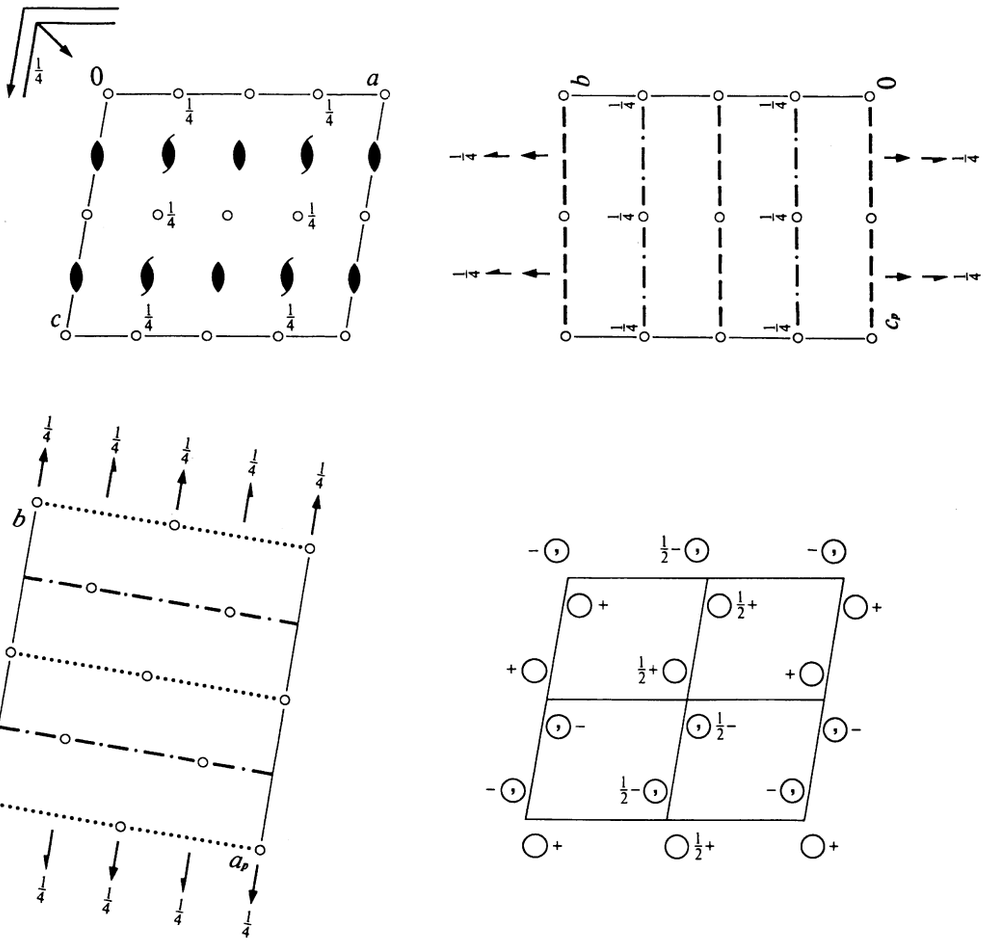
$C2/c$ C_{2h}^6 $2/m$ Monoclinic

No. 15 $C12/c1$ Patterson symmetry $C12/m1$

UNIQUE AXIS b, CELL CHOICE 1



Origin at $\bar{1}$ on glide plane c

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

Symmetry operations

For $(0,0,0)+$ set

(1) 1 (2) 2 $0,y,\frac{1}{4}$ (3) $\bar{1}$ $0,0,0$ (4) c $x,0,z$

For $(\frac{1}{2},\frac{1}{2},0)+$ set

(1) $t(\frac{1}{2},\frac{1}{2},0)$ (2) $2(0,\frac{1}{2},0)$ $\frac{1}{4},y,\frac{1}{4}$ (3) $\bar{1}$ $\frac{1}{4},\frac{1}{4},0$ (4) $n(\frac{1}{2},0,\frac{1}{2})$ $x,\frac{1}{4},z$

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(\frac{1}{2},\frac{1}{2},0)$; (2); (3)

