

$P\bar{4}$

No. 81

 $P\bar{4}$
 S_4^1
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 h 1

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

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

II Maximal klassengleiche subgroups

• Enlarged unit cell

 [2] $\mathbf{c}' = 2\mathbf{c}$
 $P\bar{4}$ (81)

 $\langle 2; 3 \rangle$
 $\mathbf{a}, \mathbf{b}, 2\mathbf{c}$
 $P\bar{4}$ (81)

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

0, 0, 1/2

 [2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$
 $C\bar{4}$ (81, $P\bar{4}$)

 $\langle 2; 3 \rangle$
 $\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, \mathbf{c}$
 $C\bar{4}$ (81, $P\bar{4}$)

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

1/2, 1/2, 0

 [2] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}, \mathbf{c}' = 2\mathbf{c}$
 $F\bar{4}$ (82, $I\bar{4}$)

 $\langle 2; 3 \rangle$
 $\mathbf{a} - \mathbf{b}, \mathbf{a} + \mathbf{b}, 2\mathbf{c}$
 $F\bar{4}$ (82, $I\bar{4}$)

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

0, 0, 1/2

 [3] $\mathbf{c}' = 3\mathbf{c}$
 $P\bar{4}$ (81)

 $\langle 2; 3 \rangle$
 $\mathbf{a}, \mathbf{b}, 3\mathbf{c}$
 $P\bar{4}$ (81)

 $\langle 2; 3 + (0, 0, 2) \rangle$
 $\mathbf{a}, \mathbf{b}, 3\mathbf{c}$

0, 0, 1

 $P\bar{4}$ (81)

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

0, 0, 2

• Series of maximal isomorphic subgroups

 [p] $\mathbf{c}' = p\mathbf{c}$
 $P\bar{4}$ (81)

 $\langle 2; 3 + (0, 0, 2u) \rangle$
 $\mathbf{a}, \mathbf{b}, p\mathbf{c}$

 0, 0, u

 prime $p > 2$; $0 \leq u < p$
 p conjugate subgroups

 [p^2] $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$
 $P\bar{4}$ (81)

 $\langle 2 + (2u, 2v, 0); 3 + (u - v, u + v, 0) \rangle$
 $p\mathbf{a}, p\mathbf{b}, \mathbf{c}$
 $u, v, 0$

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

 [$p = q^2 + r^2$] $\mathbf{a}' = q\mathbf{a} - r\mathbf{b}, \mathbf{b}' = r\mathbf{a} + q\mathbf{b}$
 $P\bar{4}$ (81)

 $\langle 2 + (2u, 0, 0); 3 + (u, u, 0) \rangle$
 $q\mathbf{a} - r\mathbf{b}, r\mathbf{a} + q\mathbf{b}, \mathbf{c}$
 $u, 0, 0$

 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] $P4_2/m$ (84); [2] $P4/n$ (85); [2] $P4_2/n$ (86); [2] $P\bar{4}2m$ (111); [2] $P\bar{4}2c$ (112); [2] $P\bar{4}2_1m$ (113); [2] $P\bar{4}2_1c$ (114);
[2] $P\bar{4}m2$ (115); [2] $P\bar{4}c2$ (116); [2] $P\bar{4}b2$ (117); [2] $P\bar{4}n2$ (118)

II Minimal non-isomorphic klassengleiche supergroups

• Additional centring translations

 [2] $I\bar{4}$ (82)

• Decreased unit cell

none