

$I4_122$

No. 98

 $I4_122$
 D_4^{10}
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)

General position

 Multiplicity,
Wyckoff letter,
Site symmetry

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

16	g	1	(1) x,y,z	(2) $\bar{x}+\frac{1}{2},\bar{y}+\frac{1}{2},z+\frac{1}{2}$	(3) $\bar{y},x+\frac{1}{2},z+\frac{1}{4}$	(4) $y+\frac{1}{2},\bar{x},z+\frac{3}{4}$
			(5) $\bar{x}+\frac{1}{2},y,\bar{z}+\frac{3}{4}$	(6) $x,\bar{y}+\frac{1}{2},\bar{z}+\frac{1}{4}$	(7) $y+\frac{1}{2},x+\frac{1}{2},\bar{z}+\frac{1}{2}$	(8) \bar{y},\bar{x},\bar{z}

I Maximal translationengleiche subgroups

[2] $I4_111$ (80, $I4_1$)	(1; 2; 3; 4)+	
[2] $I2_121$ (24, $I2_12_12_1$)	(1; 2; 5; 6)+	0, 1/4, 3/8
[2] $I2_112$ (22, $F222$)	(1; 2; 7; 8)+	$\mathbf{a-b, a+b, c}$

II Maximal klassengleiche subgroups

• Loss of centring translations

[2] $P4_32_12$ (96)	1; 2; 7; 8; (3; 4; 5; 6) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	1/4, 3/4, 1/4
[2] $P4_322$ (95)	1; 2; 5; 6; (3; 4; 7; 8) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	1/4, 1/4, 3/8
[2] $P4_12_12$ (92)	1; 2; 3; 4; (5; 6; 7; 8) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	1/4, 1/4, 0
[2] $P4_122$ (91)	1; 2; 3; 4; 5; 6; 7; 8	3/4, 1/4, 3/8

• Enlarged unit cell

[3] $\mathbf{c}' = 3\mathbf{c}$		
$\left\{ \begin{array}{l} I4_122 \text{ (98)} \\ I4_122 \text{ (98)} \\ I4_122 \text{ (98)} \end{array} \right.$	$\langle 2 + (1,0,1); 3 + (\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}); 5 + (1,0,2) \rangle$ $\langle 2 + (1,0,1); 3 + (\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}); 5 + (1,0,4) \rangle$ $\langle 2 + (1,0,1); 3 + (\frac{1}{2}, -\frac{1}{2}, \frac{1}{2}); 5 + (1,0,6) \rangle$	$\mathbf{a, b, 3c}$ $\mathbf{a, b, 3c}$ $\mathbf{a, b, 3c}$
		1/2, 0, 1/4 1/2, 0, 5/4 1/2, 0, 9/4

• Series of maximal isomorphic subgroups

[p] $\mathbf{c}' = p\mathbf{c}$		
$I4_122$ (98)	$\langle 2 + (1,0,\frac{p}{2} - \frac{1}{2}); 3 + (\frac{1}{2}, \frac{1}{2} - 1, \frac{1}{2} + \frac{p}{4} - \frac{3}{4}); 5 + (1,0,\frac{3p}{4} - \frac{1}{4} + 2u) \rangle$ $p > 2; 0 \leq u < p$ p conjugate subgroups for prime $p \equiv 3 \pmod{4}$	$\mathbf{a, b, pc}$
$I4_122$ (98)	$\langle 2 + (0,0,\frac{p}{2} - \frac{1}{2}); 3 + (0,0,\frac{p}{4} - \frac{1}{4}); 5 + (0,0,\frac{3p}{4} - \frac{3}{4} + 2u) \rangle$ $p > 4; 0 \leq u < p$ p conjugate subgroups for prime $p \equiv 1 \pmod{4}$	$\mathbf{a, b, pc}$
		1/2, 0, 1/4 + u 0, 0, u
[p ²] $\mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}$		
$I4_122$ (98)	$\langle 2 + (\frac{p}{2} - \frac{1}{2} + 2u, \frac{p}{2} - \frac{1}{2} + 2v, 0); 3 + (u+v, \frac{p}{2} - \frac{1}{2} - u + v, 0); 5 + (\frac{p}{2} - \frac{1}{2} + 2u, 0, 0) \rangle$ $p > 2; 0 \leq u < p; 0 \leq v < p$ p^2 conjugate subgroups for the prime p	$p\mathbf{a}, p\mathbf{b}, \mathbf{c}$
		u, v, 0

I Minimal translationengleiche supergroups

 [2] $I4_1/amd$ (141); [2] $I4_1/acd$ (142); [3] $F4_132$ (210); [3] $I4_132$ (214)

II Minimal non-isomorphic klassengleiche supergroups

• Additional centring translations

none

• Decreased unit cell

 [2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ $C4_222$ (93, $P4_222$)