Positions

Multiplicity, Wyckoff letter, Site symmetry			Coordinates				Reflection conditions
			$(0,0,0)+$	$(\frac{1}{2},\frac{1}{2},0)+$			General:
8	f	1	(1) x,y,z	(2) $\bar{x},y,\bar{z}+\frac{1}{2}$	(3) $\bar{x},\bar{y},\bar{z}$	(4) $x,\bar{y},z+\frac{1}{2}$	hkl : $h+k=2n$ $h0l$: $h,l=2n$ $0kl$: $k=2n$ $hk0$: $h+k=2n$ $0k0$: $k=2n$ $h00$: $h=2n$ $00l$: $l=2n$
							Special: as above, plus
4	e	2	$0,y,\frac{1}{4}$	$0,\bar{y},\frac{3}{4}$			no extra conditions
4	d	$\bar{1}$	$\frac{1}{4},\frac{1}{4},\frac{1}{2}$	$\frac{3}{4},\frac{1}{4},0$			hkl : $k+l=2n$
4	c	$\bar{1}$	$\frac{1}{4},\frac{1}{4},0$	$\frac{3}{4},\frac{1}{4},\frac{1}{2}$			hkl : $k+l=2n$
4	b	$\bar{1}$	$0,\frac{1}{2},0$	$0,\frac{1}{2},\frac{1}{2}$			hkl : $l=2n$
4	a	$\bar{1}$	$0,0,0$	$0,0,\frac{1}{2}$			hkl : $l=2n$

Symmetry of special projections

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

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

Along [010] $p2$
$\mathbf{a}'=\frac{1}{2}\mathbf{c}$ $\mathbf{b}'=\frac{1}{2}\mathbf{a}$
Origin at $0,y,0$

Maximal non-isomorphic subgroups

I
[2] $C1c1$ (Cc, 9) (1; 4)+
[2] $C121$ ($C2$, 5) (1; 2)+
[2] $C\bar{1}$ ($P\bar{1}$, 2) (1; 3)+

IIa
[2] $P12_1/n1$ ($P2_1/c$, 14) 1; 3; (2; 4) + $(\frac{1}{2},\frac{1}{2},0)$
[2] $P12_1/c1$ ($P2_1/c$, 14) 1; 4; (2; 3) + $(\frac{1}{2},\frac{1}{2},0)$
[2] $P12/c1$ ($P2/c$, 13) 1; 2; 3; 4
[2] $P12/n1$ ($P2/c$, 13) 1; 2; (3; 4) + $(\frac{1}{2},\frac{1}{2},0)$

IIb none

Maximal isomorphic subgroups of lowest index

IIc [3] $C12/c1$ ($\mathbf{b}'=3\mathbf{b}$) ($C2/c$, 15); [3] $C12/c1$ ($\mathbf{c}'=3\mathbf{c}$) ($C2/c$, 15);
[3] $C12/c1$ ($\mathbf{a}'=3\mathbf{a}$ or $\mathbf{a}'=3\mathbf{a},\mathbf{c}'=-\mathbf{a}+\mathbf{c}$ or $\mathbf{a}'=3\mathbf{a},\mathbf{c}'=\mathbf{a}+\mathbf{c}$) ($C2/c$, 15)

