \ \overline{2}_x \ \overline{2}_x \ \overline{2}_x$
g	.2.	$\overline{2}_x \ \overline{2}_x \ \overline{2}_x \ \overline{2}_x \ \overline{2}_x \ \overline{2}_x$
f	.2/m.	$\overline{2}_x / \overline{m}_x \ \overline{2}_x / \overline{m}_x \ \overline{2}_x / \overline{m}_x$

e	.2/m.	$2_x/m_x$ $2_{x'}/m_{x'}$ $2_{x''}/m_{x''}$
d	3m.	$3_x m_x$ $3_x m_x$
c	3m.	$3_x m_x$ $3_x m_x$
b	$\bar{3}m$ .	$\bar{3}_x m_x$
a	$\bar{3}m$ .	$\bar{3}_x m_x$

### No. 165 $P\bar{3}2/c1$

g	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
f	.2.	$2_x$ $2_{x'}$ $2_{x''}$ $2_x$ $2_{x'}$ $2_{x''}$
e	$\bar{1}$	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
d	3..	$3_x$ $3_x$ $3_x$ $3_x$
c	3..	$3_x$ $3_x$ $3_x$ $3_x$
b	$\bar{3}$ ..	$\bar{3}_x$ $\bar{3}_x$
a	32.	$3_x 2_x$ $3_x 2_x$

### No. 166 $R\bar{3}2/m$ (hexagonal axes)

i	1	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
h	.m	$m_{x'}$ $m_x$ $m_{x'}$ $m_x$ $m_{x''}$ $m_x$ $m_x$
g	.2	$2_x$ $2_{x'}$ $2_{x''}$ $2_x$ $2_{x'}$ $2_{x''}$
f	.2	$2_x$ $2_{x'}$ $2_{x''}$ $2_x$ $2_{x'}$ $2_{x''}$
e	.2/m	$2_x/m_x$ $2_{x'}/m_{x'}$ $2_{x''}/m_{x''}$
d	.2/m	$2_x/m_x$ $2_{x'}/m_{x'}$ $2_{x''}/m_{x''}$
c	3m	$3_x m_x$ $3_x m_x$
b	$\bar{3}m$	$\bar{3}_x m_x$
a	$\bar{3}m$	$\bar{3}_x m_x$

### No. 166 $R\bar{3}2/m$ (rhombohedral axes)

i	1	R1 R1 R1 R1 R1 R1 R1 R1 R1 R1 R1 R1 R1
h	.m	$Rm_{x\bar{y}}$ $Rm_{y\bar{x}}$ $Rm_{z\bar{x}}$ $Rm_{y\bar{z}}$ $Rm_{x\bar{z}}$ $Rm_{z\bar{y}}$ $Rm_{z\bar{x}}$
g	.2	$R2_{x\bar{y}}$ $R2_{y\bar{x}}$ $R2_{z\bar{x}}$ $R2_{x\bar{y}}$ $R2_{y\bar{x}}$ $R2_{z\bar{x}}$
f	.2	$R2_{x\bar{y}}$ $R2_{y\bar{x}}$ $R2_{z\bar{x}}$ $R2_{x\bar{y}}$ $R2_{y\bar{x}}$ $R2_{z\bar{x}}$
e	.2/m	$R2_{y\bar{x}}/m_{y\bar{x}}$ $R2_{z\bar{x}}/m_{z\bar{x}}$ $R2_{x\bar{y}}/m_{x\bar{y}}$
d	.2/m	$R2_{y\bar{x}}/m_{y\bar{x}}$ $R2_{z\bar{x}}/m_{z\bar{x}}$ $R2_{x\bar{y}}/m_{x\bar{y}}$
c	3m	$R3_p m_{x\bar{y}}$ $R3_p m_{x\bar{y}}$
b	$\bar{3}m$	$R\bar{3}_p m_{x\bar{y}}$
a	$\bar{3}m$	$R\bar{3}_p m_{x\bar{y}}$

