

$Pc\bar{c}m$ 

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	<b>c, a, b</b>	0, 0, 1/4
[2] $P2cm$ (28, $Pma2$ )	1; 4; 6; 7	<b>c, b, -a</b>	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>-b, a, c</b>	
[2] $P112/m$ (10)	1; 2; 5; 6		

## II Maximal klassengleiche subgroups

## • Enlarged unit cell

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

- **Series of maximal isomorphic subgroups**

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

**I Minimal translationengleiche supergroups**

[2]  $P4/mcc$  (124); [2]  $P4_2/mcm$  (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)

(Continued from the following page)

**I Minimal translationengleiche supergroups**

[2]  $P4/nbm$  (125); [2]  $P4_2/nbc$  (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*)