

$P3$

No. 143

 $P3$
 C_3^1
Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; (2)

General position

 Multiplicity,
 Wyckoff letter,
 Site symmetry

Coordinates

 3 d 1

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

 [3] $P1$ (1) 1

II Maximal klassengleiche subgroups

• Enlarged unit cell

 [2] $c' = 2c$
 $P3$ (143) $\langle 2 \rangle$ $\mathbf{a}, \mathbf{b}, 2\mathbf{c}$

 [3] $c' = 3c$
 $P3_2$ (145) $\langle 2 + (0,0,2) \rangle$ $\mathbf{a}, \mathbf{b}, 3\mathbf{c}$
 $P3_1$ (144) $\langle 2 + (0,0,1) \rangle$ $\mathbf{a}, \mathbf{b}, 3\mathbf{c}$
 $P3$ (143) $\langle 2 \rangle$ $\mathbf{a}, \mathbf{b}, 3\mathbf{c}$

 [3] $\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}$
 $H3$ (143, $P3$) $\langle 2 \rangle$ $\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$
 $H3$ (143, $P3$) $\langle 2 + (1,0,0) \rangle$ $\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$ $2/3, 1/3, 0$
 $H3$ (143, $P3$) $\langle 2 + (1,1,0) \rangle$ $\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, \mathbf{c}$ $1/3, 2/3, 0$

 [3] $\mathbf{a}' = \mathbf{a} - \mathbf{b}, \mathbf{b}' = \mathbf{a} + 2\mathbf{b}, \mathbf{c}' = 3\mathbf{c}$
 $R3$ (146) $\langle 2 \rangle$ $\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, 3\mathbf{c}$
 $R3$ (146) $\langle 2 + (1,0,0) \rangle$ $\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, 3\mathbf{c}$ $2/3, 1/3, 0$
 $R3$ (146) $\langle 2 + (1,1,0) \rangle$ $\mathbf{a} - \mathbf{b}, \mathbf{a} + 2\mathbf{b}, 3\mathbf{c}$ $1/3, 2/3, 0$

 [3] $\mathbf{a}' = 2\mathbf{a} + \mathbf{b}, \mathbf{b}' = -\mathbf{a} + \mathbf{b}, \mathbf{c}' = 3\mathbf{c}$
 $R3$ (146) $\langle 2 \rangle$ $2\mathbf{a} + \mathbf{b}, -\mathbf{a} + \mathbf{b}, 3\mathbf{c}$
 $R3$ (146) $\langle 2 + (1,0,0) \rangle$ $2\mathbf{a} + \mathbf{b}, -\mathbf{a} + \mathbf{b}, 3\mathbf{c}$ $2/3, 1/3, 0$
 $R3$ (146) $\langle 2 + (1,1,0) \rangle$ $2\mathbf{a} + \mathbf{b}, -\mathbf{a} + \mathbf{b}, 3\mathbf{c}$ $1/3, 2/3, 0$

 [4] $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$
 $\left\{ \begin{array}{l} P3 \text{ (143)} \\ P3 \text{ (143)} \\ P3 \text{ (143)} \\ P3 \text{ (143)} \end{array} \right. \begin{array}{l} \langle 2 \rangle \\ \langle 2 + (1, -1, 0) \rangle \\ \langle 2 + (1, 2, 0) \rangle \\ \langle 2 + (2, 1, 0) \rangle \end{array} \begin{array}{l} 2\mathbf{a}, 2\mathbf{b}, \mathbf{c} \\ 2\mathbf{a}, 2\mathbf{b}, \mathbf{c} \\ 2\mathbf{a}, 2\mathbf{b}, \mathbf{c} \\ 2\mathbf{a}, 2\mathbf{b}, \mathbf{c} \end{array} \begin{array}{l} \\ 1, 0, 0 \\ 0, 1, 0 \\ 1, 1, 0 \end{array}$

• Series of maximal isomorphic subgroups

 [p] $c' = pc$
 $P3$ (143) $\langle 2 \rangle$ $\mathbf{a}, \mathbf{b}, p\mathbf{c}$
 p prime
 no conjugate subgroups

 [p²] $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$
 $P3$ (143) $\langle 2 + (u+v, -u+2v, 0) \rangle$ $p\mathbf{a}, p\mathbf{b}, \mathbf{c}$ $u, v, 0$
 p prime; $0 \leq u < p$; $0 \leq v < p$
 p^2 conjugate subgroups for $p = 2$ or $p = 6n - 1$

 [p = q² + r² + qr] $\mathbf{a}' = q\mathbf{a} - r\mathbf{b}, \mathbf{b}' = r\mathbf{a} + (q+r)\mathbf{b}$
 $P3$ (143) $\langle 2 + (u, -u, 0) \rangle$ $q\mathbf{a} - r\mathbf{b}, r\mathbf{a} + (q+r)\mathbf{b}, \mathbf{c}$ $u, 0, 0$

 prime $p = 6n + 1$; $q > 0$; $r > 0$; $0 \leq u < p$
 p conjugate subgroups for each pair of q and r
I Minimal translationengleiche supergroups

 [2] $P\bar{3}$ (147); [2] $P312$ (149); [2] $P321$ (150); [2] $P3m1$ (156); [2] $P31m$ (157); [2] $P3c1$ (158); [2] $P31c$ (159); [2] $P6$ (168);

 [2] $P6_3$ (173); [2] $P\bar{6}$ (174)

II Minimal non-isomorphic klassengleiche supergroups

• Additional centring translations

 [3] $R_{\text{obv}}3$ (146, $R3$); [3] $R_{\text{rev}}3$ (146, $R3$)

• Decreased unit cell

none