### No. 167 $R\bar{3}2/c$ (hexagonal axes)

f	1	$\overline{1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1}$
e	.2	$\overline{2_x\ 2_{x'}\ 2_{x''}\ 2_x\ 2_{x'}\ 2_{x''}}$
d	$\overline{1}$	$\overline{\overline{1}\ \overline{1}\ \overline{1}\ \overline{1}\ \overline{1}\ \overline{1}}$
c	3.	$\overline{3_x\ 3_x\ 3_x\ 3_x}$
b	$\overline{3}$ .	$\overline{\overline{3_x}\ \overline{3_x}}$
a	32	$\overline{3_x 2_x\ 3_x 2_x}$

### No. 167 $R\overline{3}2/c$ (rhombohedral axes)

f	1	$\overline{R1\ R1\ R1\ R1\ R1\ R1\ R1\ R1\ R1\ R1\ R1\ R1}$
e	.2	$\overline{R2_{xy}\ R2_{y\bar{x}}\ R2_{z\bar{x}}\ R2_{x\bar{y}}\ R2_{y\bar{z}}\ R2_{z\bar{y}}}$
d	$\overline{1}$	$\overline{R\overline{1}\ R\overline{1}\ R\overline{1}\ R\overline{1}\ R\overline{1}\ R\overline{1}}$
c	3.	$\overline{R3_p\ R3_p\ R3_p\ R3_p}$
b	$\overline{3}$ .	$\overline{R\overline{3}_p\ R\overline{3}_p}$
a	32	$\overline{R3_p 2_{xy}\ R3_p 2_{xy}}$

### No. 168 $P6$

d	1	$\overline{1\ 1\ 1\ 1\ 1\ 1\ 1}$
c	2..	$\overline{2_x\ 2_x\ 2_x}$
b	3..	$\overline{3_x\ 3_x}$
a	6..	$\overline{6_x}$

### No. 169 $P6_1$

a	1	$\overline{1\ 1\ 1\ 1\ 1\ 1\ 1}$
---	---	----------------------------------

### No. 170 $P6_5$

a	1	$\overline{1\ 1\ 1\ 1\ 1\ 1\ 1}$
---	---	----------------------------------

### No. 171 $P6_2$

c	1	$\overline{1\ 1\ 1\ 1\ 1\ 1\ 1}$
b	2..	$\overline{2_x\ 2_x\ 2_x}$
a	2..	$\overline{2_x\ 2_x\ 2_x}$

### No. 172 $P6_4$

c	1	$\overline{1\ 1\ 1\ 1\ 1\ 1\ 1}$
b	2..	$\overline{2_x\ 2_x\ 2_x}$
a	2..	$\overline{2_x\ 2_x\ 2_x}$

### No. 173 $P6_3$

c	1	$\overline{1\ 1\ 1\ 1\ 1\ 1\ 1}$
b	3..	$\overline{3_x\ 3_x}$
a	3..	$\overline{3_x\ 3_x}$

### No. 174 $P\overline{6}$

l	1	$\overline{1\ 1\ 1\ 1\ 1\ 1\ 1}$
---	---	----------------------------------

k	m..	$m_z$ $m_z$ $m_z$
j	m..	$m_z$ $m_z$ $m_z$
i	3..	$3_z$ $3_z$
h	3..	$3_z$ $3_z$
g	3..	$3_z$ $3_z$
f	$\bar{6}$ ..	$\bar{6}_z$
e	$\bar{6}$ ..	$\bar{6}_z$
d	$\bar{6}$ ..	$\bar{6}_z$
c	$\bar{6}$ ..	$\bar{6}_z$
b	$\bar{6}$ ..	$\bar{6}_z$
a	$\bar{6}$ ..	$\bar{6}_z$

