International Tables for Crystallography (2006). Vol. A1, Maximal subgroups of space group 11, pp. 103–105.

C_{2h}^2 $P12_1/m1$ No. 11 $P2_1/m$

UNIQUE AXIS b

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

General position

Multiplicity, Wyckoff letter, Site symmetry			Coordinates
4	f	1	(1) x,y,z (2) $\bar{x},y+\frac{1}{2},\bar{z}$ (3) $\bar{x},\bar{y},\bar{z}$ (4) $x,\bar{y}+\frac{1}{2},z$

I Maximal *translationengleiche* subgroups

[2] $P1m1$ (6)	1; 4	$0,1/4,0$
[2] $P12_11$ (4)	1; 2	
[2] $P\bar{1}$ (2)	1; 3	

II Maximal *klassengleiche* subgroups

- **Enlarged unit cell**

[2] $\mathbf{c}'=2\mathbf{c}$			
$P12_1/c1$ (14)	$\langle 3;\ 2+(0,0,1)\rangle$	$\mathbf{a},\mathbf{b},2\mathbf{c}$	
$P12_1/c1$ (14)	$\langle 2;\ 3+(0,0,1)\rangle$	$\mathbf{a},\mathbf{b},2\mathbf{c}$	$0,0,1/2$
$P12_1/m1$ (11)	$\langle 2;\ 3\rangle$	$\mathbf{a},\mathbf{b},2\mathbf{c}$	
$P12_1/m1$ (11)	$\langle (2;\ 3)+(0,0,1)\rangle$	$\mathbf{a},\mathbf{b},2\mathbf{c}$	$0,0,1/2$
[2] $\mathbf{a}'=2\mathbf{a}$			
$P12_1/a1$ (14, $P12_1/c1$)	$\langle 3;\ 2+(1,0,0)\rangle$	$-2\mathbf{a}-\mathbf{c},\mathbf{b},2\mathbf{a}$	
$P12_1/a1$ (14, $P12_1/c1$)	$\langle 2;\ 3+(1,0,0)\rangle$	$-2\mathbf{a}-\mathbf{c},\mathbf{b},2\mathbf{a}$	$1/2,0,0$
$P12_1/m1$ (11)	$\langle 2;\ 3\rangle$	$2\mathbf{a},\mathbf{b},\mathbf{c}$	
$P12_1/m1$ (11)	$\langle (2;\ 3)+(1,0,0)\rangle$	$2\mathbf{a},\mathbf{b},\mathbf{c}$	$1/2,0,0$
[2] $\mathbf{a}'=2\mathbf{a},\ \mathbf{c}'=2\mathbf{c}$			
$B12_1/e1$ (14, $P12_1/c1$)	$\langle 3;\ 2+(0,0,1)\rangle$	$\mathbf{a}-\mathbf{c},\mathbf{b},2\mathbf{c}$	
$B12_1/e1$ (14, $P12_1/c1$)	$\langle 2;\ 3+(0,0,1)\rangle$	$\mathbf{a}-\mathbf{c},\mathbf{b},2\mathbf{c}$	$0,0,1/2$
$B12_1/m1$ (11, $P12_1/m1$)	$\langle 2;\ 3\rangle$	$\mathbf{a}-\mathbf{c},\mathbf{b},2\mathbf{c}$	
$B12_1/m1$ (11, $P12_1/m1$)	$\langle (2;\ 3)+(0,0,1)\rangle$	$\mathbf{a}-\mathbf{c},\mathbf{b},2\mathbf{c}$	$0,0,1/2$
[3] $\mathbf{b}'=3\mathbf{b}$			
$P12_1/m1$ (11)	$\langle 3;\ 2+(0,1,0)\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	
$P12_1/m1$ (11)	$\langle 2+(0,1,0);\ 3+(0,2,0)\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	$0,1,0$
$P12_1/m1$ (11)	$\langle 2+(0,1,0);\ 3+(0,4,0)\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	$0,2,0$
[3] $\mathbf{c}'=3\mathbf{c}$			
$P12_1/m1$ (11)	$\langle 2;\ 3\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	
$P12_1/m1$ (11)	$\langle (2;\ 3)+(0,0,2)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	$0,0,1$
$P12_1/m1$ (11)	$\langle (2;\ 3)+(0,0,4)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	$0,0,2$
[3] $\mathbf{a}'=\mathbf{a}-\mathbf{c},\ \mathbf{c}'=3\mathbf{c}$			
$P12_1/m1$ (11)	$\langle 2;\ 3\rangle$	$\mathbf{a}-\mathbf{c},\mathbf{b},3\mathbf{c}$	
$P12_1/m1$ (11)	$\langle (2;\ 3)+(0,0,2)\rangle$	$\mathbf{a}-\mathbf{c},\mathbf{b},3\mathbf{c}$	$0,0,1$
$P12_1/m1$ (11)	$\langle (2;\ 3)+(0,0,4)\rangle$	$\mathbf{a}-\mathbf{c},\mathbf{b},3\mathbf{c}$	$0,0,2$
[3] $\mathbf{a}'=\mathbf{a}-2\mathbf{c},\ \mathbf{c}'=3\mathbf{c}$			
$P12_1/m1$ (11)	$\langle 2;\ 3\rangle$	$\mathbf{a}-2\mathbf{c},\mathbf{b},3\mathbf{c}$	
$P12_1/m1$ (11)	$\langle (2;\ 3)+(0,0,2)\rangle$	$\mathbf{a}-2\mathbf{c},\mathbf{b},3\mathbf{c}$	$0,0,1$
$P12_1/m1$ (11)	$\langle (2;\ 3)+(0,0,4)\rangle$	$\mathbf{a}-2\mathbf{c},\mathbf{b},3\mathbf{c}$	$0,0,2$
[3] $\mathbf{a}'=3\mathbf{a}$			
$P12_1/m1$ (11)	$\langle 2;\ 3\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	
$P12_1/m1$ (11)	$\langle (2;\ 3)+(2,0,0)\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	$1,0,0$
$P12_1/m1$ (11)	$\langle (2;\ 3)+(4,0,0)\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	$2,0,0$

