

P312

No. 149

P312
D₃¹
Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; (2); (4)

General position

 Multiplicity,
 Wyckoff letter,
 Site symmetry

Coordinates

 6 *l* 1

 (1) x, y, z (2) $\bar{y}, x - y, z$ (3) $\bar{x} + y, \bar{x}, z$
 (4) $\bar{y}, \bar{x}, \bar{z}$ (5) $\bar{x} + y, y, \bar{z}$ (6) $x, x - y, \bar{z}$
I Maximal translationengleiche subgroups

[2] P311 (143, P3)	1; 2; 3	
[3] P112 (5, C121)	1; 4	$-a - b, a - b, c$
[3] P112 (5, C121)	1; 5	$a, a + 2b, c$
[3] P112 (5, C121)	1; 6	$b, -2a - b, c$

II Maximal klassengleiche subgroups

• Enlarged unit cell

[2] $c' = 2c$			
P312 (149)	$\langle 2; 4 \rangle$	$a, b, 2c$	
P312 (149)	$\langle 2; 4 + (0,0,1) \rangle$	$a, b, 2c$	0, 0, 1/2
[3] $c' = 3c$			
P3 ₂ 12 (153)	$\langle 2 + (0,0,2); 4 + (0,0,1) \rangle$	$a, b, 3c$	
P3 ₂ 12 (153)	$\langle 2 + (0,0,2); 4 + (0,0,3) \rangle$	$a, b, 3c$	0, 0, 1
P3 ₂ 12 (153)	$\langle 2 + (0,0,2); 4 + (0,0,5) \rangle$	$a, b, 3c$	0, 0, 2
P3 ₁ 12 (151)	$\langle 2 + (0,0,1); 4 + (0,0,2) \rangle$	$a, b, 3c$	
P3 ₁ 12 (151)	$\langle 2 + (0,0,1); 4 + (0,0,4) \rangle$	$a, b, 3c$	0, 0, 1
P3 ₁ 12 (151)	$\langle 2 + (0,0,1); 4 + (0,0,6) \rangle$	$a, b, 3c$	0, 0, 2
P312 (149)	$\langle 2; 4 \rangle$	$a, b, 3c$	
P312 (149)	$\langle 2; 4 + (0,0,2) \rangle$	$a, b, 3c$	0, 0, 1
P312 (149)	$\langle 2; 4 + (0,0,4) \rangle$	$a, b, 3c$	0, 0, 2
[3] $a' = 3a, b' = 3b$			
H312 (150, P321)	$\langle 2; 4 \rangle$	$a - b, a + 2b, c$	
H312 (150, P321)	$\langle 2 + (1, -1, 0); 4 + (1, 1, 0) \rangle$	$a - b, a + 2b, c$	1, 0, 0
H312 (150, P321)	$\langle 2 + (2, 1, 0); 4 + (2, 2, 0) \rangle$	$a - b, a + 2b, c$	1, 1, 0
H312 (150, P321)	$\langle 2 + (1, 0, 0); 4 + (1, 1, 0) \rangle$	$a - b, a + 2b, c$	2/3, 1/3, 0
H312 (150, P321)	$\langle (2; 4) + (2, 2, 0) \rangle$	$a - b, a + 2b, c$	2/3, 4/3, 0
H312 (150, P321)	$\langle 2 + (3, 4, 0); 4 + (3, 3, 0) \rangle$	$a - b, a + 2b, c$	2/3, 7/3, 0
H312 (150, P321)	$\langle (2; 4) + (1, 1, 0) \rangle$	$a - b, a + 2b, c$	1/3, 2/3, 0
H312 (150, P321)	$\langle 2 + (2, 0, 0); 4 + (2, 2, 0) \rangle$	$a - b, a + 2b, c$	4/3, 2/3, 0
H312 (150, P321)	$\langle 2 + (3, -1, 0); 4 + (3, 3, 0) \rangle$	$a - b, a + 2b, c$	7/3, 2/3, 0
[3] $a' = a - b, b' = a + 2b, c' = 3c$			
R32 (155)	$\langle 2; 4 \rangle$	$a - b, a + 2b, 3c$	
R32 (155)	$\langle 2; 4 + (0,0,2) \rangle$	$a - b, a + 2b, 3c$	0, 0, 1
R32 (155)	$\langle 2; 4 + (0,0,4) \rangle$	$a - b, a + 2b, 3c$	0, 0, 2
