

Crystal system	Point group	Space groups
Triclinic	$\bar{1}$ 1	P1 $P\bar{1}$
Monoclinic	$\bar{2}$ m 2/m	P2, P2 ₁ , C2 Pm, Pc, Cm, Cc P2/m, P2 ₁ /m, C2/m, P2/c, P2 ₁ /c, C2/c
Orthorhombic	$\bar{2}2\bar{2}$ mm2 mmm	P222, P222 ₁ , P2 ₁ 2 ₁ 2, P2 ₁ 2 ₁ 2 ₁ , C222 ₁ , C222, F222, I222, I2 ₁ 2 ₁ 2 ₁ Pmm2, Pmc2 ₁ , Pcc2, Pma2 ₁ , Pca2 ₁ , Pnc2 ₁ , Pmn2 ₁ , Pba2, Pna2 ₁ , Pnn2, Cmm2, Cmc2 ₁ , Ccc2, Amm2, Abm2, Ama2, Aba2, Fmm2, Fdd2, Imm2, Iba2, Ima2 Pmmm, Pnnn, Pccm, Pban, Pmma, Pnna, Pmna, Pcca, Pbam, Pccn, Pbcm, Pnnm, Pmmn, Pbcn, Pbca, Pnma, Cmcm, Cmca, Cmmm, Cccm, Cmna, Ccca, Fmmm, Fddd, Immm, Ibam, Ibca, Imma
Tetragonal	$\bar{4}$ 4 4/m $\bar{4}2\bar{2}$ 4mm $\bar{4}m$ 4/mmm	P4, P4 ₁ , P4 ₂ , P4 ₃ , I4, I4 ₁ P4, I4 P4/m, P4 ₂ /m, P4/n, P4 ₂ /n, I4/m, I4 ₁ /a P422, P4 ₂ 2, P4 ₁ 22, P4 ₁ 2 ₁ 2, P4 ₂ 22, P4 ₂ 2 ₁ 2, P4 ₃ 22, P4 ₃ 2 ₁ 2, I422, I4 ₁ 22 P4mm, P4bm, P4 ₂ cm, P4 ₂ nm, P4cc, P4nc, P4 ₂ mc, P4 ₂ bc, I4mm, I4cm, I4 ₁ md, I4 ₁ cd P42m, P4 ₂ c ₂ , P4 ₂ 1m, P4 ₂ 1c, P4m2, P4c2, P4b2, P4n2, I4m2, I4c2, I42m, I42d P4/mmm, P4/mcc, P4/nbm, P4/nnc, P4/mbm, P4/mnc, P4/nmm, P4/ncc, P4 ₂ /mmc, P4 ₂ /mcm, P4 ₂ /nbc, P4 ₂ /nmm, P4 ₂ /mbc, P4 ₂ mnm, P4 ₂ /nmc, P4 ₂ /ncm, I4/mmm, I4/mcm, I4 ₁ /amd, I4 ₁ /acd
Trigonal-hexagonal	$\bar{3}$ 3 $\bar{3}2$ 3m $\bar{3}m$ $\bar{6}$ 6 6/m $\bar{6}2\bar{2}$ 6mm 6m 6/mmm	P3, P3 ₁ , P3 ₂ , R3 P3, R3 P312, P321, P3 ₁ 12, P3 ₁ 21, P3 ₂ 12, P3 ₂ 21, R32 P3m1, P31m, P3c1, P31c, R3m, R3c P31m, P31c, P3m1, P3c1, R3m, R3c P6, P6 ₁ , P6 ₅ , P6 ₃ , P6 ₂ , P6 ₄ , P6 P6/m, P6 ₃ /m P622, P6 ₁ 22, P6 ₅ 22, P6 ₂ 22, P6 ₄ 22, P6 ₃ 22 P6mm, P6cc, P6 ₃ cm, P6 ₃ mc P6m2, P6c2, P62m, P62c P6/mmm, P6/mcc, P6 ₃ /mcm, P6 ₃ /mmc
Cubic	$\bar{2}3$ m3 $\bar{4}3\bar{2}$ 43m m3m	P23, F23, I23, P2 ₁ 3, I2 ₁ 3 Pm3, Pn3, Fm3, Fd3, Im3, Pa3, Ia3 P432, P4 ₂ 32, F432, F4 ₁ 32, I432, P4 ₃ 32, P4 ₁ 32, I4 ₁ 32 P43m, F43m, I43m, P43n, F43c, I43d Pm3m, Pn3n, Pm3n, Pn3m, Fm3m, Fm3c, Fd3m, Fd3c, Im3m, Ia3d

$Pmm2$

No. 25

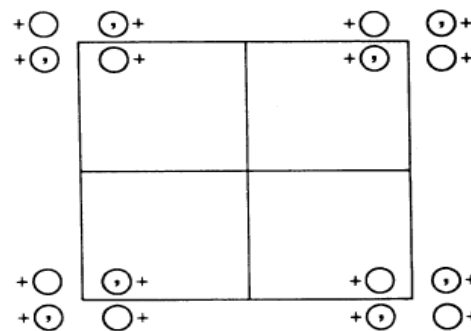
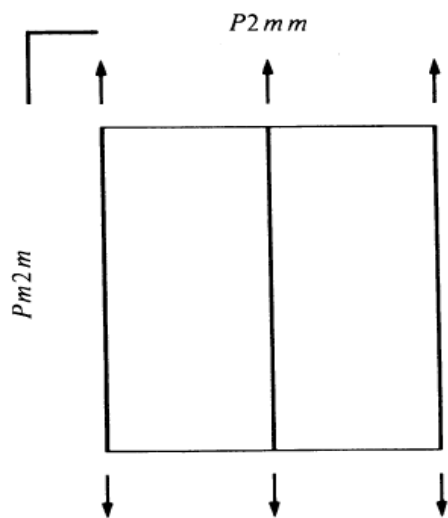
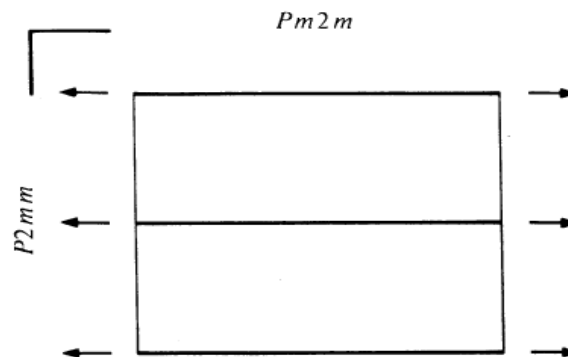
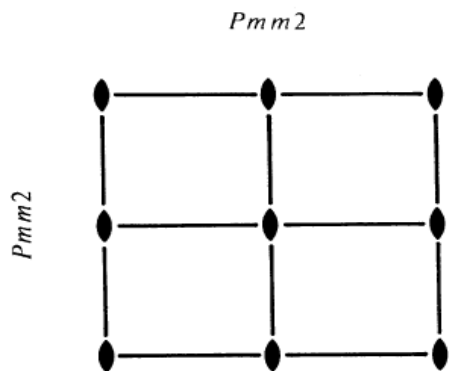
C_{2v}^1

