

$p6/mmm$

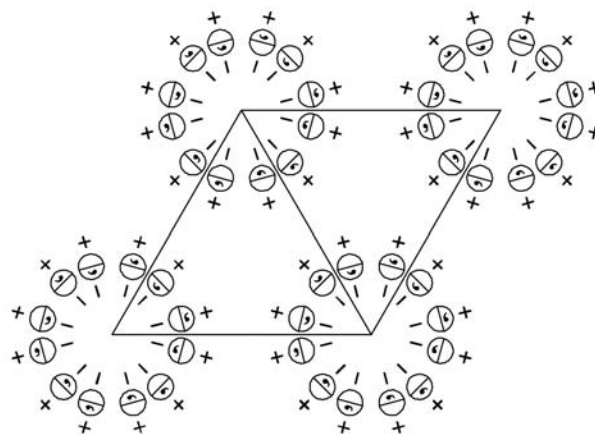
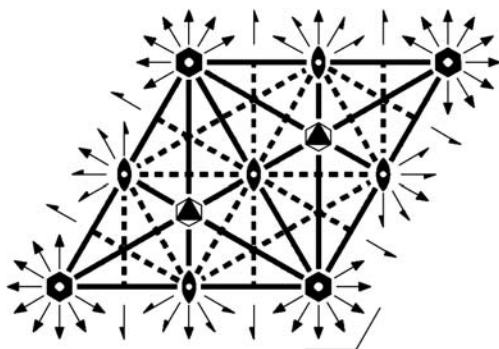
$6/mmm$

Hexagonal/Hexagonal

No. 80

$p6/mmm$

Patterson symmetry $p6/mmm$



Origin at centre ($6/mmm$)

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

Symmetry operations

- | | | |
|---|---|---|
| (1) 1
(1 0,0,0) | (2) 3^+ 0,0,z
(3_z 0,0,0) | (3) 3^- 0,0,z
(3_z^{-1} 0,0,0) |
| (4) 2 0,0,z
(2_z 0,0,0) | (5) 6^- 0,0,z
(6_z^{-1} 0,0,0) | (6) 6^+ 0,0,z
(6_z 0,0,0) |
| (7) 2 $x, x, 0$
(2_{xy} 0,0,0) | (8) 2 $x, 0, 0$
(2_x 0,0,0) | (9) 2 $0, y, 0$
(2_y 0,0,0) |
| (10) 2 $x, \bar{x}, 0$
($2_{\bar{3}}$ 0,0,0) | (11) 2 $x, 2x, 0$
(2_2 0,0,0) | (12) 2 $2x, x, 0$
(2_1 0,0,0) |
| (13) $\bar{1}$ 0,0,0
($\bar{1}$ 0,0,0) | (14) $\bar{3}^+$ 0,0,z; 0,0,0
($\bar{3}_z$ 0,0,0) | (15) $\bar{3}^-$ 0,0,z; 0,0,0
($\bar{3}_z^{-1}$ 0,0,0) |
| (16) m $x, y, 0$
(m_z 0,0,0) | (17) $\bar{6}^-$ 0,0,z; 0,0,0
($\bar{6}_z^{-1}$ 0,0,0) | (18) $\bar{6}^+$ 0,0,z; 0,0,0
($\bar{6}_z$ 0,0,0) |
| (19) m x, \bar{x}, z
(m_{xy} 0,0,0) | (20) m $x, 2x, z$
(m_x 0,0,0) | (21) m $2x, x, z$
(m_y 0,0,0) |
| (22) m x, x, z
(m_3 0,0,0) | (23) m $x, 0, z$
(m_2 0,0,0) | (24) m $0, y, z$
(m_1 0,0,0) |

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; (2); (4); (7); (13)

Positions

Multiplicity, Wyckoff letter, Site symmetry	Coordinates	Reflection conditions
24 l 1	(1) x, y, z (2) $\bar{y}, x - y, z$ (3) $\bar{x} + y, \bar{x}, z$ (4) \bar{x}, \bar{y}, z (5) $y, \bar{x} + y, z$ (6) $x - y, x, z$ (7) y, x, \bar{z} (8) $x - y, \bar{y}, \bar{z}$ (9) $\bar{x}, \bar{x} + y, \bar{z}$ (10) $\bar{y}, \bar{x}, \bar{z}$ (11) $\bar{x} + y, y, \bar{z}$ (12) $x, x - y, \bar{z}$ (13) $\bar{x}, \bar{y}, \bar{z}$ (14) $y, \bar{x} + y, \bar{z}$ (15) $x - y, x, \bar{z}$ (16) x, y, \bar{z} (17) $\bar{y}, x - y, \bar{z}$ (18) $\bar{x} + y, \bar{x}, \bar{z}$ (19) \bar{y}, \bar{x}, z (20) $\bar{x} + y, y, z$ (21) $x, x - y, z$ (22) y, x, z (23) $x - y, \bar{y}, z$ (24) $\bar{x}, \bar{x} + y, z$	General: no conditions

