

$Pbcn$

No. 60

 $P2_1/b2/c2_1/n$ D_{2h}^{14} Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; (2); (3); (5)

General position

Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

8 d 1 (1) x, y, z (2) $\bar{x} + \frac{1}{2}, \bar{y} + \frac{1}{2}, z + \frac{1}{2}$ (3) $\bar{x}, y, \bar{z} + \frac{1}{2}$ (4) $x + \frac{1}{2}, \bar{y} + \frac{1}{2}, \bar{z}$
 (5) $\bar{x}, \bar{y}, \bar{z}$ (6) $x + \frac{1}{2}, y + \frac{1}{2}, \bar{z} + \frac{1}{2}$ (7) $x, \bar{y}, z + \frac{1}{2}$ (8) $\bar{x} + \frac{1}{2}, y + \frac{1}{2}, z$

I Maximal *translationengleiche* subgroups

[2] $P2_1cn$ (33, $Pna2_1$)	1; 4; 6; 7	$\mathbf{c}, \mathbf{b}, -\mathbf{a}$	0, 1/4, 0
[2] $Pb2n$ (30, $Pnc2$)	1; 3; 6; 8	$\mathbf{c}, \mathbf{a}, \mathbf{b}$	0, 0, 1/4
[2] $Pbc2_1$ (29, $Pca2_1$)	1; 2; 7; 8	$-\mathbf{b}, \mathbf{a}, \mathbf{c}$	1/4, 1/4, 0
[2] $P2_122_1$ (18, $P2_12_12$)	1; 2; 3; 4	$\mathbf{c}, \mathbf{a}, \mathbf{b}$	0, 1/4, 1/4
[2] $P112_1/n$ (14, $P112_1/a$)	1; 2; 5; 6	$-\mathbf{a} - \mathbf{b}, \mathbf{a}, \mathbf{c}$	
[2] $P2_1/b11$ (14, $P12_1/c1$)	1; 4; 5; 8	$\mathbf{c}, \mathbf{a}, \mathbf{b}$	
[2] $P12/c1$ (13)	1; 3; 5; 7		

II Maximal *klassengleiche* subgroups

• Enlarged unit cell

[3] $\mathbf{a}' = 3\mathbf{a}$			
$\left\{ \begin{array}{l} Pbcn \text{ (60)} \\ Pbcn \text{ (60)} \\ Pbcn \text{ (60)} \end{array} \right.$	$\langle 3; 5; 2 + (1, 0, 0) \rangle$ $\langle 2 + (3, 0, 0); (3; 5) + (2, 0, 0) \rangle$ $\langle 2 + (5, 0, 0); (3; 5) + (4, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$ $3\mathbf{a}, \mathbf{b}, \mathbf{c}$ $3\mathbf{a}, \mathbf{b}, \mathbf{c}$	 1, 0, 0 2, 0, 0
[3] $\mathbf{b}' = 3\mathbf{b}$			
$\left\{ \begin{array}{l} Pbcn \text{ (60)} \\ Pbcn \text{ (60)} \\ Pbcn \text{ (60)} \end{array} \right.$	$\langle 3; 5; 2 + (0, 1, 0) \rangle$ $\langle 3; 2 + (0, 3, 0); 5 + (0, 2, 0) \rangle$ $\langle 3; 2 + (0, 5, 0); 5 + (0, 4, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$ $\mathbf{a}, 3\mathbf{b}, \mathbf{c}$ $\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	 0, 1, 0 0, 2, 0
[3] $\mathbf{c}' = 3\mathbf{c}$			
$\left\{ \begin{array}{l} Pbcn \text{ (60)} \\ Pbcn \text{ (60)} \\ Pbcn \text{ (60)} \end{array} \right.$	$\langle 5; (2; 3) + (0, 0, 1) \rangle$ $\langle 2 + (0, 0, 1); 3 + (0, 0, 3); 5 + (0, 0, 2) \rangle$ $\langle 2 + (0, 0, 1); 3 + (0, 0, 5); 5 + (0, 0, 4) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$ $\mathbf{a}, \mathbf{b}, 3\mathbf{c}$ $\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	 0, 0, 1 0, 0, 2

• Series of maximal isomorphic subgroups

[p] $\mathbf{a}' = p\mathbf{a}$			
$Pbcn$ (60)	$\langle 2 + (\frac{p}{2} - \frac{1}{2} + 2u, 0, 0); (3; 5) + (2u, 0, 0) \rangle$ prime $p > 2$; $0 \leq u < p$ p conjugate subgroups	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	$u, 0, 0$
[p] $\mathbf{b}' = p\mathbf{b}$			
$Pbcn$ (60)	$\langle 3; 2 + (0, \frac{p}{2} - \frac{1}{2} + 2u, 0); 5 + (0, 2u, 0) \rangle$ prime $p > 2$; $0 \leq u < p$ p conjugate subgroups	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$0, u, 0$
[p] $\mathbf{c}' = p\mathbf{c}$			
$Pbcn$ (60)	$\langle 2 + (0, 0, \frac{p}{2} - \frac{1}{2}); 3 + (0, 0, \frac{p}{2} - \frac{1}{2} + 2u); 5 + (0, 0, 2u) \rangle$ prime $p > 2$; $0 \leq u < p$ p conjugate subgroups	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	$0, 0, u$

I Minimal *translationengleiche* supergroups

none

II Minimal non-isomorphic *klassengleiche* supergroups

• Additional centring translations

[2] $Cmcm$ (63); [2] $Aema$ (64, $Cmce$); [2] $Bbeb$ (68, $Ccce$); [2] $Ibam$ (72)

• Decreased unit cell

[2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $Pbmn$ (53, $Pmna$); [2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}$ $Pbcb$ (54, $Pcca$); [2] $\mathbf{b}' = \frac{1}{2}\mathbf{b}$ $Pmca$ (57, $Pbcm$)