

$C_s^2$ 
 $P1c1$ 

No. 7

 $Pc$ 

 UNIQUE AXIS  $b$ , CELL CHOICE 1

**Generators selected** (1);  $t(1,0,0)$ ;  $t(0,1,0)$ ;  $t(0,0,1)$ ; (2)

**General position**

 Multiplicity,  
 Wyckoff letter,  
 Site symmetry

Coordinates

 2  $a$  1

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

 [2]  $P1$  (1) 1

**II Maximal klassengleiche subgroups**

## • Enlarged unit cell

 [2]  $\mathbf{b}' = 2\mathbf{b}$ 

$P1c1$ (7)	$\langle 2 \rangle$	$\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	
$P1c1$ (7)	$\langle 2 + (0, 1, 0) \rangle$	$\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	0, 1/2, 0

 [2]  $\mathbf{a}' = 2\mathbf{a}$ 

$P1c1$ (7)	$\langle 2 \rangle$	$2\mathbf{a}, \mathbf{b}, \mathbf{c}$	
$P1n1$ (7, $P1c1$ )	$\langle 2 + (1, 0, 0) \rangle$	$2\mathbf{a}, \mathbf{b}, -2\mathbf{a} + \mathbf{c}$	

 [2]  $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$ 

$C1c1$ (9)	$\langle 2 \rangle$	$2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	
$C1c1$ (9)	$\langle 2 + (0, 1, 0) \rangle$	$2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	0, 1/2, 0

 [3]  $\mathbf{b}' = 3\mathbf{b}$ 

$\left\{ \begin{array}{l} P1c1 (7) \\ P1c1 (7) \\ P1c1 (7) \end{array} \right.$	$\langle 2 \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	
	$\langle 2 + (0, 2, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	0, 1, 0
	$\langle 2 + (0, 4, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	0, 2, 0

 [3]  $\mathbf{c}' = 3\mathbf{c}$ 

$P1c1$ (7)	$\langle 2 + (0, 0, 1) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	
------------	---------------------------------	---------------------------------------	--

 [3]  $\mathbf{a}' = 3\mathbf{a}$ 

$P1c1$ (7)	$\langle 2 \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	
------------	---------------------	---------------------------------------	--

 [3]  $\mathbf{a}' = 3\mathbf{a}, \mathbf{c}' = -2\mathbf{a} + \mathbf{c}$ 

$P1c1$ (7)	$\langle 2 + (-1, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, -2\mathbf{a} + \mathbf{c}$	
------------	----------------------------------	--	--

 [3]  $\mathbf{a}' = 3\mathbf{a}, \mathbf{c}' = -4\mathbf{a} + \mathbf{c}$ 

$P1c1$ (7)	$\langle 2 + (-2, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, -4\mathbf{a} + \mathbf{c}$	
------------	----------------------------------	--	--

## • Series of maximal isomorphic subgroups

 [p]  $\mathbf{b}' = p\mathbf{b}$ 

$P1c1$ (7)	$\langle 2 + (0, 2u, 0) \rangle$	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	0, $u$ , 0
	$p > 2; 0 \leq u < p$		
	$p$ conjugate subgroups for the prime $p$		

 [p]  $\mathbf{c}' = p\mathbf{c}$ 

$P1c1$ (7)	$\langle 2 + (0, 0, \frac{p}{2} - \frac{1}{2}) \rangle$	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	
	$p > 2$		
	no conjugate subgroups		

 [p]  $\mathbf{a}' = p\mathbf{a}, \mathbf{c}' = -2q\mathbf{a} + \mathbf{c}$ 

$P1c1$ (7)	$\langle 2 + (-q, 0, 0) \rangle$	$p\mathbf{a}, \mathbf{b}, -2q\mathbf{a} + \mathbf{c}$	
	$p > 1; 0 \leq q < p$		
	no conjugate subgroups		

**I Minimal translationengleiche supergroups**

 [2]  $P12/c1$  (13); [2]  $P12_1/c1$  (14); [2]  $Pmc2_1$  (26); [2]  $Pcc2$  (27); [2]  $Pma2$  (28); [2]  $Pca2_1$  (29); [2]  $Pnc2$  (30); [2]  $Pmn2_1$  (31);  
 [2]  $Pba2$  (32); [2]  $Pna2_1$  (33); [2]  $Pnn2$  (34); [2]  $Aem2$  (39); [2]  $Aea2$  (41)

