

$P6_1$

No. 169

 $P6_1$
 C_6^2

 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	<i>a</i>	1	(1) x, y, z	(2) $\bar{y}, x - y, z + \frac{1}{3}$	(3) $\bar{x} + y, \bar{x}, z + \frac{2}{3}$
			(4) $\bar{x}, \bar{y}, z + \frac{1}{2}$	(5) $y, \bar{x} + y, z + \frac{5}{6}$	(6) $x - y, x, z + \frac{1}{6}$

I Maximal translationengleiche subgroups

[2] $P3_1$ (144)	1; 2; 3
[3] $P2_1$ (4, $P112_1$)	1; 4

II Maximal klassengleiche subgroups

• Enlarged unit cell

[3] $\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}$		
$\left\{ \begin{array}{l} H6_1 (169, P6_1) \\ H6_1 (169, P6_1) \\ H6_1 (169, P6_1) \end{array} \right.$	$\langle 2; 4 \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$
	$\langle 2 + (1, -1, 0); 4 + (2, 0, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$
	$\langle 2 + (2, -2, 0); 4 + (4, 0, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$
1, 0, 0		
2, 0, 0		
[4] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$		
$\left\{ \begin{array}{l} P6_1 (169) \\ P6_1 (169) \\ P6_1 (169) \\ P6_1 (169) \end{array} \right.$	$\langle 2; 4 \rangle$	$2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$
	$\langle 2 + (1, -1, 0); 4 + (2, 0, 0) \rangle$	$2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$
	$\langle 2 + (1, 2, 0); 4 + (0, 2, 0) \rangle$	$2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$
	$\langle 2 + (2, 1, 0); 4 + (2, 2, 0) \rangle$	$2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$
1, 0, 0		
0, 1, 0		
1, 1, 0		

• Series of maximal isomorphic subgroups

[<i>p</i>] $\mathbf{c}' = p\mathbf{c}$		
$P6_5$ (170)	$\langle 2 + (0, 0, \frac{2p}{3} - \frac{1}{3}); 4 + (0, 0, \frac{p}{2} - \frac{1}{2}) \rangle$	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$
	$p > 4; p \equiv 5 \pmod{6}$ no conjugate subgroups	
$P6_1$ (169)	$\langle 2 + (0, 0, \frac{p}{3} - \frac{1}{3}); 4 + (0, 0, \frac{p}{2} - \frac{1}{2}) \rangle$	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$
	$p > 6; p \equiv 1 \pmod{6}$ no conjugate subgroups	
[p^2] $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$		
$P6_1$ (169)	$\langle 2 + (u + v, -u + 2v, 0); 4 + (2u, 2v, 0) \rangle$	$p\mathbf{a}, p\mathbf{b}, \mathbf{c}$
	$p > 1; 0 \leq u < p; 0 \leq v < p$	$u, v, 0$
	p^2 conjugate subgroups for prime $p \equiv 2 \pmod{3}$	
[$p = q^2 + r^2 + qr$] $\mathbf{a}' = q\mathbf{a} - r\mathbf{b}, \mathbf{b}' = r\mathbf{a} + (q + r)\mathbf{b}$		
$P6_1$ (169)	$\langle 2 + (u, -u, 0); 4 + (2u, 0, 0) \rangle$	$q\mathbf{a} - r\mathbf{b}, r\mathbf{a} + (q + r)\mathbf{b}, \mathbf{c}$
	$q > 0; r > 0; p > 2; 0 \leq u < p$	$u, 0, 0$
	p conjugate subgroups for each pair of q and r	

I Minimal translationengleiche supergroups

 [2] $P6_1 22$ (178)

II Minimal non-isomorphic klassengleiche supergroups

• Additional centring translations

none

• Decreased unit cell

 [2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P6_2$ (171); [3] $\mathbf{c}' = \frac{1}{3}\mathbf{c}$ $P6_3$ (173)