

$p31m$

No. 15

$p31m$

**Generators selected** (1);  $t(1,0)$ ;  $t(0,1)$ ; (2); (4)

**General position**

Multiplicity,  
Wyckoff letter,  
Site symmetry

Coordinates

6  $d$  1

(1)  $x,y$  (2)  $\bar{y},x-y$  (3)  $\bar{x}+y,\bar{x}$   
(4)  $y,x$  (5)  $x-y,\bar{y}$  (6)  $\bar{x},\bar{x}+y$

**I Maximal translationengleiche subgroups**

[2] $p311$ (13, $p3$ )	1; 2; 3	
{ [3] $p11m$ (5, $cm$ )	1; 4	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}$
[3] $p11m$ (5, $cm$ )	1; 5	$\mathbf{a} + 2\mathbf{b}, -\mathbf{a}$
[3] $p11m$ (5, $cm$ )	1; 6	$-2\mathbf{a} - \mathbf{b}, -\mathbf{b}$

**II Maximal klassengleiche subgroups**

• **Enlarged unit cell**

[3] $\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}$ $h31m$ (14, $p3m1$ )	$\langle 2; 4 \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}$	
[4] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$			
{ $p31m$ (15)	$\langle 2; 4 \rangle$	$2\mathbf{a}, 2\mathbf{b}$	
{ $p31m$ (15)	$\langle \langle 2; 4 \rangle + (1, -1) \rangle$	$2\mathbf{a}, 2\mathbf{b}$	1, 0
{ $p31m$ (15)	$\langle 2 + (1, 2); 4 + (-1, 1) \rangle$	$2\mathbf{a}, 2\mathbf{b}$	0, 1
{ $p31m$ (15)	$\langle 4; 2 + (2, 1) \rangle$	$2\mathbf{a}, 2\mathbf{b}$	1, 1

• **Series of maximal isomorphic subgroups**

$[p^2] \mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$ $p31m$ (15)	$\langle 2 + (u+v, -u+2v); 4 + (u-v, -u+v) \rangle$ $p$ prime; $p \neq 3$ ; $0 \leq u < p$ ; $0 \leq v < p$ $p^2$ conjugate subgroups	$p\mathbf{a}, p\mathbf{b}$	$u, v$
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**I Minimal translationengleiche supergroups**

[2]  $p6mm$  (17)

**II Minimal non-isomorphic klassengleiche supergroups**

• **Additional centring translations**

[3]  $h31m$  (14,  $p3m1$ )

• **Decreased unit cell**

none