

$pm\bar{a}a$

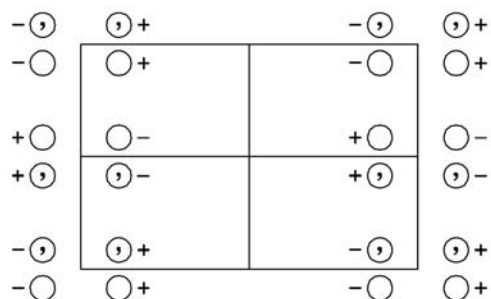
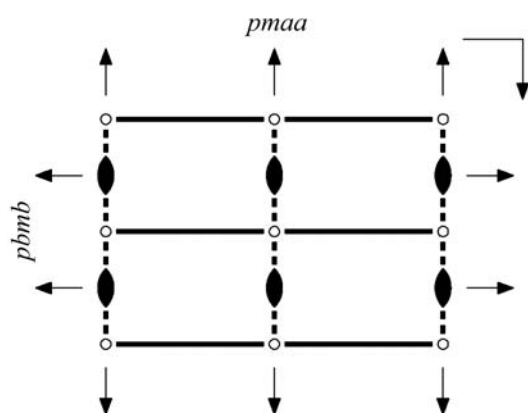
$mmm$

Orthorhombic/Rectangular

No. 38

$p2/m2/a2/a$

Patterson symmetry  $pmmm$



**Origin** at centre ( $2/m$ ) at  $2/maa$

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

**Symmetry operations**

- |                       |                 |                           |                           |
|-----------------------|-----------------|---------------------------|---------------------------|
| (1) $1$               | (2) $2 \ x,0,0$ | (3) $2 \ \frac{1}{4},0,z$ | (4) $2 \ \frac{1}{4},y,0$ |
| (5) $\bar{1} \ 0,0,0$ | (6) $m \ 0,y,z$ | (7) $a \ x,y,0$           | (8) $a \ x,0,z$           |

**Generators selected** (1);  $t(1,0,0)$ ;  $t(0,1,0)$ ; (2); (3); (5)

**Positions**

Multiplicity, Wyckoff letter, Site symmetry	Coordinates	Reflection conditions
8 <i>k</i> 1	(1) $x, y, z$ (2) $x, \bar{y}, \bar{z}$ (3) $\bar{x} + \frac{1}{2}, \bar{y}, z$ (4) $\bar{x} + \frac{1}{2}, y, \bar{z}$ (5) $\bar{x}, \bar{y}, \bar{z}$ (6) $\bar{x}, y, z$ (7) $x + \frac{1}{2}, y, \bar{z}$ (8) $x + \frac{1}{2}, \bar{y}, z$	General: $hk: h = 2n$ $h0: h = 2n$  Special: no extra conditions
4 <i>j</i> $m..$	$0, y, z$ $0, \bar{y}, \bar{z}$ $\frac{1}{2}, \bar{y}, z$ $\frac{1}{2}, y, \bar{z}$	
4 <i>i</i> $2..$	$x, \frac{1}{2}, 0$ $\bar{x} + \frac{1}{2}, \frac{1}{2}, 0$ $\bar{x}, \frac{1}{2}, 0$ $x + \frac{1}{2}, \frac{1}{2}, 0$	
4 <i>h</i> $2..$	$x, 0, 0$ $\bar{x} + \frac{1}{2}, 0, 0$ $\bar{x}, 0, 0$ $x + \frac{1}{2}, 0, 0$	
4 <i>g</i> $..2$	$\frac{1}{4}, \frac{1}{2}, z$ $\frac{1}{4}, \frac{1}{2}, \bar{z}$ $\frac{3}{4}, \frac{1}{2}, \bar{z}$ $\frac{3}{4}, \frac{1}{2}, z$	
4 <i>f</i> $..2$	$\frac{1}{4}, 0, z$ $\frac{1}{4}, 0, \bar{z}$ $\frac{3}{4}, 0, \bar{z}$ $\frac{3}{4}, 0, z$	
4 <i>e</i> $.2.$	$\frac{1}{4}, y, 0$ $\frac{1}{4}, \bar{y}, 0$ $\frac{3}{4}, \bar{y}, 0$ $\frac{3}{4}, y, 0$	
2 <i>d</i> $222$	$\frac{1}{4}, \frac{1}{2}, 0$ $\frac{3}{4}, \frac{1}{2}, 0$	
2 <i>c</i> $222$	$\frac{1}{4}, 0, 0$ $\frac{3}{4}, 0, 0$	
2 <i>b</i> $2/m..$	$0, \frac{1}{2}, 0$ $\frac{1}{2}, \frac{1}{2}, 0$	
2 <i>a</i> $2/m..$	$0, 0, 0$ $\frac{1}{2}, 0, 0$	

**Symmetry of special projections**

Along  $[001] p2mm$   
 $\mathbf{a}' = \frac{1}{2}\mathbf{a}$      $\mathbf{b}' = \mathbf{b}$   
 Origin at  $0, 0, z$

Along  $[100] \neq 2mm$   
 $\mathbf{a}' = \mathbf{b}$   
 Origin at  $x, 0, 0$

Along  $[010] \neq 2mm$   
 $\mathbf{a}' = \frac{1}{2}\mathbf{a}$   
 Origin at  $0, y, 0$

**Maximal non-isotypic subgroups**

<b>I</b>	[2] $pm2a$ (31)	1; 4; 6; 7
	[2] $p2aa$ ( $pb2b$ , 30)	1; 2; 7; 8
	[2] $pma2$ (24)	1; 3; 6; 8
	[2] $p222$ (19)	1; 2; 3; 4
	[2] $p12/a1$ ( $p2/b11$ , 16)	1; 4; 5; 8
	[2] $p2/m11$ (14)	1; 2; 5; 6
	[2] $p112/a$ (7)	1; 3; 5; 7

**IIa** none

**IIb** [2]  $pbaa$  ( $\mathbf{b}' = 2\mathbf{b}$ ) (43); [2]  $pman$  ( $\mathbf{b}' = 2\mathbf{b}$ ) (42); [2]  $pban$  ( $\mathbf{b}' = 2\mathbf{b}$ ) (39)

**Maximal isotypic subgroups of lowest index**

**IIc** [2]  $pmaa$  ( $\mathbf{b}' = 2\mathbf{b}$ ) (38); [3]  $pmaa$  ( $\mathbf{a}' = 3\mathbf{a}$ ) (38)

**Minimal non-isotypic supergroups**

**I** none

**II** [2]  $cmme$  (48); [2]  $pmmm$  ( $\mathbf{b}' = \frac{1}{2}\mathbf{b}$ ) (37)