

$\mu ccm$

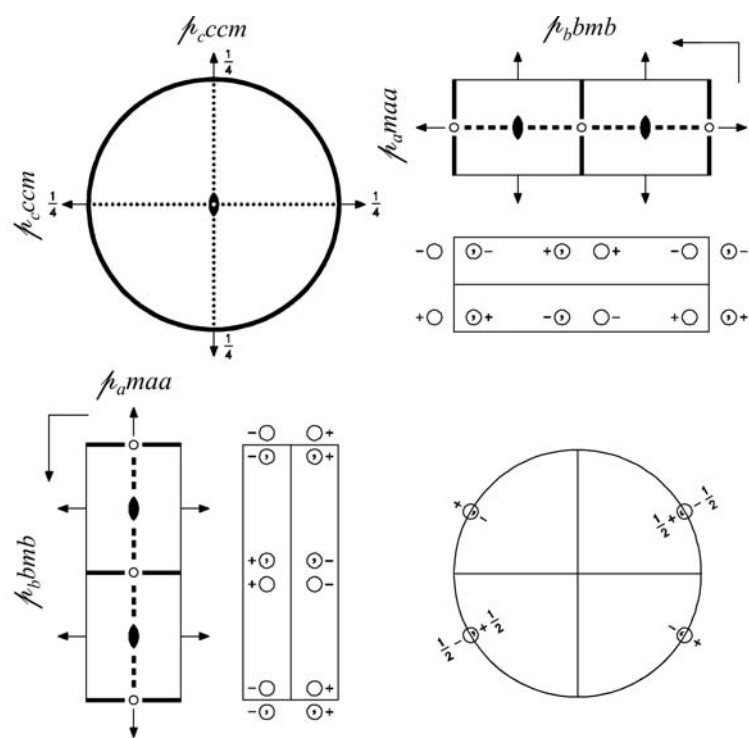
$mmm$

Orthorhombic

No. 21

$\mu 2/c2/c2/m$

Patterson symmetry  $\mu mmm$



**Origin** at centre ( $2/m$ ) at  $cc2/m$

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

**Symmetry operations**

- |  |                                      |   |   |
|--|--------------------------------------|---|---|
| (1) 1<br>(1 0,0,0)                         | (2) $2_{z}$ 0,0,z<br>( $2_z$  0,0,0) | (3) $2_y$ 0,y, $\frac{1}{4}$<br>( $2_y$  0,0, $\frac{1}{2}$ ) | (4) $2_x$ x,0, $\frac{1}{4}$<br>( $2_x$  0,0, $\frac{1}{2}$ ) |
| (5) $\bar{1}$ 0,0,0<br>( $\bar{1}$  0,0,0) | (6) $m_z$ x,y,0<br>( $m_z$  0,0,0)   | (7) $c_y$ x,0,z<br>( $m_y$  0,0, $\frac{1}{2}$ )              | (8) $c_x$ 0,y,z<br>( $m_x$  0,0, $\frac{1}{2}$ )              |

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

**Positions**

Multiplicity, Wyckoff letter, Site symmetry		Coordinates				Reflection conditions
						General:
8	$g$ 1	(1) $x, y, z$ (5) $\bar{x}, \bar{y}, \bar{z}$	(2) $\bar{x}, \bar{y}, z$ (6) $x, y, \bar{z}$	(3) $\bar{x}, y, \bar{z} + \frac{1}{2}$ (7) $x, \bar{y}, z + \frac{1}{2}$	(4) $x, \bar{y}, \bar{z} + \frac{1}{2}$ (8) $\bar{x}, y, z + \frac{1}{2}$	$l : l = 2n$
						Special: no extra conditions
4	$f$ $\dots m$	$x, y, 0$	$\bar{x}, \bar{y}, 0$	$\bar{x}, y, \frac{1}{2}$	$x, \bar{y}, \frac{1}{2}$	
4	$e$ $\dots 2$	$0, 0, z$	$0, 0, \bar{z} + \frac{1}{2}$	$0, 0, \bar{z}$	$0, 0, z + \frac{1}{2}$	
4	$d$ $\dots 2$	$0, y, \frac{1}{4}$	$0, \bar{y}, \frac{1}{4}$	$0, \bar{y}, \frac{3}{4}$	$0, y, \frac{3}{4}$	
4	$c$ $2 \dots$	$x, 0, \frac{1}{4}$	$\bar{x}, 0, \frac{1}{4}$	$\bar{x}, 0, \frac{3}{4}$	$x, 0, \frac{3}{4}$	
2	$b$ $2 2 2$	$0, 0, \frac{1}{4}$	$0, 0, \frac{3}{4}$			
2	$a$ $\dots 2/m$	$0, 0, 0$	$0, 0, \frac{1}{2}$			

**Symmetry of special projections**

Along [001]  $2mm$

Along [100]  $\bar{h}2mm$

Along [010]  $\bar{h}2mm$

Origin at  $0, 0, z$

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

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

Origin at  $x, 0, 0$

Origin at  $0, y, 0$

**Maximal non-isotypic non-enantiomorphic subgroups**

<b>I</b>	$[2]\bar{h}c2m (\bar{h}2cm, 19)$	1; 3; 6; 8
	$[2]\bar{h}2cm (19)$	1; 4; 6; 7
	$[2]\bar{h}cc2 (16)$	1; 2; 7; 8
	$[2]\bar{h}222 (13)$	1; 2; 3; 4
	$[2]\bar{h}112/m (11)$	1; 2; 5; 6
	$[2]\bar{h}12/c1 (\bar{h}2/c11, 7)$	1; 3; 5; 7
	$[2]\bar{h}2/c11 (7)$	1; 4; 5; 8

**IIa** none

**IIb** none

**Maximal isotypic subgroups and enantiomorphic subgroups of lowest index**

**IIc**  $[3]\bar{h}ccm (\mathbf{c}' = 3\mathbf{c}) (21)$

**Minimal non-isotypic non-enantiomorphic supergroups**

**I**  $[2]\bar{h}4/mcc (40)$ ;  $[2]\bar{h}4_2/mmc (41)$ ;  $[3]\bar{h}6/mcc (74)$

**II**  $[2]\bar{h}mmm (\mathbf{c}' = \frac{1}{2}\mathbf{c}) (20)$