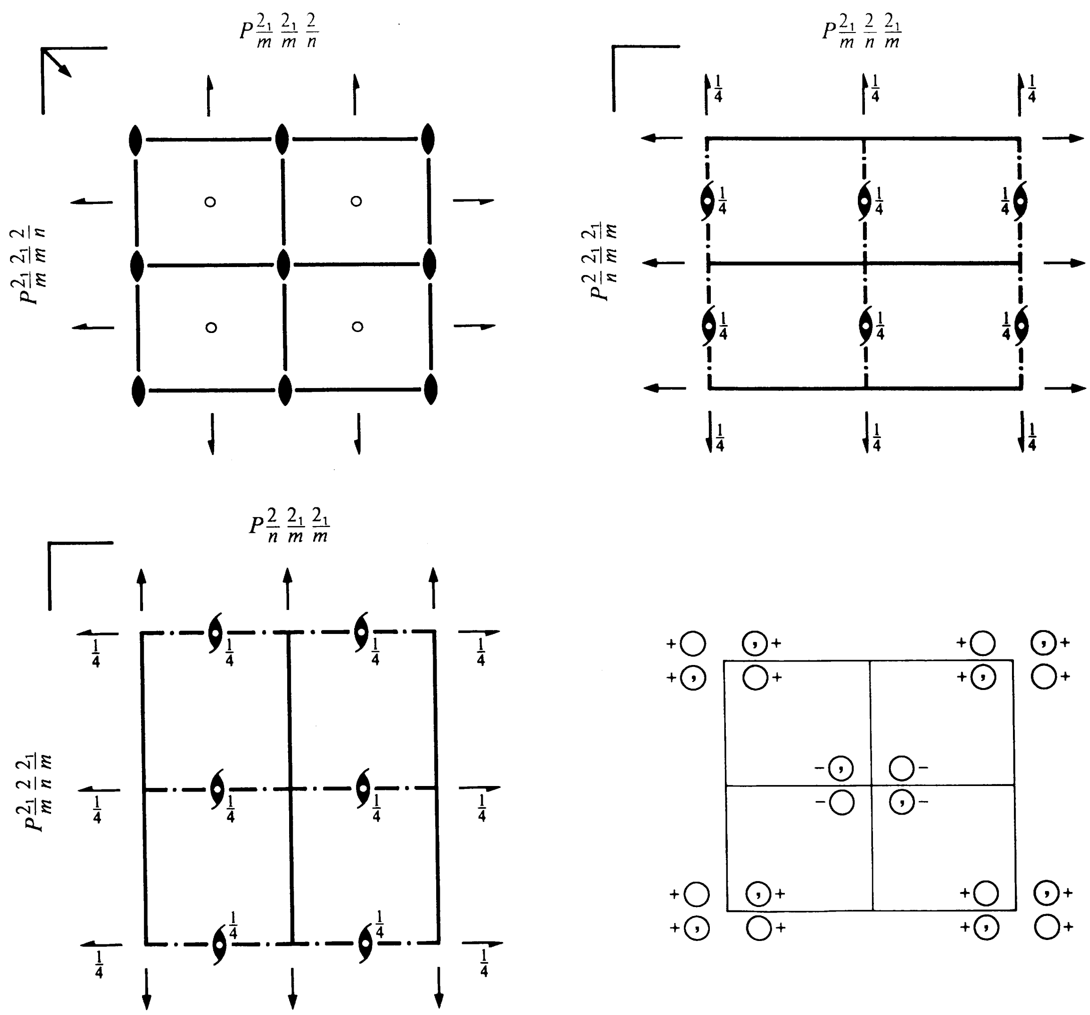
$Pmmn$ $\quad$ D_{2h}^{13} $\quad$ mmm $\quad$ Orthorhombic