**II Minimal non-isomorphic klassengleiche supergroups**

## • Additional centring translations

 [2]  $C1c1$  (9); [2]  $A1m1$  (8,  $C1m1$ ); [2]  $I1c1$  (9,  $C1c1$ )

## • Decreased unit cell

 [2]  $\mathbf{c}' = \frac{1}{2}\mathbf{c}$   $P1m1$  (6)

UNIQUE AXIS  $c$ , CELL CHOICE 1

**Generators selected** (1);  $t(1,0,0)$ ;  $t(0,1,0)$ ;  $t(0,0,1)$ ; (2)

**General position**

Multiplicity,  
Wyckoff letter,  
Site symmetry

Coordinates

2  $a$  1

(1)  $x, y, z$  (2)  $x + \frac{1}{2}, y, \bar{z}$

**I Maximal translationengleiche subgroups**

[2]  $P1$  (1) 1

**II Maximal klassengleiche subgroups**

• **Enlarged unit cell**

[2] $c' = 2c$			
$P11a$ (7)	$\langle 2 \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	
$P11a$ (7)	$\langle 2 + (0, 0, 1) \rangle$	$\mathbf{a}, \mathbf{b}, 2\mathbf{c}$	0, 0, 1/2
[2] $b' = 2b$			
$P11a$ (7)	$\langle 2 \rangle$	$\mathbf{a}, 2\mathbf{b}, \mathbf{c}$	
$P11n$ (7, $P11a$ )	$\langle 2 + (0, 1, 0) \rangle$	$\mathbf{a} - 2\mathbf{b}, 2\mathbf{b}, \mathbf{c}$	
[2] $b' = 2b, c' = 2c$			
$A11a$ (9)	$\langle 2 \rangle$	$\mathbf{a}, 2\mathbf{b}, 2\mathbf{c}$	
$A11a$ (9)	$\langle 2 + (0, 0, 1) \rangle$	$\mathbf{a}, 2\mathbf{b}, 2\mathbf{c}$	0, 0, 1/2
[3] $c' = 3c$			
$P11a$ (7)	$\langle 2 \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	
$P11a$ (7)	$\langle 2 + (0, 0, 2) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 1
$P11a$ (7)	$\langle 2 + (0, 0, 4) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 2
[3] $a' = 3a$			
$P11a$ (7)	$\langle 2 + (1, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	
[3] $b' = 3b$			
$P11a$ (7)	$\langle 2 \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	
[3] $a' = a - 2b, b' = 3b$			
$P11a$ (7)	$\langle 2 + (0, -1, 0) \rangle$	$\mathbf{a} - 2\mathbf{b}, 3\mathbf{b}, \mathbf{c}$	
[3] $a' = a - 4b, b' = 3b$			
$P11a$ (7)	$\langle 2 + (0, -2, 0) \rangle$	$\mathbf{a} - 4\mathbf{b}, 3\mathbf{b}, \mathbf{c}$	

• **Series of maximal isomorphic subgroups**

[ $p$ ] $c' = pc$			
$P11a$ (7)	$\langle 2 + (0, 0, 2u) \rangle$ $p > 2; 0 \leq u < p$ $p$ conjugate subgroups for the prime $p$	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	0, 0, $u$
[ $p$ ] $a' = pa$			
$P11a$ (7)	$\langle 2 + (\frac{p}{2} - \frac{1}{2}, 0, 0) \rangle$ $p > 2$ no conjugate subgroups	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	
[ $p$ ] $a' = a - 2qb, b' = pb$			
$P11a$ (7)	$\langle 2 + (0, -q, 0) \rangle$ $p > 1; 0 \leq q < p$ no conjugate subgroups	$\mathbf{a} - 2q\mathbf{b}, p\mathbf{b}, \mathbf{c}$	

**I Minimal translationengleiche supergroups**

[2]  $P112/a$  (13); [2]  $P112_1/a$  (14); [2]  $Pmc2_1$  (26); [2]  $Pcc2$  (27); [2]  $Pma2$  (28); [2]  $Pca2_1$  (29); [2]  $Pnc2$  (30); [2]  $Pmn2_1$  (31); [2]  $Pba2$  (32); [2]  $Pna2_1$  (33); [2]  $Pnn2$  (34); [2]  $Aem2$  (39); [2]  $Aea2$  (41)

**II Minimal non-isomorphic klassengleiche supergroups**

• **Additional centring translations**

[2]  $A11a$  (9); [2]  $B11m$  (8,  $A11m$ ); [2]  $I11a$  (9,  $A11a$ )

• **Decreased unit cell**

[2]  $a' = \frac{1}{2}a$   $P11m$  (6)