

Origin on 4

Number of positions,  
Wyckoff notation,  
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting  
possible reflections

$$(0,0,0; \frac{1}{2}, \frac{1}{2}, \frac{1}{2}) +$$

8    *c*    1     $x, y, z; \bar{x}, \bar{y}, z; \bar{y}, x, z; y, \bar{x}, z.$

General:

$$hkl: h+k+l=2n$$

$$00l: (l=2n)$$

4    *b*    2     $0, \frac{1}{2}, z; \frac{1}{2}, 0, z.$

Special: as above, plus

$$hkl: l=2n; (h+k=2n)$$

2    *a*    4     $0, 0, z.$

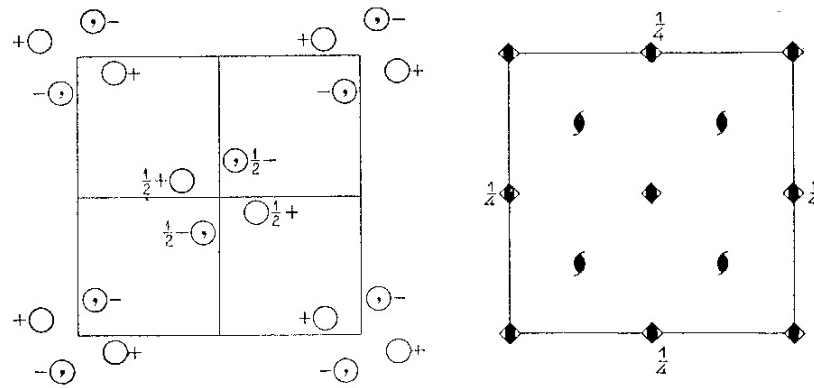
no extra conditions

$I\bar{4}$   
 $S_4^2$

No. 82

$I\bar{4}$

$\bar{4}$  Tetra



Origin at  $\bar{4}$

Number of positions,  
Wyckoff notation,  
 $n$ -fold point symmetry

Co-ordinates of equivalent positions

Conditions limit  
possible reflectic

$(0,0,0; \frac{1}{2}, \frac{1}{2}, \frac{1}{2}) +$

General:

$hkl: h+k+l=2n$

8 g 1  $x, y, z; \bar{x}, \bar{y}, z; y, \bar{x}, \bar{z}; \bar{y}, x, \bar{z}.$

4 f 2  $0, \frac{1}{2}, z; \frac{1}{2}, 0, \bar{z}.$

Special: as above on

4 e 2  $0, 0, z; 0, 0, \bar{z}.$

2 d  $\bar{4}$   $0, \frac{1}{2}, \frac{3}{4}.$

2 c  $\bar{4}$   $0, \frac{1}{2}, \frac{1}{4}.$

2 b  $\bar{2}$   $0, 0, \frac{1}{2}.$

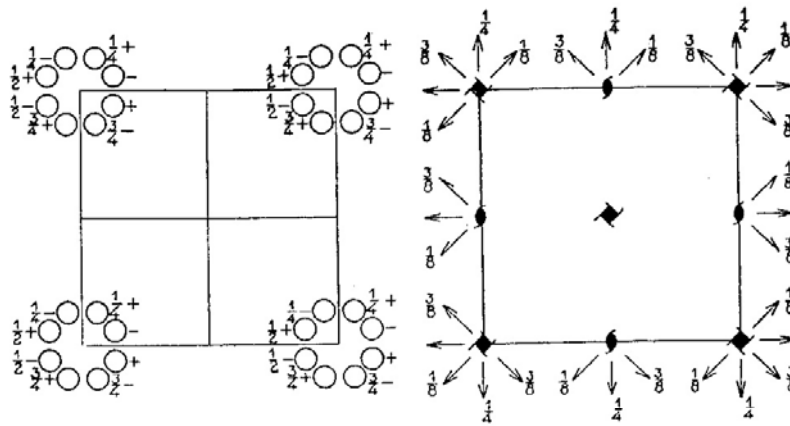
2 a  $\bar{2}$   $0, 0, 0.$

Tetragonal 4 2 2

$P 4_1 2 2$

No. 91

$P 4_1 2 2$   
 $D_4^3$



Origin at  $4_1 21$  ( $[001][010]$ )

Number of positions,  
Wyckoff notation,  
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting  
possible reflections

