C_{2h}^6 $C12/c1$ No. 15 $C2/c$

UNIQUE AXIS b, CELL CHOICE 1

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)

General position

Multiplicity, Wyckoff letter, Site symmetry	Coordinates $(0,0,0)+$ $(\frac{1}{2},\frac{1}{2},0)+$	
8 f 1	(1) x,y,z (2) $\bar{x},y,\bar{z}+\frac{1}{2}$ (3) $\bar{x},\bar{y},\bar{z}$ (4) $x,\bar{y},z+\frac{1}{2}$	

I Maximal *translationengleiche* subgroups

[2] $C1c1$ (9)	(1; 4)+		
[2] $C121$ (5)	(1; 2)+		$0,0,1/4$
[2] $C\bar{1}$ (2, $P\bar{1}$)	(1; 3)+	$1/2(\mathbf{a}-\mathbf{b}),1/2(\mathbf{a}+\mathbf{b}),\mathbf{c}$	

II Maximal *klassengleiche* subgroups

- **Loss of centring translations**

[2] $P12_1/n1$ (14, $P12_1/c1$)	1; 3; (2; 4)+$(\frac{1}{2},\frac{1}{2},0)$	$\mathbf{c},\mathbf{b},-\mathbf{a}-\mathbf{c}$	
[2] $P12_1/c1$ (14)	1; 4; (2; 3)+$(\frac{1}{2},\frac{1}{2},0)$		$1/4,1/4,0$
[2] $P12/c1$ (13)	1; 2; 3; 4		
[2] $P12/n1$ (13, $P12/c1$)	1; 2; (3; 4)+$(\frac{1}{2},\frac{1}{2},0)$	$\mathbf{c},\mathbf{b},-\mathbf{a}-\mathbf{c}$	$1/4,1/4,0$

- **Enlarged unit cell**

[3] $\mathbf{b}'=3\mathbf{b}$			
$C12/c1$ (15)	$\langle 2;\ 3\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	
$C12/c1$ (15)	$\langle 2;\ 3+(0,2,0)\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	$0,1,0$
$C12/c1$ (15)	$\langle 2;\ 3+(0,4,0)\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	$0,2,0$
[3] $\mathbf{c}'=3\mathbf{c}$			
$C12/c1$ (15)	$\langle 3;\ 2+(0,0,1)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	
$C12/c1$ (15)	$\langle 2+(0,0,3);\ 3+(0,0,2)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	$0,0,1$
$C12/c1$ (15)	$\langle 2+(0,0,5);\ 3+(0,0,4)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	$0,0,2$
[3] $\mathbf{a}'=\mathbf{a}-2\mathbf{c},\ \mathbf{c}'=3\mathbf{c}$			
$C12/c1$ (15)	$\langle 3;\ 2+(0,0,1)\rangle$	$\mathbf{a}-2\mathbf{c},\mathbf{b},3\mathbf{c}$	
$C12/c1$ (15)	$\langle 2+(0,0,3);\ 3+(0,0,2)\rangle$	$\mathbf{a}-2\mathbf{c},\mathbf{b},3\mathbf{c}$	$0,0,1$
$C12/c1$ (15)	$\langle 2+(0,0,5);\ 3+(0,0,4)\rangle$	$\mathbf{a}-2\mathbf{c},\mathbf{b},3\mathbf{c}$	$0,0,2$
[3] $\mathbf{a}'=\mathbf{a}-4\mathbf{c},\ \mathbf{c}'=3\mathbf{c}$			
$C12/c1$ (15)	$\langle 3;\ 2+(0,0,1)\rangle$	$\mathbf{a}-4\mathbf{c},\mathbf{b},3\mathbf{c}$	
$C12/c1$ (15)	$\langle 2+(0,0,3);\ 3+(0,0,2)\rangle$	$\mathbf{a}-4\mathbf{c},\mathbf{b},3\mathbf{c}$	$0,0,1$
$C12/c1$ (15)	$\langle 2+(0,0,5);\ 3+(0,0,4)\rangle$	$\mathbf{a}-4\mathbf{c},\mathbf{b},3\mathbf{c}$	$0,0,2$
[3] $\mathbf{a}'=3\mathbf{a}$			
$C12/c1$ (15)	$\langle 2;\ 3\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	
$C12/c1$ (15)	$\langle (2;\ 3)+(2,0,0)\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	$1,0,0$
$C12/c1$ (15)	$\langle (2;\ 3)+(4,0,0)\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	$2,0,0$