$Pmm2$

$mm2$

Orthorhombic

Patterson symmetry $Pmmm$



Pmm2 continued from the International Tables

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

Positions

Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

Reflection conditions

4 *i* 1 (1) x,y,z (2) \bar{x},\bar{y},z (3) x,\bar{y},z (4) \bar{x},y,z

General:

no conditions

Special: no extra conditions

2 *h* $m..$ $\frac{1}{2},y,z$ $\frac{1}{2},\bar{y},z$

2 *g* $m..$ $0,y,z$ $0,\bar{y},z$

2 *f* $.m.$ $x,\frac{1}{2},z$ $\bar{x},\frac{1}{2},z$

2 *e* $.m.$ $x,0,z$ $\bar{x},0,z$

1 *d* $mm2$ $\frac{1}{2},\frac{1}{2},z$

1 *c* $mm2$ $\frac{1}{2},0,z$

1 *b* $mm2$ $0,\frac{1}{2},z$

1 *a* $mm2$ $0,0,z$

$Cmm2$

No. 35

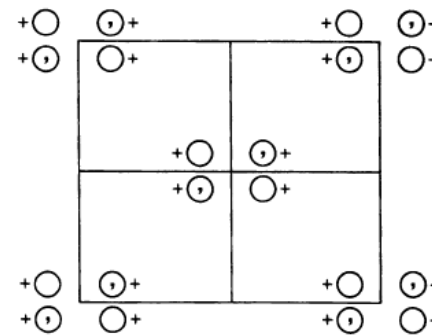
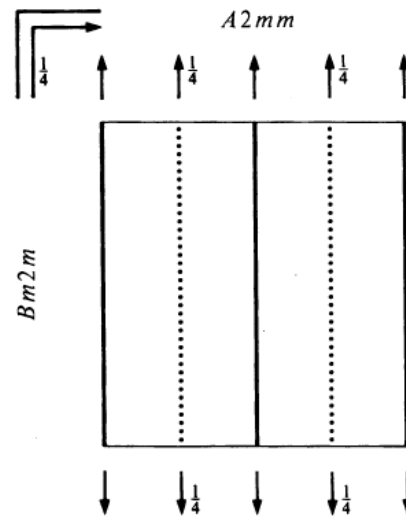
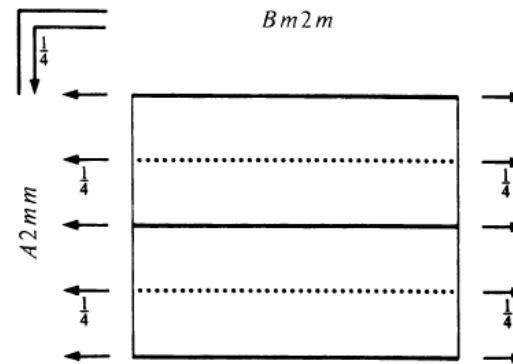
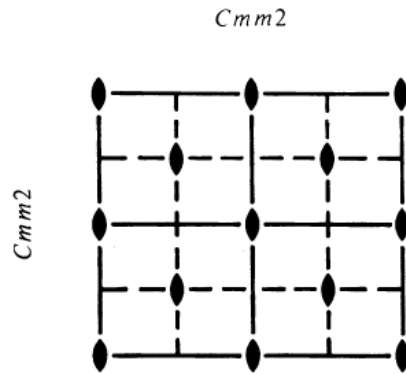
C_{2v}^{11}

$Cmm2$

$mm2$

Orthorhombic

Patterson symmetry $Cmmm$



Cmm2 continued from the International Tables

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}, \bar{y}, z (3) x, \bar{y}, z (4) \bar{x}, y, z

$hkl : h + k = 2n$

$0kl : k = 2n$

$h0l : h = 2n$

$hk0 : h + k = 2n$

$h00 : h = 2n$

$0k0 : k = 2n$

Special: as above, plus

4 *e* $m..$ $0, y, z$ $0, \bar{y}, z$

no extra conditions

4 *d* $.m.$ $x, 0, z$ $\bar{x}, 0, z$

no extra conditions

4 *c* $..2$ $\frac{1}{4}, \frac{1}{4}, z$ $\frac{1}{4}, \frac{3}{4}, z$

$hkl : h = 2n$

2 *b* $mm2$ $0, \frac{1}{2}, z$

no extra conditions

2 *a* $mm2$ $0, 0, z$

no extra conditions

Comparison of P222 and P₂₁2₁2 Spacegroups

*P*222

*D*₂¹

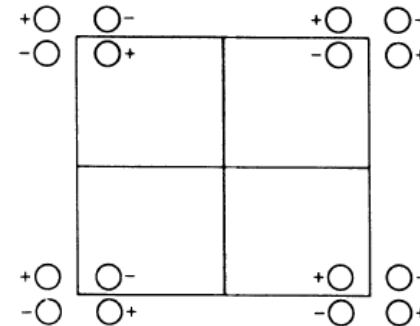
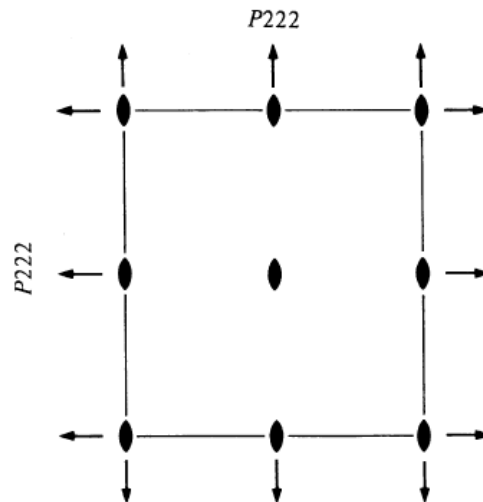
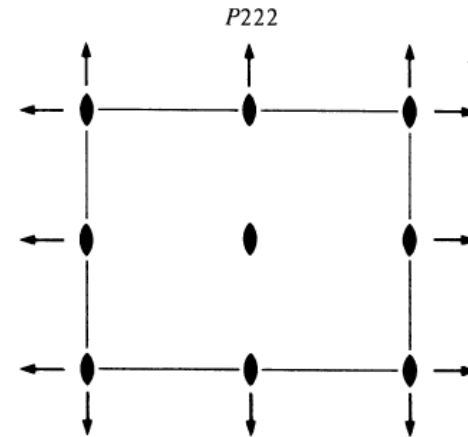
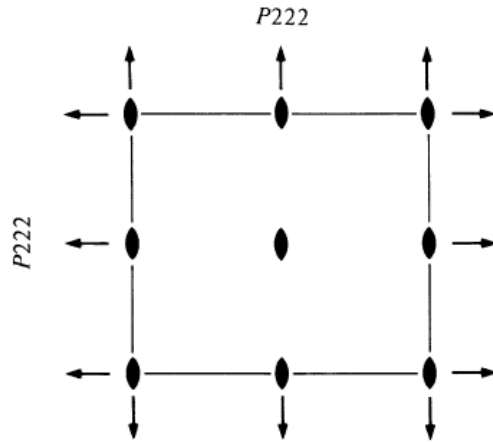
222

