

$P4_2$

No. 77

 $P4_2$
 C_4^3
Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; (2); (3)

General position

 Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

 4 d 1 (1) x, y, z (2) \bar{x}, \bar{y}, z (3) $\bar{y}, x, z + \frac{1}{2}$ (4) $y, \bar{x}, z + \frac{1}{2}$
I Maximal translationengleiche subgroups

 [2] $P2$ (3, $P112$) 1; 2

II Maximal klassengleiche subgroups

• Enlarged unit cell

[2] $\mathbf{c}' = 2\mathbf{c}$			
$P4_3$ (78)	$\langle (2; 3) + (0, 0, 1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	
$P4_1$ (76)	$\langle 3; 2 + (0, 0, 1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	
[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$			
$C4_2$ (77, $P4_2$)	$\langle 2; 3 \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, \mathbf{c}$	
$C4_2$ (77, $P4_2$)	$\langle 2 + (1, 1, 0); 3 + (1, 0, 0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, \mathbf{c}$	$1/2, 1/2, 0$
[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$			
$F4_1$ (80, $I4_1$)	$\langle 3; 2 + (0, 0, 1) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, 2\mathbf{c}$	$0, 1/2, 0$
$F4_1$ (80, $I4_1$)	$\langle (2; 3) + (0, 0, 1) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, 2\mathbf{c}$	$1/2, 0, 0$
[3] $\mathbf{c}' = 3\mathbf{c}$			
$P4_2$ (77)	$\langle 2; 3 + (0, 0, 1) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	

• Series of maximal isomorphic subgroups

[p] $\mathbf{c}' = p\mathbf{c}$			
$P4_2$ (77)	$\langle 2; 3 + (0, 0, \frac{p}{2} - \frac{1}{2}) \rangle$ prime $p > 2$ no conjugate subgroups	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	
[p^2] $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$			
$P4_2$ (77)	$\langle 2 + (2u, 2v, 0); 3 + (u + v, -u + v, 0) \rangle$ prime $p > 2; 0 \leq u < p; 0 \leq v < p$ p^2 conjugate subgroups for $p = 4n - 1$	$p\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$u, v, 0$
[$p = q^2 + r^2$] $\mathbf{a}' = q\mathbf{a} - r\mathbf{b}, \mathbf{b}' = r\mathbf{a} + q\mathbf{b}$			
$P4_2$ (77)	$\langle 2 + (2u, 0, 0); 3 + (u, -u, 0) \rangle$ prime $p > 4; q > 0; r > 0; 0 \leq u < p$ p conjugate subgroups for $p = 4n + 1$	$q\mathbf{a} - r\mathbf{b}, r\mathbf{a} + q\mathbf{b}, \mathbf{c}$	$u, 0, 0$

I Minimal translationengleiche supergroups

 [2] $P4_2/m$ (84); [2] $P4_2/n$ (86); [2] $P4_222$ (93); [2] $P4_22_12$ (94); [2] $P4_2cm$ (101); [2] $P4_2nm$ (102); [2] $P4_2mc$ (105); [2] $P4_2bc$ (106)

II Minimal non-isomorphic klassengleiche supergroups

• Additional centring translations

 [2] $I4$ (79)

• Decreased unit cell

 [2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P4$ (75)