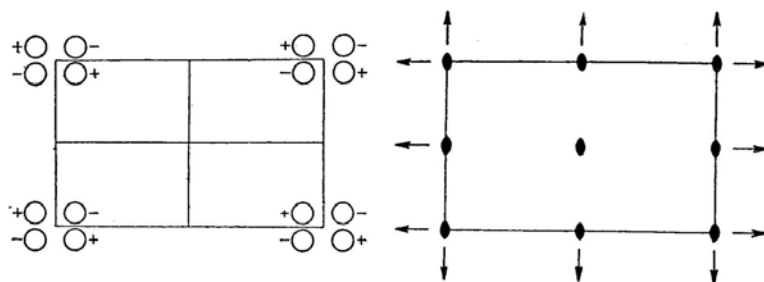


$P222$
 D_2^1

No. 16

$P222$

222 Orthorhombic



Origin at 222

Number of positions,
Wyckoff notation,
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting
possible reflections

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

General:

No conditions

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

Special:

No conditions

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

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

2 q 2 $0, 0, z; 0, 0, \bar{z}.$

2 p 2 $\frac{1}{2}, y, \frac{1}{2}; \frac{1}{2}, \bar{y}, \frac{1}{2}.$

2 l 2 $x, \frac{1}{2}, \frac{1}{2}; \bar{x}, \frac{1}{2}, \frac{1}{2}.$

2 o 2 $\frac{1}{2}, y, 0; \frac{1}{2}, \bar{y}, 0.$

2 k 2 $x, \frac{1}{2}, 0; \bar{x}, \frac{1}{2}, 0.$

2 n 2 $0, y, \frac{1}{2}; 0, \bar{y}, \frac{1}{2}.$

2 j 2 $x, 0, \frac{1}{2}; \bar{x}, 0, \frac{1}{2}.$

2 m 2 $0, y, 0; 0, \bar{y}, 0.$

2 i 2 $x, 0, 0; \bar{x}, 0, 0.$

1 h 222 $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}.$

1 d 222 $0, 0, \frac{1}{2}.$

1 g 222 $0, \frac{1}{2}, \frac{1}{2}.$

1 c 222 $0, \frac{1}{2}, 0.$

1 f 222 $\frac{1}{2}, 0, \frac{1}{2}.$

1 b 222 $\frac{1}{2}, 0, 0.$

1 e 222 $\frac{1}{2}, \frac{1}{2}, 0.$

1 a 222 $0, 0, 0.$

Symmetry of special projections

(001) $pm\bar{m}$; $a'=a, b'=b$

(100) $pm\bar{m}$; $b'=b, c'=c$

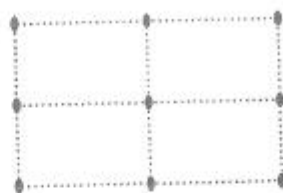
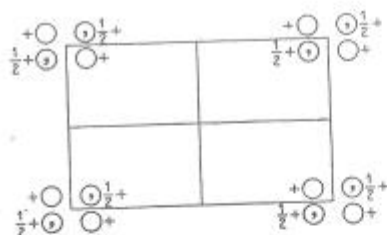
(010) $pm\bar{m}$; $c'=c, a'=a$

Orthorhombic $mm2$

$Pcc2$

No. 27

$Pcc2$
 C_{2v}^3



Origin on 2

Number of positions,
Wyckoff notation,
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting
possible reflections

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

General:

hkl : No conditions

$0kl$: $l=2n$

$h0l$: $l=2n$

$hk0$:

$h00$: } No conditions

$0k0$:

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

Special: as above, plus

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

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

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

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

hkl : $l=2n$

Symmetry of special projections

(001) pmm ; $a'=a, b'=b$

(100) $pm1$; $b'=b, c'=c/2$

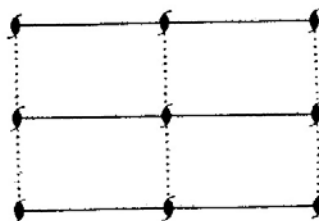
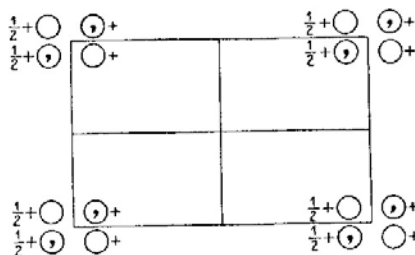
(010) plm ; $c'=c/2, a'=a$

$Pmc2_1$
 C_{2v}^2

No. 26

$Pmc2_1$

$mm2$ Orthorhombic



Origin on 2_1

Number of positions,
Wyckoff notation,
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting
possible reflections

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

General:

hkl : No conditions

$0kl$: No conditions

$h0l$: $l=2n$

$hk0$:

$h00$: } No conditions

$0k0$:

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

Special: as above only

2 b m $\frac{1}{2},y,z$; $\frac{1}{2},\bar{y},\frac{1}{2}+z$.

