

**P4**

No. 75

**P4**
**C<sub>4</sub><sup>1</sup>**
**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 *d* 1

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

 [2] *P2* (3, *P112*) 1; 2

**II Maximal klassengleiche subgroups**

 • **Enlarged unit cell**

 [2]  $\mathbf{c}' = 2\mathbf{c}$ 
*P4*<sub>2</sub> (77)

 $\langle 2; 3 + (0, 0, 1) \rangle$ 
**a, b, 2c**
*P4* (75)

 $\langle 2; 3 \rangle$ 
**a, b, 2c**

 [2]  $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$ 
*C4* (75, *P4*)

 $\langle 2; 3 \rangle$ 
**a - b, a + b, c**
*C4* (75, *P4*)

 $\langle 2 + (1, 1, 0); 3 + (1, 0, 0) \rangle$ 
**a - b, a + b, c**

1/2, 1/2, 0

 [2]  $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$ 
*F4* (79, *I4*)

 $\langle 2; 3 \rangle$ 
**a - b, a + b, 2c**
*F4* (79, *I4*)

 $\langle 2; 3 + (0, 0, 1) \rangle$ 
**a - b, a + b, 2c**

1/2, 1/2, 0

 [3]  $\mathbf{c}' = 3\mathbf{c}$ 
*P4* (75)

 $\langle 2; 3 \rangle$ 
**a, b, 3c**

 • **Series of maximal isomorphic subgroups**

 [*p*]  $\mathbf{c}' = p\mathbf{c}$ 
*P4* (75)

 $\langle 2; 3 \rangle$ 
**a, b, pc**
*p* prime

no conjugate subgroups

 [*p*<sup>2</sup>]  $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$ 
*P4* (75)

 $\langle 2 + (2u, 2v, 0); 3 + (u + v, -u + v, 0) \rangle$ 
**pa, pb, c**
*u, v, 0*

 prime  $p > 2$ ;  $0 \leq u < p$ ;  $0 \leq v < p$ 
 $p^2$  conjugate subgroups for  $p = 4n - 1$ 

 [ $p = q^2 + r^2$ ]  $\mathbf{a}' = q\mathbf{a} - r\mathbf{b}, \mathbf{b}' = r\mathbf{a} + q\mathbf{b}$ 
*P4* (75)

 $\langle 2 + (2u, 0, 0); 3 + (u, -u, 0) \rangle$ 
**qa - rb, ra + qb, c**
*u, 0, 0*

 prime  $p > 4$ ;  $q > 0$ ;  $r > 0$ ;  $0 \leq u < p$ 
 $p$  conjugate subgroups for  $p = 4n + 1$ 
**I Minimal translationengleiche supergroups**

 [2] *P4/m* (83); [2] *P4/n* (85); [2] *P422* (89); [2] *P42*<sub>1</sub>2 (90); [2] *P4mm* (99); [2] *P4bm* (100); [2] *P4cc* (103); [2] *P4nc* (104)

**II Minimal non-isomorphic klassengleiche supergroups**

 • **Additional centring translations**

 [2] *I4* (79)

 • **Decreased unit cell**

none