

C_s^4
 $C1c1$

No. 9

 Cc

 UNIQUE AXIS b , CELL CHOICE 1

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(\frac{1}{2},\frac{1}{2},0)$; (2)

General position

 Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

 4 a 1

 $(0,0,0)+ (\frac{1}{2},\frac{1}{2},0)+$
 $(1) x,y,z (2) x,\bar{y},z+\frac{1}{2}$
I Maximal translationengleiche subgroups

 [2] $C1 (1, P1)$ $1+$ $1/2(\mathbf{a}-\mathbf{b}), 1/2(\mathbf{a}+\mathbf{b}), \mathbf{c}$
II Maximal klassengleiche subgroups

• Loss of centring translations

 [2] $P1c1 (7)$ $1; 2$

 [2] $P1n1 (7, P1c1)$ $1; 2+(\frac{1}{2},\frac{1}{2},0)$
 $\mathbf{a}, \mathbf{b}, -\mathbf{a}+\mathbf{c}$
 $0, 1/4, 0$

• Enlarged unit cell

 [3] $\mathbf{b}' = 3\mathbf{b}$
 $\begin{cases} C1c1 (9) & \langle 2 \rangle \\ C1c1 (9) & \langle 2+(0,2,0) \rangle \\ C1c1 (9) & \langle 2+(0,4,0) \rangle \end{cases}$
 $\mathbf{a}, 3\mathbf{b}, \mathbf{c}$
 $\mathbf{a}, 3\mathbf{b}, \mathbf{c}$
 $0, 1, 0$
 $\mathbf{a}, 3\mathbf{b}, \mathbf{c}$
 $0, 2, 0$

 [3] $\mathbf{c}' = 3\mathbf{c}$
 $C1c1 (9) \quad \langle 2+(0,0,1) \rangle$
 $\mathbf{a}, \mathbf{b}, 3\mathbf{c}$

 [3] $\mathbf{a}' = \mathbf{a}-2\mathbf{c}, \mathbf{c}' = 3\mathbf{c}$
 $C1c1 (9) \quad \langle 2+(0,0,1) \rangle$
 $\mathbf{a}-2\mathbf{c}, \mathbf{b}, 3\mathbf{c}$

 [3] $\mathbf{a}' = \mathbf{a}-4\mathbf{c}, \mathbf{c}' = 3\mathbf{c}$
 $C1c1 (9) \quad \langle 2+(0,0,1) \rangle$
 $\mathbf{a}-4\mathbf{c}, \mathbf{b}, 3\mathbf{c}$

 [3] $\mathbf{a}' = 3\mathbf{a}$
 $C1c1 (9) \quad \langle 2 \rangle$
 $3\mathbf{a}, \mathbf{b}, \mathbf{c}$

• Series of maximal isomorphic subgroups

 [p] $\mathbf{b}' = p\mathbf{b}$
 $C1c1 (9) \quad \langle 2+(0,2u,0) \rangle$
 $p > 2; 0 \leq u < p$
 p conjugate subgroups for the prime p
 $\mathbf{a}, p\mathbf{b}, \mathbf{c}$
 $0, u, 0$

 [p] $\mathbf{a}' = \mathbf{a}-2q\mathbf{c}, \mathbf{c}' = p\mathbf{c}$
 $C1c1 (9) \quad \langle 2+(0,0,\frac{p}{2}-\frac{1}{2}) \rangle$
 $p > 2; 0 \leq q < p$
 no conjugate subgroups

 $\mathbf{a}-2q\mathbf{c}, \mathbf{b}, p\mathbf{c}$

 [p] $\mathbf{a}' = p\mathbf{a}$
 $C1c1 (9) \quad \langle 2 \rangle$
 $p > 2$
 no conjugate subgroups