Special: no extra conditions

12 k $m..$	$x, y, 0$ $y, x, 0$	$\bar{y}, x - y, 0$ $x - y, \bar{y}, 0$	$\bar{x} + y, \bar{x}, 0$ $\bar{x}, \bar{x} + y, 0$	$\bar{x}, \bar{y}, 0$ $\bar{y}, \bar{x}, 0$	$y, \bar{x} + y, 0$ $\bar{x} + y, y, 0$	$x - y, x, 0$ $x, x - y, 0$
12 j $.m.$	$x, 2x, z$ $2x, x, \bar{z}$	$2\bar{x}, \bar{x}, z$ $\bar{x}, 2\bar{x}, \bar{z}$	x, \bar{x}, z \bar{x}, x, \bar{z}	$\bar{x}, 2\bar{x}, z$ $2\bar{x}, \bar{x}, \bar{z}$	$2x, x, z$ $x, 2x, \bar{z}$	\bar{x}, x, z x, \bar{x}, \bar{z}
12 i $..m$	$x, 0, z$ $0, x, \bar{z}$	$0, x, z$ $x, 0, \bar{z}$	\bar{x}, \bar{x}, z $\bar{x}, \bar{x}, \bar{z}$	$\bar{x}, 0, z$ $0, \bar{x}, \bar{z}$	$0, \bar{x}, z$ $\bar{x}, 0, \bar{z}$	x, x, z x, x, \bar{z}
6 h $mm2$	$x, 2x, 0$	$2\bar{x}, \bar{x}, 0$	$x, \bar{x}, 0$	$\bar{x}, 2\bar{x}, 0$	$2x, x, 0$	$\bar{x}, x, 0$
6 g $m2m$	$x, 0, 0$	$0, x, 0$	$\bar{x}, \bar{x}, 0$	$\bar{x}, 0, 0$	$0, \bar{x}, 0$	$x, x, 0$
6 f $2mm$	$\frac{1}{2}, 0, z$	$0, \frac{1}{2}, z$	$\frac{1}{2}, \frac{1}{2}, z$	$0, \frac{1}{2}, \bar{z}$	$\frac{1}{2}, 0, \bar{z}$	$\frac{1}{2}, \frac{1}{2}, \bar{z}$
4 e $3m.$	$\frac{1}{3}, \frac{2}{3}, z$	$\frac{2}{3}, \frac{1}{3}, z$	$\frac{2}{3}, \frac{1}{3}, \bar{z}$	$\frac{1}{3}, \frac{2}{3}, \bar{z}$		
3 d mmm	$\frac{1}{2}, 0, 0$	$0, \frac{1}{2}, 0$	$\frac{1}{2}, \frac{1}{2}, 0$			
2 c $6mm$	$0, 0, z$	$0, 0, \bar{z}$				
2 b $\bar{6}m2$	$\frac{1}{3}, \frac{2}{3}, 0$	$\frac{2}{3}, \frac{1}{3}, 0$				
1 a $6/mmm$	$0, 0, 0$					

Symmetry of special projections

Along $[001]$ $p6mm$

$\mathbf{a}' = \mathbf{a}$ $\mathbf{b}' = \mathbf{b}$

Origin at $0, 0, z$

Along $[100]$ $\neq 2mm$

$\mathbf{a}' = \frac{1}{2}(\mathbf{a} + 2\mathbf{b})$

Origin at $x, 0, 0$

Along $[210]$ $\neq 2mm$

$\mathbf{a}' = \frac{1}{2}\mathbf{b}$

Origin at $x, \frac{1}{2}x, 0$

Maximal non-isotypic subgroups

I	$[2] p\bar{6}2m$ (79)	1; 2; 3; 7; 8; 9; 16; 17; 18; 22; 23; 24
	$[2] p\bar{6}m2$ (78)	1; 2; 3; 10; 11; 12; 16; 17; 18; 19; 20; 21
	$[2] p6mm$ (77)	1; 2; 3; 4; 5; 6; 19; 20; 21; 22; 23; 24
	$[2] p622$ (76)	1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12
	$[2] p6/m11$ ($p6/m$, 75)	1; 2; 3; 4; 5; 6; 13; 14; 15; 16; 17; 18
	$[2] p\bar{3}m1$ (72)	1; 2; 3; 7; 8; 9; 13; 14; 15; 19; 20; 21
	$[2] p\bar{3}1m$ (71)	1; 2; 3; 10; 11; 12; 13; 14; 15; 22; 23; 24
	$[3] pm\bar{m}\bar{m}$ ($cmm\bar{m}$, 47)	1; 4; 7; 10; 13; 16; 19; 22
	$[3] pm\bar{m}\bar{m}$ ($cmm\bar{m}$, 47)	1; 4; 8; 11; 13; 16; 20; 23
	$[3] pm\bar{m}\bar{m}$ ($cmm\bar{m}$, 47)	1; 4; 9; 12; 13; 16; 21; 24

IIa none

IIb none

Maximal isotypic subgroups of lowest index

IIc $[3] h6/mmm$ ($\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}$) ($p6/mmm$, 80)

Minimal non-isotypic supergroups

I none

II none