

$Pm$ 

No. 6

 $P1m1$ 
 $C_s^1$ 

 UNIQUE AXIS  $b$ 
**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  $c$  1

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

 [2]  $P1$  (1) 1

**II Maximal klassengleiche subgroups**

## • Enlarged unit cell

|   |   |   |            |
|---|---|---|------------|
| [2] $\mathbf{b}' = 2\mathbf{b}$   |   |   |            |
| $P1m1$ (6)  | $\langle 2 \rangle$                       | $\mathbf{a}, 2\mathbf{b}, \mathbf{c}$                 |            |
| $P1m1$ (6)  | $\langle 2 + (0, 1, 0) \rangle$           | $\mathbf{a}, 2\mathbf{b}, \mathbf{c}$                 | 0, 1/2, 0  |
| [2] $\mathbf{c}' = 2\mathbf{c}$   |   |   |            |
| $P1c1$ (7)  | $\langle 2 + (0, 0, 1) \rangle$           | $\mathbf{a}, \mathbf{b}, 2\mathbf{c}$                 |            |
| $P1m1$ (6)  | $\langle 2 \rangle$                       | $\mathbf{a}, \mathbf{b}, 2\mathbf{c}$                 |            |
| [2] $\mathbf{a}' = 2\mathbf{a}$   |   |   |            |
| $P1a1$ (7, $P1c1$ )   | $\langle 2 + (1, 0, 0) \rangle$           | $-2\mathbf{a} - \mathbf{c}, \mathbf{b}, 2\mathbf{a}$  |            |
| $P1m1$ (6)  | $\langle 2 \rangle$                       | $2\mathbf{a}, \mathbf{b}, \mathbf{c}$                 |            |
| [2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{c}' = 2\mathbf{c}$                            |   |   |            |
| $B1e1$ (7, $P1c1$ )   | $\langle 2 + (0, 0, 1) \rangle$           | $\mathbf{a} - \mathbf{c}, \mathbf{b}, 2\mathbf{c}$    |            |
| $B1m1$ (6, $P1m1$ )   | $\langle 2 \rangle$                       | $\mathbf{a} - \mathbf{c}, \mathbf{b}, 2\mathbf{c}$    |            |
| [2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$                            |   |   |            |
| $C1m1$ (8)  | $\langle 2 \rangle$                       | $2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$                |            |
| $C1m1$ (8)  | $\langle 2 + (0, 1, 0) \rangle$           | $2\mathbf{a}, 2\mathbf{b}, \mathbf{c}$                | 0, 1/2, 0  |
| [2] $\mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$                            |   |   |            |
| $A1m1$ (8, $C1m1$ )   | $\langle 2 \rangle$                       | $2\mathbf{c}, 2\mathbf{b}, -\mathbf{a} - 2\mathbf{c}$ |            |
| $A1m1$ (8, $C1m1$ )   | $\langle 2 + (0, 1, 0) \rangle$           | $2\mathbf{c}, 2\mathbf{b}, -\mathbf{a} - 2\mathbf{c}$ | 0, 1/2, 0  |
| [2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$ |   |   |            |
