

$Fm\bar{m}2$

C_{2v}^{18}

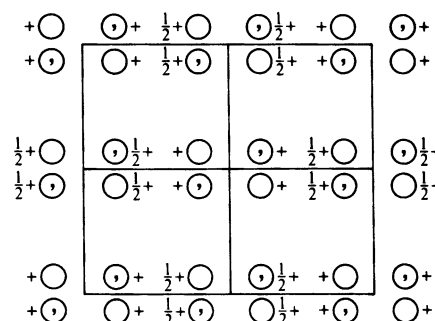
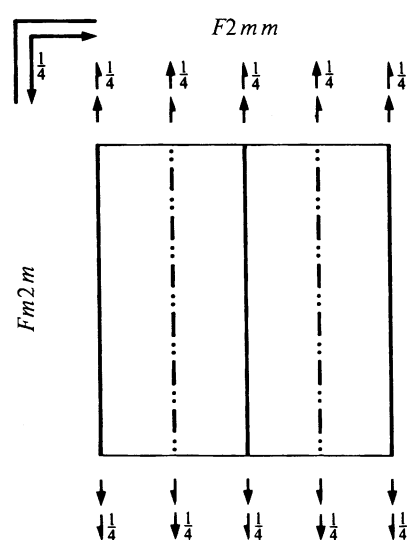
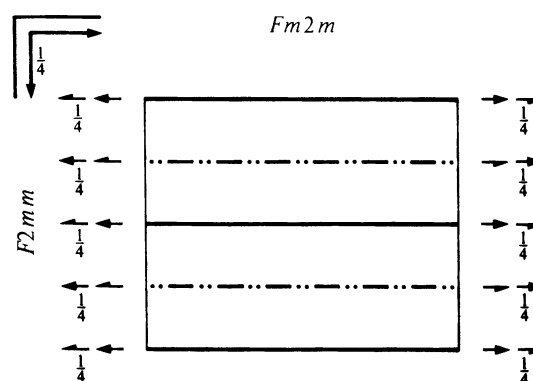
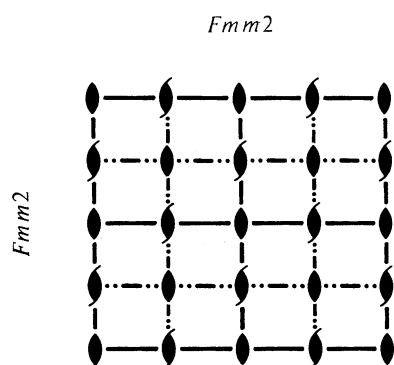
$mm2$

Orthorhombic

No. 42

$Fm\bar{m}2$

Patterson symmetry $Fm\bar{m}m$



Origin on $mm2$

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

Symmetry operations

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

- (1) 1 (2) $2 \ 0,0,z$ (3) $m \ x,0,z$ (4) $m \ 0,y,z$

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

- (1) $t(0,\frac{1}{2},\frac{1}{2})$ (2) $2(0,0,\frac{1}{2}) \ 0,\frac{1}{4},z$ (3) $c \ x,\frac{1}{4},z$ (4) $n(0,\frac{1}{2},\frac{1}{2}) \ 0,y,z$

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

- (1) $t(\frac{1}{2},0,\frac{1}{2})$ (2) $2(0,0,\frac{1}{2}) \ \frac{1}{4},0,z$ (3) $n(\frac{1}{2},0,\frac{1}{2}) \ x,0,z$ (4) $c \ \frac{1}{4},y,z$

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) $a \ x,\frac{1}{4},z$ (4) $b \ \frac{1}{4},y,z$

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

Positions

Multiplicity, Wyckoff letter, Site symmetry	Coordinates				Reflection conditions
	$(0,0,0)+$	$(0, \frac{1}{2}, \frac{1}{2})+$	$(\frac{1}{2}, 0, \frac{1}{2})+$	$(\frac{1}{2}, \frac{1}{2}, 0)+$	General:
16 <i>e</i> 1	(1) x,y,z	(2) \bar{x},\bar{y},z	(3) x,\bar{y},z	(4) \bar{x},y,z	$hkl : h+k, h+l, k+l = 2n$ $Ok l : k, l = 2n$ $h0l : h, l = 2n$ $hk0 : h, k = 2n$ $h00 : h = 2n$ $0k0 : k = 2n$ $00l : l = 2n$
8 <i>d</i> . <i>m</i> .	$x,0,z$	$\bar{x},0,z$			Special: as above, plus no extra conditions
8 <i>c</i> <i>m</i> ..	$0,y,z$	$0,\bar{y},z$			no extra conditions
8 <i>b</i> ..2	$\frac{1}{4}, \frac{1}{4}, z$	$\frac{1}{4}, \frac{3}{4}, z$			$hkl : h = 2n$
4 <i>a</i> <i>m m</i> 2	$0,0,z$				no extra conditions