8 *d* 1  $x, y, z; \bar{x}, \bar{y}, \frac{1}{2} + z; \bar{y}, x, \frac{1}{2} + z; y, \bar{x}, \frac{3}{2} + z;$   
 $\bar{x}, y, \bar{z}; x, \bar{y}, \frac{1}{2} - z; \bar{y}, \bar{x}, \frac{1}{2} - z; y, x, \frac{3}{2} - z.$

General:

$hkl$ : No conditions

$00l$ :  $l = 4n$

$h00$ : No conditions

Special: as above, plus

$0kl$ :  $l = 2n + 1$  or  $4n$

}  $hhl$ :  $l = 2n + 1$  or  $4n$

4 *c* 2  $x, x, \frac{3}{8}; \bar{x}, \bar{x}, \frac{7}{8}; x, \bar{x}, \frac{1}{8}; \bar{x}, x, \frac{5}{8}.$

4 *b* 2  $\frac{1}{2}, x, 0; \frac{1}{2}, \bar{x}, \frac{1}{2}; x, \frac{1}{2}, \frac{3}{4}; \bar{x}, \frac{1}{2}, \frac{1}{4}.$

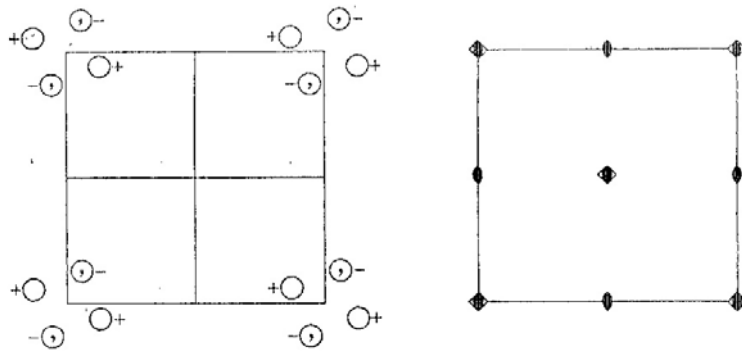
4 *a* 2  $0, x, 0; 0, \bar{x}, \frac{1}{2}; x, 0, \frac{3}{4}; \bar{x}, 0, \frac{1}{4}.$

Tetragonal  $\bar{4}$

$P\bar{4}$

No. 81

$P\bar{4}$   
 $S_4^1$



Origin at  $\bar{4}$

Number of positions,  
Wyckoff notation,  
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting  
possible reflections

4 *h* 1  $x, y, z; \bar{x}, \bar{y}, z; y, \bar{x}, \bar{z}; \bar{y}, x, \bar{z}.$

General:

$hkl$ : No conditions

2 *g* 2  $0, \frac{1}{2}, z; \frac{1}{2}, 0, \bar{z}.$

Special:

$hk0$ :  $h+k=2n$

2 *f* 2  $\frac{1}{2}, \frac{1}{2}, z; \frac{1}{2}, \frac{1}{2}, \bar{z}.$

2 *e* 2  $0, 0, z; 0, 0, \bar{z}.$

1 *d*  $\bar{4}$   $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}.$

1 *c*  $\bar{4}$   $\frac{1}{2}, \frac{1}{2}, 0.$

1 *b*  $\bar{4}$   $0, 0, \frac{1}{2}.$

1 *a*  $\bar{4}$   $0, 0, 0.$

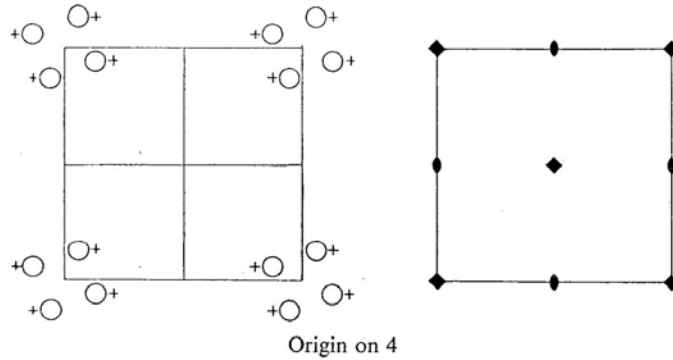
No conditions

Tetragonal 4

$P4$

No. 75

$P4$   
 $C_4^1$



Number of positions,  
Wyckoff notation,  
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting  
possible reflections

4  $d$  1  $x, y, z; \bar{x}, \bar{y}, z; y, \bar{x}, z; \bar{y}, x, z.$

General:

$hkl$ : No conditions  
 $00l$ : No conditions

2  $c$  2  $0, \frac{1}{2}, z; \frac{1}{2}, 0, z.$

Special:

$hkl$ :  $h+k=2n$

1  $b$  4  $\frac{1}{2}, \frac{1}{2}, z.$

} No conditions

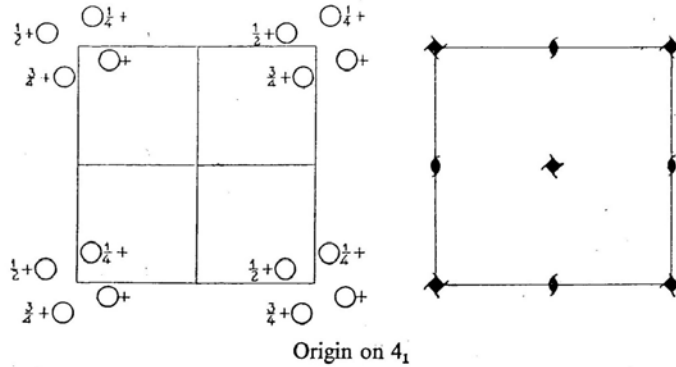
1  $a$  4  $0, 0, z.$

Tetragonal 4

$P4_1$

No. 76

$P4_1$   
 $C_4^2$



4  $a$  1  $x, y, z; \bar{x}, \bar{y}, \frac{1}{2}+z; \bar{y}, x, \frac{1}{4}+z; y, \bar{x}, \frac{3}{4}+z.$

General:

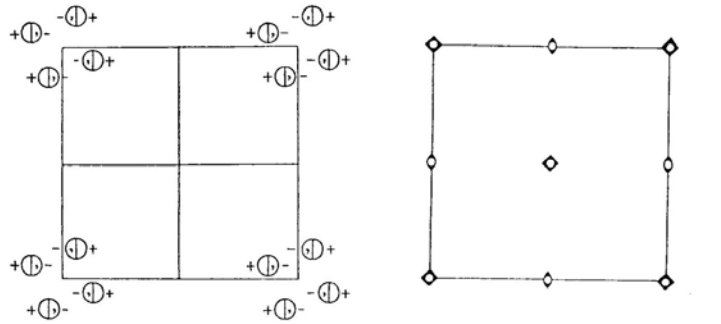
$hkl$ : No conditions  
 $00l$ :  $l=4n$

Tetragonal  $4/m$

$P 4/m$

No. 83

$P 4/m$   
 $C_{4h}^1$



Origin at centre ( $4/m$ )

Number of positions,  
Wyckoff notation,  
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting  
possible reflections

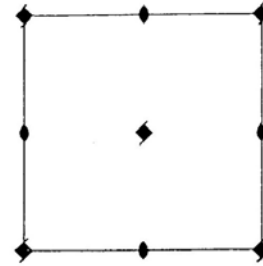
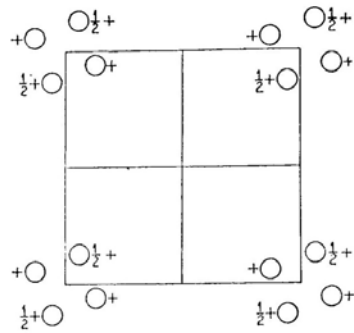
			Co-ordinates of equivalent positions				Conditions limiting possible reflections
8	<i>l</i>	1	$x, y, z;$	$\bar{x}, \bar{y}, z;$	$x, y, \bar{z};$	$\bar{x}, \bar{y}, \bar{z};$	General: $hkl:$ $hk0:$ $00l:$
			$\bar{y}, x, z;$	$y, \bar{x}, z;$	$\bar{y}, x, \bar{z};$	$y, \bar{x}, \bar{z}.$	
4	<i>k</i>	<i>m</i>	$x, y, \frac{1}{2};$	$\bar{x}, \bar{y}, \frac{1}{2};$	$\bar{y}, x, \frac{1}{2};$	$y, \bar{x}, \frac{1}{2}.$	Special: } No conditions
4	<i>j</i>	<i>m</i>	$x, y, 0;$	$\bar{x}, \bar{y}, 0;$	$\bar{y}, x, 0;$	$y, \bar{x}, 0.$	
4	<i>i</i>	2	$0, \frac{1}{2}, z;$	$\frac{1}{2}, 0, z;$	$0, \frac{1}{2}, \bar{z};$	$\frac{1}{2}, 0, \bar{z}.$	} No conditions
2	<i>h</i>	4	$\frac{1}{2}, \frac{1}{2}, z;$	$\frac{1}{2}, \frac{1}{2}, \bar{z}.$			
2	<i>g</i>	4	$0, 0, z;$	$0, 0, \bar{z}.$			$hkl: h+k=2n$
2	<i>f</i>	$2/m$	$0, \frac{1}{2}, \frac{1}{2};$	$\frac{1}{2}, 0, \frac{1}{2}.$			
2	<i>e</i>	$2/m$	$0, \frac{1}{2}, 0;$	$\frac{1}{2}, 0, 0.$			} No conditions
1	<i>d</i>	$4/m$	$\frac{1}{2}, \frac{1}{2}, \frac{1}{2}.$				
1	<i>c</i>	$4/m$	$\frac{1}{2}, \frac{1}{2}, 0.$				
1	<i>b</i>	$4/m$	$0, 0, \frac{1}{2}.$				
1	<i>a</i>	$4/m$	$0, 0, 0.$				