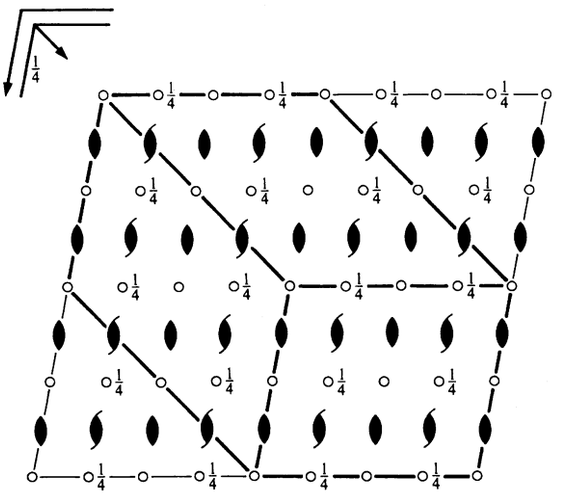
Minimal non-isomorphic supergroups

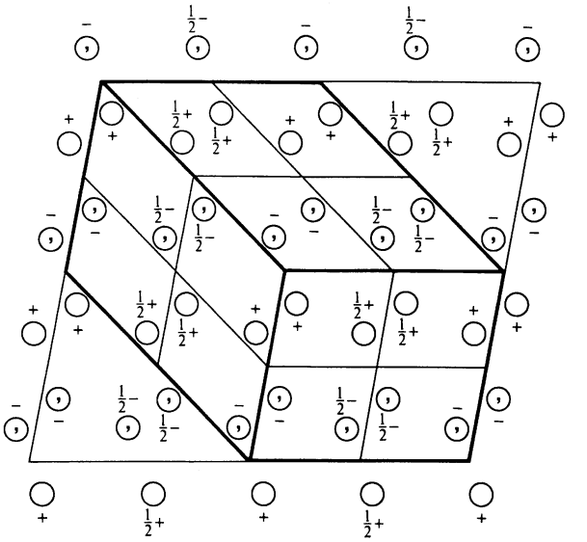
I [2] $Cmcm$ (63); [2] $Cmce$ (64); [2] $Cccm$ (66); [2] $Ccce$ (68); [2] $Fddd$ (70); [2] $Ibam$ (72); [2] $Ibca$ (73); [2] $Imma$ (74); [2] $I4_1/a$ (88); [3] $P\bar{3}1c$ (163); [3] $P\bar{3}c1$ (165); [3] $R\bar{3}c$ (167)

II [2] $F12/m1$ ($C2/m$, 12); [2] $C12/m1$ ($\mathbf{c}'=\frac{1}{2}\mathbf{c}$) ($C2/m$, 12); [2] $P12/c1$ ($\mathbf{a}'=\frac{1}{2}\mathbf{a},\mathbf{b}'=\frac{1}{2}\mathbf{b}$) ($P2/c$, 13)

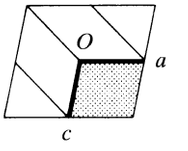
No. 15

UNIQUE AXIS b, DIFFERENT CELL CHOICES





$C12/c1$



UNIQUE AXIS b, CELL CHOICE 1

Origin at $\bar{1}$ on glide plane c

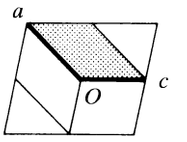
Asymmetric unit $0 \le x \le \frac{1}{2}$; $0 \le y \le \frac{1}{2}$; $0 \le z \le \frac{1}{2}$

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(\frac{1}{2},\frac{1}{2},0)$; (2); (3)

Positions

Multiplicity, Wyckoff letter, Site symmetry			Coordinates				Reflection conditions	
			$(0,0,0)+$ $(\frac{1}{2},\frac{1}{2},0)+$				General:	
8	f	1	(1) x,y,z	(2) $\bar{x},y,\bar{z}+\frac{1}{2}$	(3) $\bar{x},\bar{y},\bar{z}$	(4) $x,\bar{y},z+\frac{1}{2}$	hkl : $h+k=2n$ $h0l$: $h,l=2n$ $0kl$: $k=2n$ $hk0$: $h+k=2n$	$0k0$: $k=2n$ $h00$: $h=2n$ $00l$: $l=2n$
							Special: as above, plus	
4	e	2	$0,y,\frac{1}{4}$	$0,\bar{y},\frac{3}{4}$			no extra conditions	
4	d	$\bar{1}$	$\frac{1}{4},\frac{1}{4},\frac{1}{2}$	$\frac{3}{4},\frac{1}{4},0$			hkl : $k+l=2n$	
4	b	$\bar{1}$	$0,\frac{1}{2},0$	$0,\frac{1}{2},\frac{1}{2}$			hkl : $l=2n$	
4	c	$\bar{1}$	$\frac{1}{4},\frac{1}{4},0$	$\frac{3}{4},\frac{1}{4},\frac{1}{2}$				
4	a	$\bar{1}$	$0,0,0$	$0,0,\frac{1}{2}$				

