

$P222$ 

No. 16

 $P222$ 
 $D_2^1$ 
**Generators selected** (1);  $\iota(1,0,0)$ ;  $\iota(0,1,0)$ ;  $\iota(0,0,1)$ ; (2); (3)

**General position**

 Multiplicity,  
 Wyckoff letter,  
 Site symmetry

Coordinates

 4  $u$  1

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

[2] $P112$ (3)	1; 2	
[2] $P121$ (3)	1; 3	
[2] $P211$ (3, $P121$ )	1; 4	<b>c, a, b</b>

**II Maximal klassengleiche subgroups**

## • Enlarged unit cell

[2] $\mathbf{a}' = 2\mathbf{a}$			
$P2_122$ (17, $P222_1$ )	$\langle 3; 2 + (1,0,0) \rangle$	<b>b, c, 2a</b>	
$P2_122$ (17, $P222_1$ )	$\langle 2; 3 + (1,0,0) \rangle$	<b>b, c, 2a</b>	1/2, 0, 0
$P222$ (16)	$\langle 2; 3 \rangle$	<b>2a, b, c</b>	
$P222$ (16)	$\langle (2; 3) + (1,0,0) \rangle$	<b>2a, b, c</b>	1/2, 0, 0
[2] $\mathbf{b}' = 2\mathbf{b}$			
$P22_12$ (17, $P222_1$ )	$\langle 2; 3 + (0,1,0) \rangle$	<b>c, a, 2b</b>	
$P22_12$ (17, $P222_1$ )	$\langle (2; 3) + (0,1,0) \rangle$	<b>c, a, 2b</b>	0, 1/2, 0
$P222$ (16)	$\langle 2; 3 \rangle$	<b>a, 2b, c</b>	
$P222$ (16)	$\langle 3; 2 + (0,1,0) \rangle$	<b>a, 2b, c</b>	0, 1/2, 0
[2] $\mathbf{c}' = 2\mathbf{c}$			
$P222_1$ (17)	$\langle 3; 2 + (0,0,1) \rangle$	<b>a, b, 2c</b>	0, 0, 1/2
$P222_1$ (17)	$\langle (2; 3) + (0,0,1) \rangle$	<b>a, b, 2c</b>	
$P222$ (16)	$\langle 2; 3 \rangle$	<b>a, b, 2c</b>	
$P222$ (16)	$\langle 2; 3 + (0,0,1) \rangle$	<b>a, b, 2c</b>	0, 0, 1/2
[2] $\mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$			
$A222$ (21, $C222$ )	$\langle 2; 3 \rangle$	<b>2b, 2c, a</b>	
$A222$ (21, $C222$ )	$\langle 3; 2 + (0,1,0) \rangle$	<b>2b, 2c, a</b>	0, 1/2, 0
$A222$ (21, $C222$ )	$\langle 2; 3 + (0,0,1) \rangle$	<b>2b, 2c, a</b>	0, 0, 1/2
$A222$ (21, $C222$ )	$\langle 2 + (0,1,0); 3 + (0,0,1) \rangle$	<b>2b, 2c, a</b>	0, 1/2, 1/2
[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{c}' = 2\mathbf{c}$			
$B222$ (21, $C222$ )	$\langle 2; 3 \rangle$	<b>2c, 2a, b</b>	
$B222$ (21, $C222$ )	$\langle 2; 3 + (0,0,1) \rangle$	<b>2c, 2a, b</b>	0, 0, 1/2
$B222$ (21, $C222$ )	$\langle (2; 3) + (1,0,0) \rangle$	<b>2c, 2a, b</b>	1/2, 0, 0
$B222$ (21, $C222$ )	$\langle 2 + (1,0,0); 3 + (1,0,1) \rangle$	<b>2c, 2a, b</b>	1/2, 0, 1/2
[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$			
$C222$ (21)	$\langle 2; 3 \rangle$	<b>2a, 2b, c</b>	
$C222$ (21)	$\langle (2; 3) + (1,0,0) \rangle$	<b>2a, 2b, c</b>	1/2, 0, 0
$C222$ (21)	$\langle 3; 2 + (0,1,0) \rangle$	<b>2a, 2b, c</b>	0, 1/2, 0
$C222$ (21)	$\langle 2 + (1,1,0); 3 + (1,0,0) \rangle$	<b>2a, 2b, c</b>	1/2, 1/2, 0
[2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$			
$F222$ (22)	$\langle 2; 3 \rangle$	<b>2a, 2b, 2c</b>	
$F222$ (22)	$\langle 3; 2 + (0,1,0) \rangle$	<b>2a, 2b, 2c</b>	0, 1/2, 0
$F222$ (22)	$\langle 2; 3 + (0,0,1) \rangle$	<b>2a, 2b, 2c</b>	0, 0, 1/2
$F222$ (22)	$\langle (2; 3) + (1,0,0) \rangle$	<b>2a, 2b, 2c</b>	1/2, 0, 0
[3] $\mathbf{a}' = 3\mathbf{a}$			
$P222$ (16)	$\langle 2; 3 \rangle$	<b>3a, b, c</b>	
$P222$ (16)	$\langle (2; 3) + (2,0,0) \rangle$	<b>3a, b, c</b>	1, 0, 0
$P222$ (16)	$\langle (2; 3) + (4,0,0) \rangle$	<b>3a, b, c</b>	2, 0, 0
[3] $\mathbf{b}' = 3\mathbf{b}$			
$P222$ (16)	$\langle 2; 3 \rangle$	<b>a, 3b, c</b>	
$P222$ (16)	$\langle 3; 2 + (0,2,0) \rangle$	<b>a, 3b, c</b>	0, 1, 0
$P222$ (16)	$\langle 3; 2 + (0,4,0) \rangle$	<b>a, 3b, c</b>	0, 2, 0
[3] $\mathbf{c}' = 3\mathbf{c}$			
$P222$ (16)	$\langle 2; 3 \rangle$	<b>a, b, 3c</b>	
$P222$ (16)	$\langle 2; 3 + (0,0,2) \rangle$	<b>a, b, 3c</b>	0, 0, 1
$P222$ (16)	$\langle 2; 3 + (0,0,4) \rangle$	<b>a, b, 3c</b>	0, 0, 2

