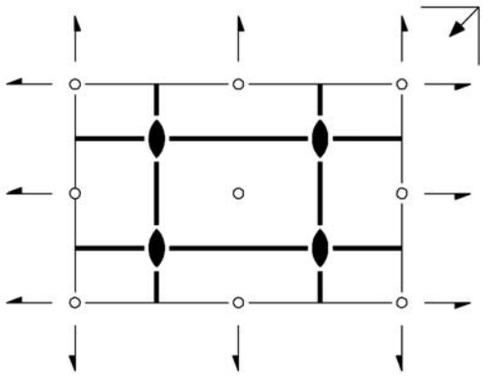
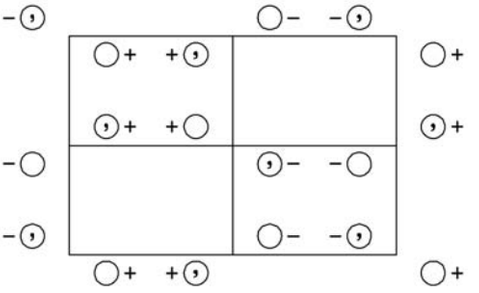
$pmmn$ mmm Orthorhombic/Rectangular

No. 46 $p2_1/m2_1/m2/n$ Patterson symmetry $pmmm$





Origin at $\bar{1}$ on $2_1 2_1 n$

Asymmetric unit $0 \le x \le \frac{1}{4}; \quad 0 \le y \le \frac{1}{2}$

Symmetry operations

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

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

Positions

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

Symmetry of special projections

Along [001] $c2mm$
$\mathbf{a}' = \mathbf{a}$ $\mathbf{b}' = \mathbf{b}$
Origin at $\frac{1}{4},\frac{1}{4},z$

Along [100] $\not{p}2mg$
$\mathbf{a}' = \mathbf{b}$
Origin at $x,0,0$

Along [010] $\not{p}2mg$
$\mathbf{a}' = \mathbf{a}$
Origin at $0,y,0$

Maximal non-isotypic subgroups

I
[2] $pm2_1n$ (32) 1; 3; 6; 8
[2] $p2_1mn$ ($pm2_1n$, 32) 1; 4; 6; 7
[2] $pmm2$ (23) 1; 2; 7; 8
[2] $p2_12_12$ (21) 1; 2; 3; 4
[2] $p12_1/m1$ ($p2_1/m11$, 15) 1; 3; 5; 7
[2] $p2_1/m11$ (15) 1; 4; 5; 8
[2] $p112/n$ ($p112/a$, 7) 1; 2; 5; 6

IIa none

IIb none

Maximal isotypic subgroups of lowest index

IIc [3] $pmmn$ ($\mathbf{a}' = 3\mathbf{a}$ or $\mathbf{b}' = 3\mathbf{b}$) (46)

Minimal non-isotypic supergroups

I [2] $p4/nmm$ (64)

II [2] $cmmm$ (47); [2] $pmma$ ($\mathbf{b}' = \frac{1}{2}\mathbf{b}$) (41)