

$P\bar{4}3m$

$T_d^1$

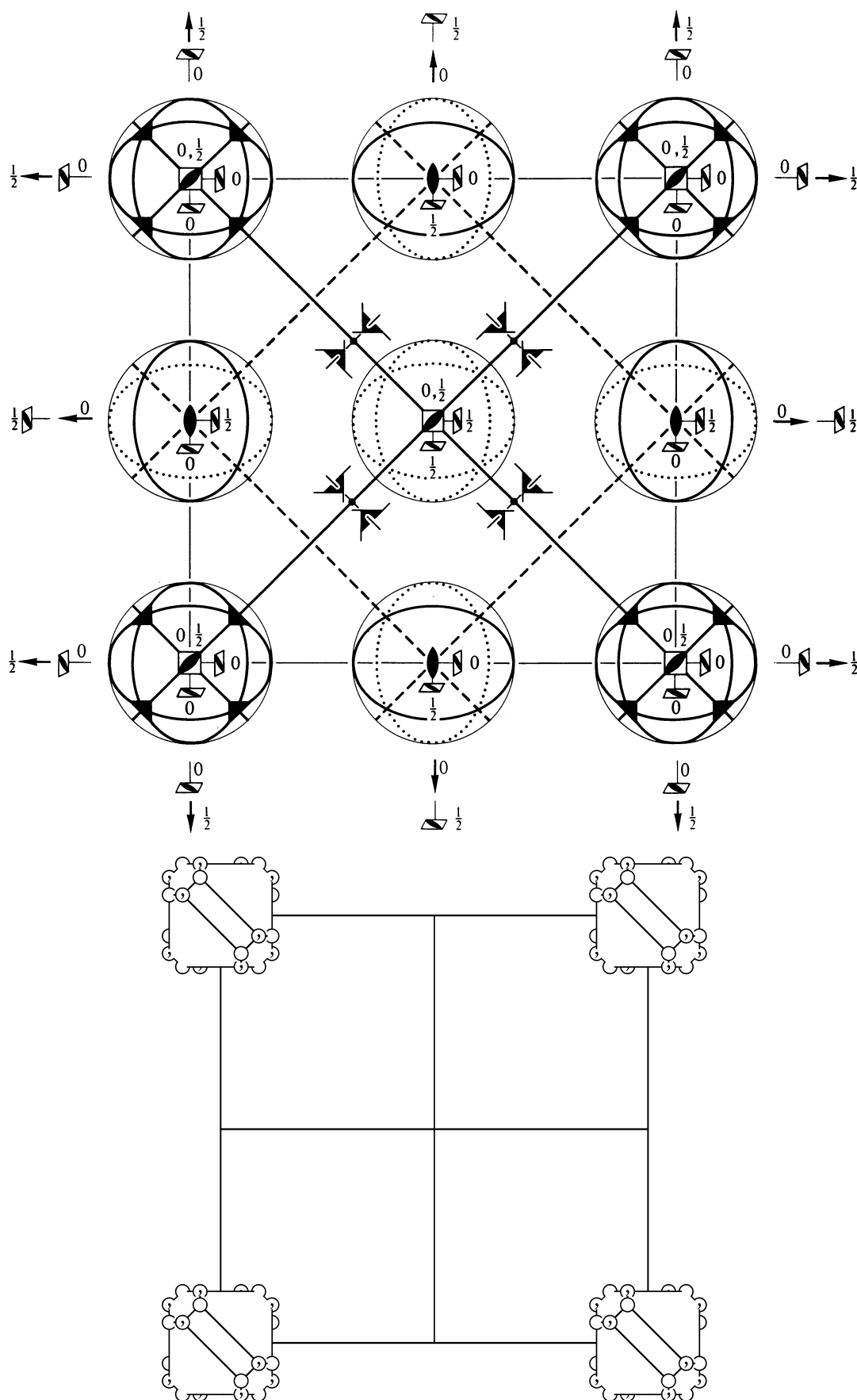
$\bar{4}3m$

Cubic

No. 215

$P\bar{4}3m$

Patterson symmetry  $Pm\bar{3}m$



Origin at  $\bar{4}3m$

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

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

## Symmetry operations

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

**Generators selected** (1);  $t(1,0,0)$ ;  $t(0,1,0)$ ;  $t(0,0,1)$ ; (2); (3); (5); (13)

## Positions

Multiplicity,  
Wyckoff letter,  
Site symmetry

Coordinates

Reflection conditions

24	<i>j</i> 1	(1) x,y,z	(2) $\bar{x}$ , $\bar{y}$ ,z	(3) $\bar{x}$ ,y, $\bar{z}$	(4) x, $\bar{y}$ , $\bar{z}$
		(5) z,x,y	(6) z, $\bar{x}$ , $\bar{y}$	(7) $\bar{z}$ , $\bar{x}$ ,y	(8) $\bar{z}$ ,x, $\bar{y}$
		(9) y,z,x	(10) $\bar{y}$ ,z, $\bar{x}$	(11) y, $\bar{z}$ , $\bar{x}$	(12) $\bar{y}$ , $\bar{z}$ ,x
		(13) y,x,z	(14) $\bar{y}$ , $\bar{x}$ ,z	(15) y, $\bar{x}$ , $\bar{z}$	(16) $\bar{y}$ ,x, $\bar{z}$
		(17) x,z,y	(18) $\bar{x}$ ,z, $\bar{y}$	(19) $\bar{x}$ , $\bar{z}$ ,y	(20) x, $\bar{z}$ , $\bar{y}$
		(21) z,y,x	(22) z, $\bar{y}$ , $\bar{x}$	(23) $\bar{z}$ ,y, $\bar{x}$	(24) $\bar{z}$ , $\bar{y}$ ,x

 $h,k,l$  permutable

General:

no conditions

Special: no extra conditions

12	<i>i</i> . . m	x,x,z	$\bar{x}$ , $\bar{x}$ ,z	$\bar{x}$ ,x, $\bar{z}$	x, $\bar{x}$ , $\bar{z}$	z,x,x	z, $\bar{x}$ , $\bar{x}$
		$\bar{z}$ , $\bar{x}$ ,x	$\bar{z}$ ,x, $\bar{x}$	x,z,x	$\bar{x}$ ,z, $\bar{x}$	x, $\bar{z}$ , $\bar{x}$	$\bar{x}$ , $\bar{z}$ ,x
