

$D_4^3$ 
 $P4_122$ 

No. 91

 $P4_122$ 
**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	<i>d</i>	1		(1) $x, y, z$	(2) $\bar{x}, \bar{y}, z + \frac{1}{2}$	(3) $\bar{y}, x, z + \frac{1}{4}$	(4) $y, \bar{x}, z + \frac{3}{4}$
				(5) $\bar{x}, y, \bar{z}$	(6) $x, \bar{y}, \bar{z} + \frac{1}{2}$	(7) $y, x, \bar{z} + \frac{3}{4}$	(8) $\bar{y}, \bar{x}, \bar{z} + \frac{1}{4}$

**I Maximal translationengleiche subgroups**

[2] $P4_111$ (76, $P4_1$ )	1; 2; 3; 4		
[2] $P2_112$ (20, $C222_1$ )	1; 2; 7; 8	<b>a – b, a + b, c</b>	0, 0, 1/8
[2] $P2_121$ (17, $P222_1$ )	1; 2; 5; 6		0, 0, 1/4

**II Maximal klassengleiche subgroups**

## • Enlarged unit cell

[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$			
$C4_122_1$ (92, $P4_12_12$ )	$\langle 2; 3; 5 + (1, 0, 0) \rangle$	<b>a – b, a + b, c</b>	1/2, 1/2, 1/4
$C4_122_1$ (92, $P4_12_12$ )	$\langle 2; 5; 3 + (1, 0, 0) \rangle$	<b>a – b, a + b, c</b>	0, 0, 1/4
$C4_122$ (91, $P4_122$ )	$\langle 2; 3; 5 + (0, 0, 1) \rangle$	<b>a – b, a + b, c</b>	0, 0, 3/8
$C4_122$ (91, $P4_122$ )	$\langle 2 + (1, 1, 0); 3 + (1, 0, 0); 5 + (1, 0, 1) \rangle$	<b>a – b, a + b, c</b>	1/2, 1/2, 3/8
[3] $\mathbf{c}' = 3\mathbf{c}$			
$P4_322$ (95)	$\langle 5; 2 + (0, 0, 1); 3 + (0, 0, 2) \rangle$	<b>a, b, 3c</b>	
$P4_322$ (95)	$\langle 2 + (0, 0, 1); (3; 5) + (0, 0, 2) \rangle$	<b>a, b, 3c</b>	0, 0, 1
$P4_322$ (95)	$\langle 2 + (0, 0, 1); 3 + (0, 0, 2); 5 + (0, 0, 4) \rangle$	<b>a, b, 3c</b>	0, 0, 2

## • Series of maximal isomorphic subgroups

[ <i>p</i> ] $\mathbf{c}' = p\mathbf{c}$			
$P4_322$ (95)	$\langle 2 + (0, 0, \frac{p}{2} - \frac{1}{2}); 3 + (0, 0, \frac{3p}{4} - \frac{1}{4}); 5 + (0, 0, 2u) \rangle$ prime $p > 2$ ; $0 \leq u < p$	<b>a, b, pc</b>	0, 0, <i>u</i>
$P4_122$ (91)	$\langle 2 + (0, 0, \frac{p}{2} - \frac{1}{2}); 3 + (0, 0, \frac{p}{4} - \frac{1}{4}); 5 + (0, 0, 2u) \rangle$ prime $p > 4$ ; $0 \leq u < p$ <i>p</i> conjugate subgroups for $p = 4n + 1$	<b>a, b, pc</b>	0, 0, <i>u</i>
[ $p^2$ ] $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$			
$P4_122$ (91)	$\langle 2 + (2u, 2v, 0); 3 + (u + v, -u + v, 0); 5 + (2u, 0, 0) \rangle$ prime $p > 2$ ; $0 \leq u < p$ ; $0 \leq v < p$ $p^2$ conjugate subgroups	<b>pa, pb, c</b>	<i>u, v, 0</i>

**I Minimal translationengleiche supergroups**

none

**II Minimal non-isomorphic klassengleiche supergroups**

## • Additional centring translations

 [2]  $I4_122$  (98)

## • Decreased unit cell

 [2]  $\mathbf{c}' = \frac{1}{2}\mathbf{c}$   $P4_222$  (93)