Orthorhombic

No. 16

*P*222

Patterson symmetry *Pmm*



$P2_12_12$

No. 18

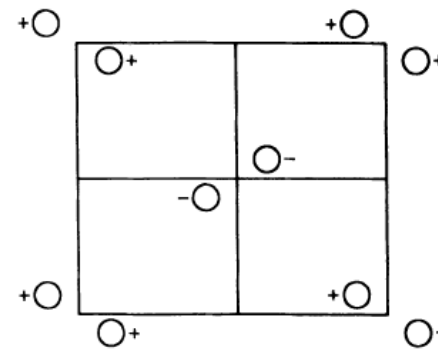
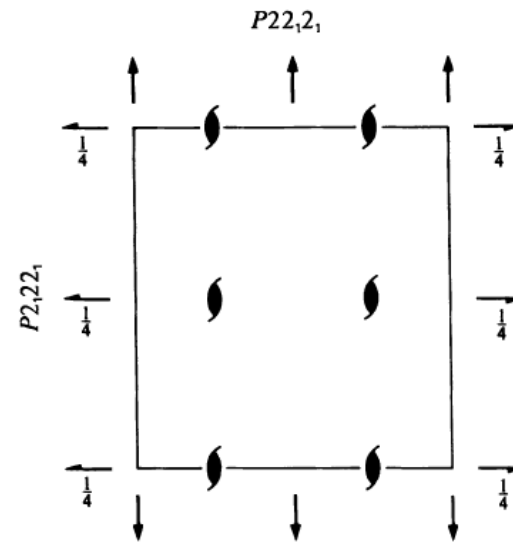
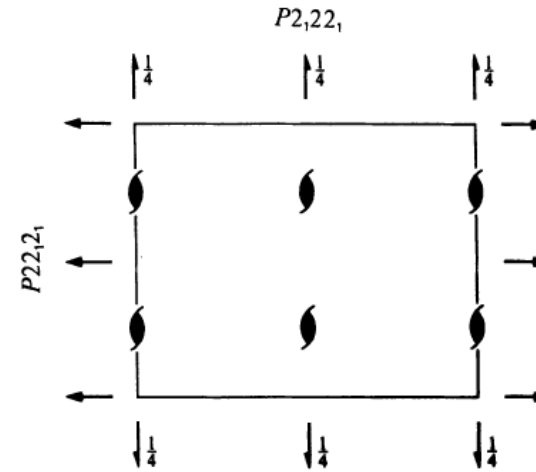
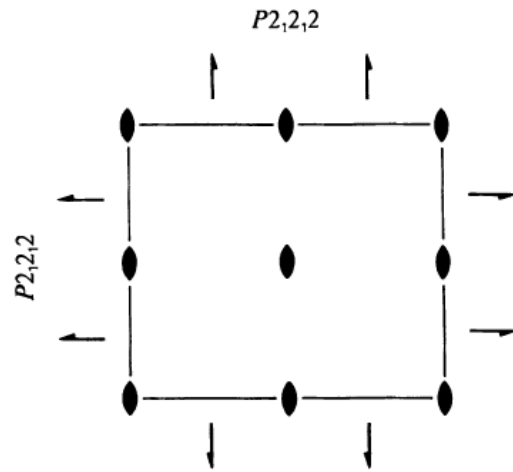
D_2^3