$A12/n1$



UNIQUE AXIS b, CELL CHOICE 2

Origin at $\bar{1}$ on glide plane n

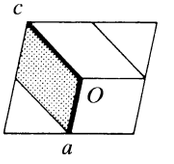
Asymmetric unit $0 \le x \le \frac{1}{2}$; $0 \le y \le 1$; $0 \le z \le \frac{1}{4}$

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(0,\frac{1}{2},\frac{1}{2})$; (2); (3)

Positions

Multiplicity, Wyckoff letter, Site symmetry			Coordinates				Reflection conditions
			$(0,0,0)+$	$(0,\frac{1}{2},\frac{1}{2})+$			General:
8	f	1	(1) x,y,z	(2) $\bar{x}+\frac{1}{2},y,\bar{z}+\frac{1}{2}$	(3) $\bar{x},\bar{y},\bar{z}$	(4) $x+\frac{1}{2},\bar{y},z+\frac{1}{2}$	hkl : $k+l=2n$ $0k0$: $k=2n$ $h0l$: $h,l=2n$ $h00$: $h=2n$ $0kl$: $k+l=2n$ $00l$: $l=2n$ $hk0$: $k=2n$
							Special: as above, plus
4	e	2	$\frac{3}{4},y,\frac{3}{4}$	$\frac{1}{4},\bar{y},\frac{1}{4}$			no extra conditions
4	d	$\bar{1}$	$\frac{1}{2},\frac{1}{4},\frac{3}{4}$	$0,\frac{1}{4},\frac{3}{4}$			hkl : $h=2n$
4	b	$\bar{1}$	$0,\frac{1}{2},0$	$\frac{1}{2},\frac{1}{2},\frac{1}{2}$			hkl : $h+k=2n$
4	c	$\bar{1}$	$0,\frac{1}{4},\frac{1}{4}$	$\frac{1}{2},\frac{1}{4},\frac{1}{4}$			
4	a	$\bar{1}$	$0,0,0$	$\frac{1}{2},0,\frac{1}{2}$			

$I12/a1$



UNIQUE AXIS b, CELL CHOICE 3

Origin at $\bar{1}$ on glide plane a

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

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(\frac{1}{2},\frac{1}{2},\frac{1}{2})$; (2); (3)

