

$P31m$

C_{3v}^2

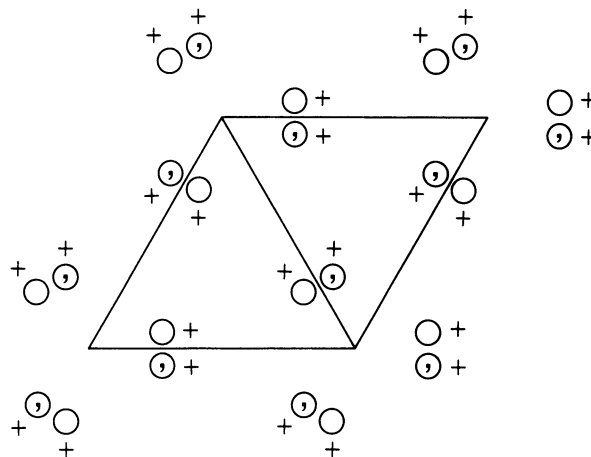
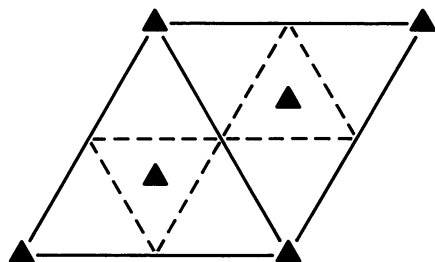
$31m$

Trigonal

No. 157

$P31m$

Patterson symmetry $P\bar{3}1m$



Origin on $31m$

Asymmetric unit $0 \leq x \leq \frac{2}{3}; 0 \leq y \leq \frac{1}{3}; 0 \leq z \leq 1; x \leq (y+1)/2; y \leq \min(1-x, x)$

Vertices $0, 0, 0$ $\frac{1}{2}, 0, 0$ $\frac{2}{3}, \frac{1}{3}, 0$ $\frac{1}{2}, \frac{1}{2}, 0$
 $0, 0, 1$ $\frac{1}{2}, 0, 1$ $\frac{2}{3}, \frac{1}{3}, 1$ $\frac{1}{2}, \frac{1}{2}, 1$

Symmetry operations

- (1) 1 (2) $3^+ 0, 0, z$ (3) $3^- 0, 0, z$
 (4) $m x, x, z$ (5) $m x, 0, z$ (6) $m 0, y, z$

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

Positions

| Multiplicity, Wyckoff letter, Site symmetry | | Coordinates | Reflection conditions |
|---|--------------------------------|--|---|
| 6 <i>d</i> 1 | (1) x, y, z (4) y, x, z | (2) $\bar{y}, x - y, z$ (5) $x - y, \bar{y}, z$ | General: no conditions Special: no extra conditions |
| 3 <i>c</i> $\dots m$ | $x, 0, z$ | $0, x, z$ | |
| | | \bar{x}, \bar{x}, z | |
| 2 <i>b</i> 3 \dots | $\frac{1}{3}, \frac{2}{3}, z$ | $\frac{2}{3}, \frac{1}{3}, z$ | |
| 1 <i>a</i> 3 $\dots m$ | $0, 0, z$ | | |

Symmetry of special projections

Along $[001]$ $P31m$
 $\mathbf{a}' = \mathbf{a}$ $\mathbf{b}' = \mathbf{b}$
 Origin at $0, 0, z$

Along $[100]$ $P1m1$
 $\mathbf{a}' = \frac{1}{2}(\mathbf{a} + 2\mathbf{b})$ $\mathbf{b}' = \mathbf{c}$
 Origin at $x, 0, 0$

Along $[210]$ $P1$
 $\mathbf{a}' = \frac{1}{2}\mathbf{b}$ $\mathbf{b}' = \mathbf{c}$
 Origin at $x, \frac{1}{2}x, 0$

Maximal non-isomorphic subgroups

I $[2] P311 (P3, 143)$ 1; 2; 3
 { $[3] P11m (Cm, 8)$ 1; 4
 $[3] P11m (Cm, 8)$ 1; 5
 $[3] P11m (Cm, 8)$ 1; 6

IIa none

IIb $[2] P31c (\mathbf{c}' = 2\mathbf{c})$ (159); $[3] H31m (\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}) (P3m1, 156)$; $[3] R3m (\mathbf{a}' = \mathbf{a} - \mathbf{b}, \mathbf{b}' = \mathbf{a} + 2\mathbf{b}, \mathbf{c}' = 3\mathbf{c})$ (160);
 $[3] R3m (\mathbf{a}' = 2\mathbf{a} + \mathbf{b}, \mathbf{b}' = -\mathbf{a} + \mathbf{b}, \mathbf{c}' = 3\mathbf{c})$ (160)

Maximal isomorphic subgroups of lowest index

IIc $[2] P31m (\mathbf{c}' = 2\mathbf{c})$ (157); $[4] P31m (\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b})$ (157)

Minimal non-isomorphic supergroups

I $[2] P\bar{3}1m$ (162); $[2] P6mm$ (183); $[2] P6_3cm$ (185); $[2] P\bar{6}2m$ (189)

II $[3] H31m (P3m1, 156)$