- Series of maximal isomorphic subgroups

[ $p$ ] $\mathbf{a}' = p\mathbf{a}$ P222 (16)	$\langle (2; 3) + (2u, 0, 0) \rangle$ $p > 2; 0 \leq u < p$ $p$ conjugate subgroups for the prime $p$	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	$u, 0, 0$
[ $p$ ] $\mathbf{b}' = p\mathbf{b}$ P222 (16)	$\langle 3; 2 + (0, 2u, 0) \rangle$ $p > 2; 0 \leq u < p$ $p$ conjugate subgroups for the prime $p$	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$0, u, 0$
[ $p$ ] $\mathbf{c}' = p\mathbf{c}$ P222 (16)	$\langle 2; 3 + (0, 0, 2u) \rangle$ $p > 2; 0 \leq u < p$ $p$ conjugate subgroups for the prime $p$	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	$0, 0, u$

### I Minimal *translationengleiche* supergroups

[2]  $Pmmm$  (47); [2]  $Pnnn$  (48); [2]  $Pccm$  (49); [2]  $Pban$  (50); [2]  $P422$  (89); [2]  $P4_222$  (93); [2]  $P\bar{4}2c$  (112); [2]  $P\bar{4}2m$  (111); [3]  $P23$  (195)

### II Minimal non-isomorphic *klassengleiche* supergroups

- Additional centring translations

[2]  $A222$  (21,  $C222$ ); [2]  $B222$  (21,  $C222$ ); [2]  $C222$  (21); [2]  $I222$  (23)

- Decreased unit cell

none