

$D_{6h}^2$ 
 $P6/m2/c2/c$ 

No. 192

 $P6/mcc$ 
**Generators selected** (1);  $t(1,0,0)$ ;  $t(0,1,0)$ ;  $t(0,0,1)$ ; (2); (4); (7); (13)

**General position**

 Multiplicity,  
Wyckoff letter,  
Site symmetry

Coordinates

24	<i>m</i>	1	(1) $x, y, z$	(2) $\bar{y}, x - y, z$	(3) $\bar{x} + y, \bar{x}, z$	(4) $\bar{x}, \bar{y}, z$	(5) $y, \bar{x} + y, z$	(6) $x - y, x, z$
			(7) $y, x, \bar{z} + \frac{1}{2}$	(8) $x - y, \bar{y}, \bar{z} + \frac{1}{2}$	(9) $\bar{x}, \bar{x} + y, \bar{z} + \frac{1}{2}$	(10) $\bar{y}, \bar{x}, \bar{z} + \frac{1}{2}$	(11) $\bar{x} + y, y, \bar{z} + \frac{1}{2}$	(12) $x, x - y, \bar{z} + \frac{1}{2}$
			(13) $\bar{x}, \bar{y}, \bar{z}$	(14) $y, \bar{x} + y, \bar{z}$	(15) $x - y, x, \bar{z}$	(16) $x, y, \bar{z}$	(17) $\bar{y}, x - y, \bar{z}$	(18) $\bar{x} + y, \bar{x}, \bar{z}$
			(19) $\bar{y}, \bar{x}, z + \frac{1}{2}$	(20) $\bar{x} + y, y, z + \frac{1}{2}$	(21) $x, x - y, z + \frac{1}{2}$	(22) $y, x, z + \frac{1}{2}$	(23) $x - y, \bar{y}, z + \frac{1}{2}$	(24) $\bar{x}, \bar{x} + y, z + \frac{1}{2}$

**I Maximal translationengleiche subgroups**

[2] $P\bar{6}2c$ (190)	1; 2; 3; 7; 8; 9; 16; 17; 18; 22; 23; 24	0, 0, 1/4
[2] $P\bar{6}c2$ (188)	1; 2; 3; 10; 11; 12; 16; 17; 18; 19; 20; 21	0, 0, 1/4
[2] $P6cc$ (184)	1; 2; 3; 4; 5; 6; 19; 20; 21; 22; 23; 24	
[2] $P622$ (177)	1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12	0, 0, 1/4
[2] $P6/m11$ (175, $P6/m$ )	1; 2; 3; 4; 5; 6; 13; 14; 15; 16; 17; 18	
[2] $P\bar{3}c1$ (165)	1; 2; 3; 7; 8; 9; 13; 14; 15; 19; 20; 21	
[2] $P\bar{3}1c$ (163)	1; 2; 3; 10; 11; 12; 13; 14; 15; 22; 23; 24	
[3] $Pmcc$ (66, $Cccm$ )	1; 4; 7; 10; 13; 16; 19; 22	$-\mathbf{a} + \mathbf{b}, -\mathbf{a} - \mathbf{b}, \mathbf{c}$
[3] $Pmcc$ (66, $Cccm$ )	1; 4; 8; 11; 13; 16; 20; 23	$-\mathbf{a} - 2\mathbf{b}, \mathbf{a}, \mathbf{c}$
[3] $Pmcc$ (66, $Cccm$ )	1; 4; 9; 12; 13; 16; 21; 24	$2\mathbf{a} + \mathbf{b}, \mathbf{b}, \mathbf{c}$

**II Maximal klassengleiche subgroups**

## • Enlarged unit cell

[3] $\mathbf{c}' = 3\mathbf{c}$		
$\left\{ \begin{array}{l} P6/mcc \text{ (192)} \\ P6/mcc \text{ (192)} \\ P6/mcc \text{ (192)} \end{array} \right.$	$\langle 2; 4; 13; 7 + (0, 0, 1) \rangle$ $\langle 2; 4; 7 + (0, 0, 3); 13 + (0, 0, 2) \rangle$ $\langle 2; 4; 7 + (0, 0, 5); 13 + (0, 0, 4) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$ $\mathbf{a}, \mathbf{b}, 3\mathbf{c}$ $\mathbf{a}, \mathbf{b}, 3\mathbf{c}$
[3] $\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}$		
$\left\{ \begin{array}{l} H6/mcc \text{ (192, } P6/mcc) \\ H6/mcc \text{ (192, } P6/mcc) \\ H6/mcc \text{ (192, } P6/mcc) \end{array} \right.$	$\langle 2; 4; 7; 13 \rangle$ $\langle (2; 7) + (1, -1, 0); (4; 13) + (2, 0, 0) \rangle$ $\langle (2; 7) + (2, -2, 0); (4; 13) + (4, 0, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$ $\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$ $\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$
[4] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$		
$\left\{ \begin{array}{l} P6/mcc \text{ (192)} \\ P6/mcc \text{ (192)} \\ P6/mcc \text{ (192)} \\ P6/mcc \text{ (192)} \end{array} \right.$	$\langle 2; 4; 7; 13 \rangle$ $\langle (2; 7) + (1, -1, 0); (4; 13) + (2, 0, 0) \rangle$ $\langle 2 + (1, 2, 0); (4; 13) + (0, 2, 0); 7 + (-1, 1, 0) \rangle$ $\langle 7; 2 + (2, 1, 0); (4; 13) + (2, 2, 0) \rangle$	$2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$ $2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$ $2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$ $2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$

## • Series of maximal isomorphic subgroups

[ $p$ ] $\mathbf{c}' = p\mathbf{c}$		
$P6/mcc$ (192)	$\langle 2; 4; 7 + (0, 0, \frac{p}{2} - \frac{1}{2} + 2u); 13 + (0, 0, 2u) \rangle$ $p > 2; 0 \leq u < p$ $p$ conjugate subgroups for the prime $p$	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$
[ $p^2$ ] $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$		
$P6/mcc$ (192)	$\langle 2 + (u + v, -u + 2v, 0); (4; 13) + (2u, 2v, 0); 7 + (u - v, -u + v, 0) \rangle$ $p > 1; p \neq 3; 0 \leq u < p; 0 \leq v < p$ $p^2$ conjugate subgroups for the prime $p$	$p\mathbf{a}, p\mathbf{b}, \mathbf{c}$

**I Minimal translationengleiche supergroups**

none

**II Minimal non-isomorphic klassengleiche supergroups**

## • Additional centring translations

none

## • Decreased unit cell

 [2]  $\mathbf{c}' = \frac{1}{2}\mathbf{c}$   $P6/mmm$  (191)