No. 59 $\quad$ $P\ 2_1/m\ 2_1/m\ 2/n$ $\quad$ Patterson symmetry $Pmmm$

ORIGIN CHOICE 1



Origin at $mm2/n$, at $\frac{1}{4},\frac{1}{4},0$ from $\bar{1}$

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

Symmetry operations

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

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	*g*	1	(1) x,y,z	(2) $\bar{x},\bar{y},z$	(3) $\bar{x}+\frac{1}{2},y+\frac{1}{2},\bar{z}$	(4) $x+\frac{1}{2},\bar{y}+\frac{1}{2},\bar{z}$	$hk0$: $h+k=2n$
			(5) $\bar{x}+\frac{1}{2},\bar{y}+\frac{1}{2},\bar{z}$	(6) $x+\frac{1}{2},y+\frac{1}{2},\bar{z}$	(7) $x,\bar{y},z$	(8) $\bar{x},y,z$	$h00$: $h=2n$
							$0k0$: $k=2n$
							Special: as above, plus
4	*f*	$.m.$	$x,0,z$	$\bar{x},0,z$	$\bar{x}+\frac{1}{2},\frac{1}{2},\bar{z}$	$x+\frac{1}{2},\frac{1}{2},\bar{z}$	no extra conditions
4	*e*	$m..$	$0,y,z$	$0,\bar{y},z$	$\frac{1}{2},y+\frac{1}{2},\bar{z}$	$\frac{1}{2},\bar{y}+\frac{1}{2},\bar{z}$	no extra conditions
4	*d*	$\bar{1}$	$\frac{1}{4},\frac{1}{4},\frac{1}{2}$	$\frac{3}{4},\frac{3}{4},\frac{1}{2}$	$\frac{1}{4},\frac{3}{4},\frac{1}{2}$	$\frac{3}{4},\frac{1}{4},\frac{1}{2}$	hkl : $h,k=2n$
4	*c*	$\bar{1}$	$\frac{1}{4},\frac{1}{4},0$	$\frac{3}{4},\frac{3}{4},0$	$\frac{1}{4},\frac{3}{4},0$	$\frac{3}{4},\frac{1}{4},0$	hkl : $h,k=2n$
2	*b*	$mm2$	$0,\frac{1}{2},z$	$\frac{1}{2},0,\bar{z}$			no extra conditions
2	*a*	$mm2$	$0,0,z$	$\frac{1}{2},\frac{1}{2},\bar{z}$			no extra conditions

Symmetry of special projections

Along [001] $c2mm$
$\mathbf{a}'=\mathbf{a}$ $\mathbf{b}'=\mathbf{b}$
Origin at $0,0,z$

Along [100] $p2mg$
$\mathbf{a}'=\mathbf{b}$ $\mathbf{b}'=\mathbf{c}$
Origin at $x,\frac{1}{4},0$

Along [010] $p2gm$
$\mathbf{a}'=\mathbf{c}$ $\mathbf{b}'=\mathbf{a}$
Origin at $\frac{1}{4},y,0$

Maximal non-isomorphic subgroups

I [2] $Pm2_1n$ ($Pmn2_1$, 31) 1; 3; 6; 8
[2] $P2_1mn$ ($Pmn2_1$, 31) 1; 4; 6; 7
[2] $Pmm2$ (25) 1; 2; 7; 8
[2] $P2_12_12$ (18) 1; 2; 3; 4
[2] $P112/n$ ($P2/c$, 13) 1; 2; 5; 6
[2] $P12_1/m1$ ($P2_1/m$, 11) 1; 3; 5; 7
[2] $P2_1/m11$ ($P2_1/m$, 11) 1; 4; 5; 8

IIa none

IIb [2] $Pcmn$ ($\mathbf{c}'=2\mathbf{c}$) ($Pnma$, 62); [2] $Pmcn$ ($\mathbf{c}'=2\mathbf{c}$) ($Pnma$, 62); [2] $Pccn$ ($\mathbf{c}'=2\mathbf{c}$) (56)

Maximal isomorphic subgroups of lowest index

IIc [2] $Pmmn$ ($\mathbf{c}'=2\mathbf{c}$) (59); [3] $Pmmn$ ($\mathbf{a}'=3\mathbf{a}$ or $\mathbf{b}'=3\mathbf{b}$) (59)

Minimal non-isomorphic supergroups

I [2] $P4/nmm$ (129); [2] $P4_2/nmc$ (137)

II [2] $Amma$ ($Cmcm$, 63); [2] $Bmmb$ ($Cmcm$, 63); [2] $Cmmm$ (65); [2] $Immm$ (71); [2] $Pmmb$ ($\mathbf{a}'=\frac{1}{2}\mathbf{a}$) ($Pmma$, 51); [2] $Pmma$ ($\mathbf{b}'=\frac{1}{2}\mathbf{b}$) (51)