 $p\mathbf{a}, \mathbf{b}, \mathbf{c}$
I Minimal translationengleiche supergroups

 [2] $C12/c1 (15)$; [2] $Cmc2_1 (36)$; [2] $Ccc2 (37)$; [2] $Ama2 (40)$; [2] $Aea2 (41)$; [2] $Fdd2 (43)$; [2] $Iba2 (45)$; [2] $Ima2 (46)$;

 [3] $P3c1 (158)$; [3] $P31c (159)$; [3] $R3c (161)$
II Minimal non-isomorphic klassengleiche supergroups

• Additional centring translations

 [2] $F1m1 (8, C1m1)$

• Decreased unit cell

 [2] $\mathbf{c}' = \frac{1}{2}\mathbf{c} C1m1 (8)$; [2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b} P1c1 (7)$

UNIQUE AXIS *c*, CELL CHOICE 1Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(0, \frac{1}{2}, \frac{1}{2})$; (2)

General position

Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

 $(0,0,0)+$ $(0, \frac{1}{2}, \frac{1}{2})+$ 4 *a* 1(1) x, y, z (2) $x + \frac{1}{2}, y, \bar{z}$ I Maximal *translationengleiche* subgroups[2] $A1 (1, P1)$ 1+ **a, 1/2(b - c), 1/2(b + c)**II Maximal *klassengleiche* subgroups

• Loss of centring translations

[2] $P11a (7)$ 1; 2[2] $P11n (7, P11a)$ 1; $2 + (0, \frac{1}{2}, \frac{1}{2})$ **a - b, b, c**

0, 0, 1/4

• Enlarged unit cell

[3] $c' = 3c$

$$\begin{cases} A11a (9) & \langle 2 \rangle \\ A11a (9) & \langle 2 + (0, 0, 2) \rangle \\ A11a (9) & \langle 2 + (0, 0, 4) \rangle \end{cases}$$
a, b, 3c**a, b, 3c**

0, 0, 1

a, b, 3c

0, 0, 2

[3] $a' = 3a$ $A11a (9)$ $\langle 2 + (1, 0, 0) \rangle$ **3a, b, c**[3] $a' = 3a, b' = -2a + b$ $A11a (9)$ $\langle 2 + (1, 0, 0) \rangle$ **3a, -2a + b, c**[3] $a' = 3a, b' = -4a + b$ $A11a (9)$ $\langle 2 + (1, 0, 0) \rangle$ **3a, -4a + b, c**[3] $b' = 3b$ $A11a (9)$ $\langle 2 \rangle$ **a, 3b, c**

• Series of maximal isomorphic subgroups

[*p*] $c' = pc$

$$A11a (9) \quad \langle 2 + (0, 0, 2u) \rangle$$

$$p > 2; 0 \leq u < p$$

$$p \text{ conjugate subgroups for the prime } p$$
a, b, pc0, 0, *u*[*p*] $a' = pa, b' = -2qa + b$

$$A11a (9) \quad \langle 2 + (\frac{p}{2} - \frac{1}{2}, 0, 0) \rangle$$

$$p > 2; 0 \leq q < p$$

$$\text{no conjugate subgroups}$$
pa, -2qa + b, c[*p*] $b' = pb$

$$A11a (9) \quad \langle 2 \rangle$$

$$p > 2$$

$$\text{no conjugate subgroups}$$
a, pb, cI Minimal *translationengleiche* supergroups[2] $A112/a (15)$; [2] $Cmc2_1 (36)$; [2] $Ccc2 (37)$; [2] $Ama2 (40)$; [2] $Aea2 (41)$; [2] $Fdd2 (43)$; [2] $Iba2 (45)$; [2] $Ima2 (46)$;[3] $P3c1 (158)$; [3] $P31c (159)$; [3] $R3c (161)$ II Minimal non-isomorphic *klassengleiche* supergroups

• Additional centring translations

[2] $F11m (8, A11m)$

• Decreased unit cell

[2] $a' = \frac{1}{2}a$ $A11m (8)$; [2] $b' = \frac{1}{2}b, c' = \frac{1}{2}c$ $P11a (7)$