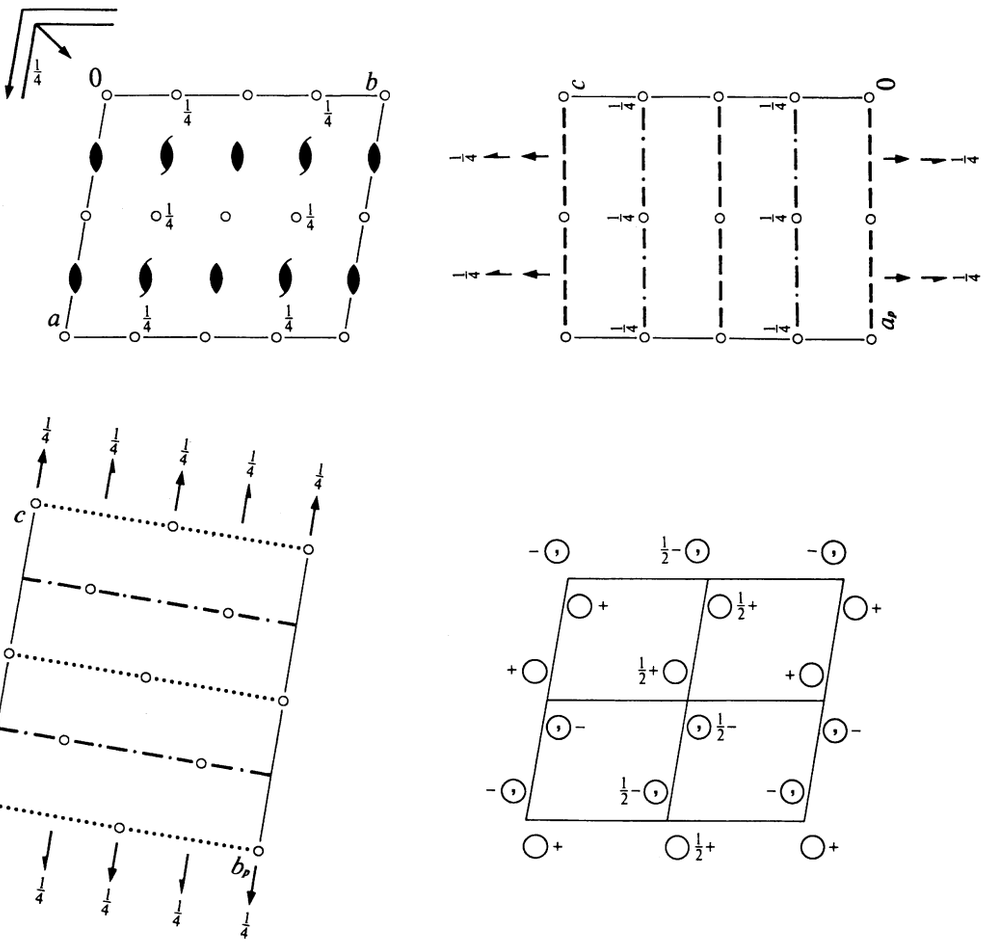
Positions

Multiplicity, Wyckoff letter, Site symmetry			Coordinates				Reflection conditions
			$(0,0,0)+$	$(\frac{1}{2},\frac{1}{2},\frac{1}{2})+$			General:
8	f	1	(1) x,y,z	(2) $\bar{x}+\frac{1}{2},y,\bar{z}$	(3) $\bar{x},\bar{y},\bar{z}$	(4) $x+\frac{1}{2},\bar{y},z$	hkl : $h+k+l=2n$ $0k0$: $k=2n$ $h0l$: $h,l=2n$ $h00$: $h=2n$ $0kl$: $k+l=2n$ $00l$: $l=2n$ $hk0$: $h+k=2n$
							Special: as above, plus
4	e	2	$\frac{1}{4},y,0$	$\frac{3}{4},\bar{y},0$			no extra conditions
4	d	$\bar{1}$	$\frac{1}{4},\frac{1}{4},\frac{3}{4}$	$\frac{1}{4},\frac{1}{4},\frac{1}{4}$			hkl : $l=2n$
4	b	$\bar{1}$	$0,\frac{1}{2},0$	$\frac{1}{2},\frac{1}{2},0$			hkl : $h=2n$
4	c	$\bar{1}$	$\frac{3}{4},\frac{1}{4},\frac{3}{4}$	$\frac{3}{4},\frac{1}{4},\frac{1}{4}$			
4	a	$\bar{1}$	$0,0,0$	$\frac{1}{2},0,0$			

$C2/c$ C_{2h}^6 $2/m$ Monoclinic

No. 15 $A112/a$ Patterson symmetry $A112/m$

UNIQUE AXIS c, CELL CHOICE 1



Origin at $\bar{1}$ on glide plane a

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

Symmetry operations

For $(0,0,0)+$ set

(1) 1 (2) 2 $\frac{1}{4},0,z$ (3) $\bar{1}$ $0,0,0$ (4) a $x,y,0$

For $(0,\frac{1}{2},\frac{1}{2})+$ set

(1) $t(0,\frac{1}{2},\frac{1}{2})$ (2) $2(0,0,\frac{1}{2})$ $\frac{1}{4},\frac{1}{4},z$ (3) $\bar{1}$ $0,\frac{1}{4},\frac{1}{4}$ (4) $n(\frac{1}{2},\frac{1}{2},0)$ $x,y,\frac{1}{4}$

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(0,\frac{1}{2},\frac{1}{2})$; (2); (3)

