

Pmma

D_{2h}^5

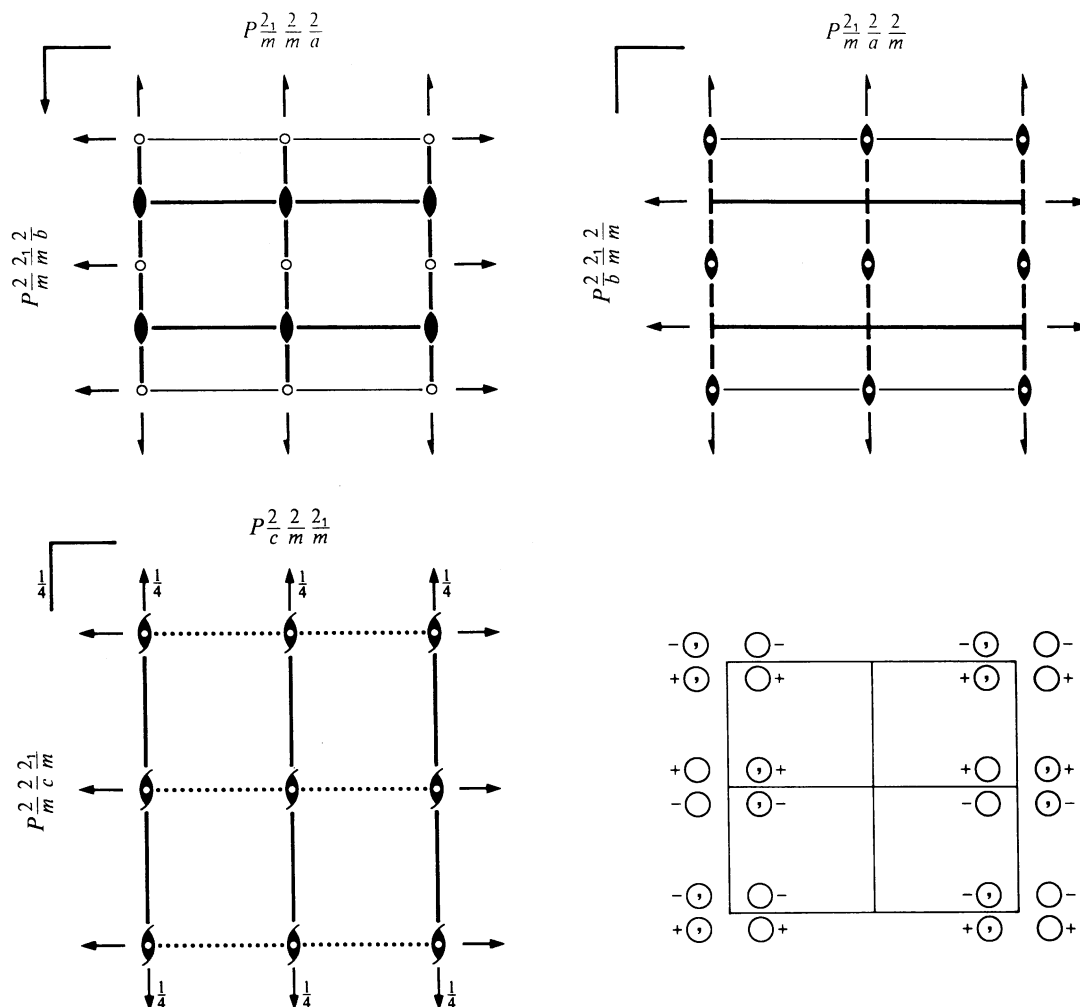
mmm

Orthorhombic

No. 51

$P 2_1/m 2/m 2/a$

Patterson symmetry *Pmmm*



Origin at centre ($2/m$) at $2_1 2/m a$

Asymmetric unit $0 \leq x \leq \frac{1}{4}; 0 \leq y \leq \frac{1}{2}; 0 \leq z \leq 1$

