

$Cmmm$

D_{2h}^{19}

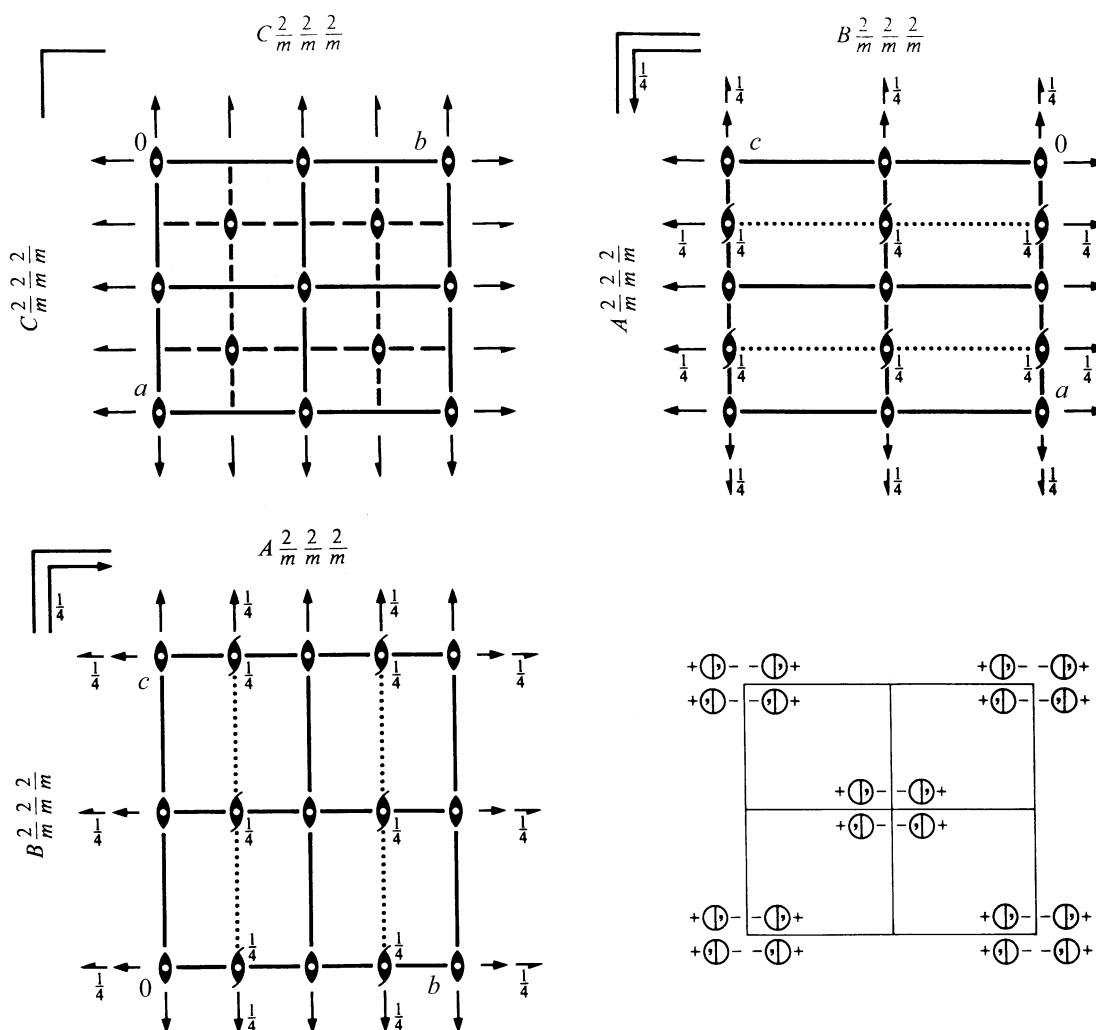
mmm

Orthorhombic

No. 65

$C 2/m 2/m 2/m$

Patterson symmetry $Cmmm$



Origin at centre (mmm)