2 a m $0,y,z$; $0,\bar{y},\frac{1}{2}+z$.

Symmetry of special projections

(001) $pm\bar{m}$; $a'=a$, $b'=b$

(100) pgl ; $b'=b$, $c'=c$

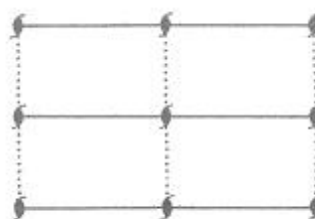
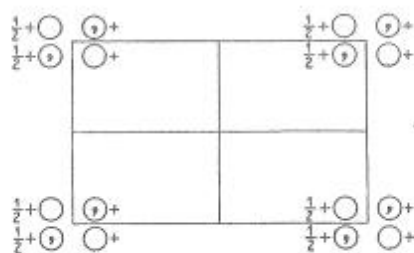
(010) $p1m$; $c'=c/2$, $a'=a$

$Pmc2_1$
 C_{2v}^2

No. 26

$Pmc2_1$

$mm2$ Orthorhombic



Origin on 2_1

Number of positions,
Wyckoff notation,
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting
possible reflections

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

General:

hkl : No conditions

$0kl$: No conditions

$h0l$: $l = 2n$

$hk0$: } No conditions

$h00$: }

$0k0$: }

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

Special: as above only

2 b m $\frac{1}{2}, y, z; \frac{1}{2}, \bar{y}, \frac{1}{2} + z.$

2 a m $0, y, z; 0, \bar{y}, \frac{1}{2} + z.$

Symmetry of special projections

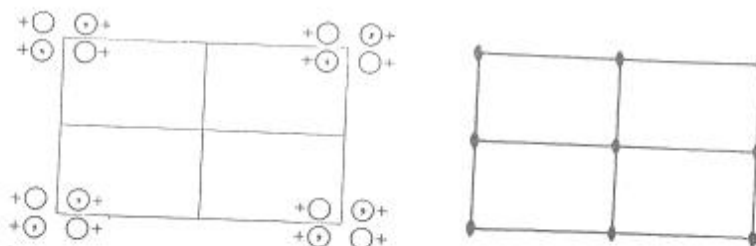
(001) pmm ; $a' = a, b' = b$

(100) pgl ; $b' = b, c' = c$

(010) $p1m$; $c' = c/2, a' = a$

Orthorhombic $m m 2$ $P m m 2$

No. 25

 $P m m 2$
 C_{2v}^1 Origin on $mm2$ Number of positions,
Wyckoff notation,
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting
possible reflections

4	<i>i</i>	1	$x, y, z; \bar{x}, \bar{y}, z; x, \bar{y}, z; \bar{x}, y, z.$
2	<i>h</i>	<i>m</i>	$\frac{1}{2}, y, z; \frac{1}{2}, \bar{y}, z.$
2	<i>g</i>	<i>m</i>	$0, y, z; 0, \bar{y}, z.$
2	<i>f</i>	<i>m</i>	$x, \frac{1}{2}, z; \bar{x}, \frac{1}{2}, z.$
2	<i>e</i>	<i>m</i>	$x, 0, z; \bar{x}, 0, z.$
1	<i>d</i>	<i>mm</i>	$\frac{1}{2}, \frac{1}{2}, z.$
1	<i>c</i>	<i>mm</i>	$\frac{1}{2}, 0, z.$
1	<i>b</i>	<i>mm</i>	$0, \frac{1}{2}, z.$
1	<i>a</i>	<i>mm</i>	$0, 0, z.$

General:

No conditions

Special:

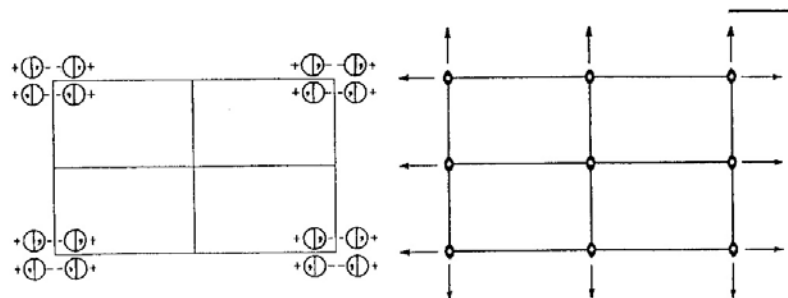
No conditions

Symmetry of special projections

(001) pmm ; $a' = a, b' = b$ (100) $pm1$; $b' = b, c' = c$ (010) plm ; $c' = c, a' = a$

