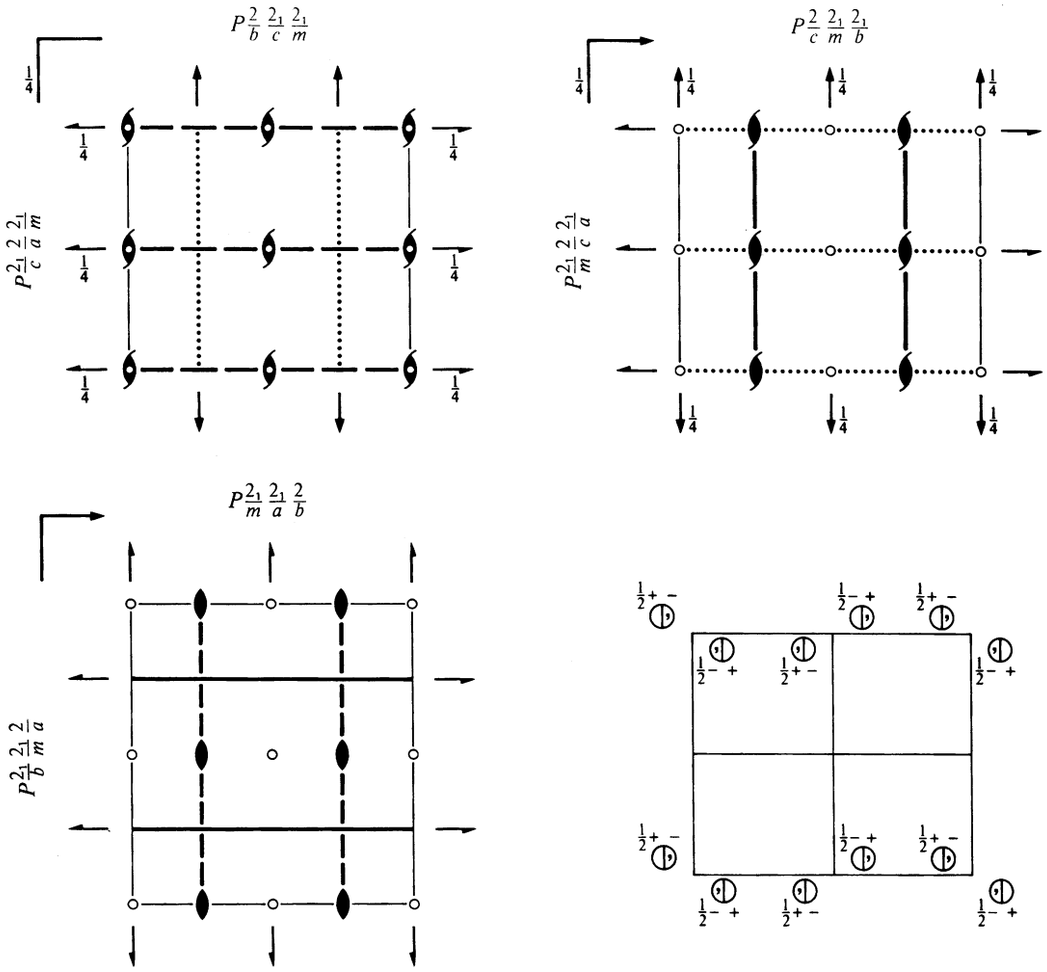
$Pbcm$ D_{2h}^{11} mmm Orthorhombic

No. 57 $P\ 2/b\ 2_1/c\ 2_1/m$ Patterson symmetry $Pmmm$



Origin at $\bar{1}$ on $b\,1\,2_1$

Asymmetric unit $0 \le x \le \frac{1}{2}$; $0 \le y \le 1$; $0 \le z \le \frac{1}{4}$

Symmetry operations

(1) 1
(2) $2(0,0,\frac{1}{2})$ $0,0,z$
(3) $2(0,\frac{1}{2},0)$ $0,y,\frac{1}{4}$
(4) 2 $x,\frac{1}{4},0$
(5) $\bar{1}$ $0,0,0$
(6) m $x,y,\frac{1}{4}$
(7) c $x,\frac{1}{4},z$
(8) b $0,y,z$