$P4_2$   
 $C_4^3$

No. 77

$P4_2$

4 Tetragonal



Origin on  $4_2$

Number of positions,  
Wyckoff notation,  
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting  
possible reflections

4 *d* 1  $x, y, z; \bar{x}, \bar{y}, z; \bar{y}, x, \frac{1}{2} + z; y, \bar{x}, \frac{1}{2} + z.$

General:

*hkl*: No conditions  
*00l*:  $l = 2n$

2 *c* 2  $0, \frac{1}{2}, z; \frac{1}{2}, 0, \frac{1}{2} + z.$

Special: as above, plus

*hkl*:  $h + k + l = 2n$

2 *b* 2  $\frac{1}{2}, \frac{1}{2}, z; \frac{1}{2}, \frac{1}{2}, \frac{1}{2} + z.$

} *hkl*:  $l = 2n$

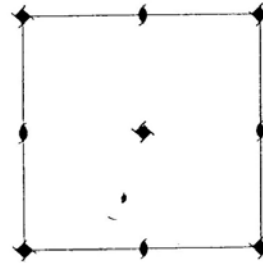
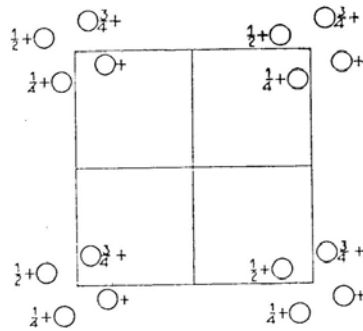
2 *a* 2  $0, 0, z; 0, 0, \frac{1}{2} + z.$

$P4_3$   
 $C_4$

No. 78

$P4_3$

4 Tetragonal



Origin on  $4_3$

4 *a* 1  $x, y, z; \bar{x}, \bar{y}, \frac{1}{2} + z; \bar{y}, x, \frac{3}{4} + z; y, \bar{x}, \frac{1}{4} + z.$

General:

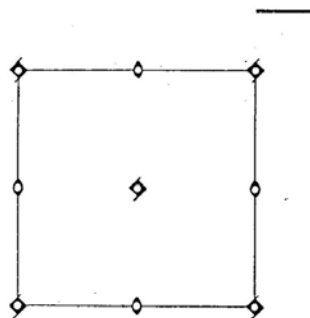
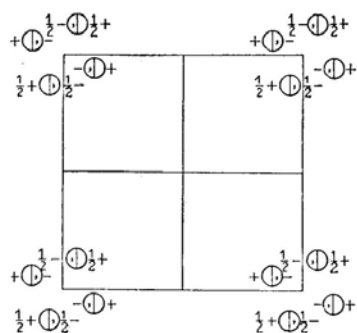
*hkl*: No conditions  
*00l*:  $l = 4n$

$P4_2/m$   
 $C_{4h}^2$

No. 84

$P4_2/m$

$4/m$  Tetragonal



Origin at centre ( $2/m$ ) on  $4_2$

Number of positions,  
Wyckoff notation,  
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting  
possible reflections