Orthorhombic $m m m$ $P 2/m 2/m 2/m$

No. 47

 $P m m m$
 D_{2h}^1 Origin at centre (mmm)Number of positions,
Wyckoff notation,
and point symmetry

Co-ordinates of equivalent positions

Conditions limiting
possible reflections

8	a	1	$x, y, z;$ $\bar{x}, \bar{y}, \bar{z};$	$\bar{x}, \bar{y}, z;$ $x, y, \bar{z};$	$x, \bar{y}, \bar{z};$ $\bar{x}, y, z;$	$\bar{x}, y, \bar{z};$ $x, \bar{y}, z;$	
4	z	m	$x, y, \frac{1}{2};$ $\bar{x}, \bar{y}, \frac{1}{2};$	$\bar{x}, \bar{y}, \frac{1}{2};$ $x, y, \frac{1}{2};$	$\bar{x}, y, \frac{1}{2};$ $x, \bar{y}, \frac{1}{2};$	$x, \bar{y}, \frac{1}{2};$ $\bar{x}, y, \frac{1}{2};$	
4	y	m	$x, y, 0;$ $\bar{x}, \bar{y}, 0;$	$\bar{x}, \bar{y}, 0;$ $x, y, 0;$	$\bar{x}, y, 0;$ $x, \bar{y}, 0;$	$x, \bar{y}, 0;$ $\bar{x}, y, 0;$	
4	x	m	$x, \frac{1}{2}, z;$ $\bar{x}, \frac{1}{2}, \bar{z};$	$\bar{x}, \frac{1}{2}, \bar{z};$ $x, \frac{1}{2}, z;$	$\bar{x}, \frac{1}{2}, z;$ $x, \frac{1}{2}, \bar{z};$	$x, \frac{1}{2}, \bar{z};$ $\bar{x}, \frac{1}{2}, z;$	
4	w	m	$x, 0, z;$ $\bar{x}, 0, \bar{z};$	$\bar{x}, 0, \bar{z};$ $x, 0, z;$	$\bar{x}, 0, z;$ $x, 0, \bar{z};$	$x, 0, \bar{z};$ $\bar{x}, 0, z;$	
4	v	m	$\frac{1}{2}, y, z;$ $\frac{1}{2}, \bar{y}, \bar{z};$	$\frac{1}{2}, \bar{y}, \bar{z};$ $\frac{1}{2}, y, z;$	$\frac{1}{2}, y, z;$ $\frac{1}{2}, \bar{y}, \bar{z};$	$\frac{1}{2}, \bar{y}, \bar{z};$ $\frac{1}{2}, y, z;$	
4	u	m	$0, y, z;$ $0, \bar{y}, \bar{z};$	$0, \bar{y}, \bar{z};$ $0, y, z;$	$0, y, z;$ $0, \bar{y}, \bar{z};$	$0, \bar{y}, \bar{z};$ $0, y, z;$	
2	t	mm	$\frac{1}{2}, \frac{1}{2}, z;$ $\frac{1}{2}, \frac{1}{2}, \bar{z};$	$\frac{1}{2}, \frac{1}{2}, \bar{z};$ $\frac{1}{2}, \frac{1}{2}, z;$	$\frac{1}{2}, \frac{1}{2}, z;$ $\frac{1}{2}, \frac{1}{2}, \bar{z};$	$\frac{1}{2}, \frac{1}{2}, \bar{z};$ $\frac{1}{2}, \frac{1}{2}, z;$	
2	s	mm	$\frac{1}{2}, 0, z;$ $\frac{1}{2}, 0, \bar{z};$	$\frac{1}{2}, 0, \bar{z};$ $\frac{1}{2}, 0, z;$	$\frac{1}{2}, 0, z;$ $\frac{1}{2}, 0, \bar{z};$	$\frac{1}{2}, 0, \bar{z};$ $\frac{1}{2}, 0, z;$	
2	r	mm	$0, \frac{1}{2}, z;$ $0, \frac{1}{2}, \bar{z};$	$0, \frac{1}{2}, \bar{z};$ $0, \frac{1}{2}, z;$	$0, \frac{1}{2}, z;$ $0, \frac{1}{2}, \bar{z};$	$0, \frac{1}{2}, \bar{z};$ $0, \frac{1}{2}, z;$	
