

$p222$

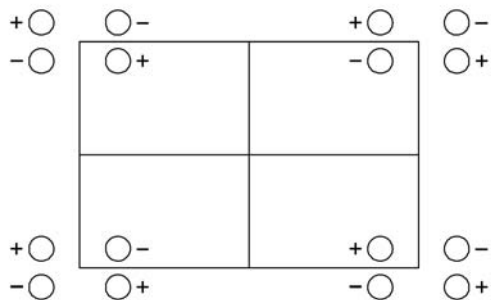
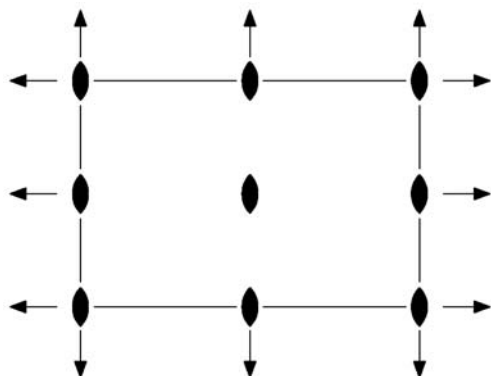
$222$

Orthorhombic/Rectangular

No. 19

$p222$

Patterson symmetry  $pmmm$



Origin at  $222$

Asymmetric unit  $0 \leq x \leq \frac{1}{2}; 0 \leq y \leq \frac{1}{2}$

Symmetry operations

- (1) 1 (2)  $2 \ 0,0,z$  (3)  $2 \ 0,y,0$  (4)  $2 \ x,0,0$   
 (1|0,0,0) (2<sub>z</sub>|0,0,0) (2<sub>y</sub>|0,0,0) (2<sub>x</sub>|0,0,0)

**Generators selected** (1);  $t(1,0,0)$ ;  $t(0,1,0)$ ; (2); (3)

**Positions**

| Multiplicity,<br>Wyckoff letter,<br>Site symmetry | Coordinates                   |                                     |                           |                           | Reflection conditions                         |
|---|-------------------------------|-------------------------------------|---------------------------|---------------------------|---|
|   |                               |                                     |                           |                           | General:                                      |
| 4 <i>m</i> 1                                      | (1) $x, y, z$                 | (2) $\bar{x}, \bar{y}, z$           | (3) $\bar{x}, y, \bar{z}$ | (4) $x, \bar{y}, \bar{z}$ | no conditions<br>Special: no extra conditions |
| 2 <i>l</i> ..2                                    | $\frac{1}{2}, \frac{1}{2}, z$ | $\frac{1}{2}, \frac{1}{2}, \bar{z}$ |                           |                           |   |
| 2 <i>k</i> ..2                                    | $0, \frac{1}{2}, z$           | $0, \frac{1}{2}, \bar{z}$           |                           |                           |   |
| 2 <i>j</i> ..2                                    | $\frac{1}{2}, 0, z$           | $\frac{1}{2}, 0, \bar{z}$           |                           |                           |   |
| 2 <i>i</i> ..2                                    | $0, 0, z$                     | $0, 0, \bar{z}$                     |                           |                           |   |
| 2 <i>h</i> .2.                                    | $\frac{1}{2}, y, 0$           | $\frac{1}{2}, \bar{y}, 0$           |                           |                           |   |
| 2 <i>g</i> .2.                                    | $0, y, 0$                     | $0, \bar{y}, 0$                     |                           |                           |   |
| 2 <i>f</i> 2..                                    | $x, \frac{1}{2}, 0$           | $\bar{x}, \frac{1}{2}, 0$           |                           |                           |   |
| 2 <i>e</i> 2..                                    | $x, 0, 0$                     | $\bar{x}, 0, 0$                     |                           |                           |   |
| 1 <i>d</i> 222                                    | $\frac{1}{2}, \frac{1}{2}, 0$ |                                     |                           |                           |   |
| 1 <i>c</i> 222                                    | $0, \frac{1}{2}, 0$           |                                     |                           |                           |   |
| 1 <i>b</i> 222                                    | $\frac{1}{2}, 0, 0$           |                                     |                           |                           |   |
| 1 <i>a</i> 222                                    | $0, 0, 0$                     |                                     |                           |                           |   |

**Symmetry of special projections**

Along [001]  $p2mm$   
 $\mathbf{a}' = \mathbf{a}$      $\mathbf{b}' = \mathbf{b}$   
 Origin at 0, 0,  $z$

Along [100]  $\not p2mm$   
 $\mathbf{a}' = \mathbf{b}$   
 Origin at  $x, 0, 0$

Along [010]  $\not p2mm$   
 $\mathbf{a}' = \mathbf{a}$   
 Origin at 0,  $y, 0$

**Maximal non-isotypic subgroups**

**I** [2]  $p121$  ( $p211$ , 8) 1; 3  
 [2]  $p211$  (8) 1; 4  
 [2]  $p112$  (3) 1; 2

**IIa** none

**IIb** [2]  $c222$  ( $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$ ) (22); [2]  $p22_12$  ( $\mathbf{b}' = 2\mathbf{b}$ ) ( $p2_122$ , 20); [2]  $p2_122$  ( $\mathbf{a}' = 2\mathbf{a}$ ) (20)

**Maximal isotypic subgroups of lowest index**

**IIc** [2]  $p222$  ( $\mathbf{a}' = 2\mathbf{a}$  or  $\mathbf{b}' = 2\mathbf{b}$ ) (19)

**Minimal non-isotypic supergroups**

**I** [2]  $pmmm$  (37); [2]  $pmaa$  (38); [2]  $pban$  (39); [2]  $p422$  (53); [2]  $p\bar{4}2m$  (57)

**II** [2]  $c222$  (22)