Number of positions, Wyckoff notation, and point symmetry			Co-ordinates of equivalent positions	Conditions limiting possible reflections
8	$k$	1	$x, y, z; \bar{x}, \bar{y}, z; \bar{y}, x, \frac{1}{2}+z; y, \bar{x}, \frac{1}{2}+z;$ $x, y, \bar{z}; \bar{x}, \bar{y}, \bar{z}; \bar{y}, x, \frac{1}{2}-z; y, \bar{x}, \frac{1}{2}-z.$	General: $hkl$ : No conditions $hk0$ : No conditions $00l$ : $l=2n$
4	$j$	$m$	$x, y, 0; \bar{x}, \bar{y}, 0; \bar{y}, x, \frac{1}{2}; y, \bar{x}, \frac{1}{2}.$	Special: as above, plus no extra conditions
4	$i$	2	$0, \frac{1}{2}, z; 0, \frac{1}{2}, \bar{z}; \frac{1}{2}, 0, \frac{1}{2}+z; \frac{1}{2}, 0, \frac{1}{2}-z.$	$hkl$ : $h+k+l=2n$
4	$h$	2	$\frac{1}{2}, \frac{1}{2}, z; \frac{1}{2}, \frac{1}{2}, \bar{z}; \frac{1}{2}, \frac{1}{2}, \frac{1}{2}+z; \frac{1}{2}, \frac{1}{2}, \frac{1}{2}-z.$	$hkl$ : $l=2n$
4	$g$	2	$0, 0, z; 0, 0, \bar{z}; 0, 0, \frac{1}{2}+z; 0, 0, \frac{1}{2}-z.$	
2	$f$	$\bar{4}$	$\frac{1}{2}, \frac{1}{2}, \frac{1}{4}; \frac{1}{2}, \frac{1}{2}, \frac{3}{4}.$	$hkl$ : $h+k+l=2n$
2	$e$	$\bar{4}$	$0, 0, \frac{1}{4}; 0, 0, \frac{3}{4}.$	
2	$d$	$2/m$	$0, \frac{1}{2}, \frac{1}{2}; \frac{1}{2}, 0, 0.$	$hkl$ : $l=2n$
2	$c$	$2/m$	$0, \frac{1}{2}, 0; \frac{1}{2}, 0, \frac{1}{2}.$	
2	$b$	$2/m$	$\frac{1}{2}, \frac{1}{2}, 0; \frac{1}{2}, \frac{1}{2}, \frac{1}{2}.$	$hkl$ : $l=2n$
2	$a$	$2/m$	$0, 0, 0; 0, 0, \frac{1}{2}.$	

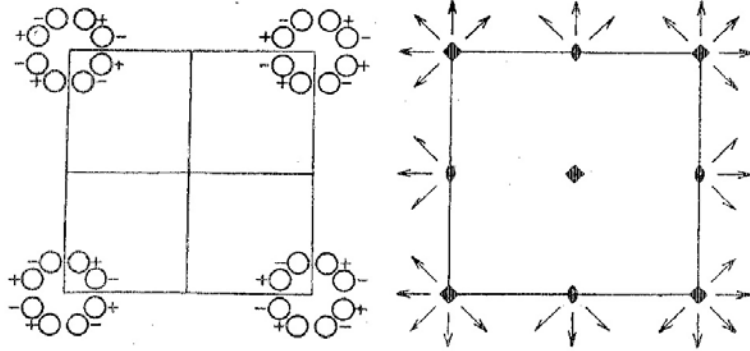


Tetragonal 4 2 2

P 4 2 2

No. 89

P422  
D<sub>4</sub><sup>1</sup>



Origin at 422

Number of positions,  
Wyckoff notation,  
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting  
possible reflections

