

$Ccmm$

No. 66

 $C2/c2/c2/m$ D_{2h}^{20} 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)

General position

Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

 $(0,0,0)+$ $(\frac{1}{2},\frac{1}{2},0)+$ 16 m 1(1) x,y,z (2) \bar{x},\bar{y},z (3) $\bar{x},y,\bar{z}+\frac{1}{2}$ (4) $x,\bar{y},\bar{z}+\frac{1}{2}$
(5) \bar{x},\bar{y},\bar{z} (6) x,y,\bar{z} (7) $x,\bar{y},z+\frac{1}{2}$ (8) $\bar{x},y,z+\frac{1}{2}$

I Maximal translationengleiche subgroups

[2] $Cc2m$ (40, $Ama2$)	(1; 3; 6; 8)+	c, a, b	0, 0, 1/4
[2] $C2cm$ (40, $Ama2$)	(1; 4; 6; 7)+	c, b, -a	0, 0, 1/4
[2] $Ccc2$ (37)	(1; 2; 7; 8)+		
[2] $C222$ (21)	(1; 2; 3; 4)+		0, 0, 1/4
[2] $C12/c1$ (15)	(1; 3; 5; 7)+		
[2] $C2/c11$ (15, $C12/c1$)	(1; 4; 5; 8)+	-b, a, c	
[2] $C112/m$ (10, $P112/m$)	(1; 2; 5; 6)+	$1/2(\mathbf{a}-\mathbf{b}), 1/2(\mathbf{a}+\mathbf{b}), \mathbf{c}$	

II Maximal klassengleiche subgroups

• Loss of centring translations

[2] $Pnmm$ (58)	1; 2; 5; 6; (3; 4; 7; 8) + $(\frac{1}{2}, \frac{1}{2}, 0)$		
[2] $Pccn$ (56)	1; 2; 7; 8; (3; 4; 5; 6) + $(\frac{1}{2}, \frac{1}{2}, 0)$		1/4, 1/4, 0
[2] $Pcnm$ (53, $Pmna$)	1; 3; 6; 8; (2; 4; 5; 7) + $(\frac{1}{2}, \frac{1}{2}, 0)$	c, b, -a	1/4, 1/4, 0
[2] $Pncm$ (53, $Pmna$)	1; 4; 6; 7; (2; 3; 5; 8) + $(\frac{1}{2}, \frac{1}{2}, 0)$	c, a, b	1/4, 1/4, 0
[2] $Pncn$ (52, $Pnna$)	1; 3; 5; 7; (2; 4; 6; 8) + $(\frac{1}{2}, \frac{1}{2}, 0)$	c, a, b	
[2] $Pcnn$ (52, $Pnna$)	1; 4; 5; 8; (2; 3; 6; 7) + $(\frac{1}{2}, \frac{1}{2}, 0)$	c, b, -a	
[2] $Pccm$ (49)	1; 2; 3; 4; 5; 6; 7; 8		
[2] $Pnnn$ (48)	1; 2; 3; 4; (5; 6; 7; 8) + $(\frac{1}{2}, \frac{1}{2}, 0)$		1/4, 1/4, 0

• Enlarged unit cell

[3] $\mathbf{a}' = 3\mathbf{a}$			
$\left\{ \begin{array}{l} Ccmm \text{ (66)} \\ Ccmm \text{ (66)} \\ Ccmm \text{ (66)} \end{array} \right.$	$\langle 2; 3; 5 \rangle$	3a, b, c	
	$\langle (2; 3; 5) + (2, 0, 0) \rangle$	3a, b, c	1, 0, 0
	$\langle (2; 3; 5) + (4, 0, 0) \rangle$	3a, b, c	2, 0, 0
[3] $\mathbf{b}' = 3\mathbf{b}$			
$\left\{ \begin{array}{l} Ccmm \text{ (66)} \\ Ccmm \text{ (66)} \\ Ccmm \text{ (66)} \end{array} \right.$	$\langle 2; 3; 5 \rangle$	a, 3b, c	
	$\langle 3; (2; 5) + (0, 2, 0) \rangle$	a, 3b, c	0, 1, 0
	$\langle 3; (2; 5) + (0, 4, 0) \rangle$	a, 3b, c	0, 2, 0
[3] $\mathbf{c}' = 3\mathbf{c}$			
$\left\{ \begin{array}{l} Ccmm \text{ (66)} \\ Ccmm \text{ (66)} \\ Ccmm \text{ (66)} \end{array} \right.$	$\langle 2; 5; 3 + (0, 0, 1) \rangle$	a, b, 3c	
	$\langle 2; 3 + (0, 0, 3); 5 + (0, 0, 2) \rangle$	a, b, 3c	0, 0, 1
	$\langle 2; 3 + (0, 0, 5); 5 + (0, 0, 4) \rangle$	a, b, 3c	0, 0, 2

• Series of maximal isomorphic subgroups

[p] $\mathbf{a}' = p\mathbf{a}$			
$Ccmm$ (66)	$\langle (2; 3; 5) + (2u, 0, 0) \rangle$	pa, b, c	$u, 0, 0$
	$p > 2; 0 \leq u < p$ p conjugate subgroups for the prime p		
[p] $\mathbf{b}' = p\mathbf{b}$			
$Ccmm$ (66)	$\langle 3; (2; 5) + (0, 2u, 0) \rangle$	a, pb, c	$0, u, 0$
	$p > 2; 0 \leq u < p$ p conjugate subgroups for the prime p		
[p] $\mathbf{c}' = p\mathbf{c}$			
$Ccmm$ (66)	$\langle 2; 3 + (0, 0, \frac{p}{2} - \frac{1}{2} + 2u); 5 + (0, 0, 2u) \rangle$	a, b, pc	$0, 0, u$
	$p > 2; 0 \leq u < p$ p conjugate subgroups for the prime p		

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- Series of maximal isomorphic subgroups

[p] $\mathbf{a}' = p\mathbf{a}$ <i>Cmmm</i> (65)	$\langle (2; 3; 5) + (2u, 0, 0) \rangle$ $p > 2; 0 \leq u < p$ p conjugate subgroups for the prime p	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	$u, 0, 0$
[p] $\mathbf{b}' = p\mathbf{b}$ <i>Cmmm</i> (65)	$\langle 3; (2; 5) + (0, 2u, 0) \rangle$ $p > 2; 0 \leq u < p$ p conjugate subgroups for the prime p	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$0, u, 0$
[p] $\mathbf{c}' = p\mathbf{c}$ <i>Cmmm</i> (65)	$\langle 2; (3; 5) + (0, 0, 2u) \rangle$ $p > 2; 0 \leq u < p$ p conjugate subgroups for the prime p	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	$0, 0, u$

I Minimal translationengleiche supergroups

[2] $P4/mmm$ (123); [2] $P4/mbm$ (127); [2] $P4_2/mcm$ (132); [2] $P4_2/mnm$ (136); [3] $P6/mmm$ (191)

II Minimal non-isomorphic klassengleiche supergroups

- Additional centring translations

[2] $Fmmm$ (69)

- Decreased unit cell

[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}$ $Pmmm$ (47)

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I Minimal translationengleiche supergroups

[2] $P4/mcc$ (124); [2] $P4/mnc$ (128); [2] $P4_2/mmc$ (131); [2] $P4_2/mbc$ (135); [3] $P6/mcc$ (192)

II Minimal non-isomorphic klassengleiche supergroups

- Additional centring translations

[2] $Fmmm$ (69)

- Decreased unit cell

[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}$ $Pccm$ (49); [2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $Cmmm$ (65)