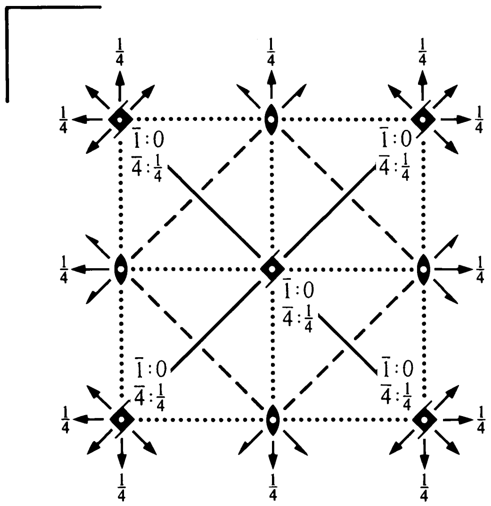
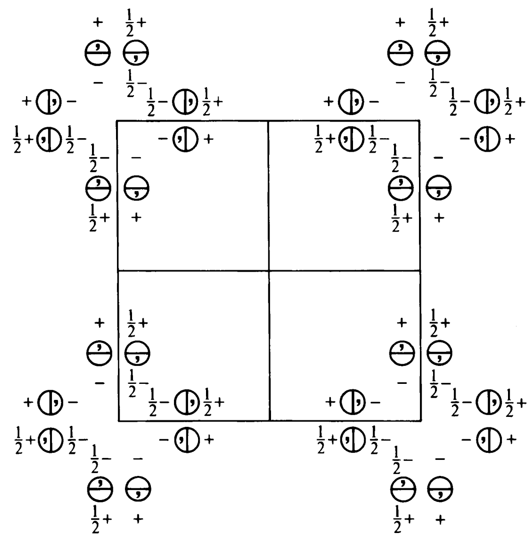
$P4_2/mcm$ D_{4h}^{10} $4/mmm$ Tetragonal

No. 132 $P\ 4_2/m\ 2/c\ 2/m$ Patterson symmetry $P4/mmm$





Origin at centre (mmm) at $4_2/mc2/m$

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

Symmetry operations

(1) 1	(2) $2\quad 0,0,z$	(3) $4^+(0,0,\frac{1}{2})\quad 0,0,z$	(4) $4^-(0,0,\frac{1}{2})\quad 0,0,z$
(5) $2\quad 0,y,\frac{1}{4}$	(6) $2\quad x,0,\frac{1}{4}$	(7) $2\quad x,x,0$	(8) $2\quad x,\bar{x},0$
(9) $\bar{1}\quad 0,0,0$	(10) $m\quad x,y,0$	(11) $\bar{4}^+\quad 0,0,z;\ 0,0,\frac{1}{4}$	(12) $\bar{4}^-\quad 0,0,z;\ 0,0,\frac{1}{4}$
(13) $c\quad x,0,z$	(14) $c\quad 0,y,z$	(15) $m\quad x,\bar{x},z$	(16) $m\quad x,x,z$

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; (2); (3); (5); (9)