Positions

Multiplicity, Wyckoff letter, Site symmetry			Coordinates				Reflection conditions
			$(0,0,0)+$	$(0,\frac{1}{2},\frac{1}{2})+$			General:
8	f	1	(1) x,y,z	(2) $\bar{x}+\frac{1}{2},\bar{y},z$	(3) $\bar{x},\bar{y},\bar{z}$	(4) $x+\frac{1}{2},y,\bar{z}$	hkl : $k+l=2n$ $hk0$: $h,k=2n$ $0kl$: $k+l=2n$ $h0l$: $l=2n$ $00l$: $l=2n$ $h00$: $h=2n$ $0k0$: $k=2n$
							Special: as above, plus
4	e	2	$\frac{1}{4},0,z$	$\frac{3}{4},0,\bar{z}$			no extra conditions
4	d	$\bar{1}$	$\frac{1}{2},\frac{1}{4},\frac{1}{4}$	$0,\frac{3}{4},\frac{1}{4}$			hkl : $h+k=2n$
4	c	$\bar{1}$	$0,\frac{1}{4},\frac{1}{4}$	$\frac{1}{2},\frac{3}{4},\frac{1}{4}$			hkl : $h+k=2n$
4	b	$\bar{1}$	$0,0,\frac{1}{2}$	$\frac{1}{2},0,\frac{1}{2}$			hkl : $h=2n$
4	a	$\bar{1}$	$0,0,0$	$\frac{1}{2},0,0$			hkl : $h=2n$

Symmetry of special projections

Along [001] $p2$
$\mathbf{a}' = \frac{1}{2}\mathbf{a}$ $\mathbf{b}' = \frac{1}{2}\mathbf{b}$
Origin at $0,0,z$

Along [100] $c2mm$
$\mathbf{a}' = \mathbf{b}_p$ $\mathbf{b}' = \mathbf{c}$
Origin at $x,0,0$

Along [010] $p2gm$
$\mathbf{a}' = \frac{1}{2}\mathbf{c}$ $\mathbf{b}' = \mathbf{a}_p$
Origin at $0,y,0$

Maximal non-isomorphic subgroups

I
[2] $A\,1\,1\,a$ (Cc, 9) (1; 4)+
[2] $A\,1\,1\,2$ ($C2$, 5) (1; 2)+
[2] $A\,\bar{1}$ ($P\bar{1}$, 2) (1; 3)+

IIa
[2] $P\,1\,1\,2_1/n$ ($P2_1/c$, 14) 1; 3; (2; 4) + $(0,\frac{1}{2},\frac{1}{2})$
[2] $P\,1\,1\,2_1/a$ ($P2_1/c$, 14) 1; 4; (2; 3) + $(0,\frac{1}{2},\frac{1}{2})$
[2] $P\,1\,1\,2/a$ ($P2/c$, 13) 1; 2; 3; 4
[2] $P\,1\,1\,2/n$ ($P2/c$, 13) 1; 2; (3; 4) + $(0,\frac{1}{2},\frac{1}{2})$

IIb none

Maximal isomorphic subgroups of lowest index

IIc [3] $A\,1\,1\,2/a$ ($\mathbf{c}' = 3\mathbf{c}$) ($C2/c$, 15); [3] $A\,1\,1\,2/a$ ($\mathbf{a}' = 3\mathbf{a}$) ($C2/c$, 15);
[3] $A\,1\,1\,2/a$ ($\mathbf{b}' = 3\mathbf{b}$ or $\mathbf{a}' = \mathbf{a}-\mathbf{b}, \mathbf{b}' = 3\mathbf{b}$ or $\mathbf{a}' = \mathbf{a}+\mathbf{b}, \mathbf{b}' = 3\mathbf{b}$) ($C2/c$, 15)

