

$P2_1/c$

No. 14

 $P12_1/c1$
 C_{2h}^5

 UNIQUE AXIS b , CELL CHOICE 1

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

[2] $P1c1$ (7)	1; 4		0, 1/4, 0
[2] $P12_11$ (4)	1; 2		0, 0, 1/4
[2] $P\bar{1}$ (2)	1; 3		

II Maximal klassengleiche subgroups

• Enlarged unit cell

[2] $\mathbf{a}' = 2\mathbf{a}$			
$P12_1/c1$ (14)	$\langle 2; 3 \rangle$	$2\mathbf{a}, \mathbf{b}, \mathbf{c}$	
$P12_1/c1$ (14)	$\langle (2; 3) + (1, 0, 0) \rangle$	$2\mathbf{a}, \mathbf{b}, \mathbf{c}$	1/2, 0, 0
$P12_1/n1$ (14, $P12_1/c1$)	$\langle 3; 2 + (1, 0, 0) \rangle$	$2\mathbf{a}, \mathbf{b}, -2\mathbf{a} + \mathbf{c}$	
$P12_1/n1$ (14, $P12_1/c1$)	$\langle 2 + (2, 0, 0); 3 + (1, 0, 0) \rangle$	$2\mathbf{a}, \mathbf{b}, -2\mathbf{a} + \mathbf{c}$	1/2, 0, 0
[3] $\mathbf{b}' = 3\mathbf{b}$			
$P12_1/c1$ (14)	$\langle 3; 2 + (0, 1, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	
$P12_1/c1$ (14)	$\langle 2 + (0, 1, 0); 3 + (0, 2, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	0, 1, 0
$P12_1/c1$ (14)	$\langle 2 + (0, 1, 0); 3 + (0, 4, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	0, 2, 0
[3] $\mathbf{c}' = 3\mathbf{c}$			
$P12_1/c1$ (14)	$\langle 3; 2 + (0, 0, 1) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	
$P12_1/c1$ (14)	$\langle 2 + (0, 0, 3); 3 + (0, 0, 2) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 1
$P12_1/c1$ (14)	$\langle 2 + (0, 0, 5); 3 + (0, 0, 4) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 2
[3] $\mathbf{a}' = 3\mathbf{a}$			
$P12_1/c1$ (14)	$\langle 2; 3 \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	
$P12_1/c1$ (14)	$\langle (2; 3) + (2, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	1, 0, 0
$P12_1/c1$ (14)	$\langle (2; 3) + (4, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	2, 0, 0
[3] $\mathbf{a}' = 3\mathbf{a}, \mathbf{c}' = -2\mathbf{a} + \mathbf{c}$			
$P12_1/c1$ (14)	$\langle 3; 2 + (-1, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, -2\mathbf{a} + \mathbf{c}$	
$P12_1/c1$ (14)	$\langle 2 + (1, 0, 0); 3 + (2, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, -2\mathbf{a} + \mathbf{c}$	1, 0, 0
$P12_1/c1$ (14)	$\langle 2 + (3, 0, 0); 3 + (4, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, -2\mathbf{a} + \mathbf{c}$	2, 0, 0
[3] $\mathbf{a}' = 3\mathbf{a}, \mathbf{c}' = -4\mathbf{a} + \mathbf{c}$			
$P12_1/c1$ (14)	$\langle 3; 2 + (-2, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, -4\mathbf{a} + \mathbf{c}$	
$P12_1/c1$ (14)	$\langle 2 + (0, 0, 0); 3 + (2, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, -4\mathbf{a} + \mathbf{c}$	1, 0, 0
$P12_1/c1$ (14)	$\langle 2 + (2, 0, 0); 3 + (4, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, -4\mathbf{a} + \mathbf{c}$	2, 0, 0

• Series of maximal isomorphic subgroups

[p] $\mathbf{b}' = p\mathbf{b}$			
$P12_1/c1$ (14)	$\langle 2 + (0, \frac{p}{2} - \frac{1}{2}, 0); 3 + (0, 2u, 0) \rangle$	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	0, u , 0
	$p > 2; 0 \leq u < p$		
	p conjugate subgroups for the prime p		
[p] $\mathbf{c}' = p\mathbf{c}$			
$P12_1/c1$ (14)	$\langle 2 + (0, 0, \frac{p}{2} - \frac{1}{2} + 2u); 3 + (0, 0, 2u) \rangle$	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	0, 0, u
	$p > 2; 0 \leq u < p$		
	p conjugate subgroups for the prime p		
[p] $\mathbf{a}' = p\mathbf{a}, \mathbf{c}' = -2q\mathbf{a} + \mathbf{c}$			
$P12_1/c1$ (14)	$\langle 2 + (-q + 2u, 0, 0); 3 + (2u, 0, 0) \rangle$	$p\mathbf{a}, \mathbf{b}, -2q\mathbf{a} + \mathbf{c}$	u , 0, 0
	$p > 2; 0 \leq q < p; 0 \leq u < p$		
	p conjugate subgroups for each pair of q and prime p		