No. 175  $P6/m$ 

l	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1
k	m..	$m_z$ $m_z$ $m_z$ $m_z$ $m_z$ $m_z$
j	m..	$m_z$ $m_z$ $m_z$ $m_z$ $m_z$ $m_z$
i	2..	$2_z$ $2_z$ $2_z$ $2_z$ $2_z$ $2_z$
h	3..	$3_z$ $3_z$ $3_z$ $3_z$
g	2/m..	$2_z/m_z$ $2_z/m_z$ $2_z/m_z$
f	2/m..	$2_z/m_z$ $2_z/m_z$ $2_z/m_z$
e	6..	$6_z$ $6_z$
d	$\bar{6}$ ..	$\bar{6}_z$ $\bar{6}_z$
c	$\bar{6}$ ..	$\bar{6}_z$ $\bar{6}_z$
b	6/m..	$6_z/m_z$
a	6/m..	$6_z/m_z$

No. 176  $P6_3/m$ 

i	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1
h	m..	$m_z$ $m_z$ $m_z$ $m_z$ $m_z$ $m_z$
g	$\bar{1}$	$\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$ $\bar{1}$
f	3..	$3_z$ $3_z$ $3_z$ $3_z$
e	3..	$3_z$ $3_z$ $3_z$ $3_z$
d	$\bar{6}$ ..	$\bar{6}_z$ $\bar{6}_z$
c	$\bar{6}$ ..	$\bar{6}_z$ $\bar{6}_z$
b	$\bar{3}$ ..	$\bar{3}_z$ $\bar{3}_z$
a	$\bar{6}$ ..	$\bar{6}_z$ $\bar{6}_z$

No. 177  $P622$

n	1	$1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1$
m	..2	$2_{y''}\ 2_y\ 2_{y'}\ 2_{y''}\ 2_y\ 2_{y'}$
l	..2	$2_{y''}\ 2_y\ 2_{y'}\ 2_{y''}\ 2_y\ 2_{y'}$
k	.2.	$2_x\ 2_{x''}\ 2_{x'}\ 2_x\ 2_{x''}\ 2_{x'}$
j	.2.	$2_x\ 2_{x''}\ 2_{x'}\ 2_x\ 2_{x''}\ 2_{x'}$
i	2..	$2_z\ 2_z\ 2_z\ 2_z\ 2_z\ 2_z$
h	3..	$3_x\ 3_x\ 3_x\ 3_x$
g	222	$2_x 2_y 2_z\ 2_{x'} 2_{y'} 2_z\ 2_{x''} 2_{y''} 2_z$
f	222	$2_x 2_y 2_z\ 2_{x'} 2_{y'} 2_z\ 2_{x''} 2_{y''} 2_z$
e	6..	$6_x\ 6_x$
d	3.2	$3_x 2_y\ 3_x 2_y$
c	3.2	$3_x 2_y\ 3_x 2_y$
b	622	$6_x 2_x 2_y$
a	622	$6_x 2_x 2_y$

**No. 178**  $P6_1 22$ 

c	1	$1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1$
b	..2	$2_y\ 2_{y''}\ 2_{y'}\ 2_y\ 2_{y''}\ 2_{y'}$
a	.2.	$2_x\ 2_{x''}\ 2_{x'}\ 2_x\ 2_{x''}\ 2_{x'}$

**No. 179**  $P6_5 22$ 

c	1	$1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1$
b	..2	$2_y\ 2_{y''}\ 2_{y'}\ 2_y\ 2_{y''}\ 2_{y'}$
a	.2.	$2_x\ 2_{x''}\ 2_{x'}\ 2_x\ 2_{x''}\ 2_{x'}$