Minimal non-isomorphic supergroups

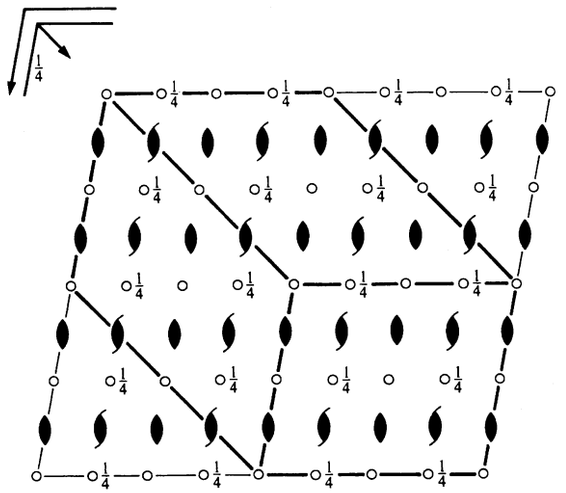
I [2] $Cmcm$ (63); [2] $Cmce$ (64); [2] $Cccm$ (66); [2] $Ccce$ (68); [2] $Fddd$ (70); [2] $Ibam$ (72); [2] $Ibca$ (73); [2] $Imma$ (74); [2] $I4_1/a$ (88); [3] $P\bar{3}1c$ (163); [3] $P\bar{3}c1$ (165); [3] $R\bar{3}c$ (167)

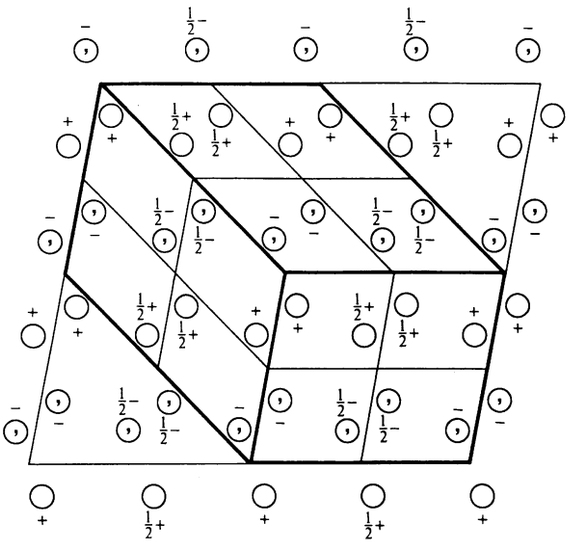
II [2] $F\,1\,1\,2/m$ ($C2/m$, 12); [2] $A\,1\,1\,2/m$ ($\mathbf{a}' = \frac{1}{2}\mathbf{a}$) ($C2/m$, 12); [2] $P\,1\,1\,2/a$ ($\mathbf{b}' = \frac{1}{2}\mathbf{b}, \mathbf{c}' = \frac{1}{2}\mathbf{c}$) ($P2/c$, 13)

$C2/c$ C_{2h}^6 $2/m$ Monoclinic

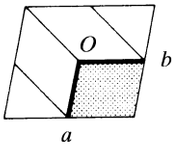
No. 15

UNIQUE AXIS c, DIFFERENT CELL CHOICES





$A112/a$



UNIQUE AXIS c, CELL CHOICE 1

Origin at $\bar{1}$ on glide plane a

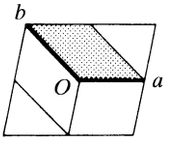
Asymmetric unit $0 \le x \le \frac{1}{2}; \quad 0 \le y \le \frac{1}{2}; \quad 0 \le z \le \frac{1}{2}$

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(0,\frac{1}{2},\frac{1}{2})$; (2); (3)

Positions

Multiplicity, Wyckoff letter, Site symmetry			Coordinates				Reflection conditions
			$(0,0,0)+$	$(0,\frac{1}{2},\frac{1}{2})+$			General:
8	f	1	(1) x,y,z	(2) $\bar{x}+\frac{1}{2},\bar{y},z$	(3) $\bar{x},\bar{y},\bar{z}$	(4) $x+\frac{1}{2},y,\bar{z}$	hkl : $k+l=2n$ $00l$: $l=2n$ $hk0$: $h,k=2n$ $h00$: $h=2n$ $0kl$: $k+l=2n$ $0k0$: $k=2n$ $h0l$: $l=2n$
							Special: as above, plus
4	e	2	$\frac{1}{4},0,z$	$\frac{3}{4},0,\bar{z}$			no extra conditions
4	d	$\bar{1}$	$\frac{1}{2},\frac{1}{4},\frac{1}{4}$	$0,\frac{3}{4},\frac{1}{4}$			hkl : $h+k=2n$
4	b	$\bar{1}$	$0,0,\frac{1}{2}$	$\frac{1}{2},0,\frac{1}{2}$			hkl : $h=2n$
4	c	$\bar{1}$	$0,\frac{1}{4},\frac{1}{4}$	$\frac{1}{2},\frac{3}{4},\frac{1}{4}$			hkl : $h+k=2n$
4	a	$\bar{1}$	$0,0,0$	$\frac{1}{2},0,0$			hkl : $h=2n$

