$P4/m$ No. 83 $P4/m$ C_{4h}^{1}

Generators selected (1); $t(1,0,0)$; $t(0,1,0)$; $t(0,0,1)$; (2); (3); (5)

General position

Multiplicity, Wyckoff letter, Site symmetry	Coordinates			
8 l 1	(1) x,y,z	(2) $\bar{x},\bar{y},z$	(3) $\bar{y},x,z$	(4) $y,\bar{x},z$
	(5) $\bar{x},\bar{y},\bar{z}$	(6) $x,y,\bar{z}$	(7) $y,\bar{x},\bar{z}$	(8) $\bar{y},x,\bar{z}$

I Maximal *translationengleiche* subgroups

[2] $P\bar{4}$ (81)	1; 2; 7; 8	
[2] $P4$ (75)	1; 2; 3; 4	
[2] $P2/m$ (10, $P112/m$)	1; 2; 5; 6	

II Maximal *klassengleiche* subgroups

- **Enlarged unit cell**

[2] $\mathbf{c}' = 2\mathbf{c}$			
$P4_2/m$ (84)	$\langle 2;\ 5;\ 3+(0,0,1)\rangle$	$\mathbf{a},\mathbf{b},2\mathbf{c}$	
$P4_2/m$ (84)	$\langle 2;\ (3;\ 5)+(0,0,1)\rangle$	$\mathbf{a},\mathbf{b},2\mathbf{c}$	$0,0,1/2$
$P4/m$ (83)	$\langle 2;\ 3;\ 5\rangle$	$\mathbf{a},\mathbf{b},2\mathbf{c}$	
$P4/m$ (83)	$\langle 2;\ 3;\ 5+(0,0,1)\rangle$	$\mathbf{a},\mathbf{b},2\mathbf{c}$	$0,0,1/2$
[2] $\mathbf{a}' = 2\mathbf{a},\ \mathbf{b}' = 2\mathbf{b}$			
$C4/e$ (85, $P4/n$)	$\langle 2;\ 3;\ 5+(1,0,0)\rangle$	$\mathbf{a}-\mathbf{b},\mathbf{a}+\mathbf{b},\mathbf{c}$	$1/2,0,0$
$C4/e$ (85, $P4/n$)	$\langle 2+(1,1,0);\ 3+(1,0,0);\ 5+(0,1,0)\rangle$	$\mathbf{a}-\mathbf{b},\mathbf{a}+\mathbf{b},\mathbf{c}$	$0,1/2,0$
$C4/m$ (83, $P4/m$)	$\langle 2;\ 3;\ 5\rangle$	$\mathbf{a}-\mathbf{b},\mathbf{a}+\mathbf{b},\mathbf{c}$	
$C4/m$ (83, $P4/m$)	$\langle (2;\ 5)+(1,1,0);\ 3+(1,0,0)\rangle$	$\mathbf{a}-\mathbf{b},\mathbf{a}+\mathbf{b},\mathbf{c}$	$1/2,1/2,0$
[2] $\mathbf{a}' = 2\mathbf{a},\ \mathbf{b}' = 2\mathbf{b},\ \mathbf{c}' = 2\mathbf{c}$			
$F4/m$ (87, $I4/m$)	$\langle 2;\ 3;\ 5\rangle$	$\mathbf{a}-\mathbf{b},\mathbf{a}+\mathbf{b},2\mathbf{c}$	
$F4/m$ (87, $I4/m$)	$\langle 2;\ 3;\ 5+(0,0,1)\rangle$	$\mathbf{a}-\mathbf{b},\mathbf{a}+\mathbf{b},2\mathbf{c}$	$0,0,1/2$
$F4/m$ (87, $I4/m$)	$\langle (2;\ 5)+(1,1,0);\ 3+(1,0,0)\rangle$	$\mathbf{a}-\mathbf{b},\mathbf{a}+\mathbf{b},2\mathbf{c}$	$1/2,1/2,0$
$F4/m$ (87, $I4/m$)	$\langle 2+(1,1,0);\ 3+(1,0,0);\ 5+(1,1,1)\rangle$	$\mathbf{a}-\mathbf{b},\mathbf{a}+\mathbf{b},2\mathbf{c}$	$1/2,1/2,1/2$
[3] $\mathbf{c}' = 3\mathbf{c}$			
$P4/m$ (83)	$\langle 2;\ 3;\ 5\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	
$P4/m$ (83)	$\langle 2;\ 3;\ 5+(0,0,2)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	$0,0,1$
$P4/m$ (83)	$\langle 2;\ 3;\ 5+(0,0,4)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	$0,0,2$

- **Series of maximal isomorphic subgroups**

[p] $\mathbf{c}' = p\mathbf{c}$			
$P4/m$ (83)	$\langle 2;\ 3;\ 5+(0,0,2u)\rangle$ prime $p>2$; $0\le u<p$ p conjugate subgroups	$\mathbf{a},\mathbf{b},p\mathbf{c}$	$0,0,u$
[p^2] $\mathbf{a}' = p\mathbf{a},\ \mathbf{b}' = p\mathbf{b}$			
$P4/m$ (83)	$\langle (2;\ 5)+(2u,2v,0);\ 3+(u+v,-u+v,0)\rangle$ prime $p>2$; $0\le u<p$; $0\le v<p$ p^2 conjugate subgroups for $p=4n-1$	$p\mathbf{a},p\mathbf{b},\mathbf{c}$	$u,v,0$
[$p=q^2+r^2$] $\mathbf{a}' = q\mathbf{a}-r\mathbf{b},\ \mathbf{b}' = r\mathbf{a}+q\mathbf{b}$			
$P4/m$ (83)	$\langle (2;\ 5)+(2u,0,0);\ 3+(u,-u,0)\rangle$ prime $p>4$; $q>0$; $r>0$; $0\le u<p$ p conjugate subgroups for $p=4n+1$	$q\mathbf{a}-r\mathbf{b},r\mathbf{a}+q\mathbf{b},\mathbf{c}$	$u,0,0$

I Minimal *translationengleiche* supergroups

[2] $P4/mmm$ (123); [2] $P4/mcc$ (124); [2] $P4/mbm$ (127); [2] $P4/mnc$ (128)

II Minimal non-isomorphic *klassengleiche* supergroups

- **Additional centring translations**

[2] $I4/m$ (87)

- **Decreased unit cell** none