| $F1m1$ (8, $C1m1$ )   | $\langle 2 \rangle$                       | $2\mathbf{a}, 2\mathbf{b}, -\mathbf{a} + \mathbf{c}$  |            |
| $F1m1$ (8, $C1m1$ )   | $\langle 2 + (0, 1, 0) \rangle$           | $2\mathbf{a}, 2\mathbf{b}, -\mathbf{a} + \mathbf{c}$  | 0, 1/2, 0  |
| [3] $\mathbf{b}' = 3\mathbf{b}$   |   |   |            |
| $P1m1$ (6)  | $\langle 2 \rangle$                       | $\mathbf{a}, 3\mathbf{b}, \mathbf{c}$                 |            |
| $P1m1$ (6)  | $\langle 2 + (0, 2, 0) \rangle$           | $\mathbf{a}, 3\mathbf{b}, \mathbf{c}$                 | 0, 1, 0    |
| $P1m1$ (6)  | $\langle 2 + (0, 4, 0) \rangle$           | $\mathbf{a}, 3\mathbf{b}, \mathbf{c}$                 | 0, 2, 0    |
| [3] $\mathbf{c}' = 3\mathbf{c}$   |   |   |            |
| $P1m1$ (6)  | $\langle 2 \rangle$                       | $\mathbf{a}, \mathbf{b}, 3\mathbf{c}$                 |            |
| [3] $\mathbf{a}' = \mathbf{a} - \mathbf{c}, \mathbf{c}' = 3\mathbf{c}$                |   |   |            |
| $P1m1$ (6)  | $\langle 2 \rangle$                       | $\mathbf{a} - \mathbf{c}, \mathbf{b}, 3\mathbf{c}$    |            |
| [3] $\mathbf{a}' = \mathbf{a} - 2\mathbf{c}, \mathbf{c}' = 3\mathbf{c}$               |   |   |            |
| $P1m1$ (6)  | $\langle 2 \rangle$                       | $\mathbf{a} - 2\mathbf{c}, \mathbf{b}, 3\mathbf{c}$   |            |
| [3] $\mathbf{a}' = 3\mathbf{a}$   |   |   |            |
| $P1m1$ (6)  | $\langle 2 \rangle$                       | $3\mathbf{a}, \mathbf{b}, \mathbf{c}$                 |            |
| • Series of maximal isomorphic subgroups  |   |   |            |
| [ $p$ ] $\mathbf{b}' = p\mathbf{b}$   |   |   |            |
| $P1m1$ (6)  | $\langle 2 + (0, 2u, 0) \rangle$          | $\mathbf{a}, p\mathbf{b}, \mathbf{c}$                 | 0, $u$ , 0 |
|   | $p > 2; 0 \leq u < p$                     |   |            |
|   | $p$ conjugate subgroups for the prime $p$ |   |            |
| [ $p$ ] $\mathbf{a}' = \mathbf{a} - q\mathbf{c}, \mathbf{c}' = p\mathbf{c}$           |   |   |            |
| $P1m1$ (6)  | $\langle 2 \rangle$                       | $\mathbf{a} - q\mathbf{c}, \mathbf{b}, p\mathbf{c}$   |            |
|   | $p > 1; 0 \leq q < p$                     |   |            |
|   | no conjugate subgroups                    |   |            |
| [ $p$ ] $\mathbf{a}' = p\mathbf{a}$   |   |   |            |
| $P1m1$ (6)  | $\langle 2 \rangle$                       | $p\mathbf{a}, \mathbf{b}, \mathbf{c}$                 |            |
|   | $p > 1$                                   |   |            |
|   | no conjugate subgroups                    |   |            |

