S_4^2 $I\bar{4}$ No. 82 $I\bar{4}$

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)

General position

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

I Maximal *translationengleiche* subgroups

[2] $I2$ (5, $A112$)	$(1;\ 2)+$	$\mathbf{b},-\mathbf{a}-\mathbf{b},\mathbf{c}$	

II Maximal *klassengleiche* subgroups

- **Loss of centring translations**

[2] $P\bar{4}$ (81)	1; 2; 3; 4		
[2] $P\bar{4}$ (81)	1; 2; $(3;\ 4)+(\frac{1}{2},\frac{1}{2},\frac{1}{2})$		$1/2,0,1/4$

- **Enlarged unit cell**

[3] $\mathbf{c}'=3\mathbf{c}$

$I\bar{4}$ (82)	$\langle 2;\ 3\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	
$I\bar{4}$ (82)	$\langle 2;\ 3+(0,0,2)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	$0,0,1$
$I\bar{4}$ (82)	$\langle 2;\ 3+(0,0,4)\rangle$	$\mathbf{a},\mathbf{b},3\mathbf{c}$	$0,0,2$

- **Series of maximal isomorphic subgroups**

[p] $\mathbf{c}'=p\mathbf{c}$

$I\bar{4}$ (82)	$\langle 2;\ 3+(0,0,2u)\rangle$ $p>2;\ 0\le u<p$ p conjugate subgroups for the prime p	$\mathbf{a},\mathbf{b},p\mathbf{c}$	$0,0,u$

[p^2] $\mathbf{a}'=p\mathbf{a},\ \mathbf{b}'=p\mathbf{b}$

$I\bar{4}$ (82)	$\langle 2+(2u,2v,0);\ 3+(u-v,u+v,0)\rangle$ $p>2;\ 0\le u<p;\ 0\le v<p$ p^2 conjugate subgroups for prime $p\equiv 3\ (\mathrm{mod}\ 4)$	$p\mathbf{a},p\mathbf{b},\mathbf{c}$	$u,v,0$

[$p=q^2+r^2$] $\mathbf{a}'=q\mathbf{a}-r\mathbf{b},\ \mathbf{b}'=r\mathbf{a}+q\mathbf{b}$

$I\bar{4}$ (82)	$\langle 2+(2u,0,0);\ 3+(u,u,0)\rangle$ $q>0;\ r>0;\ p>4;\ 0\le u<p$ p conjugate subgroups for prime $p\equiv 1\ (\mathrm{mod}\ 4)$	$q\mathbf{a}-r\mathbf{b},r\mathbf{a}+q\mathbf{b},\mathbf{c}$	$u,0,0$

I Minimal *translationengleiche* supergroups

[2] $I4/m$ (87); [2] $I4_1/a$ (88); [2] $I\bar{4}m2$ (119); [2] $I\bar{4}c2$ (120); [2] $I\bar{4}2m$ (121); [2] $I\bar{4}2d$ (122)

II Minimal non-isomorphic *klassengleiche* supergroups

- **Additional centring translations** none

- **Decreased unit cell**

[2] $\mathbf{c}'=\frac{1}{2}\mathbf{c}$ $C\bar{4}$ (81, $P\bar{4}$)