

D_2^8

I222

No. 23

I222

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 k 1(1) x,y,z (2) \bar{x},\bar{y},z (3) \bar{x},y,\bar{z} (4) x,\bar{y},\bar{z} I Maximal *translationengleiche* subgroups

[2] I112 (5, A112)	(1; 2)+	$\mathbf{b}, -\mathbf{a} - \mathbf{b}, \mathbf{c}$
[2] I121 (5, C121)	(1; 3)+	$-\mathbf{a} - \mathbf{c}, \mathbf{b}, \mathbf{a}$
[2] I211 (5, C121)	(1; 4)+	$-\mathbf{b} - \mathbf{c}, \mathbf{a}, \mathbf{c}$

II Maximal *klassengleiche* subgroups

• Loss of centring translations

[2] P2 ₁ 2 ₁ 2 (18)	1; 2; (3; 4) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$		0, 0, 1/4
[2] P2 ₁ 22 ₁ (18, P2 ₁ 2 ₁ 2)	1; 3; (2; 4) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	$\mathbf{c}, \mathbf{a}, \mathbf{b}$	0, 1/4, 0
[2] P22 ₁ 2 ₁ (18, P2 ₁ 2 ₁ 2)	1; 4; (2; 3) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	$\mathbf{b}, \mathbf{c}, \mathbf{a}$	1/4, 0, 0
[2] P222 (16)	1; 2; 3; 4		

• Enlarged unit cell

[3] $\mathbf{a}' = 3\mathbf{a}$			
$\left\{ \begin{array}{l} I222 (23) \\ I222 (23) \\ I222 (23) \end{array} \right.$	$\langle 2; 3 \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	
	$\langle (2; 3) + (2, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	1, 0, 0
	$\langle (2; 3) + (4, 0, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	2, 0, 0
[3] $\mathbf{b}' = 3\mathbf{b}$			
$\left\{ \begin{array}{l} I222 (23) \\ I222 (23) \\ I222 (23) \end{array} \right.$	$\langle 2; 3 \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	
	$\langle 3; 2 + (0, 2, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	0, 1, 0
	$\langle 3; 2 + (0, 4, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	0, 2, 0
[3] $\mathbf{c}' = 3\mathbf{c}$			
$\left\{ \begin{array}{l} I222 (23) \\ I222 (23) \\ I222 (23) \end{array} \right.$	$\langle 2; 3 \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	
	$\langle 2; 3 + (0, 0, 2) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 1
	$\langle 2; 3 + (0, 0, 4) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	0, 0, 2

• Series of maximal isomorphic subgroups

[p] $\mathbf{a}' = p\mathbf{a}$			
I222 (23)	$\langle (2; 3) + (2u, 0, 0) \rangle$	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	$u, 0, 0$
	prime $p > 2$; $0 \leq u < p$		
	p conjugate subgroups		
[p] $\mathbf{b}' = p\mathbf{b}$			
I222 (23)	$\langle 3; 2 + (0, 2u, 0) \rangle$	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$0, u, 0$
	prime $p > 2$; $0 \leq u < p$		
	p conjugate subgroups		
[p] $\mathbf{c}' = p\mathbf{c}$			
I222 (23)	$\langle 2; 3 + (0, 0, 2u) \rangle$	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	$0, 0, u$
	prime $p > 2$; $0 \leq u < p$		
	p conjugate subgroups		

I Minimal *translationengleiche* supergroups[2] *Immm* (71); [2] *Ibam* (72); [2] *I422* (97); [2] *I4̄2m* (121); [3] *I23* (197)II Minimal non-isomorphic *klassengleiche* supergroups

• Additional centring translations

none

• Decreased unit cell

[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}$ A222 (21, C222); [2] $\mathbf{b}' = \frac{1}{2}\mathbf{b}$ B222 (21, C222); [2] $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ C222 (21)