**No. 180**  $P6_2 22$ 

k	1	$1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1\ 1$
j	..2	$2_y\ 2_{y''}\ 2_{y'}\ 2_y\ 2_{y''}\ 2_{y'}$
i	..2	$2_y\ 2_{y''}\ 2_{y'}\ 2_y\ 2_{y''}\ 2_{y'}$
h	.2.	$2_x\ 2_{x''}\ 2_{x'}\ 2_x\ 2_{x''}\ 2_{x'}$
g	.2.	$2_x\ 2_{x''}\ 2_{x'}\ 2_x\ 2_{x''}\ 2_{x'}$
f	2..	$2_z\ 2_z\ 2_z\ 2_z\ 2_z\ 2_z$
e	2..	$2_z\ 2_z\ 2_z\ 2_z\ 2_z\ 2_z$
d	222	$2_x 2_y 2_z\ 2_{x'} 2_{y'} 2_z\ 2_{x''} 2_{y''} 2_z$
c	222	$2_x 2_y 2_z\ 2_{x'} 2_{y'} 2_z\ 2_{x''} 2_{y''} 2_z$
b	222	$2_x 2_y 2_z\ 2_{x'} 2_{y'} 2_z\ 2_{x''} 2_{y''} 2_z$
a	222	$2_x 2_y 2_z\ 2_{x'} 2_{y'} 2_z\ 2_{x''} 2_{y''} 2_z$

**No. 181**  $P6_4 22$











a 23.  $\boxed{23}$ No. 197  $I23$ f 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$ e 2..  $\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x}$ d 2..  $\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x}$ c .3.  $\boxed{3_p} \boxed{3_q} \boxed{3_s} \boxed{3_r}$ b 222..  $\boxed{2_x 2_y 2_x} \boxed{2_x 2_y 2_x} \boxed{2_x 2_y 2_x}$ a 23.  $\boxed{23}$ No. 198  $P2_13$ b 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$ a .3.  $\boxed{3_p} \boxed{3_q} \boxed{3_s} \boxed{3_r}$ No. 199  $I2_13$ c 1  $\boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1} \boxed{1}$ b 2..  $\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x}$ a .3.  $\boxed{3_p} \boxed{3_q} \boxed{3_s} \boxed{3_r}$ No. 200  $P2/m\bar{3}$ l 1  $\boxed{1} \boxed{1}$ k m..  $\boxed{m_x} \boxed{m_x} \boxed{m_x} \boxed{m_x} \boxed{m_y} \boxed{m_y} \boxed{m_y} \boxed{m_y} \boxed{m_z} \boxed{m_z} \boxed{m_z} \boxed{m_z}$ j m..  $\boxed{m_x} \boxed{m_x} \boxed{m_x} \boxed{m_x} \boxed{m_y} \boxed{m_y} \boxed{m_y} \boxed{m_y} \boxed{m_z} \boxed{m_z} \boxed{m_z} \boxed{m_z}$ i .3.  $\boxed{3_p} \boxed{3_q} \boxed{3_s} \boxed{3_r} \boxed{3_p} \boxed{3_q} \boxed{3_s} \boxed{3_r}$ h mm2..  $\boxed{2_x m_y m_z} \boxed{2_x m_y m_z} \boxed{m_x 2_y m_z} \boxed{m_x 2_y m_z} \boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$ g mm2..  $\boxed{2_x m_y m_z} \boxed{2_x m_y m_z} \boxed{m_x 2_y m_z} \boxed{m_x 2_y m_z} \boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$ f mm2..  $\boxed{2_x m_y m_z} \boxed{2_x m_y m_z} \boxed{m_x 2_y m_z} \boxed{m_x 2_y m_z} \boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$ e mm2..  $\boxed{2_x m_y m_z} \boxed{2_x m_y m_z} \boxed{m_x 2_y m_z} \boxed{m_x 2_y m_z} \boxed{m_x m_y 2_x} \boxed{m_x m_y 2_x}$ d mmm..  $\boxed{m_x m_y m_z} \boxed{m_x m_y m_z} \boxed{m_x m_y m_z}$ c mmm..  $\boxed{m_x m_y m_z} \boxed{m_x m_y m_z} \boxed{m_x m_y m_z}$ b  $m\bar{3}$ .  $\boxed{m\bar{3}}$ a  $m\bar{3}$ .  $\boxed{m\bar{3}}$ No. 201  $P2/n\bar{3}$  (origin choice 1)h 1  $\boxed{1} \boxed{1}$ g 2..  $\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x}$ f 2..  $\boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_x} \boxed{2_y} \boxed{2_y} \boxed{2_x} \boxed{2_x}$ e .3.  $\boxed{3_p} \boxed{3_q} \boxed{3_s} \boxed{3_r} \boxed{3_p} \boxed{3_q} \boxed{3_s} \boxed{3_r}$ d 222..  $\boxed{2_x 2_y 2_x} \boxed{2_x 2_y 2_x} \boxed{2_x 2_y 2_x} \boxed{2_x 2_y 2_x} \boxed{2_x 2_y 2_x} \boxed{2_x 2_y 2_x}$ c  $\bar{3}$ .  $\boxed{\bar{3}_p} \boxed{\bar{3}_q} \boxed{\bar{3}_s} \boxed{\bar{3}_r}$