- **Series of maximal isomorphic subgroups**

[p] $\mathbf{b}'=p\mathbf{b}$			
$P12_1/m1$ (11)	$\langle 2+(0,\frac{p}{2}-\frac{1}{2},0);\ 3+(0,2u,0)\rangle$	$\mathbf{a},p\mathbf{b},\mathbf{c}$	$0,u,0$
	$p>2;\ 0\le u<p$		
	p conjugate subgroups for the prime p		
[p] $\mathbf{a}'=\mathbf{a}-q\mathbf{c},\ \mathbf{c}'=p\mathbf{c}$			
$P12_1/m1$ (11)	$\langle (2;\ 3)+(0,0,2u)\rangle$	$\mathbf{a}-q\mathbf{c},\mathbf{b},p\mathbf{c}$	$0,0,u$
	$p>2;\ 0\le q<p;\ 0\le u<p$		
	p conjugate subgroups for each pair of q and prime p		
[p] $\mathbf{a}'=p\mathbf{a}$			
$P12_1/m1$ (11)	$\langle (2;\ 3)+(2u,0,0)\rangle$	$p\mathbf{a},\mathbf{b},\mathbf{c}$	$u,0,0$
	$p>2;\ 0\le u<p$		
	p conjugate subgroups for the prime p		

I Minimal *translationengleiche* supergroups

[2] *Pmma* (51); [2] *Pbcm* (57); [2] *Pmmn* (59); [2] *Pnma* (62); [2] *Cmcm* (63); [3] $P6_3/m$ (176)

II Minimal non-isomorphic *klassengleiche* supergroups

- **Additional centring translations**

[2] $C12/m1$ (12); [2] $A12/m1$ (12, $C12/m1$); [2] $I12/m1$ (12, $C12/m1$)

- **Decreased unit cell**

[2] $\mathbf{b}' = \frac{1}{2}\mathbf{b}$ $P12/m1$ (10)

 (*Continued from the facing page*)

I Minimal *translationengleiche* supergroups

[2] *Pmma* (51); [2] *Pbcm* (57); [2] *Pmmn* (59); [2] *Pnma* (62); [2] *Cmcm* (63); [3] $P6_3/m$ (176)

II Minimal non-isomorphic *klassengleiche* supergroups

- **Additional centring translations**

[2] $A112/m$ (12); [2] $B112/m$ (12, $A112/m$); [2] $I112/m$ (12, $A112/m$)

