

$P4_2nm$

C_{4v}^4

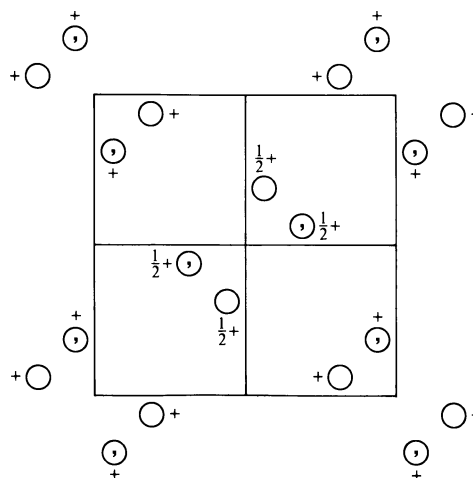
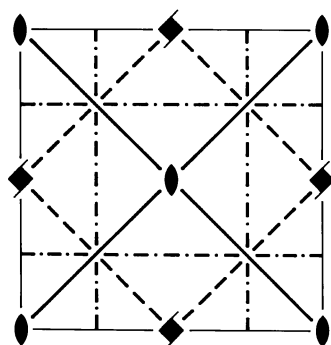
$4mm$

Tetragonal

No. 102

$P4_2nm$

Patterson symmetry $P4/mmm$



Origin on $2mm$ on $21m$

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

Symmetry operations

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

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>d</i> 1	(1) x, y, z (5) $x + \frac{1}{2}, \bar{y} + \frac{1}{2}, z + \frac{1}{2}$	(2) \bar{x}, \bar{y}, z (6) $\bar{x} + \frac{1}{2}, y + \frac{1}{2}, z + \frac{1}{2}$	(3) $\bar{y} + \frac{1}{2}, x + \frac{1}{2}, z + \frac{1}{2}$ (7) \bar{y}, \bar{x}, z	(4) $y + \frac{1}{2}, \bar{x} + \frac{1}{2}, z + \frac{1}{2}$ (8) y, x, z	General: $Ok\bar{l} : k + l = 2n$ $00l : l = 2n$ $h00 : h = 2n$ Special: as above, plus
4 <i>c</i> $\dots m$	x, x, z	\bar{x}, \bar{x}, z	$\bar{x} + \frac{1}{2}, x + \frac{1}{2}, z + \frac{1}{2}$	$x + \frac{1}{2}, \bar{x} + \frac{1}{2}, z + \frac{1}{2}$	no extra conditions
4 <i>b</i> $2 \dots$	$0, \frac{1}{2}, z$	$0, \frac{1}{2}, z + \frac{1}{2}$	$\frac{1}{2}, 0, z + \frac{1}{2}$	$\frac{1}{2}, 0, z$	$hkl : h + k, l = 2n$
2 <i>a</i> $2 \dots mm$	$0, 0, z$	$\frac{1}{2}, \frac{1}{2}, z + \frac{1}{2}$			$hkl : h + k + l = 2n$

Symmetry of special projections

Along [001] $p4gm$
 $\mathbf{a}' = \mathbf{a}$ $\mathbf{b}' = \mathbf{b}$
Origin at $0, \frac{1}{2}, z$

Along [100] $c1m1$
 $\mathbf{a}' = \mathbf{b}$ $\mathbf{b}' = \mathbf{c}$
Origin at $x, 0, 0$

Along [110] $p1m1$
 $\mathbf{a}' = \frac{1}{2}(-\mathbf{a} + \mathbf{b})$ $\mathbf{b}' = \mathbf{c}$
Origin at $x, x, 0$

Maximal non-isomorphic subgroups

I [2] $P4_211 (P4_2, 77)$ 1; 2; 3; 4
[2] $P21m (Cmm2, 35)$ 1; 2; 7; 8
[2] $P2n1 (Pnn2, 34)$ 1; 2; 5; 6

IIa none

IIb [2] $F4_1dc (\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}) (I4_1cd, 110)$; [2] $F4_1dm (\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}) (I4_1md, 109)$

Maximal isomorphic subgroups of lowest index

IIc [3] $P4_2nm (\mathbf{c}' = 3\mathbf{c}) (102)$; [9] $P4_2nm (\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}) (102)$

Minimal non-isomorphic supergroups

I [2] $P4_2/nnm (134)$; [2] $P4_2/mnm (136)$

II [2] $C4_2cm (P4_2mc, 105)$; [2] $I4mm (107)$; [2] $P4bm (\mathbf{c}' = \frac{1}{2}\mathbf{c}) (100)$