

$p42_12$

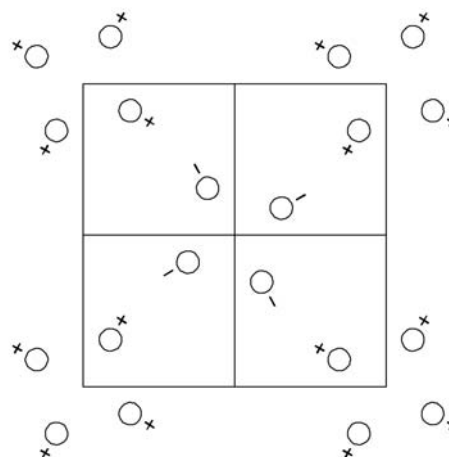
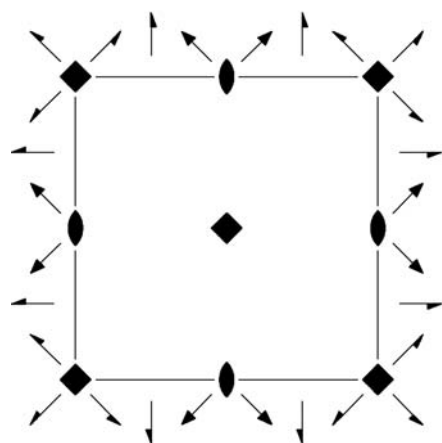
422

Tetragonal/Square

No. 54

$p42_12$

Patterson symmetry $p4/mmm$



Origin on 4 at $-\frac{1}{2}, 0, 0$ from 222 at 212

Asymmetric unit $0 \leq x \leq \frac{1}{2}; 0 \leq y \leq \frac{1}{2}; 0 \leq z$

Symmetry operations

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

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; (2); (3); (5)

Positions

Multiplicity, Wyckoff letter, Site symmetry		Coordinates				Reflection conditions
8	<i>e</i> 1	(1) x, y, z (5) $\bar{x} + \frac{1}{2}, y + \frac{1}{2}, \bar{z}$	(2) \bar{x}, \bar{y}, z (6) $x + \frac{1}{2}, \bar{y} + \frac{1}{2}, \bar{z}$	(3) \bar{y}, x, z (7) $y + \frac{1}{2}, x + \frac{1}{2}, \bar{z}$	(4) y, \bar{x}, z (8) $\bar{y} + \frac{1}{2}, \bar{x} + \frac{1}{2}, \bar{z}$	General: $h0: h = 2n$ $0k: k = 2n$ Special: as above, plus
4	<i>d</i> . . 2	$x, x + \frac{1}{2}, 0$	$\bar{x}, \bar{x} + \frac{1}{2}, 0$	$\bar{x} + \frac{1}{2}, x, 0$	$x + \frac{1}{2}, \bar{x}, 0$	no extra conditions
4	<i>c</i> 2 . .	$0, \frac{1}{2}, z$	$\frac{1}{2}, 0, z$	$\frac{1}{2}, 0, \bar{z}$	$0, \frac{1}{2}, \bar{z}$	$hk: h + k = 2n$
2	<i>b</i> 4 . .	$0, 0, z$	$\frac{1}{2}, \frac{1}{2}, \bar{z}$			$hk: h + k = 2n$
2	<i>a</i> 2 . 22	$0, \frac{1}{2}, 0$	$\frac{1}{2}, 0, 0$			$hk: h + k = 2n$

Symmetry of special projections

Along $[001]$ $p4gm$

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

Origin at $0, 0, z$

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

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

Origin at $x, \frac{1}{4}, 0$

Along $[110]$ $\neq 2mm$

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

Origin at $x, x, 0$

Maximal non-isotypic subgroups

I	$[2] p411 (p4, 49)$	1; 2; 3; 4
	$[2] p212 (c222, 22)$	1; 2; 7; 8
	$[2] p22_11 (p2_12, 2, 21)$	1; 2; 5; 6

IIa none

IIb none

Maximal isotypic subgroups of lowest index

IIc $[9] p42_12 (\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}) (54)$

Minimal non-isotypic supergroups

I $[2] p4/mbm (63)$; $[2] p4/nmm (64)$

II $[2] c422 (p422, 53)$