- **Decreased unit cell**

[2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P112/m$ (10)

UNIQUE AXIS c

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

General position

Multiplicity, Wyckoff letter, Site symmetry			Coordinates
4	f	1	(1) x,y,z (2) $\bar{x},\bar{y},z+\frac{1}{2}$ (3) $\bar{x},\bar{y},\bar{z}$ (4) $x,y,\bar{z}+\frac{1}{2}$

I Maximal *translationengleiche* subgroups

[2] $P11m$ (6)	1; 4	0,0,1/4
[2] $P112_1$ (4)	1; 2	
[2] $P\bar{1}$ (2)	1; 3	

II Maximal *klassengleiche* subgroups

- **Enlarged unit cell**

[2] $\mathbf{a}'=2\mathbf{a}$			
$P112_1/a$ (14)	$\langle 3;\ 2+(1,0,0)\rangle$	$2\mathbf{a},\mathbf{b},\mathbf{c}$	
$P112_1/a$ (14)	$\langle 2;\ 3+(1,0,0)\rangle$	$2\mathbf{a},\mathbf{b},\mathbf{c}$	1/2,0,0
$P112_1/m$ (11)	$\langle 2;\ 3\rangle$	$2\mathbf{a},\mathbf{b},\mathbf{c}$	
$P112_1/m$ (11)	$\langle (2;\ 3)+(1,0,0)\rangle$	$2\mathbf{a},\mathbf{b},\mathbf{c}$	1/2,0,0
[2] $\mathbf{b}'=2\mathbf{b}$			
$P112_1/b$ (14, $P112_1/a$)	$\langle 3;\ 2+(0,1,0)\rangle$	$2\mathbf{b},-\mathbf{a}-2\mathbf{b},\mathbf{c}$	
$P112_1/b$ (14, $P112_1/a$)	$\langle 2;\ 3+(0,1,0)\rangle$	$2\mathbf{b},-\mathbf{a}-2\mathbf{b},\mathbf{c}$	0,1/2,0
$P112_1/m$ (11)	$\langle 2;\ 3\rangle$	$\mathbf{a},2\mathbf{b},\mathbf{c}$	
$P112_1/m$ (11)	$\langle (2;\ 3)+(0,1,0)\rangle$	$\mathbf{a},2\mathbf{b},\mathbf{c}$	0,1/2,0
[2] $\mathbf{a}'=2\mathbf{a},\ \mathbf{b}'=2\mathbf{b}$			
$C112_1/e$ (14, $P112_1/a$)	$\langle 3;\ 2+(1,0,0)\rangle$	$2\mathbf{a},-\mathbf{a}+\mathbf{b},\mathbf{c}$	
$C112_1/e$ (14, $P112_1/a$)	$\langle 2;\ 3+(1,0,0)\rangle$	$2\mathbf{a},-\mathbf{a}+\mathbf{b},\mathbf{c}$	1/2,0,0
$C112_1/m$ (11, $P112_1/m$)	$\langle 2;\ 3\rangle$	$2\mathbf{a},-\mathbf{a}+\mathbf{b},\mathbf{c}$	
$C112_1/m$ (11, $P112_1/m$)	$\langle (2;\ 3)+(1,0,0)\rangle$	$2\mathbf{a},-\mathbf{a}+\mathbf{b},\mathbf{c}$	1/2,0,0
[3] $\mathbf{c}'=3\mathbf{c}$			
$P112_1/m$ (11)	$\langle 3;\ 2+(0,0,1)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	
$P112_1/m$ (11)	$\langle 2+(0,0,1);\ 3+(0,0,2)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	0,0,1
$P112_1/m$ (11)	$\langle 2+(0,0,1);\ 3+(0,0,4)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	0,0,2
[3] $\mathbf{a}'=3\mathbf{a}$			
$P112_1/m$ (11)	$\langle 2;\ 3\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	
$P112_1/m$ (11)	$\langle (2;\ 3)+(2,0,0)\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	1,0,0
$P112_1/m$ (11)	$\langle (2;\ 3)+(4,0,0)\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	2,0,0
[3] $\mathbf{a}'=3\mathbf{a},\ \mathbf{b}'=-\mathbf{a}+\mathbf{b}$			
$P112_1/m$ (11)	$\langle 2;\ 3\rangle$	$3\mathbf{a},-\mathbf{a}+\mathbf{b},\mathbf{c}$	
$P112_1/m$ (11)	$\langle (2;\ 3)+(2,0,0)\rangle$	$3\mathbf{a},-\mathbf{a}+\mathbf{b},\mathbf{c}$	1,0,0
$P112_1/m$ (11)	$\langle (2;\ 3)+(4,0,0)\rangle$	$3\mathbf{a},-\mathbf{a}+\mathbf{b},\mathbf{c}$	2,0,0
[3] $\mathbf{a}'=3\mathbf{a},\ \mathbf{b}'=-2\mathbf{a}+\mathbf{b}$			
$P112_1/m$ (11)	$\langle 2;\ 3\rangle$	$3\mathbf{a},-2\mathbf{a}+\mathbf{b},\mathbf{c}$	
$P112_1/m$ (11)	$\langle (2;\ 3)+(2,0,0)\rangle$	$3\mathbf{a},-2\mathbf{a}+\mathbf{b},\mathbf{c}$	1,0,0
$P112_1/m$ (11)	$\langle (2;\ 3)+(4,0,0)\rangle$	$3\mathbf{a},-2\mathbf{a}+\mathbf{b},\mathbf{c}$	2,0,0
[3] $\mathbf{b}'=3\mathbf{b}$			
$P112_1/m$ (11)	$\langle 2;\ 3\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	
$P112_1/m$ (11)	$\langle (2;\ 3)+(0,2,0)\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	0,1,0
$P112_1/m$ (11)	$\langle (2;\ 3)+(0,4,0)\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	0,2,0

