

$P222_1$ 

No. 17

 $P222_1$ 
 $D_2^2$ 
**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)  $\bar{x}, \bar{y}, z + \frac{1}{2}$  (3)  $\bar{x}, y, \bar{z} + \frac{1}{2}$  (4)  $x, \bar{y}, \bar{z}$ 
**I Maximal translationengleiche subgroups**

[2] $P112_1$ (4)	1; 2		
[2] $P121$ (3)	1; 3		0, 0, 1/4
[2] $P211$ (3, $P121$ )	1; 4	<b>c, a, b</b>	

**II Maximal klassengleiche subgroups**

## • Enlarged unit cell

[2] $\mathbf{a}' = 2\mathbf{a}$			
$P2_122_1$ (18, $P2_12_12$ )	$\langle 2; 3 + (1, 0, 0) \rangle$	<b>c, 2a, b</b>	1/2, 0, 1/4
$P2_122_1$ (18, $P2_12_12$ )	$\langle 3; 2 + (1, 0, 0) \rangle$	<b>c, 2a, b</b>	0, 0, 1/4
$P222_1$ (17)	$\langle 2; 3 \rangle$	<b>2a, b, c</b>	
$P222_1$ (17)	$\langle (2; 3) + (1, 0, 0) \rangle$	<b>2a, b, c</b>	1/2, 0, 0
[2] $\mathbf{b}' = 2\mathbf{b}$			
$P22_12_1$ (18, $P2_12_12$ )	$\langle 2; 3 + (0, 1, 0) \rangle$	<b>2b, c, a</b>	0, 1/2, 0
$P22_12_1$ (18, $P2_12_12$ )	$\langle (2; 3) + (0, 1, 0) \rangle$	<b>2b, c, a</b>	
$P222_1$ (17)	$\langle 2; 3 \rangle$	<b>a, 2b, c</b>	
$P222_1$ (17)	$\langle 3; 2 + (0, 1, 0) \rangle$	<b>a, 2b, c</b>	0, 1/2, 0
[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$			
$C222_1$ (20)	$\langle 2; 3 \rangle$	<b>2a, 2b, c</b>	
$C222_1$ (20)	$\langle (2; 3) + (1, 0, 0) \rangle$	<b>2a, 2b, c</b>	1/2, 0, 0
$C222_1$ (20)	$\langle 3; 2 + (0, 1, 0) \rangle$	<b>2a, 2b, c</b>	0, 1/2, 0
$C222_1$ (20)	$\langle 2 + (1, 1, 0); 3 + (1, 0, 0) \rangle$	<b>2a, 2b, c</b>	1/2, 1/2, 0
[3] $\mathbf{a}' = 3\mathbf{a}$			
$P222_1$ (17)	$\langle 2; 3 \rangle$	<b>3a, b, c</b>	
$P222_1$ (17)	$\langle (2; 3) + (2, 0, 0) \rangle$	<b>3a, b, c</b>	1, 0, 0
$P222_1$ (17)	$\langle (2; 3) + (4, 0, 0) \rangle$	<b>3a, b, c</b>	2, 0, 0
[3] $\mathbf{b}' = 3\mathbf{b}$			
$P222_1$ (17)	$\langle 2; 3 \rangle$	<b>a, 3b, c</b>	
$P222_1$ (17)	$\langle 3; 2 + (0, 2, 0) \rangle$	<b>a, 3b, c</b>	0, 1, 0
$P222_1$ (17)	$\langle 3; 2 + (0, 4, 0) \rangle$	<b>a, 3b, c</b>	0, 2, 0
[3] $\mathbf{c}' = 3\mathbf{c}$			
$P222_1$ (17)	$\langle (2; 3) + (0, 0, 1) \rangle$	<b>a, b, 3c</b>	
$P222_1$ (17)	$\langle 2 + (0, 0, 1); 3 + (0, 0, 3) \rangle$	<b>a, b, 3c</b>	0, 0, 1
$P222_1$ (17)	$\langle 2 + (0, 0, 1); 3 + (0, 0, 5) \rangle$	<b>a, b, 3c</b>	0, 0, 2
• Series of maximal isomorphic subgroups			
[ $p$ ] $\mathbf{a}' = p\mathbf{a}$			
$P222_1$ (17)	$\langle (2; 3) + (2u, 0, 0) \rangle$	<b>pa, b, c</b>	$u, 0, 0$
	prime $p > 2$ ; $0 \leq u < p$		
	$p$ conjugate subgroups		
[ $p$ ] $\mathbf{b}' = p\mathbf{b}$			
$P222_1$ (17)	$\langle 3; 2 + (0, 2u, 0) \rangle$	<b>a, pb, c</b>	$0, u, 0$
	prime $p > 2$ ; $0 \leq u < p$		
	$p$ conjugate subgroups		
[ $p$ ] $\mathbf{c}' = p\mathbf{c}$			
$P222_1$ (17)	$\langle 2 + (0, 0, \frac{p}{2} - \frac{1}{2}); 3 + (0, 0, \frac{p}{2} - \frac{1}{2} + 2u) \rangle$	<b>a, b, pc</b>	$0, 0, u$
	prime $p > 2$ ; $0 \leq u < p$		
	$p$ conjugate subgroups		

**I Minimal translationengleiche supergroups**

 [2]  $Pmma$  (51); [2]  $Pnna$  (52); [2]  $Pmna$  (53); [2]  $Pcca$  (54); [2]  $P4_122$  (91); [2]  $P4_322$  (95)

**II Minimal non-isomorphic klassengleiche supergroups**

## • Additional centring translations

 [2]  $C222_1$  (20); [2]  $A222$  (21,  $C222$ ); [2]  $B222$  (21,  $C222$ ); [2]  $I2_12_12_1$  (24)

## • Decreased unit cell

 [2]  $\mathbf{c}' = \frac{1}{2}\mathbf{c}$   $P222$  (16)