$P2_12_12$

222

Orthorhombic

Patterson symmetry $Pmmm$



$Ia\bar{3}d$

O_h^{10}

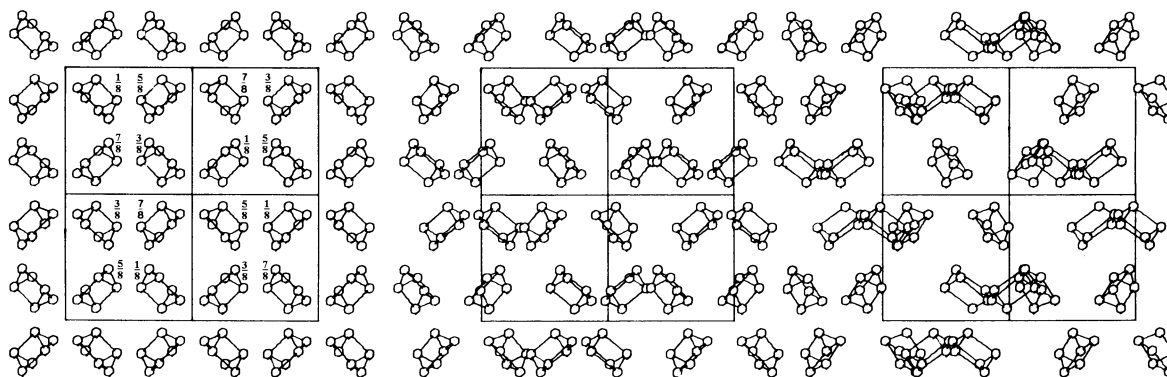
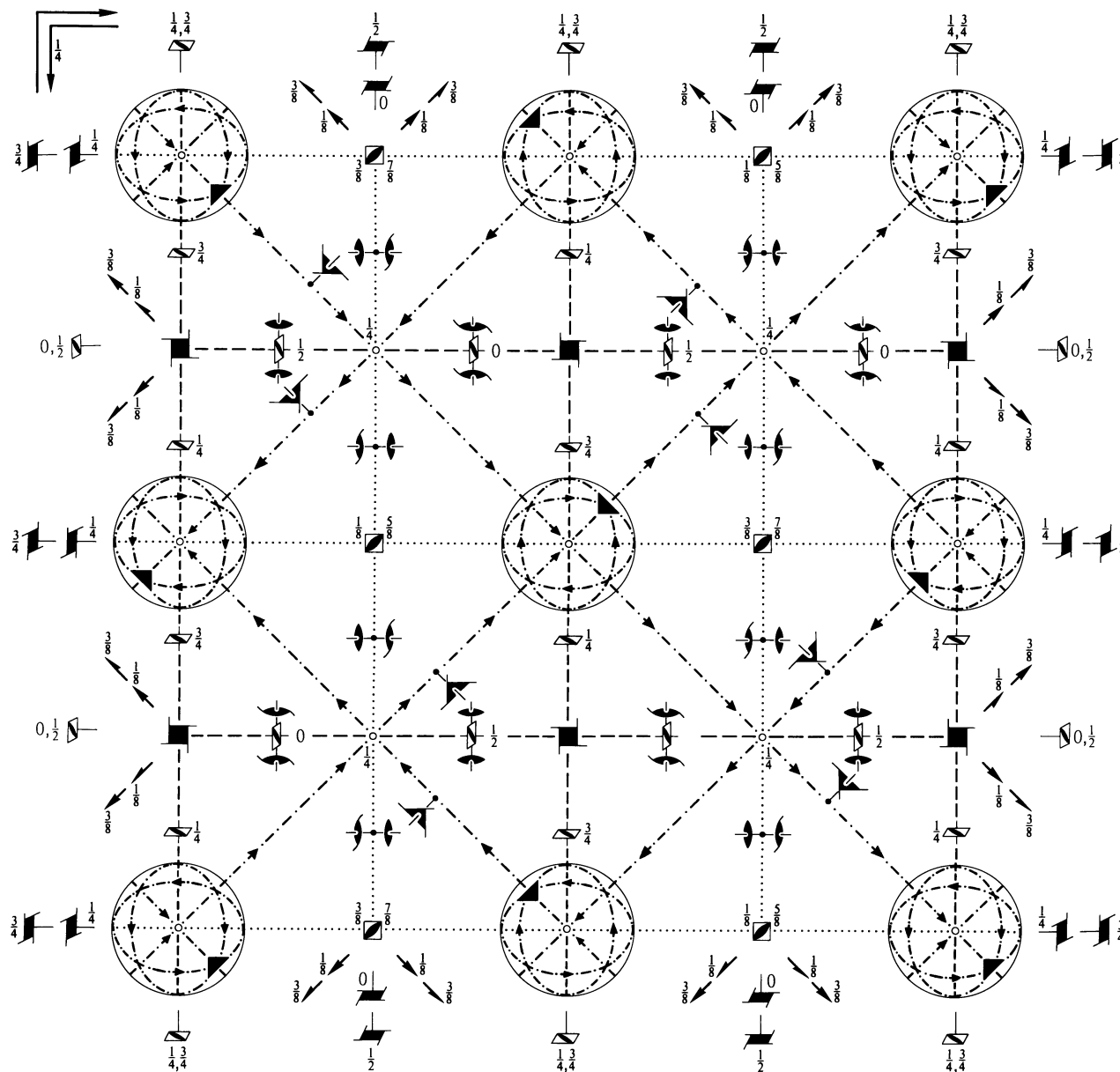
$m\bar{3}m$

Cubic

No. 230

$I 4_1/a \bar{3} 2/d$

Patterson symmetry $Im\bar{3}m$



Origin at centre ($\bar{3}$)

Asymmetric unit

$$-\frac{1}{2} \leq x \leq \frac{1}{2}; \quad -\frac{1}{2} \leq y \leq \frac{1}{2}; \quad 0 \leq z \leq \frac{1}{4}; \quad \max(x, -x, y, -y) \leq z$$

Vertices

$$0, 0, 0 \quad \frac{1}{2}, \frac{1}{2}, \frac{1}{4} \quad -\frac{1}{2}, \frac{1}{2}, \frac{1}{4} \quad -\frac{1}{2}, -\frac{1}{2}, \frac{1}{4} \quad \frac{1}{2}, -\frac{1}{2}, \frac{1}{4}$$

$$\frac{1}{2}, \frac{1}{2}, \frac{3}{4} \quad -\frac{1}{2}, \frac{1}{2}, \frac{3}{4} \quad -\frac{1}{2}, -\frac{1}{2}, \frac{3}{4} \quad \frac{1}{2}, -\frac{1}{2}, \frac{3}{4}$$

Symmetry operations

(given on page 715)

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); (5); (13); (25)**Positions**Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

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

Reflection conditions

 h,k,l permutable

General:

96	h	1	(1) x,y,z	(2) $\bar{x}+\frac{1}{2},\bar{y},z+\frac{1}{2}$	(3) $\bar{x},y+\frac{1}{2},\bar{z}+\frac{1}{2}$	(4) $x+\frac{1}{2},\bar{y}+\frac{1}{2},\bar{z}$	$hkl : h+k+l=2n$
			(5) z,x,y	(6) $z+\frac{1}{2},\bar{x}+\frac{1}{2},\bar{y}$	(7) $\bar{z}+\frac{1}{2},\bar{x},y+\frac{1}{2}$	(8) $\bar{z},x+\frac{1}{2},\bar{y}+\frac{1}{2}$	$Ok : k,l=2n$
			(9) y,z,x	(10) $\bar{y},z+\frac{1}{2},\bar{x}+\frac{1}{2}$	(11) $y+\frac{1}{2},\bar{z}+\frac{1}{2},\bar{x}$	(12) $\bar{y}+\frac{1}{2},\bar{z},x+\frac{1}{2}$	$hhl : 2h+l=4n$
			(13) $y+\frac{3}{4},x+\frac{1}{4},\bar{z}+\frac{1}{4}$	(14) $\bar{y}+\frac{3}{4},\bar{x}+\frac{3}{4},\bar{z}+\frac{3}{4}$	(15) $y+\frac{1}{4},\bar{x}+\frac{1}{4},z+\frac{3}{4}$	(16) $\bar{y}+\frac{1}{4},x+\frac{3}{4},z+\frac{1}{4}$	$h00 : h=4n$
			(17) $x+\frac{3}{4},z+\frac{1}{4},\bar{y}+\frac{1}{4}$	(18) $\bar{x}+\frac{1}{4},z+\frac{3}{4},y+\frac{1}{4}$	(19) $\bar{x}+\frac{3}{4},\bar{z}+\frac{3}{4},\bar{y}+\frac{3}{4}$	(20) $x+\frac{1}{4},\bar{z}+\frac{1}{4},y+\frac{3}{4}$	
			(21) $z+\frac{3}{4},y+\frac{1}{4},\bar{x}+\frac{1}{4}$	(22) $z+\frac{1}{4},\bar{y}+\frac{1}{4},x+\frac{3}{4}$	(23) $\bar{z}+\frac{1}{4},y+\frac{3}{4},x+\frac{1}{4}$	(24) $\bar{z}+\frac{3}{4},\bar{y}+\frac{3}{4},\bar{x}+\frac{3}{4}$	
			(25) \bar{x},\bar{y},\bar{z}	(26) $x+\frac{1}{2},y,\bar{z}+\frac{1}{2}$	(27) $x,\bar{y}+\frac{1}{2},z+\frac{1}{2}$	(28) $\bar{x}+\frac{1}{2},y+\frac{1}{2},z$	
			(29) \bar{z},\bar{x},\bar{y}	(30) $\bar{z}+\frac{1}{2},x+\frac{1}{2},y$	(31) $z+\frac{1}{2},x,\bar{y}+\frac{1}{2}$	(32) $z,\bar{x}+\frac{1}{2},y+\frac{1}{2}$	
			(33) \bar{y},\bar{z},\bar{x}	(34) $y,\bar{z}+\frac{1}{2},x+\frac{1}{2}$	(35) $\bar{y}+\frac{1}{2},z+\frac{1}{2},x$	(36) $y+\frac{1}{2},z,\bar{x}+\frac{1}{2}$	
			(37) $\bar{y}+\frac{1}{4},\bar{x}+\frac{3}{4},z+\frac{3}{4}$	(38) $y+\frac{1}{4},x+\frac{1}{4},z+\frac{1}{4}$	(39) $\bar{y}+\frac{3}{4},x+\frac{3}{4},\bar{z}+\frac{1}{4}$	(40) $y+\frac{3}{4},\bar{x}+\frac{1}{4},\bar{z}+\frac{3}{4}$	
			(41) $\bar{x}+\frac{1}{4},\bar{z}+\frac{3}{4},y+\frac{3}{4}$	(42) $x+\frac{3}{4},\bar{z}+\frac{1}{4},\bar{y}+\frac{3}{4}$	(43) $x+\frac{1}{4},z+\frac{1}{4},y+\frac{1}{4}$	(44) $\bar{x}+\frac{3}{4},z+\frac{3}{4},\bar{y}+\frac{1}{4}$	
			(45) $\bar{z}+\frac{1}{4},\bar{y}+\frac{3}{4},x+\frac{3}{4}$	(46) $\bar{z}+\frac{3}{4},y+\frac{3}{4},\bar{x}+\frac{1}{4}$	(47) $z+\frac{3}{4},\bar{y}+\frac{1}{4},\bar{x}+\frac{3}{4}$	(48) $z+\frac{1}{4},y+\frac{1}{4},x+\frac{1}{4}$	

Special: as above, plus

48	g	$\dots 2$	$\frac{1}{8},y,\bar{y}+\frac{1}{4}$	$\frac{3}{8},\bar{y},\bar{y}+\frac{3}{4}$	$\frac{7}{8},y+\frac{1}{2},y+\frac{1}{4}$	$\frac{5}{8},\bar{y}+\frac{1}{2},y+\frac{3}{4}$	$hkl : h=2n+1$
			$\bar{y}+\frac{1}{4},\frac{1}{8},y$	$\bar{y}+\frac{3}{4},\frac{3}{8},\bar{y}$	$y+\frac{1}{4},\frac{7}{8},y+\frac{1}{2}$	$y+\frac{3}{4},\frac{5}{8},\bar{y}+\frac{1}{2}$	or $h=4n$
			$y,\bar{y}+\frac{1}{4},\frac{1}{8}$	$\bar{y},\bar{y}+\frac{3}{4},\frac{3}{8}$	$y+\frac{1}{2},y+\frac{1}{4},\frac{7}{8}$	$\bar{y}+\frac{1}{2},y+\frac{3}{4},\frac{5}{8}$	
			$\frac{7}{8},\bar{y},y+\frac{3}{4}$	$\frac{5}{8},y,y+\frac{1}{4}$	$\frac{1}{8},\bar{y}+\frac{1}{2},\bar{y}+\frac{3}{4}$	$\frac{3}{8},y+\frac{1}{2},\bar{y}+\frac{1}{4}$	
			$y+\frac{3}{4},\frac{7}{8},\bar{y}$	$y+\frac{1}{4},\frac{5}{8},y$	$\bar{y}+\frac{3}{4},\frac{1}{8},\bar{y}+\frac{1}{2}$	$\bar{y}+\frac{1}{4},\frac{3}{8},y+\frac{1}{2}$	
			$\bar{y},y+\frac{3}{4},\frac{7}{8}$	$y,y+\frac{1}{4},\frac{5}{8}$	$\bar{y}+\frac{1}{2},\bar{y}+\frac{3}{4},\frac{1}{8}$	$y+\frac{1}{2},\bar{y}+\frac{1}{4},\frac{3}{8}$	

48	f	$2 \dots$	$x,0,\frac{1}{4}$	$\bar{x}+\frac{1}{2},0,\frac{3}{4}$	$\frac{1}{4},x,0$	$\frac{3}{4},\bar{x}+\frac{1}{2},0$	$0,\frac{1}{4},x$	$0,\frac{3}{4},\bar{x}+\frac{1}{2}$	$hkl : 2h+l=4n$
			$\frac{3}{4},x+\frac{1}{4},0$	$\frac{3}{4},\bar{x}+\frac{3}{4},\frac{1}{2}$	$x+\frac{3}{4},\frac{1}{2},\frac{1}{4}$	$\bar{x}+\frac{1}{4},0,\frac{1}{4}$	$0,\frac{1}{4},\bar{x}+\frac{1}{4}$	$\frac{1}{2},\frac{1}{4},x+\frac{3}{4}$	
			$\bar{x},0,\frac{3}{4}$	$x+\frac{1}{2},0,\frac{1}{4}$	$\frac{3}{4},\bar{x},0$	$\frac{1}{4},x+\frac{1}{2},0$	$0,\frac{3}{4},\bar{x}$	$0,\frac{1}{4},x+\frac{1}{2}$	
			$\frac{1}{4},\bar{x}+\frac{3}{4},0$	$\frac{1}{4},x+\frac{1}{4},\frac{1}{2}$	$\bar{x}+\frac{1}{4},\frac{1}{2},\frac{3}{4}$	$x+\frac{3}{4},0,\frac{3}{4}$	$0,\frac{3}{4},x+\frac{3}{4}$	$\frac{1}{2},\frac{3}{4},\bar{x}+\frac{1}{4}$	

