

$P6/mcc$

D_{6h}^2

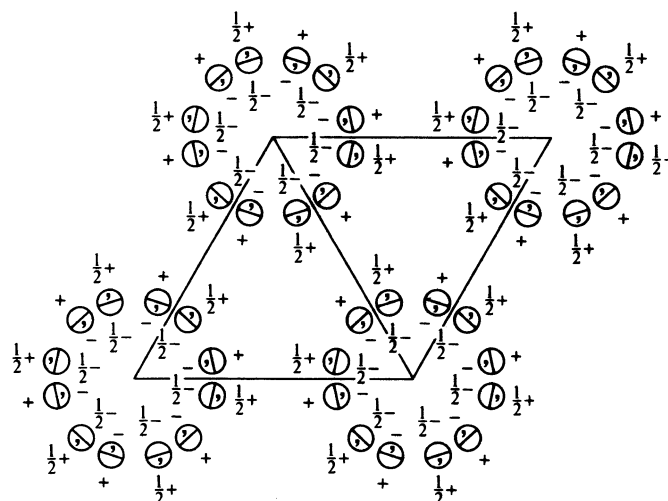
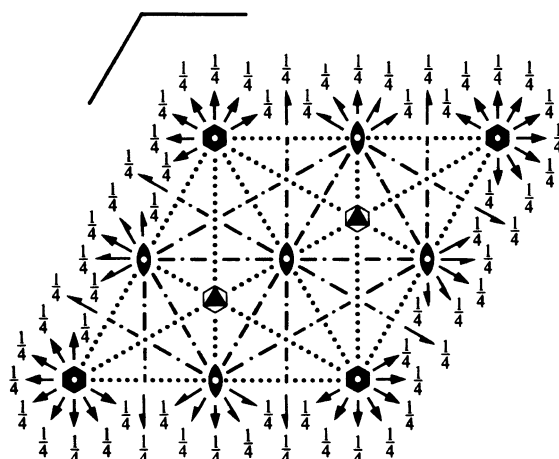
$6/mmm$

Hexagonal

No. 192

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

Patterson symmetry $P6/mmm$



Origin at centre ($6/m$) at $6/mcc$

Asymmetric unit $0 \leq x \leq \frac{2}{3}$; $0 \leq y \leq \frac{1}{2}$; $0 \leq z \leq \frac{1}{4}$; $x \leq (1+y)/2$; $y \leq \min(1-x, x)$

Vertices $0, 0, 0$ $\frac{1}{2}, 0, 0$ $\frac{2}{3}, \frac{1}{3}, 0$ $\frac{1}{2}, \frac{1}{2}, 0$
 $0, 0, \frac{1}{4}$ $\frac{1}{2}, 0, \frac{1}{4}$ $\frac{2}{3}, \frac{1}{3}, \frac{1}{4}$ $\frac{1}{2}, \frac{1}{2}, \frac{1}{4}$

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 $x, x, \frac{1}{4}$ | (8) 2 $x, 0, \frac{1}{4}$ | (9) 2 $0, y, \frac{1}{4}$ |
| (10) 2 $x, \bar{x}, \frac{1}{4}$ | (11) 2 $x, 2x, \frac{1}{4}$ | (12) 2 $2x, x, \frac{1}{4}$ |
| (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) c x, \bar{x}, z | (20) c $x, 2x, z$ | (21) c $2x, x, z$ |
| (22) c x, x, z | (23) c $x, 0, z$ | (24) c $0, y, z$ |

