

D_4^1
 $P422$

No. 89

 $P422$
Generators selected (1); $\tau(1,0,0)$; $\tau(0,1,0)$; $\tau(0,0,1)$; (2); (3); (5)

General position

 Multiplicity,
 Wyckoff letter,
 Site symmetry

Coordinates

 8 p 1

 (1) x, y, z (2) \bar{x}, \bar{y}, z (3) \bar{y}, x, z (4) y, \bar{x}, z
 (5) \bar{x}, y, \bar{z} (6) x, \bar{y}, \bar{z} (7) y, x, \bar{z} (8) $\bar{y}, \bar{x}, \bar{z}$
I Maximal translationengleiche subgroups

[2] $P411$ (75, $P4$)	1; 2; 3; 4	
[2] $P212$ (21, $C222$)	1; 2; 7; 8	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, \mathbf{c}$
[2] $P221$ (16, $P222$)	1; 2; 5; 6	

II Maximal klassengleiche subgroups

• Enlarged unit cell

[2] $\mathbf{c}' = 2\mathbf{c}$			
$P4_222$ (93)	$\langle 2; 5; 3 + (0,0,1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	
$P4_222$ (93)	$\langle 2; (3; 5) + (0,0,1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	0, 0, 1/2
$P422$ (89)	$\langle 2; 3; 5 \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	
$P422$ (89)	$\langle 2; 3; 5 + (0,0,1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	0, 0, 1/2
[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$			
$C422_1$ (90, $P42_12$)	$\langle 2; 3; 5 + (1,0,0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, \mathbf{c}$	1/2, 1/2, 0
$C422_1$ (90, $P42_12$)	$\langle 2; 5; 3 + (1,0,0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, \mathbf{c}$	
$C422$ (89, $P422$)	$\langle 2; 3; 5 \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, \mathbf{c}$	
$C422$ (89, $P422$)	$\langle 2 + (1,1,0); (3; 5) + (1,0,0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, \mathbf{c}$	1/2, 1/2, 0
[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$			
$F422$ (97, $I422$)	$\langle 2; 3; 5 \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, 2\mathbf{c}$	
$F422$ (97, $I422$)	$\langle 2; 3; 5 + (0,0,1) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, 2\mathbf{c}$	0, 0, 1/2
$F422$ (97, $I422$)	$\langle 2; (3; 5) + (1,0,0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, 2\mathbf{c}$	1/2, 1/2, 0
$F422$ (97, $I422$)	$\langle 2; 5; 3 + (1,0,0) \rangle$	$\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, 2\mathbf{c}$	1/2, 1/2, 1/2
[3] $\mathbf{c}' = 3\mathbf{c}$			
$P422$ (89)	$\langle 2; 3; 5 \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	
$P422$ (89)	$\langle 2; 3; 5 + (0,0,2) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 1
$P422$ (89)	$\langle 2; 3; 5 + (0,0,4) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 2

• Series of maximal isomorphic subgroups

[p] $\mathbf{c}' = p\mathbf{c}$			
$P422$ (89)	$\langle 2; 3; 5 + (0,0,2u) \rangle$	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	0, 0, u
	$p > 2; 0 \leq u < p$		
	p conjugate subgroups for the prime p		
[p^2] $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$			
$P422$ (89)	$\langle 2 + (2u, 2v, 0); 3 + (u + v, -u + v, 0); 5 + (2u, 0, 0) \rangle$	$p\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$u, v, 0$
	$p > 2; 0 \leq u < p; 0 \leq v < p$		
	p^2 conjugate subgroups for the prime p		

I Minimal translationengleiche supergroups

 [2] $P4/mmm$ (123); [2] $P4/mcc$ (124); [2] $P4/nbm$ (125); [2] $P4/nnc$ (126); [3] $P432$ (207)

II Minimal non-isomorphic klassengleiche supergroups

• Additional centring translations

 [2] $I422$ (97)

• Decreased unit cell

none