

$pmmm$

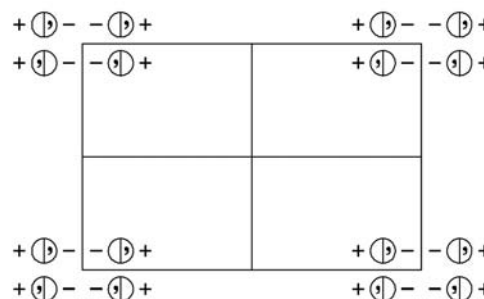
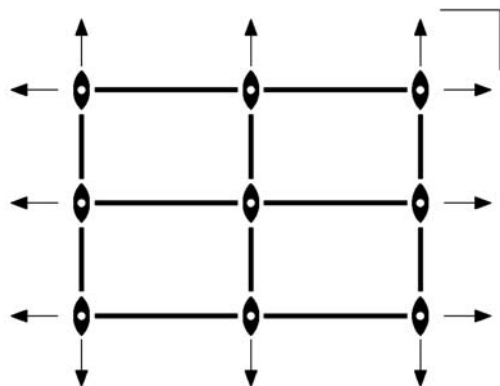
mmm

Orthorhombic/Rectangular

No. 37

$p2/m2/m2/m$

Patterson symmetry $pmmm$



Origin at centre (mmm)

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

Symmetry operations

- | | | | |
|--|--|--|--|
| (1) 1
(1 0,0,0) | (2) 2 0,0,z
(2 _z 0,0,0) | (3) 2 0,y,0
(2 _y 0,0,0) | (4) 2 x,0,0
(2 _x 0,0,0) |
| (5) $\bar{1}$ 0,0,0
($\bar{1}$ 0,0,0) | (6) m x,y,0
(m_z 0,0,0) | (7) m x,0,z
(m_y 0,0,0) | (8) m 0,y,z
(m_x 0,0,0) |

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

Positions

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

Symmetry of special projections

Along [001] $p2mm$

$\mathbf{a}' = \mathbf{a}$ $\mathbf{b}' = \mathbf{b}$

Origin at $0, 0, z$

Along [100] $\not\sim 2mm$

$\mathbf{a}' = \mathbf{b}$

Origin at $x, 0, 0$

Along [010] $\not\sim 2mm$

$\mathbf{a}' = \mathbf{a}$

Origin at $0, y, 0$

Maximal non-isotypic subgroups

I	[2] $pm2m$ (27)	1; 3; 6; 8
	[2] $p2mm$ ($pm2m$, 27)	1; 4; 6; 7
	[2] $pmm2$ (23)	1; 2; 7; 8
	[2] $p222$ (19)	1; 2; 3; 4
	[2] $p12/m1$ ($p2/m11$, 14)	1; 3; 5; 7
	[2] $p2/m11$ (14)	1; 4; 5; 8
	[2] $p112/m$ (6)	1; 2; 5; 6

IIa none

IIb [2] $cmme$ ($\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$) (48); [2] $cmmm$ ($\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$) (47); [2] $pmma$ ($\mathbf{a}' = 2\mathbf{a}$) (41); [2] $pmbb$ ($\mathbf{b}' = 2\mathbf{b}$) ($pmma$, 41); [2] $pmam$ ($\mathbf{a}' = 2\mathbf{a}$) (40); [2] $pbmm$ ($\mathbf{b}' = 2\mathbf{b}$) ($pmam$, 40); [2] $pmaa$ ($\mathbf{a}' = 2\mathbf{a}$) (38); [2] $pbmb$ ($\mathbf{b}' = 2\mathbf{b}$) ($pmaa$, 38)

Maximal isotypic subgroups of lowest index

IIc [2] $pmmm$ ($\mathbf{a}' = 2\mathbf{a}$ or $\mathbf{b}' = 2\mathbf{b}$) (37)

Minimal non-isotypic supergroups

I [2] $p4/mmm$ (61)

II [2] $cmmm$ (47)