Symmetry of special projections

Along [001] *p2mm*
 $\mathbf{a}' = \frac{1}{2}\mathbf{a}$ $\mathbf{b}' = \frac{1}{2}\mathbf{b}$
 Origin at 0,0,z

Along [100] *p1m1*
 $\mathbf{a}' = \frac{1}{2}\mathbf{b}$ $\mathbf{b}' = \frac{1}{2}\mathbf{c}$
 Origin at x,0,0

Along [010] *p11m*
 $\mathbf{a}' = \frac{1}{2}\mathbf{c}$ $\mathbf{b}' = \frac{1}{2}\mathbf{a}$
 Origin at 0,y,0

Maximal non-isomorphic subgroups

I	[2] <i>F1m1</i> (<i>Cm</i> , 8)	(1; 3)+
	[2] <i>Fm11</i> (<i>Cm</i> , 8)	(1; 4)+
	[2] <i>F112</i> (<i>C2</i> , 5)	(1; 2)+
IIa	[2] <i>Aea2</i> (41)	1; 2; (1; 2) + $(0, \frac{1}{2}, \frac{1}{2})$; (3; 4) + $(\frac{1}{2}, 0, \frac{1}{2})$; (3; 4) + $(\frac{1}{2}, \frac{1}{2}, 0)$
	[2] <i>Bbe2</i> (<i>Aea2</i> , 41)	1; 2; (1; 2) + $(\frac{1}{2}, 0, \frac{1}{2})$; (3; 4) + $(0, \frac{1}{2}, \frac{1}{2})$; (3; 4) + $(\frac{1}{2}, \frac{1}{2}, 0)$
	[2] <i>Ama2</i> (40)	1; 4; (1; 4) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 3) + $(\frac{1}{2}, 0, \frac{1}{2})$; (2; 3) + $(\frac{1}{2}, \frac{1}{2}, 0)$
	[2] <i>Bbm2</i> (<i>Ama2</i> , 40)	1; 3; (1; 3) + $(\frac{1}{2}, 0, \frac{1}{2})$; (2; 4) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 4) + $(\frac{1}{2}, \frac{1}{2}, 0)$
	[2] <i>Bme2</i> (<i>Aem2</i> , 39)	1; 4; (1; 4) + $(\frac{1}{2}, 0, \frac{1}{2})$; (2; 3) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 3) + $(\frac{1}{2}, \frac{1}{2}, 0)$
	[2] <i>Aem2</i> (39)	1; 3; (1; 3) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 4) + $(\frac{1}{2}, 0, \frac{1}{2})$; (2; 4) + $(\frac{1}{2}, \frac{1}{2}, 0)$
	[2] <i>Amm2</i> (38)	1; 2; 3; 4; (1; 2; 3; 4) + $(0, \frac{1}{2}, \frac{1}{2})$
	[2] <i>Bmm2</i> (<i>Amm2</i> , 38)	1; 2; 3; 4; (1; 2; 3; 4) + $(\frac{1}{2}, 0, \frac{1}{2})$
	[2] <i>Ccc2</i> (37)	1; 2; (1; 2) + $(\frac{1}{2}, \frac{1}{2}, 0)$; (3; 4) + $(0, \frac{1}{2}, \frac{1}{2})$; (3; 4) + $(\frac{1}{2}, 0, \frac{1}{2})$
	[2] <i>Ccm2</i> ₁ (<i>Cmc2</i> ₁ , 36)	1; 3; (1; 3) + $(\frac{1}{2}, \frac{1}{2}, 0)$; (2; 4) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 4) + $(\frac{1}{2}, 0, \frac{1}{2})$
	[2] <i>Cmc2</i> ₁ (36)	1; 4; (1; 4) + $(\frac{1}{2}, \frac{1}{2}, 0)$; (2; 3) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 3) + $(\frac{1}{2}, 0, \frac{1}{2})$
	[2] <i>Cmm2</i> (35)	1; 2; 3; 4; (1; 2; 3; 4) + $(\frac{1}{2}, \frac{1}{2}, 0)$
IIb	none	

Maximal isomorphic subgroups of lowest index

IIc [3] *Fmm2* ($\mathbf{a}' = 3\mathbf{a}$ or $\mathbf{b}' = 3\mathbf{b}$) (42); [3] *Fmm2* ($\mathbf{c}' = 3\mathbf{c}$) (42)

Minimal non-isomorphic supergroups

I [2] *Fmmm* (69); [2] *I4mm* (107); [2] *I4cm* (108); [2] *I42m* (121)

II [2] *Pmm2* ($\mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}, \mathbf{c}' = \frac{1}{2}\mathbf{c}$) (25)