32	e	$\dots 3$	x,x,x	$\bar{x}+\frac{1}{2},\bar{x},x+\frac{1}{2}$	$\bar{x},x+\frac{1}{2},\bar{x}+\frac{1}{2}$	$x+\frac{1}{2},\bar{x}+\frac{1}{2},\bar{x}$	$hkl : h=2n+1$
			$x+\frac{3}{4},x+\frac{1}{4},\bar{x}+\frac{1}{4}$	$\bar{x}+\frac{3}{4},\bar{x}+\frac{3}{4},\bar{x}+\frac{3}{4}$	$x+\frac{1}{4},\bar{x}+\frac{1}{4},x+\frac{3}{4}$	$\bar{x}+\frac{1}{4},x+\frac{3}{4},x+\frac{1}{4}$	or $h+k+l=4n$
			\bar{x},\bar{x},\bar{x}	$x+\frac{1}{2},x,\bar{x}+\frac{1}{2}$	$x,\bar{x}+\frac{1}{2},x+\frac{1}{2}$	$\bar{x}+\frac{1}{2},x+\frac{1}{2},x$	
			$\bar{x}+\frac{1}{4},\bar{x}+\frac{3}{4},x+\frac{3}{4}$	$x+\frac{1}{4},x+\frac{1}{4},x+\frac{1}{4}$	$\bar{x}+\frac{3}{4},x+\frac{3}{4},\bar{x}+\frac{1}{4}$	$x+\frac{3}{4},\bar{x}+\frac{1}{4},\bar{x}+\frac{3}{4}$	

24	d	$\bar{4} \dots$	$\frac{3}{8},0,\frac{1}{4}$	$\frac{1}{8},0,\frac{3}{4}$	$\frac{1}{4},\frac{3}{8},0$	$\frac{3}{4},\frac{1}{8},0$	$0,\frac{1}{4},\frac{3}{8}$	$0,\frac{3}{4},\frac{1}{8}$	$hkl : h,k=2n, h+k+l=4n$ or $h,k=2n+1, l=4n+2$ or $h=8n, k=8n+4$ and $h+k+l=4n+2$
			$\frac{3}{4},\frac{5}{8},0$	$\frac{3}{4},\frac{3}{8},\frac{1}{2}$	$\frac{1}{8},\frac{1}{2},\frac{1}{4}$	$\frac{7}{8},0,\frac{1}{4}$	$0,\frac{1}{4},\frac{7}{8}$	$\frac{1}{2},\frac{1}{4},\frac{1}{8}$	
24	c	$2 \dots 22$	$\frac{1}{8},0,\frac{1}{4}$	$\frac{3}{8},0,\frac{3}{4}$	$\frac{1}{4},\frac{1}{8},0$	$\frac{3}{4},\frac{3}{8},0$	$0,\frac{1}{4},\frac{1}{8}$	$0,\frac{3}{4},\frac{3}{8}$	
			$\frac{7}{8},0,\frac{3}{4}$	$\frac{5}{8},0,\frac{1}{4}$	$\frac{3}{4},\frac{7}{8},0$	$\frac{1}{4},\frac{5}{8},0$	$0,\frac{3}{4},\frac{7}{8}$	$0,\frac{1}{4},\frac{5}{8}$	

16	b	$\dots 32$	$\frac{1}{8},\frac{1}{8},\frac{1}{8}$	$\frac{3}{8},\frac{7}{8},\frac{5}{8}$	$\frac{7}{8},\frac{5}{8},\frac{3}{8}$	$\frac{5}{8},\frac{3}{8},\frac{7}{8}$	$\frac{7}{8},\frac{7}{8},\frac{7}{8}$	$\frac{5}{8},\frac{1}{8},\frac{3}{8}$	$\frac{1}{8},\frac{3}{8},\frac{5}{8}$	$\frac{3}{8},\frac{5}{8},\frac{1}{8}$	$hkl : h,k=2n+1, l=4n+2$ or $h,k,l=4n$
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16	a	$\dots \bar{3}$	$0,0,0$	$\frac{1}{2},0,\frac{1}{2}$	$0,\frac{1}{2},\frac{1}{2}$	$\frac{1}{2},\frac{1}{2},0$	$\frac{3}{4},\frac{1}{4},\frac{1}{4}$	$\frac{3}{4},\frac{3}{4},\frac{3}{4}$	$\frac{1}{4},\frac{1}{4},\frac{3}{4}$	$\frac{1}{4},\frac{3}{4},\frac{1}{4}$	$hkl : h,k=2n, h+k+l=4n$
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(Continued on page 715)

Symmetry of special projections

Along [001] $p4mm$
 $\mathbf{a}' = \frac{1}{2}\mathbf{a}$ $\mathbf{b}' = \frac{1}{2}\mathbf{b}$
 Origin at $\frac{1}{4}, 0, z$

Along [111] $p6mm$
 $\mathbf{a}' = \frac{1}{3}(2\mathbf{a} - \mathbf{b} - \mathbf{c})$ $\mathbf{b}' = \frac{1}{3}(-\mathbf{a} + 2\mathbf{b} - \mathbf{c})$
 Origin at x, x, x

Along [110] $c2mm$
 $\mathbf{a}' = \frac{1}{2}(-\mathbf{a} + \mathbf{b})$ $\mathbf{b}' = \frac{1}{2}\mathbf{c}$
 Origin at $x, x + \frac{1}{4}, \frac{1}{8}$

Maximal non-isomorphic subgroups

- | | | |
|----------|---|--|
| I | [2] $I\bar{4}3d$ (220) | (1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 37; 38; 39; 40; 41; 42; 43; 44; 45; 46; 47; 48)+ |
| | [2] $I4_132$ (214) | (1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 21; 22; 23; 24)+ |
| | [2] $Ia\bar{3}1$ ($Ia\bar{3}$, 206) | (1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 25; 26; 27; 28; 29; 30; 31; 32; 33; 34; 35; 36)+ |
| | { [3] $I4_1/a12/d$ ($I4_1/acd$, 142) | (1; 2; 3; 4; 13; 14; 15; 16; 25; 26; 27; 28; 37; 38; 39; 40)+ |
| | { [3] $I4_1/a12/d$ ($I4_1/acd$, 142) | (1; 2; 3; 4; 17; 18; 19; 20; 25; 26; 27; 28; 41; 42; 43; 44)+ |
| | { [3] $I4_1/a12/d$ ($I4_1/acd$, 142) | (1; 2; 3; 4; 21; 22; 23; 24; 25; 26; 27; 28; 45; 46; 47; 48)+ |
| | { [4] $I1\bar{3}2/d$ ($R\bar{3}c$, 167) | (1; 5; 9; 14; 19; 24; 25; 29; 33; 38; 43; 48)+ |
| | { [4] $I1\bar{3}2/d$ ($R\bar{3}c$, 167) | (1; 6; 12; 13; 18; 24; 25; 30; 36; 37; 42; 48)+ |
| | { [4] $I1\bar{3}2/d$ ($R\bar{3}c$, 167) | (1; 7; 10; 13; 19; 22; 25; 31; 34; 37; 43; 46)+ |
| | { [4] $I1\bar{3}2/d$ ($R\bar{3}c$, 167) | (1; 8; 11; 14; 18; 22; 25; 32; 35; 38; 42; 46)+ |