Positions

Multiplicity, Wyckoff letter, Site symmetry			Coordinates				Reflection conditions
							General:
16	p	1	(1) x,y,z	(2) $\bar{x},\bar{y},z$	(3) $\bar{y},x,z+\frac{1}{2}$	(4) $y,\bar{x},z+\frac{1}{2}$	$0kl$: $l=2n$
			(5) $\bar{x},y,\bar{z}+\frac{1}{2}$	(6) $x,\bar{y},\bar{z}+\frac{1}{2}$	(7) $y,x,\bar{z}$	(8) $\bar{y},\bar{x},\bar{z}$	$00l$: $l=2n$
			(9) $\bar{x},\bar{y},\bar{z}$	(10) $x,y,\bar{z}$	(11) $y,\bar{x},\bar{z}+\frac{1}{2}$	(12) $\bar{y},x,\bar{z}+\frac{1}{2}$	
			(13) $x,\bar{y},z+\frac{1}{2}$	(14) $\bar{x},y,z+\frac{1}{2}$	(15) $\bar{y},\bar{x},z$	(16) y,x,z	
							Special: as above, plus
8	o	$..m$	x,x,z	$\bar{x},\bar{x},z$	$\bar{x},x,z+\frac{1}{2}$	$x,\bar{x},z+\frac{1}{2}$	no extra conditions
			$\bar{x},x,\bar{z}+\frac{1}{2}$	$x,\bar{x},\bar{z}+\frac{1}{2}$	$x,x,\bar{z}$	$\bar{x},\bar{x},\bar{z}$	
8	n	$m..$	$x,y,0$	$\bar{x},\bar{y},0$	$\bar{y},x,\frac{1}{2}$	$y,\bar{x},\frac{1}{2}$	no extra conditions
			$\bar{x},y,\frac{1}{2}$	$x,\bar{y},\frac{1}{2}$	$y,x,0$	$\bar{y},\bar{x},0$	
8	m	$.2.$	$x,\frac{1}{2},\frac{1}{4}$	$\bar{x},\frac{1}{2},\frac{1}{4}$	$\frac{1}{2},x,\frac{3}{4}$	$\frac{1}{2},\bar{x},\frac{3}{4}$	hkl: $l=2n$
			$\bar{x},\frac{1}{2},\frac{3}{4}$	$x,\frac{1}{2},\frac{3}{4}$	$\frac{1}{2},\bar{x},\frac{1}{4}$	$\frac{1}{2},x,\frac{1}{4}$	
8	l	$.2.$	$x,0,\frac{1}{4}$	$\bar{x},0,\frac{1}{4}$	$0,x,\frac{3}{4}$	$0,\bar{x},\frac{3}{4}$	hkl: $l=2n$
			$\bar{x},0,\frac{3}{4}$	$x,0,\frac{3}{4}$	$0,\bar{x},\frac{1}{4}$	$0,x,\frac{1}{4}$	
8	k	$2..$	$0,\frac{1}{2},z$	$\frac{1}{2},0,z+\frac{1}{2}$	$0,\frac{1}{2},\bar{z}+\frac{1}{2}$	$\frac{1}{2},0,\bar{z}$	hkl: $h+k,l=2n$
			$0,\frac{1}{2},\bar{z}$	$\frac{1}{2},0,\bar{z}+\frac{1}{2}$	$0,\frac{1}{2},z+\frac{1}{2}$	$\frac{1}{2},0,z$	
4	j	$m.2m$	$x,x,\frac{1}{2}$	$\bar{x},\bar{x},\frac{1}{2}$	$\bar{x},x,0$	$x,\bar{x},0$	no extra conditions
4	i	$m.2m$	$x,x,0$	$\bar{x},\bar{x},0$	$\bar{x},x,\frac{1}{2}$	$x,\bar{x},\frac{1}{2}$	no extra conditions
4	h	$2.mm$	$\frac{1}{2},\frac{1}{2},z$	$\frac{1}{2},\frac{1}{2},z+\frac{1}{2}$	$\frac{1}{2},\frac{1}{2},\bar{z}+\frac{1}{2}$	$\frac{1}{2},\frac{1}{2},\bar{z}$	hkl: $l=2n$
4	g	$2.mm$	$0,0,z$	$0,0,z+\frac{1}{2}$	$0,0,\bar{z}+\frac{1}{2}$	$0,0,\bar{z}$	hkl: $l=2n$
4	f	$2/m..$	$0,\frac{1}{2},0$	$\frac{1}{2},0,\frac{1}{2}$	$0,\frac{1}{2},\frac{1}{2}$	$\frac{1}{2},0,0$	hkl: $h+k,l=2n$
4	e	$222.$	$0,\frac{1}{2},\frac{1}{4}$	$\frac{1}{2},0,\frac{3}{4}$	$0,\frac{1}{2},\frac{3}{4}$	$\frac{1}{2},0,\frac{1}{4}$	hkl: $h+k,l=2n$
2	d	$\bar{4}2m$	$\frac{1}{2},\frac{1}{2},\frac{1}{4}$	$\frac{1}{2},\frac{1}{2},\frac{3}{4}$			hkl: $l=2n$
2	c	$m.mm$	$\frac{1}{2},\frac{1}{2},0$	$\frac{1}{2},\frac{1}{2},\frac{1}{2}$			hkl: $l=2n$
2	b	$\bar{4}2m$	$0,0,\frac{1}{4}$	$0,0,\frac{3}{4}$			hkl: $l=2n$
2	a	$m.mm$	$0,0,0$	$0,0,\frac{1}{2}$			hkl: $l=2n$

Symmetry of special projections

Along [001] $p4mm$
$\mathbf{a}'=\mathbf{a}$ $\mathbf{b}'=\mathbf{b}$
Origin at $0,0,z$

Along [100] $p2mm$
$\mathbf{a}'=\mathbf{b}$ $\mathbf{b}'=\frac{1}{2}\mathbf{c}$
Origin at $x,0,0$

Along [110] $p2mm$
$\mathbf{a}'=\frac{1}{2}(-\mathbf{a}+\mathbf{b})$ $\mathbf{b}'=\mathbf{c}$
Origin at $x,x,0$