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

Positions

Multiplicity, Wyckoff letter, Site symmetry			Coordinates				Reflection conditions
							General:
8	*e*	1	(1) x,y,z (5) $\bar{x},\bar{y},\bar{z}$	(2) $\bar{x},\bar{y},z+\frac{1}{2}$ (6) $x,y,\bar{z}+\frac{1}{2}$	(3) $\bar{x},y+\frac{1}{2},\bar{z}+\frac{1}{2}$ (7) $x,\bar{y}+\frac{1}{2},z+\frac{1}{2}$	(4) $x,\bar{y}+\frac{1}{2},\bar{z}$ (8) $\bar{x},y+\frac{1}{2},z$	$0kl$: $k=2n$ $h0l$: $l=2n$ $0k0$: $k=2n$ $00l$: $l=2n$
							Special: as above, plus
4	*d*	. . *m*	$x,y,\frac{1}{4}$	$\bar{x},\bar{y},\frac{3}{4}$	$\bar{x},y+\frac{1}{2},\frac{1}{4}$	$x,\bar{y}+\frac{1}{2},\frac{3}{4}$	no extra conditions
4	*c*	2 . .	$x,\frac{1}{4},0$	$\bar{x},\frac{3}{4},\frac{1}{2}$	$\bar{x},\frac{3}{4},0$	$x,\frac{1}{4},\frac{1}{2}$	hkl : $l=2n$
4	*b*	$\bar{1}$	$\frac{1}{2},0,0$	$\frac{1}{2},0,\frac{1}{2}$	$\frac{1}{2},\frac{1}{2},\frac{1}{2}$	$\frac{1}{2},\frac{1}{2},0$	hkl : $k,l=2n$
4	*a*	$\bar{1}$	$0,0,0$	$0,0,\frac{1}{2}$	$0,\frac{1}{2},\frac{1}{2}$	$0,\frac{1}{2},0$	hkl : $k,l=2n$

Symmetry of special projections

Along [001] $p2gm$
$\mathbf{a}'=\mathbf{a}$ $\mathbf{b}'=\mathbf{b}$
Origin at $0,0,z$

Along [100] $p2gm$
$\mathbf{a}'=\frac{1}{2}\mathbf{b}$ $\mathbf{b}'=\mathbf{c}$
Origin at $x,0,0$

Along [010] $p2mm$
$\mathbf{a}'=\frac{1}{2}\mathbf{c}$ $\mathbf{b}'=\mathbf{a}$
Origin at $0,y,0$

Maximal non-isomorphic subgroups

I [2] $Pbc2_1$ ($Pca2_1$, 29) 1; 2; 7; 8
[2] $P2cm$ ($Pma2$, 28) 1; 4; 6; 7
[2] $Pb2_1m$ ($Pmc2_1$, 26) 1; 3; 6; 8
[2] $P22_12_1$ ($P2_12_12$, 18) 1; 2; 3; 4
[2] $P12_1/c1$ ($P2_1/c$, 14) 1; 3; 5; 7
[2] $P2/b11$ ($P2/c$, 13) 1; 4; 5; 8
[2] $P112_1/m$ ($P2_1/m$, 11) 1; 2; 5; 6

IIa none

IIb [2] $Pbnm$ ($\mathbf{a}'=2\mathbf{a}$) ($Pnma$, 62); [2] $Pbca$ ($\mathbf{a}'=2\mathbf{a}$) (61); [2] $Pbna$ ($\mathbf{a}'=2\mathbf{a}$) ($Pbcn$, 60)

Maximal isomorphic subgroups of lowest index

IIc [2] $Pbcm$ ($\mathbf{a}'=2\mathbf{a}$) (57); [3] $Pbcm$ ($\mathbf{b}'=3\mathbf{b}$) (57); [3] $Pbcm$ ($\mathbf{c}'=3\mathbf{c}$) (57)

Minimal non-isomorphic supergroups

I none

II [2] $Cmcm$ (63); [2] $Bbem$ ($Cmce$, 64); [2] $Aemm$ ($Cmme$, 67); [2] $Ibam$ (72); [2] $Pmcm$ ($\mathbf{b}'=\frac{1}{2}\mathbf{b}$) ($Pmma$, 51); [2] $Pbmm$ ($\mathbf{c}'=\frac{1}{2}\mathbf{c}$) ($Pmma$, 51)