Symmetry operations

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

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

Positions

Multiplicity, Wyckoff letter, Site symmetry	Coordinates	Reflection conditions
8 <i>l</i> 1	(1) x, y, z (5) $\bar{x}, \bar{y}, \bar{z}$ (2) $\bar{x} + \frac{1}{2}, \bar{y}, z$ (6) $x + \frac{1}{2}, y, \bar{z}$ (3) \bar{x}, y, \bar{z} (7) x, \bar{y}, z (4) $x + \frac{1}{2}, \bar{y}, \bar{z}$ (8) $\bar{x} + \frac{1}{2}, y, z$	General: $hk0 : h = 2n$ $h00 : h = 2n$ Special: as above, plus
4 <i>k</i> $m..$	$\frac{1}{4}, y, z$ $\frac{1}{4}, \bar{y}, z$ $\frac{3}{4}, y, \bar{z}$ $\frac{3}{4}, \bar{y}, \bar{z}$	no extra conditions
4 <i>j</i> $.m.$	$x, \frac{1}{2}, z$ $\bar{x} + \frac{1}{2}, \frac{1}{2}, z$ $\bar{x}, \frac{1}{2}, \bar{z}$ $x + \frac{1}{2}, \frac{1}{2}, \bar{z}$	no extra conditions
4 <i>i</i> $.m.$	$x, 0, z$ $\bar{x} + \frac{1}{2}, 0, z$ $\bar{x}, 0, \bar{z}$ $x + \frac{1}{2}, 0, \bar{z}$	no extra conditions
4 <i>h</i> $.2.$	$0, y, \frac{1}{2}$ $\frac{1}{2}, \bar{y}, \frac{1}{2}$ $0, \bar{y}, \frac{1}{2}$ $\frac{1}{2}, y, \frac{1}{2}$	$hkl : h = 2n$
4 <i>g</i> $.2.$	$0, y, 0$ $\frac{1}{2}, \bar{y}, 0$ $0, \bar{y}, 0$ $\frac{1}{2}, y, 0$	$hkl : h = 2n$
2 <i>f</i> $mm2$	$\frac{1}{4}, \frac{1}{2}, z$ $\frac{3}{4}, \frac{1}{2}, \bar{z}$	no extra conditions
2 <i>e</i> $mm2$	$\frac{1}{4}, 0, z$ $\frac{3}{4}, 0, \bar{z}$	no extra conditions
2 <i>d</i> $.2/m.$	$0, \frac{1}{2}, \frac{1}{2}$ $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$	$hkl : h = 2n$
2 <i>c</i> $.2/m.$	$0, 0, \frac{1}{2}$ $\frac{1}{2}, 0, \frac{1}{2}$	$hkl : h = 2n$
2 <i>b</i> $.2/m.$	$0, \frac{1}{2}, 0$ $\frac{1}{2}, \frac{1}{2}, 0$	$hkl : h = 2n$
2 <i>a</i> $.2/m.$	$0, 0, 0$ $\frac{1}{2}, 0, 0$	$hkl : h = 2n$

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] $p2mm$

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

Origin at $x, 0, 0$

Along [010] $p2gm$

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

Origin at $0, y, 0$

Maximal non-isomorphic subgroups

I	[2] $Pm2a$ ($Pma2$, 28)	1; 3; 6; 8
	[2] $P2_1ma$ ($Pmc2_1$, 26)	1; 4; 6; 7
	[2] $Pmm2$ (25)	1; 2; 7; 8
	[2] $P2_122$ ($P222_1$, 17)	1; 2; 3; 4
	[2] $P112/a$ ($P2/c$, 13)	1; 2; 5; 6
	[2] $P2_1/m11$ ($P2_1/m$, 11)	1; 4; 5; 8
	[2] $P12/m1$ ($P2/m$, 10)	1; 3; 5; 7

IIa none

IIb [2] $Pmnm$ ($\mathbf{b}' = 2\mathbf{b}$) (59); [2] $Pbma$ ($\mathbf{b}' = 2\mathbf{b}$) ($Pbcm$, 57); [2] $Pbmn$ ($\mathbf{b}' = 2\mathbf{b}$) ($Pmna$, 53); [2] $Pmca$ ($\mathbf{c}' = 2\mathbf{c}$) ($Pbcm$, 57); [2] $Pcma$ ($\mathbf{c}' = 2\mathbf{c}$) ($Pbam$, 55); [2] $Pcca$ ($\mathbf{c}' = 2\mathbf{c}$) (54); [2] $Aema$ ($\mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$) ($Cmce$, 64); [2] $Amma$ ($\mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$) ($Cmcm$, 63)

Maximal isomorphic subgroups of lowest index

IIc [2] $Pmma$ ($\mathbf{b}' = 2\mathbf{b}$) (51); [2] $Pmma$ ($\mathbf{c}' = 2\mathbf{c}$) (51); [3] $Pmma$ ($\mathbf{a}' = 3\mathbf{a}$) (51)

Minimal non-isomorphic supergroups

I none

II [2] $Amma$ ($Cmcm$, 63); [2] $Bmmm$ ($Cmmm$, 65); [2] $Cmme$ (67); [2] $Imma$ (74); [2] $Pmmm$ ($\mathbf{a}' = \frac{1}{2}\mathbf{a}$) (47)