## Appendix

### Packages

```
AppendTo[$Path, "D:\\X-ray-diffraction\\Packages"];
```

```
<< spacegroupspatch.m;
```

```
<< pointgroupspatch.m;
```

```
<< subgroupspatch.m;
```

```
? spacegroupspatch
```

gives the 230 space groups in a list format  
 spacegroupspatch[[i,\*,1]] : Hermann\_Mauguin symbol  
 spacegroupspatch[[i,\*,2]] : ltc (lattice centering)  
 spacegroupspatch[[i,\*,3]] : cs-operators  
 spacegroupspatch[[i,\*,3,s,1]] : rs-matrix  
 spacegroupspatch[[i,\*,3,s,2]] : ts-vector  
 s ∈ {1,Length[spacegroupspatch[[i,\*,3]]]}  
 i ∈ {1,2,...,230}  
 \* numbering entries 1,..., according to the sequences of ITA,  
 (default 1 to comply with spacegroups.m)  
 to cover all possibilities, i.e.:  
 (i) : unique axis (monoclinic space groups)  
 (ii) : origin choice  
 (iii) : rhombohedral setting

Triclinic : 1– 2  
 Monoclinic : 3– 15  
 Orthorhombic : 16– 74  
 Tetragonal : 75–142  
 Trigonal : 143–167  
 Hexagonal : 168–194  
 Cubic : 195–230

**? pointgroupspatch**

gives 45 point groups(+) in a list format  
 pointgroupspatch[[i,1]] : Hermann\_Mauguin symbol  
 pointgroupspatch[[i,2]] : rs-matrix  
 pointgroupspatch[[i,3]] : symmetry operation ITA  
 pointgroupspatch[[i,4]] : symmetry operation ITD  
 i ∈ {1,2,...,45}  
 (\*) 45 sets of matrices to cover all representations  
 of the 32 crystallographic point groups

Triclinic : 1–2  
 Monoclinic : 3–5 (b-axis unique)  
 Monoclinic : 6–8 (c-axis unique)  
 Orthorhombic : 9–11  
 Tetragonal : 12–19  
 Trigonal : 20–24 (rhombohedral axes)  
 Trigonal : 25–32 (hexagonal axes)  
 Hexagonal : 33–40  
 Cubic : 41–45

