

$P4mm$

C_{4v}^1

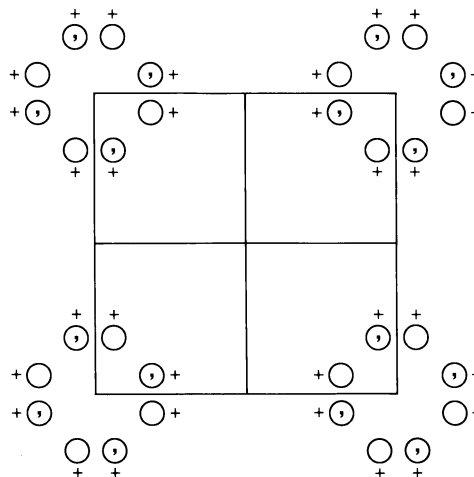
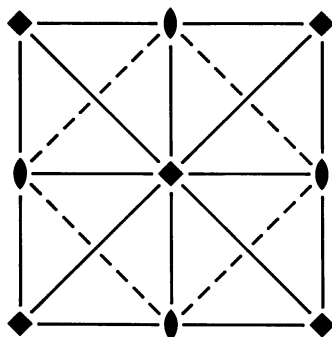
$4mm$

Tetragonal

No. 99

$P4mm$

Patterson symmetry $P4/mmm$



Origin on $4mm$

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 $0,0,z$ | (3) 4^+ $0,0,z$ | (4) 4^- $0,0,z$ |
| (5) m $x,0,z$ | (6) m $0,y,z$ | (7) m x,\bar{x},z | (8) m 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>g</i> 1	(1) x, y, z (5) x, \bar{y}, z (2) \bar{x}, \bar{y}, z (6) \bar{x}, y, z (3) \bar{y}, x, z (7) \bar{y}, \bar{x}, z (4) y, \bar{x}, z (8) y, x, z	General: no conditions Special: no extra conditions
4 <i>f</i> . <i>m</i> .	$x, \frac{1}{2}, z$ $\bar{x}, \frac{1}{2}, z$ $\frac{1}{2}, x, z$ $\frac{1}{2}, \bar{x}, z$	no extra conditions
4 <i>e</i> . <i>m</i> .	$x, 0, z$ $\bar{x}, 0, z$ $0, x, z$ $0, \bar{x}, z$	no extra conditions
4 <i>d</i> . . <i>m</i>	x, x, z \bar{x}, \bar{x}, z \bar{x}, x, z x, \bar{x}, z	no extra conditions
2 <i>c</i> 2 <i>m m</i> .	$\frac{1}{2}, 0, z$ $0, \frac{1}{2}, z$	$hkl : h + k = 2n$
1 <i>b</i> 4 <i>m m</i>	$\frac{1}{2}, \frac{1}{2}, z$	no extra conditions
1 <i>a</i> 4 <i>m m</i>	$0, 0, z$	no extra conditions

Symmetry of special projections

Along [001] $p4mm$
 $\mathbf{a}' = \mathbf{a}$ $\mathbf{b}' = \mathbf{b}$
 Origin at $0, 0, z$

Along [100] $p1m1$
 $\mathbf{a}' = \mathbf{b}$ $\mathbf{b}' = \mathbf{c}$
 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] $P411$ ($P4, 75$) 1; 2; 3; 4
 [2] $P21m$ ($Cmm2, 35$) 1; 2; 7; 8
 [2] $P2m1$ ($Pmm2, 25$) 1; 2; 5; 6

IIa none

IIb [2] $P4_2mc$ ($\mathbf{c}' = 2\mathbf{c}$) (105); [2] $P4cc$ ($\mathbf{c}' = 2\mathbf{c}$) (103); [2] $P4_2cm$ ($\mathbf{c}' = 2\mathbf{c}$) (101); [2] $C4md$ ($\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$) ($P4bm, 100$);
 [2] $F4mc$ ($\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$) ($I4cm, 108$); [2] $F4mm$ ($\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$) ($I4mm, 107$)

Maximal isomorphic subgroups of lowest index

IIc [2] $P4mm$ ($\mathbf{c}' = 2\mathbf{c}$) (99); [2] $C4mm$ ($\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$) ($P4mm, 99$)

Minimal non-isomorphic supergroups

I [2] $P4/mmm$ (123); [2] $P4/nmm$ (129)

II [2] $I4mm$ (107)