Number of positions, Wyckoff notation, and point symmetry			Co-ordinates of equivalent positions
8	<i>p</i>	1	$x, y, z; \bar{x}, \bar{y}, z; \bar{x}, y, \bar{z}; x, \bar{y}, \bar{z};$ $\bar{y}, \bar{x}, \bar{z}; y, x, \bar{z}; y, \bar{x}, z; \bar{y}, x, z.$
4	<i>o</i>	2	$x, \frac{1}{2}, 0; \bar{x}, \frac{1}{2}, 0; \frac{1}{2}, x, 0; \frac{1}{2}, \bar{x}, 0.$
4	<i>n</i>	2	$x, 0, \frac{1}{2}; \bar{x}, 0, \frac{1}{2}; 0, x, \frac{1}{2}; 0, \bar{x}, \frac{1}{2}.$
4	<i>m</i>	2	$x, \frac{1}{2}, \frac{1}{2}; \bar{x}, \frac{1}{2}, \frac{1}{2}; \frac{1}{2}, x, \frac{1}{2}; \frac{1}{2}, \bar{x}, \frac{1}{2}.$
4	<i>l</i>	2	$x, 0, 0; \bar{x}, 0, 0; 0, x, 0; 0, \bar{x}, 0.$
4	<i>k</i>	2	$x, x, \frac{1}{2}; \bar{x}, \bar{x}, \frac{1}{2}; \bar{x}, x, \frac{1}{2}; x, \bar{x}, \frac{1}{2}.$
4	<i>j</i>	2	$x, x, 0; \bar{x}, \bar{x}, 0; \bar{x}, x, 0; x, \bar{x}, 0.$
4	<i>i</i>	2	$0, \frac{1}{2}, z; 0, \frac{1}{2}, \bar{z}; \frac{1}{2}, 0, z; \frac{1}{2}, 0, \bar{z}.$
2	<i>h</i>	4	$\frac{1}{2}, \frac{1}{2}, z; \frac{1}{2}, \frac{1}{2}, \bar{z}.$
2	<i>g</i>	4	$0, 0, z; 0, 0, \bar{z}.$
2	<i>f</i>	222	$\frac{1}{2}, 0, \frac{1}{2}; 0, \frac{1}{2}, \frac{1}{2}.$
2	<i>e</i>	222	$\frac{1}{2}, 0, 0; 0, \frac{1}{2}, 0.$
1	<i>d</i>	42	$\frac{1}{2}, \frac{1}{2}, \frac{1}{2}.$
1	<i>c</i>	42	$\frac{1}{2}, \frac{1}{2}, 0.$
1	<i>b</i>	42	$0, 0, \frac{1}{2}.$
1	<i>a</i>	42	$0, 0, 0.$

General:

No conditions

Special:

No conditions

$hkl: h+k=2n$

No conditions

$hkl: h+k=2n$

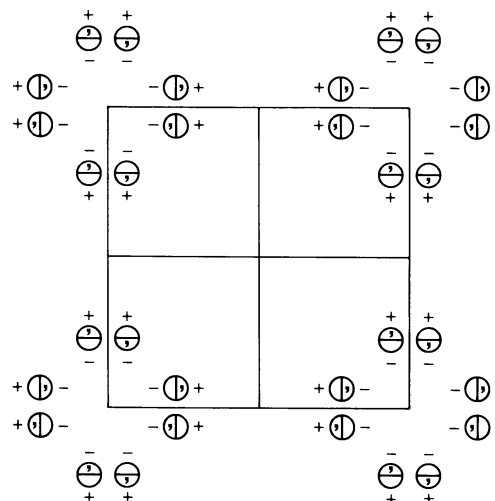
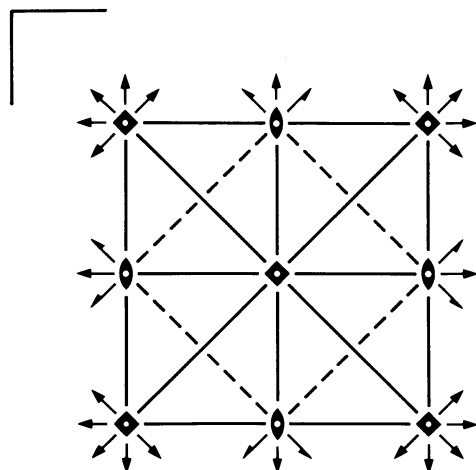
No conditions

$P4/mmm$ 
 $D_{4h}^1$ 
 $4/mmm$ 

Tetragonal

No. 123

 $P 4/m 2/m 2/m$ 

 Patterson symmetry  $P4/mmm$ 

 Origin at centre ( $4/mmm$ )

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

Symmetry operations

- |                       |                  |                                    |                                    |
|-----------------------|------------------|------------------------------------|------------------------------------|
| (1) 1                 | (2) 2 $0,0,z$    | (3) $4^+$ $0,0,z$                  | (4) $4^-$ $0,0,z$                  |
| (5) 2 $0,y,0$         | (6) 2 $x,0,0$    | (7) 2 $x,x,0$                      | (8) 2 $x,\bar{x},0$                |
| (9) $\bar{1}$ $0,0,0$ | (10) $m$ $x,y,0$ | (11) $\bar{4}^+$ $0,0,z$ ; $0,0,0$ | (12) $\bar{4}^-$ $0,0,z$ ; $0,0,0$ |
| (13) $m$ $x,0,z$      | (14) $m$ $0,y,z$ | (15) $m$ $x,\bar{x},z$             | (16) $m$ $x,x,z$                   |