- **Series of maximal isomorphic subgroups**

[p] $\mathbf{b}'=p\mathbf{b}$			
$C12/c1$ (15)	$\langle 2;\ 3+(0,2u,0)\rangle$ prime $p>2$; $0\le u<p$ p conjugate subgroups	$\mathbf{a},p\mathbf{b},\mathbf{c}$	$0,u,0$
[p] $\mathbf{a}'=\mathbf{a}-2q\mathbf{c},\ \mathbf{c}'=p\mathbf{c}$			
$C12/c1$ (15)	$\langle 2+(0,0,\frac{p}{2}-\frac{1}{2}+2u);\ 3+(0,0,2u)\rangle$ prime $p>2$; $0\le q<p$; $0\le u<p$ p conjugate subgroups for each pair of q and p	$\mathbf{a}-2q\mathbf{c},\mathbf{b},p\mathbf{c}$	$0,0,u$
[p] $\mathbf{a}'=p\mathbf{a}$			
$C12/c1$ (15)	$\langle (2;\ 3)+(2u,0,0)\rangle$ prime $p>2$; $0\le u<p$ p conjugate subgroups	$p\mathbf{a},\mathbf{b},\mathbf{c}$	$u,0,0$

I Minimal *translationengleiche* supergroups

[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] $P\bar{3}12/c$ (163, $P\bar{3}1c$); [3] $P\bar{3}2/c1$ (165, $P\bar{3}c1$); [3] $R\bar{3}2/c$ (167, $R\bar{3}c$)

II Minimal non-isomorphic *klassengleiche* supergroups

- **Additional centring translations**

[2] $F12/m1$ (12, $C12/m1$)

- **Decreased unit cell**

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

$C2/c$ UNIQUE AXIS c No. 15

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I Minimal *translationengleiche* supergroups

[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] $P\bar{3}12/c$ (163, $P\bar{3}1c$); [3] $P\bar{3}2/c1$ (165, $P\bar{3}c1$); [3] $R\bar{3}2/c$ (167, $R\bar{3}c$)

II Minimal non-isomorphic *klassengleiche* supergroups

- **Additional centring translations**

[2] $F112/m$ (12, $A112/m$)

- **Decreased unit cell**

[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}$ $A112/m$ (12); [2] $\mathbf{b}' = \frac{1}{2}\mathbf{b}$, $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P112/a$ (13)

UNIQUE AXIS c, CELL CHOICE 1

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)

General position

Multiplicity, Wyckoff letter, Site symmetry		Coordinates $(0,0,0)+$ $(0,\frac{1}{2},\frac{1}{2})+$
8	f 1	(1) x,y,z (2) $\bar{x}+\frac{1}{2},\bar{y},z$ (3) $\bar{x},\bar{y},\bar{z}$ (4) $x+\frac{1}{2},y,\bar{z}$

I Maximal *translationengleiche* subgroups

[2] $A11a$ (9)	(1; 4)+		
[2] $A112$ (5)	(1; 2)+		$1/4,0,0$
[2] $A\bar{1}$ $(2, P\bar{1})$	(1; 3)+	$\mathbf{a}, 1/2(\mathbf{b}-\mathbf{c}), 1/2(\mathbf{b}+\mathbf{c})$	

II Maximal *klassengleiche* subgroups

- **Loss of centring translations**

[2] $P112_1/n$ $(14, P112_1/a)$	1; 3; $(2; 4)+(0,\frac{1}{2},\frac{1}{2})$	$-\mathbf{a}-\mathbf{b},\mathbf{a},\mathbf{c}$	
[2] $P112_1/a$ (14)	1; 4; $(2; 3)+(0,\frac{1}{2},\frac{1}{2})$		$0,1/4,1/4$
[2] $P112/a$ (13)	1; 2; 3; 4		
[2] $P112/n$ $(13, P112/a)$	1; 2; $(3; 4)+(0,\frac{1}{2},\frac{1}{2})$	$-\mathbf{a}-\mathbf{b},\mathbf{a},\mathbf{c}$	$0,1/4,1/4$