R32 (155)	$\langle 2 + (1,0,0); 4 + (1,1,0) \rangle$	$a - b, a + 2b, 3c$	2/3, 1/3, 0
R32 (155)	$\langle 2 + (1,0,0); 4 + (1,1,2) \rangle$	$a - b, a + 2b, 3c$	2/3, 1/3, 1
R32 (155)	$\langle 2 + (1,0,0); 4 + (1,1,4) \rangle$	$a - b, a + 2b, 3c$	2/3, 1/3, 2
R32 (155)	$\langle (2; 4) + (1, 1, 0) \rangle$	$a - b, a + 2b, 3c$	1/3, 2/3, 0
R32 (155)	$\langle 2 + (1, 1, 0); 4 + (1, 1, 2) \rangle$	$a - b, a + 2b, 3c$	1/3, 2/3, 1
R32 (155)	$\langle 2 + (1, 1, 0); 4 + (1, 1, 4) \rangle$	$a - b, a + 2b, 3c$	1/3, 2/3, 2
[3] $a' = 2a + b, b' = -a + b, c' = 3c$			
R32 (155)	$\langle 2; 4 \rangle$	$2a + b, -a + b, 3c$	
R32 (155)	$\langle 2; 4 + (0,0,2) \rangle$	$2a + b, -a + b, 3c$	0, 0, 1
R32 (155)	$\langle 2; 4 + (0,0,4) \rangle$	$2a + b, -a + b, 3c$	0, 0, 2
R32 (155)	$\langle 2 + (1,0,0); 4 + (1,1,0) \rangle$	$2a + b, -a + b, 3c$	2/3, 1/3, 0
R32 (155)	$\langle 2 + (1,0,0); 4 + (1,1,2) \rangle$	$2a + b, -a + b, 3c$	2/3, 1/3, 1
R32 (155)	$\langle 2 + (1,0,0); 4 + (1,1,4) \rangle$	$2a + b, -a + b, 3c$	2/3, 1/3, 2
R32 (155)	$\langle (2; 4) + (1, 1, 0) \rangle$	$2a + b, -a + b, 3c$	1/3, 2/3, 0
R32 (155)	$\langle 2 + (1, 1, 0); 4 + (1, 1, 2) \rangle$	$2a + b, -a + b, 3c$	1/3, 2/3, 1
R32 (155)	$\langle 2 + (1, 1, 0); 4 + (1, 1, 4) \rangle$	$2a + b, -a + b, 3c$	1/3, 2/3, 2
[4] $a' = 2a, b' = 2b$			
P312 (149)	$\langle 2; 4 \rangle$	$2a, 2b, c$	
P312 (149)	$\langle 2 + (1, -1, 0); 4 + (1, 1, 0) \rangle$	$2a, 2b, c$	1, 0, 0
P312 (149)	$\langle 2 + (1, 2, 0); 4 + (1, 1, 0) \rangle$	$2a, 2b, c$	0, 1, 0
P312 (149)	$\langle 2 + (2, 1, 0); 4 + (2, 2, 0) \rangle$	$2a, 2b, c$	1, 1, 0

- Series of maximal isomorphic subgroups

$[p]$ $\mathbf{c}' = p\mathbf{c}$ P312 (149)	$\langle 2; 4 + (0, 0, 2u) \rangle$ prime $p > 2$; $0 \leq u < p$ p conjugate subgroups	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	$0, 0, u$
$[p^2]$ $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$ P312 (149)	$\langle 2 + (u + v, -u + 2v, 0); 4 + (u + v, u + v, 0) \rangle$ prime $p \neq 3$; $0 \leq u < p$; $0 \leq v < p$ p^2 conjugate subgroups	$p\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$u, v, 0$

I Minimal *translationengleiche* supergroups

[2] $P\bar{3}1m$ (162); [2] $P\bar{3}1c$ (163); [2] $P622$ (177); [2] $P6_322$ (182); [2] $P\bar{6}m2$ (187); [2] $P\bar{6}c2$ (188)

II Minimal non-isomorphic *klassengleiche* supergroups

- Additional centring translations

[3] $H312$ (150, $P321$)

- Decreased unit cell

none