**? subgroupspatch**

gives subgroups of the 45 point group representations in a list format:  
 subgroupspatch[[i,1]] : Hermann\_Mauguin symbol of the pointgroup following Janovec and Privratska  
 subgroupspatch[[i,2]] : The subgroups arranged as a list of lists {{},...,{}}  
 The sublists gives the position of symmetry elements in pointgroup 'i'  
 subgroupspatch[[i,3]] : The subgroup class type  
 Nespolo & Souvignier Z.Kristallogr. 224 (2009) 127–136  
 subgroupspatch[[i,4]] : The subgroup symmetry  
 Janovec and Privratska International Tables for Crystallography (2010).  
 Vol D. Chap.3.4 Table 3.4.2.7  
 i ∈ {1,2,...,45}  
 Triclinic : 1–2  
 Monoclinic : 3–5 (b-axis unique)  
 Monoclinic : 6–8 (c-axis unique)  
 Orthorhombic : 9–11  
 Tetragonal : 12–19  
 Trigonal : 20–24 (rhombohedral axes)  
 Trigonal : 25–32 (hexagonal axes)  
 Hexagonal : 33–40  
 Cubic : 41–45

## Functions &amp; Codes (technical details)

## Application -- an example:

Give space-group number ( $ig\beta$ ) and origin choice ( $iorigin = 1 \vee 2$ ):

```
igβ = 133; iorigin = 2;
```

```
ITA[[igβ, iorigin]]
```

```
P42/n 2/b2/c (origin choice 2)
```

Associated point-group symmetry ( $ip\beta$ ) is determined:

```
ipβ = ip[igβ, iorigin]
```

```
19
```

```
pointgroupspatch[[ipβ, 1]]
```

```
4/mmm
```

Coordinates -- current example: Wyckoff set  $h$  entry no. 1:

```
w = {x, 1/4, 0};
```

Build symmetry related positions according to the actual space group (in this example the lattice is primitive):

```
tab = Table[spacegroupspatch[[igβ, iorigin, 3, ii, 1]].w + spacegroupspatch[[igβ, iorigin, 3, ii, 2]], {ii, Length[spacegroupspatch[[igβ, iorigin, 3]]]}];
```

Transform to standard coordinate representation within the unit cell:

```
tabA = Map[test[#] &, tab, {2}]
```

```
{ {x, 1/4, 0}, {1/2 - x, 1/4, 0}, {1/4, x, 1/2}, {1/4, 1/2 - x, 1/2}, {1/2 - x, 1/4, 0}, {x, 1/4, 0}, {1/4, x, 1/2}, {1/4, 1/2 - x, 1/2}, {-x, 3/4, 0}, {1/2 + x, 3/4, 0}, {3/4, -x, 1/2}, {3/4, 1/2 + x, 1/2}, {1/2 + x, 3/4, 0}, {-x, 3/4, 0}, {3/4, -x, 1/2}, {3/4, 1/2 + x, 1/2} }
```

Retrieve the operations that leave the original coordinates unchanged:

```
sβi = Flatten[Position[tabA, w]]
```

```
{1, 6}
```

Identify the subgroup ( $is\beta$ ) of the point group ( $ip\beta$ ) from the subset of point-group elements established above:

```
isβ = Position[subgroupspatch[[ipβ, 2]], sβi][[1, 1]]
```

```
3
```

```
subgroupspatch[[ipβ, 4, isβ]]
```

```
2x
```

Build the invariant  $\beta$ -tensor according to Janssen (2010):

```
rw = FullSimplify[Plus @@ Table[pointgroupspatch[[ipβ, 2, gβi]].{{β11, β12, β13}, {β12, β22, β23}, {β13, β23, β33}}.Transpose[pointgroupspatch[[ipβ, 2, gβi]]], {gβi, sβi}]];
```

```
rw // TraditionalForm
```

$$\begin{pmatrix} 2\beta_{11} & 0 & 0 \\ 0 & 2\beta_{22} & 2\beta_{23} \\ 0 & 2\beta_{23} & 2\beta_{33} \end{pmatrix}$$

Obtain the correct entry in the lookup table:

```
ik = selectB[{rw[[1, 1]], rw[[2, 2]], rw[[3, 3]], 2*rw[[1, 2]], 2*rw[[1, 3]], 2*rw[[2, 3]]}]
```

```
18
```

Symmetry restrictions according to Kuhs (2010):

```
Grid[{betaRestrictions[[ik]], Frame -> All}]
```