IIa none

IIb none

Maximal isomorphic subgroups of lowest index

IIc [27] $Ia\bar{3}d$ ($\mathbf{a}' = 3\mathbf{a}, \mathbf{b}' = 3\mathbf{b}, \mathbf{c}' = 3\mathbf{c}$) (230)

Minimal non-isomorphic supergroups

I none

II [4] $Pm\bar{3}n$ ($\mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}, \mathbf{c}' = \frac{1}{2}\mathbf{c}$) (223)

Symmetry operations

For (0,0,0)+ set

- | | | | |
|---|---|---|--|
| (1) 1 | (2) $2(0,0,\frac{1}{2})$ $\frac{1}{4}, 0, z$ | (3) $2(0,\frac{1}{2},0)$ $0, y, \frac{1}{4}$ | (4) $2(\frac{1}{2}, 0, 0)$ $x, \frac{1}{4}, 0$ |
| (5) $3^+ x, x, x$ | (6) $3^+ \bar{x} + \frac{1}{2}, x, \bar{x}$ | (7) $3^+ x + \frac{1}{2}, \bar{x} - \frac{1}{2}, \bar{x}$ | (8) $3^+ \bar{x}, \bar{x} + \frac{1}{2}, x$ |
| (9) $3^- x, x, x$ | (10) $3^- (-\frac{1}{3}, \frac{1}{3}, \frac{1}{3})$ $x + \frac{1}{6}, \bar{x} + \frac{1}{6}, \bar{x}$ | (11) $3^- (\frac{1}{3}, \frac{1}{3}, -\frac{1}{3})$ $\bar{x} + \frac{1}{3}, \bar{x} + \frac{1}{6}, x$ | (12) $3^- (-\frac{1}{3}, -\frac{1}{3}, \frac{1}{3})$ $\bar{x} - \frac{1}{6}, x + \frac{1}{3}, \bar{x}$ |
| (13) $2(\frac{1}{2}, \frac{1}{2}, 0)$ $x, x - \frac{1}{4}, \frac{3}{8}$ | (14) $2(x, \bar{x} + \frac{3}{4}, \frac{3}{8})$ | (15) $4^-(0, 0, \frac{3}{4})$ $\frac{1}{4}, 0, z$ | (16) $4^+(0, 0, \frac{1}{4})$ $-\frac{1}{4}, \frac{1}{2}, z$ |
| (17) $4^-(\frac{3}{4}, 0, 0)$ $x, \frac{1}{4}, 0$ | (18) $2(0, \frac{1}{2}, \frac{1}{2})$ $\frac{1}{8}, y + \frac{1}{4}, y$ | (19) $2(\frac{3}{8}, y + \frac{3}{4}, \bar{y})$ | (20) $4^+(\frac{1}{4}, 0, 0)$ $x, -\frac{1}{4}, \frac{1}{2}$ |
| (21) $4^+(0, \frac{1}{4}, 0)$ $\frac{1}{2}, y, -\frac{1}{4}$ | (22) $2(\frac{1}{2}, 0, \frac{1}{2})$ $x - \frac{1}{4}, \frac{1}{8}, x$ | (23) $4^-(0, \frac{3}{4}, 0)$ $0, y, \frac{1}{4}$ | (24) $2(\bar{x} + \frac{1}{4}, \frac{3}{8}, x)$ |
| (25) $\bar{1}$ $0, 0, 0$ | (26) a $x, y, \frac{1}{4}$ | (27) c $x, \frac{1}{4}, z$ | (28) b $\frac{1}{4}, y, z$ |
| (29) $\bar{3}^+ x, x, x; 0, 0, 0$ | (30) $\bar{3}^+ \bar{x} - \frac{1}{2}, x + 1, \bar{x}; 0, \frac{1}{2}, \frac{1}{2}$ | (31) $\bar{3}^+ x + \frac{1}{2}, \bar{x} + \frac{1}{2}, \bar{x}; \frac{1}{2}, \frac{1}{2}, 0$ | (32) $\bar{3}^+ \bar{x} + 1, \bar{x} + \frac{1}{2}, x; \frac{1}{2}, 0, \frac{1}{2}$ |
| (33) $\bar{3}^- x, x, x; 0, 0, 0$ | (34) $\bar{3}^- x + \frac{1}{2}, \bar{x} - \frac{1}{2}, \bar{x}; 0, 0, \frac{1}{2}$ | (35) $\bar{3}^- \bar{x}, \bar{x} + \frac{1}{2}, x; 0, \frac{1}{2}, 0$ | (36) $\bar{3}^- \bar{x} + \frac{1}{2}, x, \bar{x}; \frac{1}{2}, 0, 0$ |
| (37) $d(-\frac{1}{4}, \frac{1}{4}, \frac{3}{4})$ $x + \frac{1}{2}, \bar{x}, z$ | (38) $d(\frac{1}{4}, \frac{1}{4}, \frac{1}{4})$ x, x, z | (39) $\bar{4}^- 0, \frac{3}{4}, z; 0, \frac{3}{4}, \frac{1}{8}$ | (40) $\bar{4}^+ \frac{1}{2}, -\frac{1}{4}, z; \frac{1}{2}, -\frac{1}{4}, \frac{3}{8}$ |
| (41) $\bar{4}^- x, 0, \frac{3}{4}; \frac{1}{8}, 0, \frac{3}{4}$ | (42) $d(\frac{3}{4}, -\frac{1}{4}, \frac{1}{4})$ $x, y + \frac{1}{2}, \bar{y}$ | (43) $d(\frac{1}{4}, \frac{1}{4}, \frac{1}{4})$ x, y, y | (44) $\bar{4}^+ x, \frac{1}{2}, -\frac{1}{4}; \frac{3}{8}, \frac{1}{2}, -\frac{1}{4}$ |
| (45) $\bar{4}^+ -\frac{1}{4}, y, \frac{1}{2}; -\frac{1}{4}, \frac{3}{8}, \frac{1}{2}$ | (46) $d(\frac{1}{4}, \frac{3}{4}, -\frac{1}{4})$ $\bar{x} + \frac{1}{2}, y, x$ | (47) $\bar{4}^- \frac{3}{4}, y, 0; \frac{3}{4}, \frac{3}{8}, 0$ | (48) $d(\frac{1}{4}, \frac{1}{4}, \frac{1}{4})$ x, y, x |

