

$p42_12$

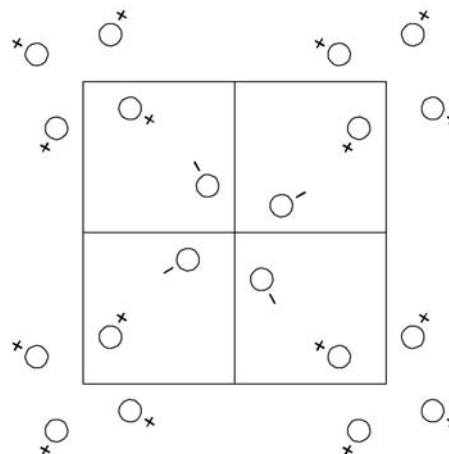
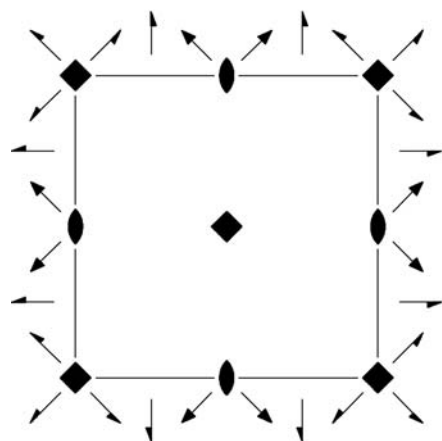
422

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
(1 0,0,0) | (2) 2 0,0,z
(2 _z 0,0,0) | (3) 4 ⁺ 0,0,z
(4 _z ⁺ 0,0,0) | (4) 4 ⁻ 0,0,z
(4 _z ⁻ 0,0,0) |
| (5) 2(0, $\frac{1}{2}$, 0) $\frac{1}{4}, y, 0$
(2 _y $\frac{1}{2}, \frac{1}{2}, 0$) | (6) 2($\frac{1}{2}$, 0, 0) $x, \frac{1}{4}, 0$
(2 _x $\frac{1}{2}, \frac{1}{2}, 0$) | (7) 2($\frac{1}{2}, \frac{1}{2}$, 0) $x, x, 0$
(2 _{xy} $\frac{1}{2}, \frac{1}{2}, 0$) | (8) 2($\frac{1}{2}, \frac{1}{2}$, 0) $x, \bar{x}, 0$
(2 _{xy} $\frac{1}{2}, \frac{1}{2}, 0$) |

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] $\not p2mg$

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

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

Along [110] $\not p2mm$

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

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] $c422$ ($p422, 53$)