$B112/n$



UNIQUE AXIS c, CELL CHOICE 2

Origin at $\bar{1}$ on glide plane n

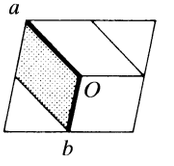
Asymmetric unit $0 \le x \le \frac{1}{4}$; $0 \le y \le \frac{1}{2}$; $0 \le z \le 1$

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(\frac{1}{2},0,\frac{1}{2})$; (2); (3)

Positions

Multiplicity, Wyckoff letter, Site symmetry			Coordinates $(0,0,0)+$ $(\frac{1}{2},0,\frac{1}{2})+$				Reflection conditions
							General:
8	f	1	(1) x,y,z	(2) $\bar{x}+\frac{1}{2},\bar{y}+\frac{1}{2},z$	(3) $\bar{x},\bar{y},\bar{z}$	(4) $x+\frac{1}{2},y+\frac{1}{2},\bar{z}$	hkl : $h+l=2n$ $00l$: $l=2n$ $hk0$: $h,k=2n$ $h00$: $h=2n$ $0kl$: $l=2n$ $0k0$: $k=2n$ $h0l$: $h+l=2n$
							Special: as above, plus
4	e	2	$\frac{3}{4},\frac{3}{4},z$	$\frac{1}{4},\frac{1}{4},\bar{z}$			no extra conditions
4	d	$\bar{1}$	$\frac{3}{4},\frac{1}{2},\frac{1}{4}$	$\frac{3}{4},0,\frac{1}{4}$			hkl : $k=2n$
4	c	$\bar{1}$	$\frac{1}{4},0,\frac{1}{4}$	$\frac{1}{4},\frac{1}{2},\frac{1}{4}$			
4	b	$\bar{1}$	$0,0,\frac{1}{2}$	$\frac{1}{2},\frac{1}{2},\frac{1}{2}$			hkl : $h+k=2n$
4	a	$\bar{1}$	$0,0,0$	$\frac{1}{2},\frac{1}{2},0$			

$I112/b$



UNIQUE AXIS c, CELL CHOICE 3

Origin at $\bar{1}$ on glide plane b

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

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; $t(\frac{1}{2},\frac{1}{2},\frac{1}{2})$; (2); (3)

Positions

Multiplicity, Wyckoff letter, Site symmetry			Coordinates $(0,0,0)+$ $(\frac{1}{2},\frac{1}{2},\frac{1}{2})+$				Reflection conditions
							General:
8	f	1	(1) x,y,z	(2) $\bar{x},\bar{y}+\frac{1}{2},z$	(3) $\bar{x},\bar{y},\bar{z}$	(4) $x,y+\frac{1}{2},\bar{z}$	hkl : $h+k+l=2n$ $00l$: $l=2n$ $hk0$: $h,k=2n$ $h00$: $h=2n$ $0kl$: $k+l=2n$ $0k0$: $k=2n$ $h0l$: $h+l=2n$
							Special: as above, plus
4	e	2	$0,\frac{1}{4},z$	$0,\frac{3}{4},\bar{z}$			no extra conditions
4	d	$\bar{1}$	$\frac{3}{4},\frac{1}{4},\frac{1}{4}$	$\frac{1}{4},\frac{1}{4},\frac{1}{4}$			hkl : $h=2n$
4	c	$\bar{1}$	$\frac{3}{4},\frac{3}{4},\frac{1}{4}$	$\frac{1}{4},\frac{3}{4},\frac{1}{4}$			
4	b	$\bar{1}$	$0,0,\frac{1}{2}$	$0,\frac{1}{2},\frac{1}{2}$			
4	a	$\bar{1}$	$0,0,0$	$0,\frac{1}{2},0$			hkl : $k=2n$