**Maximal non-isomorphic subgroups**

- I** [2]  $P\bar{4}m2$  (115) 1; 2; 7; 8; 11; 12; 13; 14  
 [2]  $P\bar{4}2m$  (111) 1; 2; 5; 6; 11; 12; 15; 16  
 [2]  $P4mm$  (99) 1; 2; 3; 4; 13; 14; 15; 16  
 [2]  $P422$  (89) 1; 2; 3; 4; 5; 6; 7; 8  
 [2]  $P4/m11$  ( $P4/m$ , 83) 1; 2; 3; 4; 9; 10; 11; 12  
 [2]  $P2/m12/m$  ( $Cmmm$ , 65) 1; 2; 7; 8; 9; 10; 15; 16  
 [2]  $P2/m2/m1$  ( $Pmmm$ , 47) 1; 2; 5; 6; 9; 10; 13; 14

**IIa** none

- IIb** [2]  $P4_2/mcm$  ( $c' = 2c$ ) (132); [2]  $P4_2/mmc$  ( $c' = 2c$ ) (131); [2]  $P4/mcc$  ( $c' = 2c$ ) (124);  
 [2]  $C4/emm$  ( $a' = 2a, b' = 2b$ ) ( $P4/nmm$ , 129); [2]  $C4/mmd$  ( $a' = 2a, b' = 2b$ ) ( $P4/mbm$ , 127);  
 [2]  $C4/emd$  ( $a' = 2a, b' = 2b$ ) ( $P4/nbm$ , 125); [2]  $F4/mmc$  ( $a' = 2a, b' = 2b, c' = 2c$ ) ( $I4/mcm$ , 140);  
 [2]  $F4/mmm$  ( $a' = 2a, b' = 2b, c' = 2c$ ) ( $I4/mmm$ , 139)

**Maximal isomorphic subgroups of lowest index**

- IIc** [2]  $P4/mmm$  ( $c' = 2c$ ) (123); [2]  $C4/mmm$  ( $a' = 2a, b' = 2b$ ) ( $P4/mmm$ , 123)

**Minimal non-isomorphic supergroups**

- I** [3]  $Pm\bar{3}m$  (221)  
**II** [2]  $I4/mmm$  (139)