12	<i>h</i> 2 . .	$x, \frac{1}{2}, 0$	$\bar{x}, \frac{1}{2}, 0$	0,x, $\frac{1}{2}$	0, $\bar{x}, \frac{1}{2}$	$\frac{1}{2}, 0, x$	$\frac{1}{2}, 0, \bar{x}$
		$\frac{1}{2}, x, 0$	$\frac{1}{2}, \bar{x}, 0$	x,0, $\frac{1}{2}$	$\bar{x}, 0, \frac{1}{2}$	0, $\frac{1}{2}, x$	0, $\frac{1}{2}, \bar{x}$
6	<i>g</i> 2 . mm	$x, \frac{1}{2}, \frac{1}{2}$	$\bar{x}, \frac{1}{2}, \frac{1}{2}$	$\frac{1}{2}, x, \frac{1}{2}$	$\frac{1}{2}, \bar{x}, \frac{1}{2}$	$\frac{1}{2}, \frac{1}{2}, x$	$\frac{1}{2}, \frac{1}{2}, \bar{x}$
6	<i>f</i> 2 . mm	x,0,0	$\bar{x}$ ,0,0	0,x,0	0, $\bar{x}$ ,0	0,0,x	0,0, $\bar{x}$
4	<i>e</i> . 3 m	x,x,x	$\bar{x}$ , $\bar{x}$ ,x	$\bar{x}$ ,x, $\bar{x}$	x, $\bar{x}$ , $\bar{x}$		
3	<i>d</i> $\bar{4}2$ . m	$\frac{1}{2}, 0, 0$	0, $\frac{1}{2}, 0$	0,0, $\frac{1}{2}$			
3	<i>c</i> $\bar{4}2$ . m	0, $\frac{1}{2}, \frac{1}{2}$	$\frac{1}{2}, 0, \frac{1}{2}$	$\frac{1}{2}, \frac{1}{2}, 0$			
1	<i>b</i> $\bar{4}3$ m	$\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$					
1	<i>a</i> $\bar{4}3$ m	0,0,0					

## Symmetry of special projections

Along [001]  $p4mm$  $\mathbf{a}' = \mathbf{a}$   $\mathbf{b}' = \mathbf{b}$ 

Origin at 0,0,z

Along [111]  $p31m$  $\mathbf{a}' = \frac{1}{3}(2\mathbf{a} - \mathbf{b} - \mathbf{c})$ 

Origin at x,x,x

 $\mathbf{b}' = \frac{1}{3}(-\mathbf{a} + 2\mathbf{b} - \mathbf{c})$ Along [110]  $p1m1$  $\mathbf{a}' = \frac{1}{2}(-\mathbf{a} + \mathbf{b})$ 

Origin at x,x,0

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