2	q	mm	$0, 0, z;$ $0, 0, \bar{z};$	$0, 0, \bar{z};$ $0, 0, z;$	$0, 0, z;$ $0, 0, \bar{z};$	$0, 0, \bar{z};$ $0, 0, z;$	
2	p	mm	$\frac{1}{2}, y, \frac{1}{2};$ $\frac{1}{2}, \bar{y}, \frac{1}{2};$	$\frac{1}{2}, \bar{y}, \frac{1}{2};$ $\frac{1}{2}, y, \frac{1}{2};$	$\frac{1}{2}, y, \frac{1}{2};$ $\frac{1}{2}, \bar{y}, \frac{1}{2};$	$\frac{1}{2}, \bar{y}, \frac{1}{2};$ $\frac{1}{2}, y, \frac{1}{2};$	
2	o	mm	$\frac{1}{2}, y, 0;$ $\frac{1}{2}, \bar{y}, 0;$	$\frac{1}{2}, \bar{y}, 0;$ $\frac{1}{2}, y, 0;$	$\frac{1}{2}, y, 0;$ $\frac{1}{2}, \bar{y}, 0;$	$\frac{1}{2}, \bar{y}, 0;$ $\frac{1}{2}, y, 0;$	
1	h	mmm	$\frac{1}{2}, \frac{1}{2}, \frac{1}{2};$				
1	g	mmm	$0, \frac{1}{2}, \frac{1}{2};$				
1	f	mmm	$\frac{1}{2}, \frac{1}{2}, 0;$				
1	e	mmm	$0, \frac{1}{2}, 0;$				
2	n	mm	$0, y, \frac{1}{2};$ $0, \bar{y}, \frac{1}{2};$	$0, \bar{y}, \frac{1}{2};$ $0, y, \frac{1}{2};$	$0, y, \frac{1}{2};$ $0, \bar{y}, \frac{1}{2};$	$0, \bar{y}, \frac{1}{2};$ $0, y, \frac{1}{2};$	
2	m	mm	$0, y, 0;$ $0, \bar{y}, 0;$	$0, \bar{y}, 0;$ $0, y, 0;$	$0, y, 0;$ $0, \bar{y}, 0;$	$0, \bar{y}, 0;$ $0, y, 0;$	
2	l	mm	$x, \frac{1}{2}, \frac{1}{2};$ $\bar{x}, \frac{1}{2}, \frac{1}{2};$	$\bar{x}, \frac{1}{2}, \frac{1}{2};$ $x, \frac{1}{2}, \frac{1}{2};$	$x, \frac{1}{2}, \frac{1}{2};$ $\bar{x}, \frac{1}{2}, \frac{1}{2};$	$\bar{x}, \frac{1}{2}, \frac{1}{2};$ $x, \frac{1}{2}, \frac{1}{2};$	
2	k	mm	$x, \frac{1}{2}, 0;$ $\bar{x}, \frac{1}{2}, 0;$	$\bar{x}, \frac{1}{2}, 0;$ $x, \frac{1}{2}, 0;$	$x, \frac{1}{2}, 0;$ $\bar{x}, \frac{1}{2}, 0;$	$\bar{x}, \frac{1}{2}, 0;$ $x, \frac{1}{2}, 0;$	
2	j	mm	$x, 0, \frac{1}{2};$ $\bar{x}, 0, \frac{1}{2};$	$\bar{x}, 0, \frac{1}{2};$ $x, 0, \frac{1}{2};$	$x, 0, \frac{1}{2};$ $\bar{x}, 0, \frac{1}{2};$	$\bar{x}, 0, \frac{1}{2};$ $x, 0, \frac{1}{2};$	
2	i	mm	$x, 0, 0;$ $\bar{x}, 0, 0;$	$\bar{x}, 0, 0;$ $x, 0, 0;$	$x, 0, 0;$ $\bar{x}, 0, 0;$	$\bar{x}, 0, 0;$ $x, 0, 0;$	
1	d	mmm	$\frac{1}{2}, 0, \frac{1}{2};$				
1	c	mmm	$0, 0, \frac{1}{2};$				
1	b	mmm	$\frac{1}{2}, 0, 0;$				
1	a	mmm	$0, 0, 0;$				

General:

No conditions

Special:

No conditions

Symmetry of special projections

(001) pmm ; $a' = a, b' = b$ (100) pmm ; $b' = b, c' = c$ (010) pmm ; $c' = c, a' = a$