**I Minimal translationengleiche supergroups**

[2]  $P12/m1$  (10); [2]  $P12_1/m1$  (11); [2]  $Pmm2$  (25); [2]  $Pmc2_1$  (26); [2]  $Pma2$  (28); [2]  $Pmn2_1$  (31); [2]  $Amm2$  (38); [2]  $Ama2$  (40);  
 [3]  $P\bar{6}$  (174)

**II Minimal non-isomorphic klassengleiche supergroups**

- **Additional centring translations**

[2]  $C1m1$  (8); [2]  $A1m1$  (8,  $C1m1$ ); [2]  $I1m1$  (8,  $C1m1$ )

- **Decreased unit cell**

none

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**I Minimal translationengleiche supergroups**

[2]  $P112/m$  (10); [2]  $P112_1/m$  (11); [2]  $Pmm2$  (25); [2]  $Pmc2_1$  (26); [2]  $Pma2$  (28); [2]  $Pmn2_1$  (31); [2]  $Amm2$  (38); [2]  $Ama2$  (40);  
 [3]  $P\bar{6}$  (174)

**II Minimal non-isomorphic klassengleiche supergroups**

- **Additional centring translations**

[2]  $A11m$  (8); [2]  $B11m$  (8,  $A11m$ ); [2]  $I11m$  (8,  $A11m$ )

- **Decreased unit cell**

none

UNIQUE AXIS *c*

**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 *c* 1

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

**I Maximal translationengleiche subgroups**

[2] *P1* (1) 1

**II Maximal klassengleiche subgroups**

• **Enlarged unit cell**

[2]  $c' = 2c$

|                 |                               |                 |           |
|-----------------|-------------------------------|-----------------|-----------|
| <i>P11m</i> (6) | $\langle 2 \rangle$           | <b>a, b, 2c</b> |           |
| <i>P11m</i> (6) | $\langle 2 + (0,0,1) \rangle$ | <b>a, b, 2c</b> | 0, 0, 1/2 |

[2]  $a' = 2a$

|                 |                               |                 |  |
|-----------------|-------------------------------|-----------------|--|
| <i>P11a</i> (7) | $\langle 2 + (1,0,0) \rangle$ | <b>2a, b, c</b> |  |
| <i>P11m</i> (6) | $\langle 2 \rangle$           | <b>2a, b, c</b> |  |

[2]  $b' = 2b$

|                               |                               |                       |  |
|-------------------------------|-------------------------------|-----------------------|--|
| <i>P11b</i> (7, <i>P11a</i> ) | $\langle 2 + (0,1,0) \rangle$ | <b>2b, -a - 2b, c</b> |  |
| <i>P11m</i> (6)               | $\langle 2 \rangle$           | <b>a, 2b, c</b>       |  |

[2]  $a' = 2a, b' = 2b$

|                               |                               |                      |  |
|-------------------------------|-------------------------------|----------------------|--|
| <i>C11e</i> (7, <i>P11a</i> ) | $\langle 2 + (1,0,0) \rangle$ | <b>2a, -a + b, c</b> |  |
| <i>C11m</i> (6, <i>P11m</i> ) | $\langle 2 \rangle$           | <b>2a, -a + b, c</b> |  |

[2]  $b' = 2b, c' = 2c$

|                 |                               |                  |           |
|-----------------|-------------------------------|------------------|-----------|
| <i>A11m</i> (8) | $\langle 2 \rangle$           | <b>a, 2b, 2c</b> |           |
| <i>A11m</i> (8) | $\langle 2 + (0,0,1) \rangle$ | <b>a, 2b, 2c</b> | 0, 0, 1/2 |

[2]  $a' = 2a, c' = 2c$

|                               |                               |                        |           |
|-------------------------------|-------------------------------|------------------------|-----------|
| <i>B11m</i> (8, <i>A11m</i> ) | $\langle 2 \rangle$           | <b>-2a - b, 2a, 2c</b> |           |
| <i>B11m</i> (8, <i>A11m</i> ) | $\langle 2 + (0,0,1) \rangle$ | <b>-2a - b, 2a, 2c</b> | 0, 0, 1/2 |

[2]  $a' = 2a, b' = 2b, c' = 2c$

|                               |                               |                      |           |
|-------------------------------|-------------------------------|----------------------|-----------|
| <i>F11m</i> (8, <i>A11m</i> ) | $\langle 2 \rangle$           | <b>a - b, 2b, 2c</b> |           |
| <i>F11m</i> (8, <i>A11m</i> ) | $\langle 2 + (0,0,1) \rangle$ | <b>a - b, 2b, 2c</b> | 0, 0, 1/2 |

[3]  $c' = 3c$

|   |                               |                 |         |
|---|-------------------------------|-----------------|---------|
| $\left\{ \begin{array}{l} P11m (6) \\ P11m (6) \\ P11m (6) \end{array} \right.$ | $\langle 2 \rangle$           | <b>a, b, 3c</b> |         |
|   | $\langle 2 + (0,0,2) \rangle$ | <b>a, b, 3c</b> | 0, 0, 1 |
|   | $\langle 2 + (0,0,4) \rangle$ | <b>a, b, 3c</b> | 0, 0, 2 |