- **Series of maximal isomorphic subgroups**

[p] $\mathbf{c}'=p\mathbf{c}$			
$P112_1/m$ (11)	$\langle 2+(0,0,\frac{p}{2}-\frac{1}{2});\ 3+(0,0,2u)\rangle$	$\mathbf{a},\mathbf{b},p\mathbf{c}$	$0,0,u$
	$p>2;\ 0\le u<p$		
	p conjugate subgroups for the prime p		
[p] $\mathbf{a}'=p\mathbf{a},\ \mathbf{b}'=-q\mathbf{a}+\mathbf{b}$			
$P112_1/m$ (11)	$\langle (2;\ 3)+(2u,0,0)\rangle$	$p\mathbf{a},-q\mathbf{a}+\mathbf{b},\mathbf{c}$	$u,0,0$
	$p>2;\ 0\le q<p;\ 0\le u<p$		
	p conjugate subgroups for each pair of q and prime p		
[p] $\mathbf{b}'=p\mathbf{b}$			
$P112_1/m$ (11)	$\langle (2;\ 3)+(0,2u,0)\rangle$	$\mathbf{a},p\mathbf{b},\mathbf{c}$	$0,u,0$
	$p>2;\ 0\le u<p$		
	p conjugate subgroups for the prime p		

(*Continued on the facing page*)

I Minimal *translationengleiche* supergroups

[2] *Pmma* (51); [2] *Pbcm* (57); [2] *Pmmn* (59); [2] *Pnma* (62); [2] *Cmcm* (63); [3] $P6_3/m$ (176)

II Minimal non-isomorphic *klassengleiche* supergroups

- **Additional centring translations**

[2] $C12/m1$ (12); [2] $A12/m1$ (12, $C12/m1$); [2] $I12/m1$ (12, $C12/m1$)

- **Decreased unit cell**

[2] $\mathbf{b}' = \frac{1}{2}\mathbf{b}$ $P12/m1$ (10)

 (*Continued from the facing page*)

I Minimal *translationengleiche* supergroups

[2] *Pmma* (51); [2] *Pbcm* (57); [2] *Pmmn* (59); [2] *Pnma* (62); [2] *Cmcm* (63); [3] $P6_3/m$ (176)

II Minimal non-isomorphic *klassengleiche* supergroups

- **Additional centring translations**

[2] $A112/m$ (12); [2] $B112/m$ (12, $A112/m$); [2] $I112/m$ (12, $A112/m$)

- **Decreased unit cell**

[2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P112/m$ (10)