

$P3m1$ 

No. 156

 $P3m1$ 
 $C_{3v}^1$ 
**Generators selected** (1);  $t(1,0,0)$ ;  $t(0,1,0)$ ;  $t(0,0,1)$ ; (2); (4)

**General position**

 Multiplicity,  
 Wyckoff letter,  
 Site symmetry

Coordinates

 6  $e$  1

 (1)  $x, y, z$  (2)  $\bar{y}, x - y, z$  (3)  $\bar{x} + y, \bar{x}, z$   
 (4)  $\bar{y}, \bar{x}, z$  (5)  $\bar{x} + y, y, z$  (6)  $x, x - y, z$ 
**I Maximal translationengleiche subgroups**

[2] $P311$ (143, $P3$ )	1; 2; 3	
{ [3] $P1m1$ (8, $C1m1$ )	1; 4	$-\mathbf{a} + \mathbf{b}, -\mathbf{a} - \mathbf{b}, \mathbf{c}$
[3] $P1m1$ (8, $C1m1$ )	1; 5	$-\mathbf{a} - 2\mathbf{b}, \mathbf{a}, \mathbf{c}$
[3] $P1m1$ (8, $C1m1$ )	1; 6	$2\mathbf{a} + \mathbf{b}, \mathbf{b}, \mathbf{c}$

**II Maximal klassengleiche subgroups**

## • Enlarged unit cell

[2] $\mathbf{c}' = 2\mathbf{c}$			
$P3c1$ (158)	$\langle 2; 4 + (0, 0, 1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	
$P3m1$ (156)	$\langle 2; 4 \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	
[3] $\mathbf{c}' = 3\mathbf{c}$			
$P3m1$ (156)	$\langle 2; 4 \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	
[3] $\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}$			
{ $H3m1$ (157, $P31m$ )	$\langle 2; 4 \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$	
{ $H3m1$ (157, $P31m$ )	$\langle 2 + (1, -1, 0); 4 + (1, 1, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$	1, 0, 0
{ $H3m1$ (157, $P31m$ )	$\langle 2 + (2, 1, 0); 4 + (2, 2, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$	1, 1, 0
{ $H3m1$ (157, $P31m$ )	$\langle 4; 2 + (1, 0, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$	$2/3, -2/3, 0$
{ $H3m1$ (157, $P31m$ )	$\langle 2 + (2, 2, 0); 4 + (1, 1, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$	$2/3, 1/3, 0$
{ $H3m1$ (157, $P31m$ )	$\langle 2 + (3, 4, 0); 4 + (2, 2, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$	$2/3, 4/3, 0$
{ $H3m1$ (157, $P31m$ )	$\langle 4; 2 + (1, 1, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$	$1/3, -1/3, 0$
{ $H3m1$ (157, $P31m$ )	$\langle 2 + (2, 3, 0); 4 + (1, 1, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$	$1/3, 2/3, 0$
{ $H3m1$ (157, $P31m$ )	$\langle 2 + (3, 2, 0); 4 + (2, 2, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$	$4/3, 2/3, 0$
[4] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$			
{ $P3m1$ (156)	$\langle 2; 4 \rangle$	$2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	
{ $P3m1$ (156)	$\langle 2 + (1, -1, 0); 4 + (1, 1, 0) \rangle$	$2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	1, 0, 0
{ $P3m1$ (156)	$\langle 2 + (1, 2, 0); 4 + (1, 1, 0) \rangle$	$2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	0, 1, 0
{ $P3m1$ (156)	$\langle 2 + (2, 1, 0); 4 + (2, 2, 0) \rangle$	$2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	1, 1, 0

## • Series of maximal isomorphic subgroups

[ $p$ ] $\mathbf{c}' = p\mathbf{c}$			
$P3m1$ (156)	$\langle 2; 4 \rangle$	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	
	$p > 1$		
	no conjugate subgroups		
[ $p^2$ ] $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$			
$P3m1$ (156)	$\langle 2 + (u + v, -u + 2v, 0); 4 + (u + v, u + v, 0) \rangle$	$p\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$u, v, 0$
	$p > 1; p \neq 3; 0 \leq u < p; 0 \leq v < p$		
	$p^2$ conjugate subgroups for the prime $p$		

**I Minimal translationengleiche supergroups**

 [2]  $P\bar{3}m1$  (164); [2]  $P6mm$  (183); [2]  $P6_3mc$  (186); [2]  $P\bar{6}m2$  (187)

**II Minimal non-isomorphic klassengleiche supergroups**

## • Additional centring translations

 [3]  $H3m1$  (157,  $P31m$ ); [3]  $R_{\text{obv}}3m$  (160,  $R3m$ ); [3]  $R_{\text{rev}}3m$  (160,  $R3m$ )

## • Decreased unit cell

none