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

Symmetry operations

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

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

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

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

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

Positions

Multiplicity, Wyckoff letter, Site symmetry		Coordinates $(0,0,0)+ (\frac{1}{2},\frac{1}{2},0)+$				Reflection conditions
16	<i>r</i> 1	(1) x,y,z (5) \bar{x},\bar{y},\bar{z}	(2) \bar{x},\bar{y},z (6) x,y,\bar{z}	(3) \bar{x},y,\bar{z} (7) x,\bar{y},z	(4) x,\bar{y},\bar{z} (8) \bar{x},y,z	General: $hkl: h+k=2n$ $0kl: k=2n$ $h0l: h=2n$ $hk0: h+k=2n$ $h00: h=2n$ $0k0: k=2n$ Special: as above, plus
8	<i>q</i> .. <i>m</i>	$x,y,\frac{1}{2}$	$\bar{x},\bar{y},\frac{1}{2}$	$\bar{x},y,\frac{1}{2}$	$x,\bar{y},\frac{1}{2}$	no extra conditions
8	<i>p</i> .. <i>m</i>	$x,y,0$	$\bar{x},\bar{y},0$	$\bar{x},y,0$	$x,\bar{y},0$	no extra conditions
8	<i>o</i> . <i>m</i> .	$x,0,z$	$\bar{x},0,z$	$\bar{x},0,\bar{z}$	$x,0,\bar{z}$	no extra conditions
8	<i>n</i> <i>m</i> . .	$0,y,z$	$0,\bar{y},z$	$0,y,\bar{z}$	$0,\bar{y},\bar{z}$	no extra conditions
8	<i>m</i> . . 2	$\frac{1}{4},\frac{1}{4},z$	$\frac{3}{4},\frac{1}{4},\bar{z}$	$\frac{3}{4},\frac{3}{4},\bar{z}$	$\frac{1}{4},\frac{3}{4},z$	$hkl: h=2n$
4	<i>l</i> <i>m m</i> 2	$0,\frac{1}{2},z$	$0,\frac{1}{2},\bar{z}$			no extra conditions
4	<i>k</i> <i>m m</i> 2	$0,0,z$	$0,0,\bar{z}$			no extra conditions
4	<i>j</i> <i>m</i> 2 <i>m</i>	$0,y,\frac{1}{2}$	$0,\bar{y},\frac{1}{2}$			no extra conditions
4	<i>i</i> <i>m</i> 2 <i>m</i>	$0,y,0$	$0,\bar{y},0$			no extra conditions
4	<i>h</i> 2 <i>m m</i>	$x,0,\frac{1}{2}$	$\bar{x},0,\frac{1}{2}$			no extra conditions
4	<i>g</i> 2 <i>m m</i>	$x,0,0$	$\bar{x},0,0$			no extra conditions
4	<i>f</i> . . 2/ <i>m</i>	$\frac{1}{4},\frac{1}{4},\frac{1}{2}$	$\frac{3}{4},\frac{1}{4},\frac{1}{2}$			$hkl: h=2n$
4	<i>e</i> . . 2/ <i>m</i>	$\frac{1}{4},\frac{1}{4},0$	$\frac{3}{4},\frac{1}{4},0$			$hkl: h=2n$
2	<i>d</i> <i>m m m</i>	$0,0,\frac{1}{2}$				no extra conditions
2	<i>c</i> <i>m m m</i>	$\frac{1}{2},0,\frac{1}{2}$				no extra conditions
2	<i>b</i> <i>m m m</i>	$\frac{1}{2},0,0$				no extra conditions
2	<i>a</i> <i>m m m</i>	$0,0,0$				no extra conditions

Symmetry of special projections

Along [001] *c*2*mm*
 $\mathbf{a}' = \mathbf{a}$ $\mathbf{b}' = \mathbf{b}$
 Origin at 0,0,z

Along [100] *p*2*mm*
 $\mathbf{a}' = \frac{1}{2}\mathbf{b}$ $\mathbf{b}' = \mathbf{c}$
 Origin at x,0,0

Along [010] *p*2*mm*
 $\mathbf{a}' = \mathbf{c}$ $\mathbf{b}' = \frac{1}{2}\mathbf{a}$
 Origin at 0,y,0