

$I\bar{4}c2$

D_{2d}^{10}

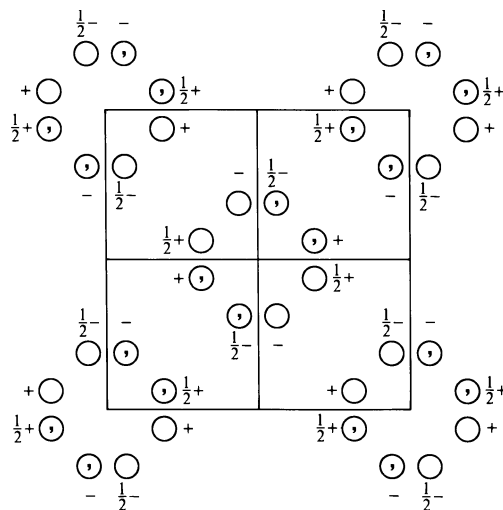
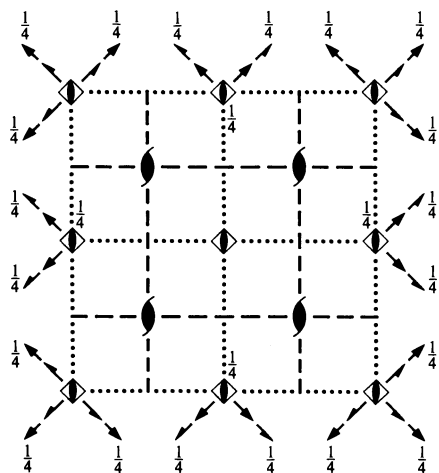
$\bar{4}m2$

Tetragonal

No. 120

$I\bar{4}c2$

Patterson symmetry $I4/mmm$



Origin at $\bar{4}c2_1$

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

Symmetry operations

For $(0,0,0)+$ set

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

For $(\frac{1}{2},\frac{1}{2},\frac{1}{2})+$ set

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

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(\frac{1}{2},\frac{1}{2},\frac{1}{2})$; (2); (3); (5)

Positions

Multiplicity, Wyckoff letter, Site symmetry	Coordinates	Reflection conditions
	$(0,0,0) + (\frac{1}{2},\frac{1}{2},\frac{1}{2}) +$	General:
16 <i>i</i> 1	(1) x,y,z (2) \bar{x},\bar{y},z (3) y,\bar{x},\bar{z} (4) \bar{y},x,\bar{z} (5) $x,\bar{y},z+\frac{1}{2}$ (6) $\bar{x},y,z+\frac{1}{2}$ (7) $y,x,\bar{z}+\frac{1}{2}$ (8) $\bar{y},\bar{x},\bar{z}+\frac{1}{2}$	$hkl : h+k+l=2n$ $hk0 : h+k=2n$ $0kl : k,l=2n$ $hhl : l=2n$ $00l : l=2n$ $h00 : h=2n$
8 <i>h</i> .. 2	$x,x+\frac{1}{2},0$ $\bar{x},\bar{x}+\frac{1}{2},0$ $x+\frac{1}{2},\bar{x},0$ $\bar{x}+\frac{1}{2},x,0$	Special: as above, plus no extra conditions
8 <i>g</i> 2..	$0,\frac{1}{2},z$ $\frac{1}{2},0,\bar{z}$ $0,\frac{1}{2},z+\frac{1}{2}$ $\frac{1}{2},0,\bar{z}+\frac{1}{2}$	$hkl : l=2n$
8 <i>f</i> 2..	$0,0,z$ $0,0,\bar{z}$ $0,0,z+\frac{1}{2}$ $0,0,\bar{z}+\frac{1}{2}$	$hkl : l=2n$
8 <i>e</i> .. 2	$x,x,\frac{1}{4}$ $\bar{x},\bar{x},\frac{1}{4}$ $x,\bar{x},\frac{3}{4}$ $\bar{x},x,\frac{3}{4}$	no extra conditions
4 <i>d</i> 2.22	$0,\frac{1}{2},0$ $\frac{1}{2},0,0$	$hkl : l=2n$
4 <i>c</i> $\bar{4}$..	$0,\frac{1}{2},\frac{1}{4}$ $0,\frac{1}{2},\frac{3}{4}$	$hkl : l=2n$
4 <i>b</i> $\bar{4}$..	$0,0,0$ $0,0,\frac{1}{2}$	$hkl : l=2n$
4 <i>a</i> 2.22	$0,0,\frac{1}{4}$ $0,0,\frac{3}{4}$	$hkl : l=2n$

Symmetry of special projections

Along [001] $p4mm$

$$\mathbf{a}' = \frac{1}{2}(\mathbf{a} - \mathbf{b}) \quad \mathbf{b}' = \frac{1}{2}(\mathbf{a} + \mathbf{b})$$

Origin at $0,0,z$

Along [100] $p1m1$

$$\mathbf{a}' = \frac{1}{2}\mathbf{b} \quad \mathbf{b}' = \frac{1}{2}\mathbf{c}$$

Origin at $x,0,0$

Along [110] $p2mm$

$$\mathbf{a}' = \frac{1}{2}(-\mathbf{a} + \mathbf{b}) \quad \mathbf{b}' = \frac{1}{2}\mathbf{c}$$

Origin at $x,x,0$

Maximal non-isomorphic subgroups

I	[2] $I\bar{4}11$ ($I\bar{4}$, 82)	(1; 2; 3; 4)+
	[2] $I2c1$ ($Iba2$, 45)	(1; 2; 5; 6)+
	[2] $I212$ ($F222$, 22)	(1; 2; 7; 8)+
IIa	[2] $P\bar{4}b2$ (117)	1; 2; 3; 4; (5; 6; 7; 8) + $(\frac{1}{2},\frac{1}{2},\frac{1}{2})$
	[2] $P\bar{4}b2$ (117)	1; 2; 7; 8; (3; 4; 5; 6) + $(\frac{1}{2},\frac{1}{2},\frac{1}{2})$
	[2] $P\bar{4}c2$ (116)	1; 2; 3; 4; 5; 6; 7; 8
	[2] $P\bar{4}c2$ (116)	1; 2; 5; 6; (3; 4; 7; 8) + $(\frac{1}{2},\frac{1}{2},\frac{1}{2})$
IIb	none	

Maximal isomorphic subgroups of lowest index

IIc [3] $I\bar{4}c2$ ($\mathbf{c}' = 3\mathbf{c}$) (120); [9] $I\bar{4}c2$ ($\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}$) (120)

Minimal non-isomorphic supergroups

I [2] $I4/mcm$ (140); [2] $I4_1/acd$ (142); [3] $F\bar{4}3c$ (219)

II [2] $C\bar{4}m2$ ($\mathbf{c}' = \frac{1}{2}\mathbf{c}$) ($P\bar{4}2m$, 111)