

$Pccm$

No. 49

 $P2/c2/c2/m$ D_{2h}^3 Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; (2); (3); (5)

General position

Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

8	r	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] $Pc2m$ (28, $Pma2$)	1; 3; 6; 8	c, a, b	0, 0, 1/4
[2] $P2cm$ (28, $Pma2$)	1; 4; 6; 7	c, b, -a	0, 0, 1/4
[2] $Pcc2$ (27)	1; 2; 7; 8		
[2] $P222$ (16)	1; 2; 3; 4		0, 0, 1/4
[2] $P12/c1$ (13)	1; 3; 5; 7		
[2] $P2/c11$ (13, $P12/c1$)	1; 4; 5; 8	-b, a, c	
[2] $P112/m$ (10)	1; 2; 5; 6		

II Maximal *klassengleiche* subgroups

• Enlarged unit cell

[2] $\mathbf{a}' = 2\mathbf{a}$			
$Pcca$ (54)	$\langle 3; 5; 2 + (1, 0, 0) \rangle$	2a, b, c	
$Pcca$ (54)	$\langle 2; (3; 5) + (1, 0, 0) \rangle$	2a, b, c	1/2, 0, 0
$Pcnm$ (53, $Pmna$)	$\langle 2; 5; 3 + (1, 0, 0) \rangle$	c, b, -2a	
$Pcnm$ (53, $Pmna$)	$\langle 3; (2; 5) + (1, 0, 0) \rangle$	c, b, -2a	1/2, 0, 0
$Pcna$ (50, $Pban$)	$\langle 5; (2; 3) + (1, 0, 0) \rangle$	c, 2a, b	
$Pcna$ (50, $Pban$)	$\langle 2; 3; 5 + (1, 0, 0) \rangle$	c, 2a, b	1/2, 0, 0
$Pccm$ (49)	$\langle 2; 3; 5 \rangle$	2a, b, c	
$Pccm$ (49)	$\langle (2; 3; 5) + (1, 0, 0) \rangle$	2a, b, c	1/2, 0, 0
[2] $\mathbf{b}' = 2\mathbf{b}$			
$Pccb$ (54, $Pcca$)	$\langle 5; (2; 3) + (0, 1, 0) \rangle$	-2b, a, c	
$Pccb$ (54, $Pcca$)	$\langle 2; (3; 5) + (0, 1, 0) \rangle$	-2b, a, c	0, 1/2, 0
$Pncm$ (53, $Pmna$)	$\langle 2; 5; 3 + (0, 1, 0) \rangle$	c, a, 2b	
$Pncm$ (53, $Pmna$)	$\langle (2; 3; 5) + (0, 1, 0) \rangle$	c, a, 2b	0, 1/2, 0
$Pncb$ (50, $Pban$)	$\langle 3; 5; 2 + (0, 1, 0) \rangle$	2b, c, a	
$Pncb$ (50, $Pban$)	$\langle 2; 3; 5 + (0, 1, 0) \rangle$	2b, c, a	0, 1/2, 0
$Pccm$ (49)	$\langle 2; 3; 5 \rangle$	a, 2b, c	
$Pccm$ (49)	$\langle 3; (2; 5) + (0, 1, 0) \rangle$	a, 2b, c	0, 1/2, 0
[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$			
$Ccce$ (68)	$\langle 3; 5; 2 + (1, 0, 0) \rangle$	2a, 2b, c	
$Ccce$ (68)	$\langle 5; (2; 3) + (1, 0, 0) \rangle$	2a, 2b, c	1/2, 1/2, 0
$Ccce$ (68)	$\langle 2; 3; 5 + (1, 0, 0) \rangle$	2a, 2b, c	0, 1/2, 0
$Ccce$ (68)	$\langle 2; (3; 5) + (1, 0, 0) \rangle$	2a, 2b, c	1/2, 0, 0
$Cccm$ (66)	$\langle 2; 3; 5 \rangle$	2a, 2b, c	
$Cccm$ (66)	$\langle (2; 3; 5) + (1, 0, 0) \rangle$	2a, 2b, c	1/2, 0, 0
$Cccm$ (66)	$\langle 2; 5; 3 + (1, 0, 0) \rangle$	2a, 2b, c	1/2, 1/2, 0
$Cccm$ (66)	$\langle 3; (2; 5) + (1, 0, 0) \rangle$	2a, 2b, c	0, 1/2, 0
[3] $\mathbf{a}' = 3\mathbf{a}$			
$Pccm$ (49)	$\langle 2; 3; 5 \rangle$	3a, b, c	
$Pccm$ (49)	$\langle (2; 3; 5) + (2, 0, 0) \rangle$	3a, b, c	1, 0, 0
$Pccm$ (49)	$\langle (2; 3; 5) + (4, 0, 0) \rangle$	3a, b, c	2, 0, 0
[3] $\mathbf{b}' = 3\mathbf{b}$			
$Pccm$ (49)	$\langle 2; 3; 5 \rangle$	a, 3b, c	
$Pccm$ (49)	$\langle 3; (2; 5) + (0, 2, 0) \rangle$	a, 3b, c	0, 1, 0
$Pccm$ (49)	$\langle 3; (2; 5) + (0, 4, 0) \rangle$	a, 3b, c	0, 2, 0
[3] $\mathbf{c}' = 3\mathbf{c}$			
$Pccm$ (49)	$\langle 2; 5; 3 + (0, 0, 1) \rangle$	a, b, 3c	
$Pccm$ (49)	$\langle 2; 3 + (0, 0, 3); 5 + (0, 0, 2) \rangle$	a, b, 3c	0, 0, 1
$Pccm$ (49)	$\langle 2; 3 + (0, 0, 5); 5 + (0, 0, 4) \rangle$	a, b, 3c	0, 0, 2

