

$Pnna$

No. 52

 $P2/n2_1/n2/a$
 D_{2h}^6
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	e	1	(1) x, y, z	(2) $\bar{x} + \frac{1}{2}, \bar{y}, z$	(3) $\bar{x} + \frac{1}{2}, y + \frac{1}{2}, \bar{z} + \frac{1}{2}$	(4) $x, \bar{y} + \frac{1}{2}, \bar{z} + \frac{1}{2}$
			(5) $\bar{x}, \bar{y}, \bar{z}$	(6) $x + \frac{1}{2}, y, \bar{z}$	(7) $x + \frac{1}{2}, \bar{y} + \frac{1}{2}, z + \frac{1}{2}$	(8) $\bar{x}, y + \frac{1}{2}, z + \frac{1}{2}$

I Maximal translationengleiche subgroups

[2] $Pnn2$ (34)	1; 2; 7; 8		
[2] $Pn2_1a$ (33, $Pna2_1$)	1; 3; 6; 8	a, -c, b	1/4, 0, 1/4
[2] $P2na$ (30, $Pnc2$)	1; 4; 6; 7	b, c, a	0, 1/4, 1/4
[2] $P22_12$ (17, $P222_1$)	1; 2; 3; 4	c, a, b	1/4, 0, 1/4
[2] $P12_1/n1$ (14, $P12_1/c1$)	1; 3; 5; 7	c, b, -a - c	
[2] $P112/a$ (13)	1; 2; 5; 6		
[2] $P2/n11$ (13, $P12/c1$)	1; 4; 5; 8	-b, a, b + c	

II Maximal klassengleiche subgroups

• Enlarged unit cell

[3] $\mathbf{a}' = 3\mathbf{a}$			
$\left\{ \begin{array}{l} Pnna \text{ (52)} \\ Pnna \text{ (52)} \\ Pnna \text{ (52)} \end{array} \right.$	$\langle 5; (2; 3) + (1, 0, 0) \rangle$	3a, b, c	
	$\langle (2; 3) + (3, 0, 0); 5 + (2, 0, 0) \rangle$	3a, b, c	1, 0, 0
	$\langle (2; 3) + (5, 0, 0); 5 + (4, 0, 0) \rangle$	3a, b, c	2, 0, 0
[3] $\mathbf{b}' = 3\mathbf{b}$			
$\left\{ \begin{array}{l} Pnna \text{ (52)} \\ Pnna \text{ (52)} \\ Pnna \text{ (52)} \end{array} \right.$	$\langle 2; 5; 3 + (0, 1, 0) \rangle$	a, 3b, c	
	$\langle (2; 5) + (0, 2, 0); 3 + (0, 1, 0) \rangle$	a, 3b, c	0, 1, 0
	$\langle (2; 5) + (0, 4, 0); 3 + (0, 1, 0) \rangle$	a, 3b, c	0, 2, 0
[3] $\mathbf{c}' = 3\mathbf{c}$			
$\left\{ \begin{array}{l} Pnna \text{ (52)} \\ Pnna \text{ (52)} \\ Pnna \text{ (52)} \end{array} \right.$	$\langle 2; 5; 3 + (0, 0, 1) \rangle$	a, b, 3c	
	$\langle 2; 3 + (0, 0, 3); 5 + (0, 0, 2) \rangle$	a, b, 3c	0, 0, 1
	$\langle 2; 3 + (0, 0, 5); 5 + (0, 0, 4) \rangle$	a, b, 3c	0, 0, 2

• Series of maximal isomorphic subgroups

[p] $\mathbf{a}' = p\mathbf{a}$			
$\left\{ \begin{array}{l} Pnna \text{ (52)} \\ Pnna \text{ (52)} \\ Pnna \text{ (52)} \end{array} \right.$	$\langle (2; 3) + (\frac{p}{2} - \frac{1}{2} + 2u, 0, 0); 5 + (2u, 0, 0) \rangle$	pa, b, c	$u, 0, 0$
	$p > 2; 0 \leq u < p$		
	p conjugate subgroups for the prime p		
[p] $\mathbf{b}' = p\mathbf{b}$			
$\left\{ \begin{array}{l} Pnna \text{ (52)} \\ Pnna \text{ (52)} \\ Pnna \text{ (52)} \end{array} \right.$	$\langle (2; 5) + (0, 2u, 0); 3 + (0, \frac{p}{2} - \frac{1}{2}, 0) \rangle$	a, pb, c	$0, u, 0$
	$p > 2; 0 \leq u < p$		
	p conjugate subgroups for the prime p		
[p] $\mathbf{c}' = p\mathbf{c}$			
$\left\{ \begin{array}{l} Pnna \text{ (52)} \\ Pnna \text{ (52)} \\ Pnna \text{ (52)} \end{array} \right.$	$\langle 2; 3 + (0, 0, \frac{p}{2} - \frac{1}{2} + 2u); 5 + (0, 0, 2u) \rangle$	a, b, pc	$0, 0, u$
	$p > 2; 0 \leq u < p$		
	p conjugate subgroups for the prime p		

I Minimal translationengleiche supergroups

none

II Minimal non-isomorphic klassengleiche supergroups

• Additional centring translations

 [2] $Bbmm$ (63, $Cmcm$); [2] $Amaa$ (66, $Cccm$); [2] $Ccce$ (68); [2] $Imma$ (74)

• Decreased unit cell

 [2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}$ $Pnca$ (53, $Pmna$); [2] $\mathbf{b}' = \frac{1}{2}\mathbf{b}$ $Pcna$ (50, $Pban$); [2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $Pbaa$ (54, $Pcca$)