

$P6/mmm$

D_{6h}^1

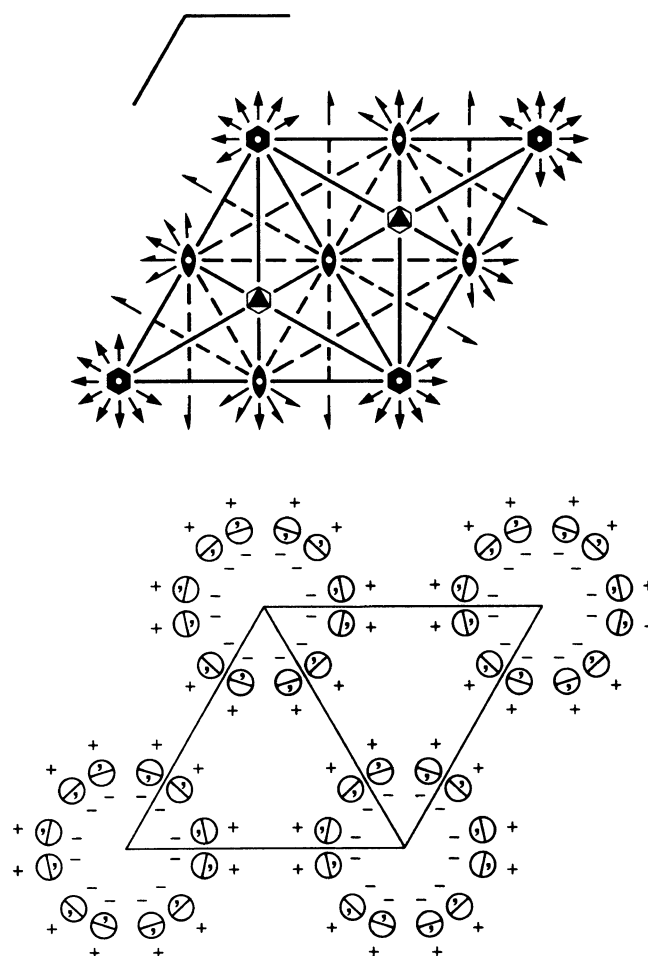
$6/mmm$

Hexagonal

No. 191

$P 6/m 2/m 2/m$

Patterson symmetry $P6/mmm$



Origin at centre ($6/mmm$)

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

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

Symmetry operations

- | | | |
|----------------------|-------------------------------|-------------------------------|
| (1) 1 | (2) $3^+ 0,0,z$ | (3) $3^- 0,0,z$ |
| (4) 2 $0,0,z$ | (5) $6^- 0,0,z$ | (6) $6^+ 0,0,z$ |
| (7) 2 $x,x,0$ | (8) 2 $x,0,0$ | (9) 2 $0,y,0$ |
| (10) 2 $x,\bar{x},0$ | (11) 2 $x,2x,0$ | (12) 2 $2x,x,0$ |
| (13) $\bar{1} 0,0,0$ | (14) $\bar{3}^+ 0,0,z; 0,0,0$ | (15) $\bar{3}^- 0,0,z; 0,0,0$ |
| (16) $m x,y,0$ | (17) $\bar{6}^- 0,0,z; 0,0,0$ | (18) $\bar{6}^+ 0,0,z; 0,0,0$ |
| (19) $m x,\bar{x},z$ | (20) $m x,2x,z$ | (21) $m 2x,x,z$ |
| (22) $m x,x,z$ | (23) $m x,0,z$ | (24) $m 0,y,z$ |

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

Positions

Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

Reflection conditions

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

Symmetry of special projectionsAlong [001] $p6mm$ $\mathbf{a}' = \mathbf{a}$ $\mathbf{b}' = \mathbf{b}$ Origin at $0, 0, z$ Along [100] $p2mm$ $\mathbf{a}' = \frac{1}{2}(\mathbf{a} + 2\mathbf{b})$ $\mathbf{b}' = \mathbf{c}$ Origin at $x, 0, 0$ Along [210] $p2mm$ $\mathbf{a}' = \frac{1}{2}\mathbf{b}$ $\mathbf{b}' = \mathbf{c}$ Origin at $x, \frac{1}{2}x, 0$