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

- | | | | |
|---|--|---|--|
| (1) $t(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$ | (2) $2(0, \frac{1}{4}, z)$ | (3) $2(\frac{1}{4}, y, 0)$ | (4) $2(x, 0, \frac{1}{4})$ |
| (5) $3^+(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$ x, x, x | (6) $3^+(\frac{1}{6}, -\frac{1}{6}, \frac{1}{6})$ $\bar{x} - \frac{1}{6}, x + \frac{1}{3}, \bar{x}$ | (7) $3^+(\frac{1}{6}, \frac{1}{6}, \frac{1}{6})$ $x + \frac{1}{6}, \bar{x} + \frac{1}{6}, \bar{x}$ | (8) $3^+(\frac{1}{6}, \frac{1}{6}, -\frac{1}{6})$ $\bar{x} + \frac{1}{3}, \bar{x} + \frac{1}{6}, x$ |
| (9) $3^-(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$ x, x, x | (10) $3^-(\frac{1}{6}, -\frac{1}{6}, -\frac{1}{6})$ $x + \frac{1}{6}, \bar{x} + \frac{1}{6}, \bar{x}$ | (11) $3^-(\frac{1}{6}, -\frac{1}{6}, \frac{1}{6})$ $\bar{x} + \frac{1}{3}, \bar{x} + \frac{1}{6}, x$ | (12) $3^-(\frac{1}{6}, \frac{1}{6}, -\frac{1}{6})$ $\bar{x} - \frac{1}{6}, x + \frac{1}{3}, \bar{x}$ |
| (13) $2(\frac{1}{2}, \frac{1}{2}, 0)$ $x, x + \frac{1}{4}, \frac{3}{8}$ | (14) $2(x, \bar{x} + \frac{1}{4}, \frac{3}{8})$ | (15) $4^-(0, 0, \frac{1}{4})$ $\frac{3}{4}, 0, z$ | (16) $4^+(0, 0, \frac{3}{4})$ $\frac{1}{4}, \frac{1}{2}, z$ |
| (17) $4^-(\frac{1}{4}, 0, 0)$ $x, \frac{3}{4}, 0$ | (18) $2(0, \frac{1}{2}, \frac{1}{2})$ $\frac{3}{8}, y - \frac{1}{4}, y$ | (19) $2(\frac{1}{8}, y + \frac{1}{4}, \bar{y})$ | (20) $4^+(\frac{3}{4}, 0, 0)$ $x, \frac{1}{4}, \frac{1}{2}$ |
| (21) $4^+(0, \frac{3}{4}, 0)$ $\frac{1}{2}, y, \frac{1}{4}$ | (22) $2(\frac{1}{2}, 0, \frac{1}{2})$ $x + \frac{1}{4}, \frac{3}{8}, x$ | (23) $4^-(0, \frac{1}{4}, 0)$ $0, y, \frac{3}{4}$ | (24) $2(\bar{x} + \frac{1}{4}, \frac{1}{8}, x)$ |
| (25) $\bar{1}$ $\frac{1}{4}, \frac{1}{4}, \frac{1}{4}$ | (26) b $x, y, 0$ | (27) a $x, 0, z$ | (28) c $0, y, z$ |
| (29) $\bar{3}^+ x, x, x; \frac{1}{4}, \frac{1}{4}, \frac{1}{4}$ | (30) $\bar{3}^+ \bar{x} - \frac{1}{2}, x, \bar{x}; -\frac{1}{4}, -\frac{1}{4}, \frac{1}{4}$ | (31) $\bar{3}^+ x - \frac{1}{2}, \bar{x} + \frac{1}{2}, \bar{x}; -\frac{1}{4}, \frac{1}{4}, -\frac{1}{4}$ | (32) $\bar{3}^+ \bar{x}, \bar{x} - \frac{1}{2}, x; \frac{1}{4}, -\frac{1}{4}, -\frac{1}{4}$ |
| (33) $\bar{3}^- x, x, x; \frac{1}{4}, \frac{1}{4}, \frac{1}{4}$ | (34) $\bar{3}^- x + \frac{1}{2}, \bar{x} - \frac{1}{2}, \bar{x}; \frac{1}{4}, -\frac{1}{4}, \frac{1}{4}$ | (35) $\bar{3}^- \bar{x}, \bar{x} + \frac{1}{2}, x; -\frac{1}{4}, \frac{1}{4}, \frac{1}{4}$ | (36) $\bar{3}^- \bar{x} + \frac{1}{2}, x, \bar{x}; \frac{1}{4}, \frac{1}{4}, -\frac{1}{4}$ |
| (37) $d(\frac{1}{4}, -\frac{1}{4}, \frac{1}{4})$ $x + \frac{1}{2}, \bar{x}, z$ | (38) $d(\frac{3}{4}, \frac{1}{4}, \frac{3}{4})$ x, x, z | (39) $\bar{4}^- 0, \frac{1}{4}, z; 0, \frac{1}{4}, \frac{3}{8}$ | (40) $\bar{4}^+ \frac{1}{2}, \frac{1}{4}, z; \frac{1}{2}, \frac{1}{4}, \frac{3}{8}$ |
| (41) $\bar{4}^- x, 0, \frac{1}{4}; \frac{3}{8}, 0, \frac{1}{4}$ | (42) $d(\frac{1}{4}, \frac{1}{4}, -\frac{1}{4})$ $x, y + \frac{1}{2}, \bar{y}$ | (43) $d(\frac{3}{4}, \frac{3}{4}, \frac{3}{4})$ x, y, y | (44) $\bar{4}^+ x, \frac{1}{2}, \frac{1}{4}; \frac{1}{8}, \frac{1}{2}, \frac{1}{4}$ |
| (45) $\bar{4}^+ \frac{1}{4}, y, \frac{1}{2}; \frac{1}{4}, \frac{1}{8}, \frac{1}{2}$ | (46) $d(-\frac{1}{4}, \frac{1}{4}, \frac{1}{4})$ $\bar{x} + \frac{1}{2}, y, x$ | (47) $\bar{4}^- \frac{1}{4}, y, 0; \frac{1}{4}, \frac{3}{8}, 0$ | (48) $d(\frac{3}{4}, \frac{3}{4}, \frac{3}{4})$ x, y, x |