- **Series of maximal isomorphic subgroups**

[p] $\mathbf{a}' = p\mathbf{a}$ <i>Pccm</i> (49)	$\langle (2; 3; 5) + (2u, 0, 0) \rangle$ prime $p > 2$; $0 \leq u < p$ p conjugate subgroups	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	$u, 0, 0$
[p] $\mathbf{b}' = p\mathbf{b}$ <i>Pccm</i> (49)	$\langle 3; (2; 5) + (0, 2u, 0) \rangle$ prime $p > 2$; $0 \leq u < p$ p conjugate subgroups	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$0, u, 0$
[p] $\mathbf{c}' = p\mathbf{c}$ <i>Pccm</i> (49)	$\langle 2; 3 + (0, 0, \frac{p}{2} - \frac{1}{2} + 2u); 5 + (0, 0, 2u) \rangle$ prime $p > 2$; $0 \leq u < p$ p conjugate subgroups	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	$0, 0, u$

I Minimal translationengleiche supergroups

[2] *P4/mcc* (124); [2] *P4₂/mcm* (132)

II Minimal non-isomorphic klassengleiche supergroups

- **Additional centring translations**

[2] *Cccm* (66); [2] *Aemm* (67, *Cmme*); [2] *Bmem* (67, *Cmme*); [2] *Ibam* (72)

- **Decreased unit cell**

[2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ *Pmmm* (47)

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I Minimal translationengleiche supergroups

[2] *P4/nbm* (125); [2] *P4₂/nbc* (133)

II Minimal non-isomorphic klassengleiche supergroups

- **Additional centring translations**

[2] *Cmmm* (65); [2] *Aaaa* (68, *Ccce*); [2] *Bbeb* (68, *Ccce*); [2] *Ibam* (72)

- **Decreased unit cell**

[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}$ *Pbmb* (49, *Pccm*); [2] $\mathbf{b}' = \frac{1}{2}\mathbf{b}$ *Pmaa* (49, *Pccm*)