I Minimal translationengleiche supergroups

[2] $Pnna$ (52); [2] $Pmna$ (53); [2] $Pcca$ (54); [2] $Pbam$ (55); [2] $Pccn$ (56); [2] $Pbcm$ (57); [2] $Pnmm$ (58); [2] $Pbcn$ (60); [2] $Pbca$ (61);
[2] $Pnma$ (62); [2] $Cmce$ (64)

II Minimal non-isomorphic klassengleiche supergroups

- Additional centring translations

[2] $A12/m1$ (12, $C12/m1$); [2] $C12/c1$ (15); [2] $I12/c1$ (15, $C12/c1$)

- Decreased unit cell

[2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P12_1/m1$ (11); [2] $\mathbf{b}' = \frac{1}{2}\mathbf{b}$ $P12/c1$ (13)

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I Minimal translationengleiche supergroups

[2] $Pnna$ (52); [2] $Pmna$ (53); [2] $Pcca$ (54); [2] $Pbam$ (55); [2] $Pccn$ (56); [2] $Pbcm$ (57); [2] $Pnmm$ (58); [2] $Pbcn$ (60); [2] $Pbca$ (61);
[2] $Pnma$ (62); [2] $Cmce$ (64)

II Minimal non-isomorphic klassengleiche supergroups

- Additional centring translations

[2] $A112/a$ (15); [2] $B112/m$ (12, $A112/m$); [2] $I112/a$ (15, $A112/a$)

- Decreased unit cell

[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}$ $P112_1/m$ (11); [2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P112/a$ (13)

UNIQUE AXIS c , CELL CHOICE 1

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 e 1 (1) x, y, z (2) $\bar{x} + \frac{1}{2}, \bar{y}, z + \frac{1}{2}$ (3) $\bar{x}, \bar{y}, \bar{z}$ (4) $x + \frac{1}{2}, y, \bar{z} + \frac{1}{2}$

I Maximal translationengleiche subgroups

[2] $P11a$ (7)	1; 4		0, 0, 1/4
[2] $P112_1$ (4)	1; 2		1/4, 0, 0
[2] $P\bar{1}$ (2)	1; 3		

II Maximal klassengleiche subgroups

• **Enlarged unit cell**

[2] $\mathbf{b}' = 2\mathbf{b}$			
$P112_1/a$ (14)	$\langle 2; 3 \rangle$	$\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	
$P112_1/a$ (14)	$\langle (2; 3) + (0, 1, 0) \rangle$	$\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	0, 1/2, 0
$P112_1/n$ (14, $P112_1/a$)	$\langle 3; 2 + (0, 1, 0) \rangle$	$\mathbf{a} - 2\mathbf{b}, 2\mathbf{b}, \mathbf{c}$	
$P112_1/n$ (14, $P112_1/a$)	$\langle 2 + (0, 2, 0); 3 + (0, 1, 0) \rangle$	$\mathbf{a} - 2\mathbf{b}, 2\mathbf{b}, \mathbf{c}$	0, 1/2, 0
[3] $\mathbf{c}' = 3\mathbf{c}$			
$P112_1/a$ (14)	$\langle 3; 2 + (0, 0, 1) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	
$P112_1/a$ (14)	$\langle 2 + (0, 0, 1); 3 + (0, 0, 2) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 1
$P112_1/a$ (14)	$\langle 2 + (0, 0, 1); 3 + (0, 0, 4) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 2
[3] $\mathbf{a}' = 3\mathbf{a}$			
$P112_1/a$ (14)	$\langle 3; 2 + (1, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	
$P112_1/a$ (14)	$\langle 2 + (3, 0, 0); 3 + (2, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	1, 0, 0
$P112_1/a$ (14)	$\langle 2 + (5, 0, 0); 3 + (4, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	2, 0, 0
[3] $\mathbf{b}' = 3\mathbf{b}$			
$P112_1/a$ (14)	$\langle 2; 3 \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	
$P112_1/a$ (14)	$\langle (2; 3) + (0, 2, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	0, 1, 0
$P112_1/a$ (14)	$\langle (2; 3) + (0, 4, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	0, 2, 0
[3] $\mathbf{a}' = \mathbf{a} - 2\mathbf{b}, \mathbf{b}' = 3\mathbf{b}$			
$P112_1/a$ (14)	$\langle 3; 2 + (0, -1, 0) \rangle$	$\mathbf{a} - 2\mathbf{b}, 3\mathbf{b}, \mathbf{c}$	
$P112_1/a$ (14)	$\langle 2 + (0, 1, 0); 3 + (0, 2, 0) \rangle$	$\mathbf{a} - 2\mathbf{b}, 3\mathbf{b}, \mathbf{c}$	0, 1, 0
$P112_1/a$ (14)	$\langle 2 + (0, 3, 0); 3 + (0, 4, 0) \rangle$	$\mathbf{a} - 2\mathbf{b}, 3\mathbf{b}, \mathbf{c}$	0, 2, 0
[3] $\mathbf{a}' = \mathbf{a} - 4\mathbf{b}, \mathbf{b}' = 3\mathbf{b}$			
$P112_1/a$ (14)	$\langle 3; 2 + (0, -2, 0) \rangle$	$\mathbf{a} - 4\mathbf{b}, 3\mathbf{b}, \mathbf{c}$	
$P112_1/a$ (14)	$\langle 2 + (0, 0, 0); 3 + (0, 2, 0) \rangle$	$\mathbf{a} - 4\mathbf{b}, 3\mathbf{b}, \mathbf{c}$	0, 1, 0
$P112_1/a$ (14)	$\langle 2 + (0, 2, 0); 3 + (0, 4, 0) \rangle$	$\mathbf{a} - 4\mathbf{b}, 3\mathbf{b}, \mathbf{c}$	0, 2, 0