A	B	C	0	F
---	---	---	---	---

Actual  $\beta$ -matrix - associated with first position of this Wyckoff set ( $h$ ):

```
 $\beta = \{\{a, 0, 0\}, \{0, b, f/2\}, \{0, f/2, c\}\};$ 
```

All coordinates of the Wyckoff set:

```
tabB = DeleteDuplicates[tabA]
```

```
 $\{\{x, \frac{1}{4}, 0\}, \{\frac{1}{2}-x, \frac{1}{4}, 0\}, \{\frac{1}{4}, x, \frac{1}{2}\}, \{\frac{1}{4}, \frac{1}{2}-x, \frac{1}{2}\}, \{-x, \frac{3}{4}, 0\}, \{\frac{1}{2}+x, \frac{3}{4}, 0\}, \{\frac{3}{4}, -x, \frac{1}{2}\}, \{\frac{3}{4}, \frac{1}{2}+x, \frac{1}{2}\}\}$ 
```

Point-group symmetry operations associated with this set of coordinates:

```
pos = Flatten[(Position[tabA, #] & /@ tabB)[[All, 1]]]
```

```
{1, 2, 3, 4, 9, 10, 11, 12}
```

```
pointgroupspatch[[ipbeta, 3, #]] & /@ pos
```

```
{1, 2[001], 4[001]+, 4[001]-, 1, m[001], 2[001]+, 2[001]-}
```

Build the set of symmetry related matrices:  $R_S \cdot \beta \cdot R_S^T$ :

```
tt = Table[FullSimplify[pointgroupspatch[[ipbeta, 2, pbeta]] . beta . Transpose[pointgroupspatch[[ipbeta, 2, pbeta]]]], {pbeta, pos}]
```

```
 $\{\{\{a, 0, 0\}, \{0, b, \frac{f}{2}\}, \{0, \frac{f}{2}, c\}\}, \{\{a, 0, 0\}, \{0, b, -\frac{f}{2}\}, \{0, -\frac{f}{2}, c\}\}, \{\{b, 0, -\frac{f}{2}\}, \{0, a, 0\}, \{-\frac{f}{2}, 0, c\}\}, \{\{b, 0, \frac{f}{2}\}, \{0, a, 0\}, \{\frac{f}{2}, 0, c\}\},$   

 $\{\{a, 0, 0\}, \{0, b, \frac{f}{2}\}, \{0, \frac{f}{2}, c\}\}, \{\{a, 0, 0\}, \{0, b, -\frac{f}{2}\}, \{0, -\frac{f}{2}, c\}\}, \{\{b, 0, -\frac{f}{2}\}, \{0, a, 0\}, \{-\frac{f}{2}, 0, c\}\}, \{\{b, 0, \frac{f}{2}\}, \{0, a, 0\}, \{\frac{f}{2}, 0, c\}\}\}$ 
```

Extract the sets:  $\{\dots\{\beta^{11}, \beta^{22}, \beta^{33}, 2\beta^{12}, 2\beta^{13}, 2\beta^{23}\}\dots\}$ :

```
{#[[1, 1]], #[[2, 2]], #[[3, 3]], 2*#[[1, 2]], 2*#[[1, 3]], 2*#[[2, 3]]} & /@ tt
```

```
{\{a, b, c, 0, 0, f\}, \{a, b, c, 0, 0, -f\}, \{b, a, c, 0, -f, 0\}, \{b, a, c, 0, f, 0\}, \{a, b, c, 0, 0, f\}, \{a, b, c, 0, 0, -f\}, \{b, a, c, 0, -f, 0\}, \{b, a, c, 0, f, 0\}}
```

Identify actual codes for  $\beta$ -restrictions:

```
Grid[{StringJoin["B", ToString[#]] & /@ (selectB /@ %)}, Frame → All]
```

B18	B18	B17	B17	B18	B18	B17	B17
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