

$P6_3mc$

C_{6v}^4

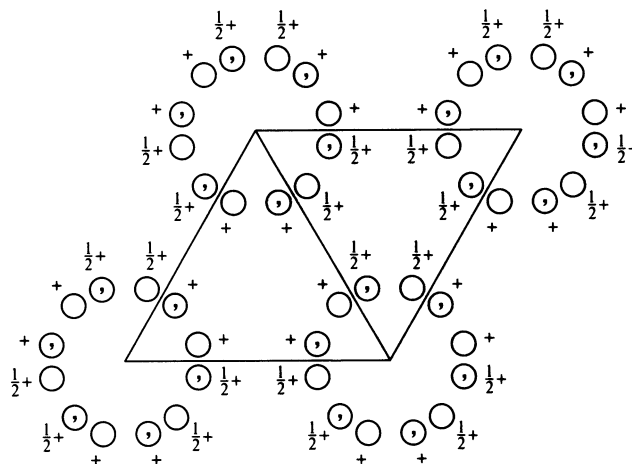
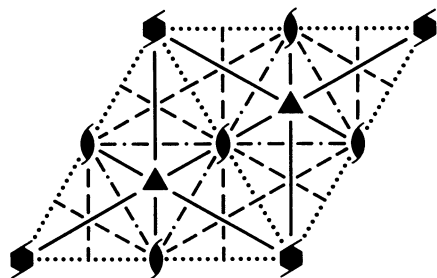
$6mm$

Hexagonal

No. 186

$P6_3mc$

Patterson symmetry $P6/mmm$



Origin on $3m1$ on 6_3mc

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

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

Symmetry operations

- | | | |
|------------------------------------|--------------------------------------|--------------------------------------|
| (1) 1 | (2) $3^+ 0, 0, z$ | (3) $3^- 0, 0, z$ |
| (4) $2(0, 0, \frac{1}{2}) 0, 0, z$ | (5) $6^-(0, 0, \frac{1}{2}) 0, 0, z$ | (6) $6^+(0, 0, \frac{1}{2}) 0, 0, z$ |
| (7) $m x, \bar{x}, z$ | (8) $m x, 2x, z$ | (9) $m 2x, x, z$ |
| (10) $c x, x, z$ | (11) $c x, 0, z$ | (12) $c 0, y, z$ |

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; (2); (4); (7)

Positions

Multiplicity, Wyckoff letter, Site symmetry	Coordinates						Reflection conditions
							General:
12 <i>d</i> 1	(1) x, y, z	(2) $\bar{y}, x - y, z$	(3) $\bar{x} + y, \bar{x}, z$				$hh\bar{2}hl: l = 2n$
	(4) $\bar{x}, \bar{y}, z + \frac{1}{2}$	(5) $y, \bar{x} + y, z + \frac{1}{2}$	(6) $x - y, x, z + \frac{1}{2}$				$000l: l = 2n$
	(7) \bar{y}, \bar{x}, z	(8) $\bar{x} + y, y, z$	(9) $x, x - y, z$				
	(10) $y, x, z + \frac{1}{2}$	(11) $x - y, \bar{y}, z + \frac{1}{2}$	(12) $\bar{x}, \bar{x} + y, z + \frac{1}{2}$				
							Special: as above, plus
6 <i>c</i> . <i>m</i> .	x, \bar{x}, z	$x, 2x, z$	$2\bar{x}, \bar{x}, z$	$\bar{x}, x, z + \frac{1}{2}$	$\bar{x}, 2\bar{x}, z + \frac{1}{2}$	$2x, x, z + \frac{1}{2}$	no extra conditions
2 <i>b</i> 3 <i>m</i> .	$\frac{1}{3}, \frac{2}{3}, z$	$\frac{2}{3}, \frac{1}{3}, z + \frac{1}{2}$					$hkil: l = 2n$ or $h - k = 3n + 1$ or $h - k = 3n + 2$
2 <i>a</i> 3 <i>m</i> .	$0, 0, z$	$0, 0, z + \frac{1}{2}$					$hkil: l = 2n$

Symmetry of special projections

Along [001] $p6mm$
 $\mathbf{a}' = \mathbf{a}$ $\mathbf{b}' = \mathbf{b}$
 Origin at 0, 0, z

Along [100] $p1g1$
 $\mathbf{a}' = \frac{1}{2}(\mathbf{a} + 2\mathbf{b})$ $\mathbf{b}' = \mathbf{c}$
 Origin at $x, 0, 0$

Along [210] $p1m1$
 $\mathbf{a}' = \frac{1}{2}\mathbf{b}$ $\mathbf{b}' = \frac{1}{2}\mathbf{c}$
 Origin at $x, \frac{1}{2}x, 0$

Maximal non-isomorphic subgroups

I	[2] $P6_311$ ($P6_3, 173$)	1; 2; 3; 4; 5; 6
	[2] $P31c$ (159)	1; 2; 3; 10; 11; 12
	[2] $P3m1$ (156)	1; 2; 3; 7; 8; 9
	{ [3] $P2_1mc$ ($Cmc2_1, 36$)	1; 4; 7; 10
	{ [3] $P2_1mc$ ($Cmc2_1, 36$)	1; 4; 8; 11
	{ [3] $P2_1mc$ ($Cmc2_1, 36$)	1; 4; 9; 12

IIa none

IIb [3] $H6_3mc$ ($\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}$) ($P6_3cm, 185$)

Maximal isomorphic subgroups of lowest index

IIc [3] $P6_3mc$ ($\mathbf{c}' = 3\mathbf{c}$) (186); [4] $P6_3mc$ ($\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$) (186)

Minimal non-isomorphic supergroups

I [2] $P6_3/mmc$ (194)

II [3] $H6_3mc$ ($P6_3cm, 185$); [2] $P6mm$ ($\mathbf{c}' = \frac{1}{2}\mathbf{c}$) (183)