**Generators selected** (1);  $t(1,0,0)$ ;  $t(0,1,0)$ ;  $t(0,0,1)$ ; (2); (3); (5); (9)

**Positions**

Multiplicity, Wyckoff letter, Site symmetry		Coordinates				Reflection conditions
16	<i>u</i> 1	(1) $x, y, z$ (5) $\bar{x}, y, \bar{z}$ (9) $\bar{x}, \bar{y}, \bar{z}$ (13) $x, \bar{y}, z$	(2) $\bar{x}, \bar{y}, z$ (6) $x, \bar{y}, \bar{z}$ (10) $x, y, \bar{z}$ (14) $\bar{x}, y, z$	(3) $\bar{y}, x, z$ (7) $y, x, \bar{z}$ (11) $y, \bar{x}, \bar{z}$ (15) $\bar{y}, \bar{x}, z$	(4) $y, \bar{x}, z$ (8) $\bar{y}, \bar{x}, \bar{z}$ (12) $\bar{y}, x, \bar{z}$ (16) $y, x, z$	General: no conditions
8	<i>t</i> . <i>m</i> .	$x, \frac{1}{2}, z$ $\bar{x}, \frac{1}{2}, \bar{z}$	$\bar{x}, \frac{1}{2}, z$ $x, \frac{1}{2}, \bar{z}$	$\frac{1}{2}, x, z$ $\frac{1}{2}, x, \bar{z}$	$\frac{1}{2}, \bar{x}, z$ $\frac{1}{2}, \bar{x}, \bar{z}$	Special: no extra conditions
8	<i>s</i> . <i>m</i> .	$x, 0, z$ $\bar{x}, 0, \bar{z}$	$\bar{x}, 0, z$ $x, 0, \bar{z}$	$0, x, z$ $0, x, \bar{z}$	$0, \bar{x}, z$ $0, \bar{x}, \bar{z}$	no extra conditions
8	<i>r</i> . . <i>m</i>	$x, x, z$ $\bar{x}, x, \bar{z}$	$\bar{x}, \bar{x}, z$ $x, \bar{x}, \bar{z}$	$\bar{x}, x, z$ $x, x, \bar{z}$	$x, \bar{x}, z$ $\bar{x}, \bar{x}, \bar{z}$	no extra conditions
8	<i>q</i> <i>m</i> . .	$x, y, \frac{1}{2}$ $\bar{x}, y, \frac{1}{2}$	$\bar{x}, \bar{y}, \frac{1}{2}$ $x, \bar{y}, \frac{1}{2}$	$\bar{y}, x, \frac{1}{2}$ $y, x, \frac{1}{2}$	$y, \bar{x}, \frac{1}{2}$ $\bar{y}, \bar{x}, \frac{1}{2}$	no extra conditions
8	<i>p</i> <i>m</i> . .	$x, y, 0$ $\bar{x}, y, 0$	$\bar{x}, \bar{y}, 0$ $x, \bar{y}, 0$	$\bar{y}, x, 0$ $y, x, 0$	$y, \bar{x}, 0$ $\bar{y}, \bar{x}, 0$	no extra conditions
4	<i>o</i> <i>m</i> 2 <i>m</i> .	$x, \frac{1}{2}, \frac{1}{2}$	$\bar{x}, \frac{1}{2}, \frac{1}{2}$	$\frac{1}{2}, x, \frac{1}{2}$	$\frac{1}{2}, \bar{x}, \frac{1}{2}$	no extra conditions
4	<i>n</i> <i>m</i> 2 <i>m</i> .	$x, \frac{1}{2}, 0$	$\bar{x}, \frac{1}{2}, 0$	$\frac{1}{2}, x, 0$	$\frac{1}{2}, \bar{x}, 0$	no extra conditions
4	<i>m</i> <i>m</i> 2 <i>m</i> .	$x, 0, \frac{1}{2}$	$\bar{x}, 0, \frac{1}{2}$	$0, x, \frac{1}{2}$	$0, \bar{x}, \frac{1}{2}$	no extra conditions
4	<i>l</i> <i>m</i> 2 <i>m</i> .	$x, 0, 0$	$\bar{x}, 0, 0$	$0, x, 0$	$0, \bar{x}, 0$	no extra conditions
4	<i>k</i> <i>m</i> . 2 <i>m</i>	$x, x, \frac{1}{2}$	$\bar{x}, \bar{x}, \frac{1}{2}$	$\bar{x}, x, \frac{1}{2}$	$x, \bar{x}, \frac{1}{2}$	no extra conditions
4	<i>j</i> <i>m</i> . 2 <i>m</i>	$x, x, 0$	$\bar{x}, \bar{x}, 0$	$\bar{x}, x, 0$	$x, \bar{x}, 0$	no extra conditions
4	<i>i</i> 2 <i>m</i> <i>m</i> .	$0, \frac{1}{2}, z$	$\frac{1}{2}, 0, z$	$0, \frac{1}{2}, \bar{z}$	$\frac{1}{2}, 0, \bar{z}$	$hkl : h + k = 2n$
2	<i>h</i> 4 <i>m</i> <i>m</i>	$\frac{1}{2}, \frac{1}{2}, z$	$\frac{1}{2}, \frac{1}{2}, \bar{z}$			no extra conditions
2	<i>g</i> 4 <i>m</i> <i>m</i>	$0, 0, z$	$0, 0, \bar{z}$			no extra conditions
2	<i>f</i> <i>m</i> <i>m</i> <i>m</i> .	$0, \frac{1}{2}, 0$	$\frac{1}{2}, 0, 0$			$hkl : h + k = 2n$
2	<i>e</i> <i>m</i> <i>m</i> <i>m</i> .	$0, \frac{1}{2}, \frac{1}{2}$	$\frac{1}{2}, 0, \frac{1}{2}$			$hkl : h + k = 2n$
1	<i>d</i> 4/ <i>m</i> <i>m</i> <i>m</i>	$\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$				no extra conditions
1	<i>c</i> 4/ <i>m</i> <i>m</i> <i>m</i>	$\frac{1}{2}, \frac{1}{2}, 0$				no extra conditions
1	<i>b</i> 4/ <i>m</i> <i>m</i> <i>m</i>	$0, 0, \frac{1}{2}$				no extra conditions
1	<i>a</i> 4/ <i>m</i> <i>m</i> <i>m</i>	$0, 0, 0$				no extra conditions

**Symmetry of special projections**

Along [001]  $p4mm$

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

Origin at 0, 0, z

(Continued on preceding page)

Along [100]  $p2mm$

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

Origin at  $x, 0, 0$

Along [110]  $p2mm$

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

Origin at  $x, x, 0$