• **Series of maximal isomorphic subgroups**

[p] $\mathbf{c}' = p\mathbf{c}$			
$P112_1/a$ (14)	$\langle 2 + (0, 0, \frac{p}{2} - \frac{1}{2}); 3 + (0, 0, 2u) \rangle$ $p > 2; 0 \leq u < p$ p conjugate subgroups for the prime p	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	0, 0, u
[p] $\mathbf{a}' = p\mathbf{a}$			
$P112_1/a$ (14)	$\langle 2 + (\frac{p}{2} - \frac{1}{2} + 2u, 0, 0); 3 + (2u, 0, 0) \rangle$ $p > 2; 0 \leq u < p$ p conjugate subgroups for the prime p	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	$u, 0, 0$
[p] $\mathbf{a}' = \mathbf{a} - 2q\mathbf{b}, \mathbf{b}' = p\mathbf{b}$			
$P112_1/a$ (14)	$\langle 2 + (0, -q + 2u, 0); 3 + (0, 2u, 0) \rangle$ $p > 2; 0 \leq q < p; 0 \leq u < p$ p conjugate subgroups for each pair of q and prime p	$\mathbf{a} - 2q\mathbf{b}, p\mathbf{b}, \mathbf{c}$	0, $u, 0$

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I Minimal translationengleiche supergroups

[2] $Pnna$ (52); [2] $Pmna$ (53); [2] $Pcca$ (54); [2] $Pbam$ (55); [2] $Pccn$ (56); [2] $Pbcm$ (57); [2] $Pnmm$ (58); [2] $Pbcn$ (60); [2] $Pbca$ (61);
[2] $Pnma$ (62); [2] $Cmce$ (64)

II Minimal non-isomorphic klassengleiche supergroups

- Additional centring translations

[2] $A12/m1$ (12, $C12/m1$); [2] $C12/c1$ (15); [2] $I12/c1$ (15, $C12/c1$)

- Decreased unit cell

[2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P12_1/m1$ (11); [2] $\mathbf{b}' = \frac{1}{2}\mathbf{b}$ $P12/c1$ (13)

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I Minimal translationengleiche supergroups

[2] $Pnna$ (52); [2] $Pmna$ (53); [2] $Pcca$ (54); [2] $Pbam$ (55); [2] $Pccn$ (56); [2] $Pbcm$ (57); [2] $Pnmm$ (58); [2] $Pbcn$ (60); [2] $Pbca$ (61);
[2] $Pnma$ (62); [2] $Cmce$ (64)

II Minimal non-isomorphic klassengleiche supergroups

- Additional centring translations

[2] $A112/a$ (15); [2] $B112/m$ (12, $A112/m$); [2] $I112/a$ (15, $A112/a$)

- Decreased unit cell

[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}$ $P112_1/m$ (11); [2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P112/a$ (13)