[3]  $a' = 3a$

|                 |                     |                 |  |
|-----------------|---------------------|-----------------|--|
| <i>P11m</i> (6) | $\langle 2 \rangle$ | <b>3a, b, c</b> |  |
|-----------------|---------------------|-----------------|--|

[3]  $a' = 3a, b' = -a + b$

|                 |                     |                      |  |
|-----------------|---------------------|----------------------|--|
| <i>P11m</i> (6) | $\langle 2 \rangle$ | <b>3a, -a + b, c</b> |  |
|-----------------|---------------------|----------------------|--|

[3]  $a' = 3a, b' = -2a + b$

|                 |                     |                       |  |
|-----------------|---------------------|-----------------------|--|
| <i>P11m</i> (6) | $\langle 2 \rangle$ | <b>3a, -2a + b, c</b> |  |
|-----------------|---------------------|-----------------------|--|

[3]  $b' = 3b$

|                 |                     |                 |  |
|-----------------|---------------------|-----------------|--|
| <i>P11m</i> (6) | $\langle 2 \rangle$ | <b>a, 3b, c</b> |  |
|-----------------|---------------------|-----------------|--|

• **Series of maximal isomorphic subgroups**

[*p*]  $c' = pc$

|                 |   |                 |                |
|-----------------|---|-----------------|----------------|
| <i>P11m</i> (6) | $\langle 2 + (0,0,2u) \rangle$                      | <b>a, b, pc</b> | 0, 0, <i>u</i> |
|                 | $p > 2; 0 \leq u < p$                               |                 |                |
|                 | <i>p</i> conjugate subgroups for the prime <i>p</i> |                 |                |

[*p*]  $a' = pa, b' = -qa + b$

|                 |                        |                       |  |
|-----------------|------------------------|-----------------------|--|
| <i>P11m</i> (6) | $\langle 2 \rangle$    | <b>pa, -qa + b, c</b> |  |
|                 | $p > 1; 0 \leq q < p$  |                       |  |
|                 | no conjugate subgroups |                       |  |

[*p*]  $b' = pb$

|                 |                        |                 |  |
|-----------------|------------------------|-----------------|--|
| <i>P11m</i> (6) | $\langle 2 \rangle$    | <b>a, pb, c</b> |  |
|                 | $p > 1$                |                 |  |
|                 | no conjugate subgroups |                 |  |

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**I Minimal translationengleiche supergroups**

[2]  $P12/m1$  (10); [2]  $P12_1/m1$  (11); [2]  $Pmm2$  (25); [2]  $Pmc2_1$  (26); [2]  $Pma2$  (28); [2]  $Pmn2_1$  (31); [2]  $Amm2$  (38); [2]  $Ama2$  (40); [3]  $P\bar{6}$  (174)

**II Minimal non-isomorphic klassengleiche supergroups**

- **Additional centring translations**

[2]  $C1m1$  (8); [2]  $A1m1$  (8,  $C1m1$ ); [2]  $I1m1$  (8,  $C1m1$ )

- **Decreased unit cell**

none

(Continued from the following page)

No. 6

UNIQUE AXIS  $c$   $Pm$

**I Minimal translationengleiche supergroups**

[2]  $P112/m$  (10); [2]  $P112_1/m$  (11); [2]  $Pmm2$  (25); [2]  $Pmc2_1$  (26); [2]  $Pma2$  (28); [2]  $Pmn2_1$  (31); [2]  $Amm2$  (38); [2]  $Ama2$  (40); [3]  $P\bar{6}$  (174)

**II Minimal non-isomorphic klassengleiche supergroups**

- **Additional centring translations**

[2]  $A11m$  (8); [2]  $B11m$  (8,  $A11m$ ); [2]  $I11m$  (8,  $A11m$ )

- **Decreased unit cell**

none