

C_{2v}^{18}
 $Fmm2$

No. 42

 $Fmm2$
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)

General position

 Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

 16 e 1

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

 (1) x, y, z (2) \bar{x}, \bar{y}, z (3) x, \bar{y}, z (4) \bar{x}, y, z
I Maximal translationengleiche subgroups

[2] $F1m1$ (8, $C1m1$)	(1; 3)+	$\mathbf{a, b, 1/2(-a+c)}$
[2] $Fm11$ (8, $C1m1$)	(1; 4)+	$\mathbf{c, a, 1/2(b-c)}$
[2] $F112$ (5, $A112$)	(1; 2)+	$\mathbf{1/2(a-b), b, c}$

II Maximal klassengleiche subgroups

• Loss of centring translations

[2] $Aea2$ (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] $Bbe2$ (41, $Aea2$)	1; 2; (1; 2) + $(\frac{1}{2}, 0, \frac{1}{2})$; (3; 4) + $(0, \frac{1}{2}, \frac{1}{2})$; (3; 4) + $(\frac{1}{2}, \frac{1}{2}, 0)$	$-\mathbf{b, a, c}$	
[2] $Ama2$ (40)	1; 4; (1; 4) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 3) + $(\frac{1}{2}, 0, \frac{1}{2})$; (2; 3) + $(\frac{1}{2}, \frac{1}{2}, 0)$		$1/4, 1/4, 0$
[2] $Bbm2$ (40, $Ama2$)	1; 3; (1; 3) + $(\frac{1}{2}, 0, \frac{1}{2})$; (2; 4) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 4) + $(\frac{1}{2}, \frac{1}{2}, 0)$	$-\mathbf{b, a, c}$	$1/4, 1/4, 0$
[2] $Bme2$ (39, $Aem2$)	1; 4; (1; 4) + $(\frac{1}{2}, 0, \frac{1}{2})$; (2; 3) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 3) + $(\frac{1}{2}, \frac{1}{2}, 0)$	$-\mathbf{b, a, c}$	$1/4, 1/4, 0$
[2] $Aem2$ (39)	1; 3; (1; 3) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 4) + $(\frac{1}{2}, 0, \frac{1}{2})$; (2; 4) + $(\frac{1}{2}, \frac{1}{2}, 0)$		$1/4, 1/4, 0$
[2] $Amm2$ (38)	1; 2; 3; 4; (1; 2; 3; 4) + $(0, \frac{1}{2}, \frac{1}{2})$		
[2] $Bmm2$ (38, $Amm2$)	1; 2; 3; 4; (1; 2; 3; 4) + $(\frac{1}{2}, 0, \frac{1}{2})$	$-\mathbf{b, a, c}$	
[2] $Ccc2$ (37)	1; 2; (1; 2) + $(\frac{1}{2}, \frac{1}{2}, 0)$; (3; 4) + $(0, \frac{1}{2}, \frac{1}{2})$; (3; 4) + $(\frac{1}{2}, 0, \frac{1}{2})$		$1/4, 1/4, 0$
[2] $Ccm2_1$ (36, $Cmc2_1$)	1; 3; (1; 3) + $(\frac{1}{2}, \frac{1}{2}, 0)$; (2; 4) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 4) + $(\frac{1}{2}, 0, \frac{1}{2})$	$-\mathbf{b, a, c}$	$1/4, 0, 0$
[2] $Cmc2_1$ (36)	1; 4; (1; 4) + $(\frac{1}{2}, \frac{1}{2}, 0)$; (2; 3) + $(0, \frac{1}{2}, \frac{1}{2})$; (2; 3) + $(\frac{1}{2}, 0, \frac{1}{2})$		$0, 1/4, 0$
[2] $Cmm2$ (35)	1; 2; 3; 4; (1; 2; 3; 4) + $(\frac{1}{2}, \frac{1}{2}, 0)$		

• Enlarged unit cell

[3] $\mathbf{a}' = 3\mathbf{a}$			
$\left\{ \begin{array}{l} Fmm2 \text{ (42)} \\ Fmm2 \text{ (42)} \\ Fmm2 \text{ (42)} \end{array} \right.$	$\langle 2; 3 \rangle$ $\langle 3; 2 + (2, 0, 0) \rangle$ $\langle 3; 2 + (4, 0, 0) \rangle$	$3\mathbf{a, b, c}$ $3\mathbf{a, b, c}$ $3\mathbf{a, b, c}$	$1, 0, 0$ $2, 0, 0$
[3] $\mathbf{b}' = 3\mathbf{b}$			
$\left\{ \begin{array}{l} Fmm2 \text{ (42)} \\ Fmm2 \text{ (42)} \\ Fmm2 \text{ (42)} \end{array} \right.$	$\langle 2; 3 \rangle$ $\langle (2; 3) + (0, 2, 0) \rangle$ $\langle (2; 3) + (0, 4, 0) \rangle$	$\mathbf{a, 3b, c}$ $\mathbf{a, 3b, c}$ $\mathbf{a, 3b, c}$	$0, 1, 0$ $0, 2, 0$
[3] $\mathbf{c}' = 3\mathbf{c}$			
$Fmm2$ (42)	$\langle 2; 3 \rangle$	$\mathbf{a, b, 3c}$	

• Series of maximal isomorphic subgroups

[p] $\mathbf{a}' = p\mathbf{a}$			
$Fmm2$ (42)	$\langle 3; 2 + (2u, 0, 0) \rangle$ prime $p > 2$; $0 \leq u < p$ p conjugate subgroups	$p\mathbf{a, b, c}$	$u, 0, 0$
[p] $\mathbf{b}' = p\mathbf{b}$			
$Fmm2$ (42)	$\langle (2; 3) + (0, 2u, 0) \rangle$ prime $p > 2$; $0 \leq u < p$ p conjugate subgroups	$\mathbf{a, pb, c}$	$0, u, 0$
[p] $\mathbf{c}' = p\mathbf{c}$			
$Fmm2$ (42)	$\langle 2; 3 \rangle$ prime $p > 2$ no conjugate subgroups	$\mathbf{a, b, pc}$	

I Minimal *translationengleiche* supergroups

[2] $Fmmm$ (69); [2] $I4mm$ (107); [2] $I4cm$ (108); [2] $I\bar{4}2m$ (121)

II Minimal non-isomorphic *klassengleiche* supergroups

- Additional centring translations

none

- Decreased unit cell

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