

$p321$

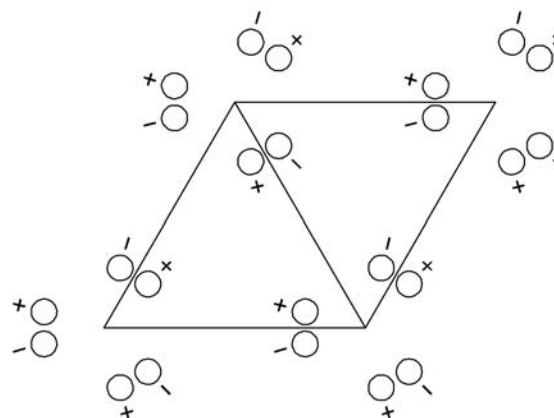
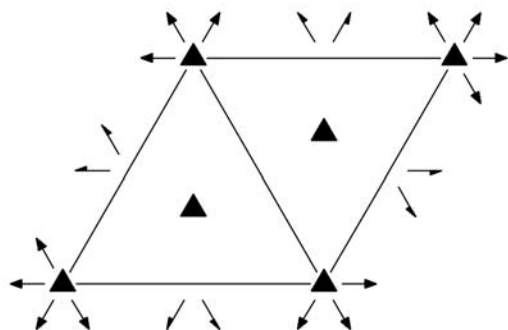
321

Trigonal/Hexagonal

No. 68

$p321$

Patterson symmetry  $p\bar{3}m1$



Origin at 321

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

**Symmetry operations**

- |               |                 |                 |
|---------------|-----------------|-----------------|
| (1) 1         | (2) $3^+ 0,0,z$ | (3) $3^- 0,0,z$ |
| (4) 2 $x,x,0$ | (5) 2 $x,0,0$   | (6) 2 $0,y,0$   |

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

**Positions**

Multiplicity, Wyckoff letter, Site symmetry	Coordinates			Reflection conditions
6 <i>e</i> 1	(1) $x, y, z$ (4) $y, x, \bar{z}$	(2) $\bar{y}, x - y, z$ (5) $x - y, \bar{y}, \bar{z}$	(3) $\bar{x} + y, \bar{x}, z$ (6) $\bar{x}, \bar{x} + y, \bar{z}$	General: no conditions  Special: no extra conditions
3 <i>d</i> .2.	$x, 0, 0$	$0, x, 0$	$\bar{x}, \bar{x}, 0$	
2 <i>c</i> 3..	$\frac{1}{3}, \frac{2}{3}, z$	$\frac{2}{3}, \frac{1}{3}, \bar{z}$		
2 <i>b</i> 3..	$0, 0, z$	$0, 0, \bar{z}$		
1 <i>a</i> 32.	$0, 0, 0$			

**Symmetry of special projections**

Along  $[001]$   $p31m$   
 $\mathbf{a}' = \mathbf{a}$      $\mathbf{b}' = \mathbf{b}$   
 Origin at  $0, 0, z$

Along  $[100]$   $\bar{2}11$   
 $\mathbf{a}' = \frac{1}{2}(\mathbf{a} + 2\mathbf{b})$   
 Origin at  $x, 0, 0$

Along  $[210]$   $\bar{1}1m$   
 $\mathbf{a}' = \frac{1}{2}\mathbf{b}$   
 Origin at  $x, \frac{1}{2}x, 0$

**Maximal non-isotypic subgroups**

**I** [2]  $p311$  ( $p3, 65$ ) 1; 2; 3  
 [3]  $p121$  ( $c211, 10$ ) 1; 4  
 [3]  $p121$  ( $c211, 10$ ) 1; 5  
 [3]  $p121$  ( $c211, 10$ ) 1; 6

**IIa** none

**IIb** [3]  $h321$  ( $\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}$ ) ( $p312, 67$ )

**Maximal isotypic subgroups of lowest index**

**IIc** [4]  $p321$  ( $\mathbf{a}' = 2\mathbf{a}, \mathbf{b}' = 2\mathbf{b}$ ) (68)

**Minimal non-isotypic supergroups**

**I** [2]  $p\bar{3}m1$  (72); [2]  $p622$  (76); [2]  $p\bar{6}2m$  (79)

**II** [2]  $h321$  ( $p312, 67$ )