- **Enlarged unit cell**

[3] $\mathbf{c}'=3\mathbf{c}$			
$A112/a$ (15)	$\langle 2;\ 3\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	
$A112/a$ (15)	$\langle 2;\ 3+(0,0,2)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	$0,0,1$
$A112/a$ (15)	$\langle 2;\ 3+(0,0,4)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	$0,0,2$
[3] $\mathbf{a}'=3\mathbf{a}$			
$A112/a$ (15)	$\langle 3;\ 2+(1,0,0)\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	
$A112/a$ (15)	$\langle 2+(3,0,0);\ 3+(2,0,0)\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	$1,0,0$
$A112/a$ (15)	$\langle 2+(5,0,0);\ 3+(4,0,0)\rangle$	$3\mathbf{a},\mathbf{b},\mathbf{c}$	$2,0,0$
[3] $\mathbf{a}'=3\mathbf{a},\ \mathbf{b}'=-2\mathbf{a}+\mathbf{b}$			
$A112/a$ (15)	$\langle 3;\ 2+(1,0,0)\rangle$	$3\mathbf{a},-2\mathbf{a}+\mathbf{b},\mathbf{c}$	
$A112/a$ (15)	$\langle 2+(3,0,0);\ 3+(2,0,0)\rangle$	$3\mathbf{a},-2\mathbf{a}+\mathbf{b},\mathbf{c}$	$1,0,0$
$A112/a$ (15)	$\langle 2+(5,0,0);\ 3+(4,0,0)\rangle$	$3\mathbf{a},-2\mathbf{a}+\mathbf{b},\mathbf{c}$	$2,0,0$
[3] $\mathbf{a}'=3\mathbf{a},\ \mathbf{b}'=-4\mathbf{a}+\mathbf{b}$			
$A112/a$ (15)	$\langle 3;\ 2+(1,0,0)\rangle$	$3\mathbf{a},-4\mathbf{a}+\mathbf{b},\mathbf{c}$	
$A112/a$ (15)	$\langle 2+(3,0,0);\ 3+(2,0,0)\rangle$	$3\mathbf{a},-4\mathbf{a}+\mathbf{b},\mathbf{c}$	$1,0,0$
$A112/a$ (15)	$\langle 2+(5,0,0);\ 3+(4,0,0)\rangle$	$3\mathbf{a},-4\mathbf{a}+\mathbf{b},\mathbf{c}$	$2,0,0$
[3] $\mathbf{b}'=3\mathbf{b}$			
$A112/a$ (15)	$\langle 2;\ 3\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	
$A112/a$ (15)	$\langle (2;\ 3)+(0,2,0)\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	$0,1,0$
$A112/a$ (15)	$\langle (2;\ 3)+(0,4,0)\rangle$	$\mathbf{a},3\mathbf{b},\mathbf{c}$	$0,2,0$

- **Series of maximal isomorphic subgroups**

[p] $\mathbf{c}'=p\mathbf{c}$			
$A112/a$ (15)	$\langle 2;\ 3+(0,0,2u)\rangle$ prime $p>2$; $0\le u<p$ p conjugate subgroups	$\mathbf{a},\mathbf{b},p\mathbf{c}$	$0,0,u$
[p] $\mathbf{a}'=p\mathbf{a},\ \mathbf{b}'=-2q\mathbf{a}+\mathbf{b}$			
$A112/a$ (15)	$\langle 2+(\frac{p}{2}-\frac{1}{2}+2u,0,0);\ 3+(2u,0,0)\rangle$ prime $p>2$; $0\le q<p$; $0\le u<p$ p conjugate subgroups for each pair of q and p	$p\mathbf{a},-2q\mathbf{a}+\mathbf{b},\mathbf{c}$	$u,0,0$
[p] $\mathbf{b}'=p\mathbf{b}$			
$A112/a$ (15)	$\langle (2;\ 3)+(0,2u,0)\rangle$ prime $p>2$; $0\le u<p$ p conjugate subgroups	$\mathbf{a},p\mathbf{b},\mathbf{c}$	$0,u,0$

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I Minimal *translationengleiche* supergroups

[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] $P\bar{3}12/c$ (163, $P\bar{3}1c$); [3] $P\bar{3}2/c1$ (165, $P\bar{3}c1$); [3] $R\bar{3}2/c$ (167, $R\bar{3}c$)

II Minimal non-isomorphic *klassengleiche* supergroups

- **Additional centring translations**

[2] $F12/m1$ (12, $C12/m1$)

- **Decreased unit cell**

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

$C2/c$ UNIQUE AXIS c No. 15

(*Continued from the facing page*)

I Minimal *translationengleiche* supergroups

[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] $P\bar{3}12/c$ (163, $P\bar{3}1c$); [3] $P\bar{3}2/c1$ (165, $P\bar{3}c1$); [3] $R\bar{3}2/c$ (167, $R\bar{3}c$)

II Minimal non-isomorphic *klassengleiche* supergroups

- **Additional centring translations**

[2] $F112/m$ (12, $A112/m$)

- **Decreased unit cell**

[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}$ $A112/m$ (12); [2] $\mathbf{b}' = \frac{1}{2}\mathbf{b}$, $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $P112/a$ (13)