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

								General:
24	<i>m</i> 1	(1) x, y, z (4) \bar{x}, \bar{y}, z (7) $y, x, \bar{z} + \frac{1}{2}$ (10) $\bar{y}, \bar{x}, \bar{z} + \frac{1}{2}$ (13) $\bar{x}, \bar{y}, \bar{z}$ (16) x, y, \bar{z} (19) $\bar{y}, \bar{x}, z + \frac{1}{2}$ (22) $y, x, z + \frac{1}{2}$	(2) $\bar{y}, x - y, z$ (5) $y, \bar{x} + y, z$ (8) $x - y, \bar{y}, \bar{z} + \frac{1}{2}$ (11) $\bar{x} + y, y, \bar{z} + \frac{1}{2}$ (14) $y, \bar{x} + y, \bar{z}$ (17) $\bar{y}, x - y, \bar{z}$ (20) $\bar{x} + y, y, z + \frac{1}{2}$ (23) $x - y, \bar{y}, z + \frac{1}{2}$	(3) $\bar{x} + y, \bar{x}, z$ (6) $x - y, x, z$ (9) $\bar{x}, \bar{x} + y, \bar{z} + \frac{1}{2}$ (12) $x, x - y, \bar{z} + \frac{1}{2}$ (15) $x - y, x, \bar{z}$ (18) $\bar{x} + y, \bar{x}, \bar{z}$ (21) $x, x - y, z + \frac{1}{2}$ (24) $\bar{x}, \bar{x} + y, z + \frac{1}{2}$				$hh\bar{2}hl: l = 2n$ $h\bar{h}0l: l = 2n$ $000l: l = 2n$
								Special: as above, plus
12	<i>l</i> <i>m</i> . .	$x, y, 0$ $y, x, \frac{1}{2}$	$\bar{y}, x - y, 0$ $x - y, \bar{y}, \frac{1}{2}$	$\bar{x} + y, \bar{x}, 0$ $\bar{x}, \bar{x} + y, \frac{1}{2}$	$\bar{x}, \bar{y}, 0$ $\bar{y}, \bar{x}, \frac{1}{2}$	$y, \bar{x} + y, 0$ $\bar{x} + y, y, \frac{1}{2}$	$x - y, x, 0$ $x, x - y, \frac{1}{2}$	no extra conditions
12	<i>k</i> . . 2	$x, 2x, \frac{1}{4}$ $\bar{x}, 2\bar{x}, \frac{3}{4}$	$2\bar{x}, \bar{x}, \frac{1}{4}$ $2x, x, \frac{3}{4}$	$x, \bar{x}, \frac{1}{4}$ $\bar{x}, x, \frac{3}{4}$	$\bar{x}, 2\bar{x}, \frac{1}{4}$ $x, 2x, \frac{3}{4}$	$2x, x, \frac{1}{4}$ $2\bar{x}, \bar{x}, \frac{3}{4}$	$\bar{x}, x, \frac{1}{4}$ $x, \bar{x}, \frac{3}{4}$	$hkil: l = 2n$
12	<i>j</i> . 2 .	$x, 0, \frac{1}{4}$ $\bar{x}, 0, \frac{3}{4}$	$0, x, \frac{1}{4}$ $0, \bar{x}, \frac{3}{4}$	$\bar{x}, \bar{x}, \frac{1}{4}$ $x, x, \frac{3}{4}$	$\bar{x}, 0, \frac{1}{4}$ $x, 0, \frac{3}{4}$	$0, \bar{x}, \frac{1}{4}$ $0, x, \frac{3}{4}$	$x, x, \frac{1}{4}$ $\bar{x}, \bar{x}, \frac{3}{4}$	$hkil: l = 2n$
12	<i>i</i> 2 . .	$\frac{1}{2}, 0, z$ $\frac{1}{2}, 0, \bar{z}$	$0, \frac{1}{2}, z$ $0, \frac{1}{2}, \bar{z}$	$\frac{1}{2}, \frac{1}{2}, z$ $\frac{1}{2}, \frac{1}{2}, \bar{z}$	$0, \frac{1}{2}, \bar{z} + \frac{1}{2}$ $0, \frac{1}{2}, z + \frac{1}{2}$	$\frac{1}{2}, 0, \bar{z} + \frac{1}{2}$ $\frac{1}{2}, 0, z + \frac{1}{2}$	$\frac{1}{2}, \frac{1}{2}, \bar{z} + \frac{1}{2}$ $\frac{1}{2}, \frac{1}{2}, z + \frac{1}{2}$	$hkil: l = 2n$
8	<i>h</i> 3 . .	$\frac{1}{3}, \frac{2}{3}, z$ $\frac{2}{3}, \frac{1}{3}, \bar{z}$	$\frac{2}{3}, \frac{1}{3}, z$ $\frac{1}{3}, \frac{2}{3}, \bar{z}$	$\frac{2}{3}, \frac{1}{3}, \bar{z} + \frac{1}{2}$ $\frac{1}{3}, \frac{2}{3}, z + \frac{1}{2}$	$\frac{1}{3}, \frac{2}{3}, \bar{z} + \frac{1}{2}$ $\frac{2}{3}, \frac{1}{3}, z + \frac{1}{2}$			$hkil: l = 2n$
6	<i>g</i> 2/ <i>m</i> . .	$\frac{1}{2}, 0, 0$	$0, \frac{1}{2}, 0$	$\frac{1}{2}, \frac{1}{2}, 0$	$0, \frac{1}{2}, \frac{1}{2}$	$\frac{1}{2}, 0, \frac{1}{2}$	$\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$	$hkil: l = 2n$
6	<i>f</i> 222	$\frac{1}{2}, 0, \frac{1}{4}$	$0, \frac{1}{2}, \frac{1}{4}$	$\frac{1}{2}, \frac{1}{2}, \frac{1}{4}$	$\frac{1}{2}, 0, \frac{3}{4}$	$0, \frac{1}{2}, \frac{3}{4}$	$\frac{1}{2}, \frac{1}{2}, \frac{3}{4}$	$hkil: l = 2n$
4	<i>e</i> 6 . .	$0, 0, z$	$0, 0, \bar{z} + \frac{1}{2}$	$0, 0, \bar{z}$	$0, 0, z + \frac{1}{2}$			$hkil: l = 2n$
4	<i>d</i> $\bar{6}$. .	$\frac{1}{3}, \frac{2}{3}, 0$	$\frac{2}{3}, \frac{1}{3}, 0$	$\frac{2}{3}, \frac{1}{3}, \frac{1}{2}$	$\frac{1}{3}, \frac{2}{3}, \frac{1}{2}$			$hkil: l = 2n$
4	<i>c</i> 3 . 2	$\frac{1}{3}, \frac{2}{3}, \frac{1}{4}$	$\frac{2}{3}, \frac{1}{3}, \frac{1}{4}$	$\frac{2}{3}, \frac{1}{3}, \frac{3}{4}$	$\frac{1}{3}, \frac{2}{3}, \frac{3}{4}$			$hkil: l = 2n$
2	<i>b</i> 6/ <i>m</i> . .	$0, 0, 0$	$0, 0, \frac{1}{2}$					$hkil: l = 2n$
2	<i>a</i> 622	$0, 0, \frac{1}{4}$	$0, 0, \frac{3}{4}$					$hkil: l = 2n$

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