

$c2mm$ 

No. 9

 $c2mm$ 

 Generators selected (1);  $t(1,0)$ ;  $t(0,1)$ ;  $t(\frac{1}{2}, \frac{1}{2})$ ; (2); (3)

**General position**

 Multiplicity,  
Wyckoff letter,  
Site symmetry

Coordinates

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

 8  $f$  1

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

[2] $c1m1$ (5, $cm$ )	$\langle 1; 3 \rangle +$	
[2] $c11m$ (5, $cm$ )	$\langle 1; 4 \rangle +$	$\mathbf{b}, -\mathbf{a}$
[2] $c211$ (2, $p2$ )	$\langle 1; 2 \rangle +$	$1/2(\mathbf{a} - \mathbf{b}), 1/2(\mathbf{a} + \mathbf{b})$

**II Maximal klassengleiche subgroups**

## • Loss of centring translations

[2] $p2gg$ (8)	$1; 2; (3; 4) + (\frac{1}{2}, \frac{1}{2})$		
[2] $p2gm$ (7, $p2mg$ )	$1; 4; (2; 3) + (\frac{1}{2}, \frac{1}{2})$	$\mathbf{b}, -\mathbf{a}$	$1/4, 1/4$
[2] $p2mg$ (7)	$1; 3; (2; 4) + (\frac{1}{2}, \frac{1}{2})$		$1/4, 1/4$
[2] $p2mm$ (6)	$1; 2; 3; 4$		

## • Enlarged unit cell

[3] $\mathbf{a}' = 3\mathbf{a}$			
$\left\{ \begin{array}{l} c2mm \text{ (9)} \\ c2mm \text{ (9)} \\ c2mm \text{ (9)} \end{array} \right.$	$\langle 2; 3 \rangle$ $\langle (2; 3) + (2, 0) \rangle$ $\langle (2; 3) + (4, 0) \rangle$	$3\mathbf{a}, \mathbf{b}$ $3\mathbf{a}, \mathbf{b}$ $3\mathbf{a}, \mathbf{b}$	 $1, 0$ $2, 0$
[3] $\mathbf{b}' = 3\mathbf{b}$			
$\left\{ \begin{array}{l} c2mm \text{ (9)} \\ c2mm \text{ (9)} \\ c2mm \text{ (9)} \end{array} \right.$	$\langle 2; 3 \rangle$ $\langle 3; 2 + (0, 2) \rangle$ $\langle 3; 2 + (0, 4) \rangle$	$\mathbf{a}, 3\mathbf{b}$ $\mathbf{a}, 3\mathbf{b}$ $\mathbf{a}, 3\mathbf{b}$	 $0, 1$ $0, 2$

## • Series of maximal isomorphic subgroups

[ $p$ ] $\mathbf{a}' = p\mathbf{a}$			
$c2mm$ (9)	$\langle (2; 3) + (2u, 0) \rangle$ prime $p > 2$ ; $0 \leq u < p$ $p$ conjugate subgroups	$p\mathbf{a}, \mathbf{b}$	$u, 0$
[ $p$ ] $\mathbf{b}' = p\mathbf{b}$			
$c2mm$ (9)	$\langle 3; 2 + (0, 2u) \rangle$ prime $p > 2$ ; $0 \leq u < p$ $p$ conjugate subgroups	$\mathbf{a}, p\mathbf{b}$	$0, u$

**I Minimal translationengleiche supergroups**

 [2]  $p4mm$  (11); [2]  $p4gm$  (12); [3]  $p6mm$  (17)

**II Minimal non-isomorphic klassengleiche supergroups**

## • Additional centring translations

none

## • Decreased unit cell

 [2]  $\mathbf{a}' = \frac{1}{2}\mathbf{a}$ ,  $\mathbf{b}' = \frac{1}{2}\mathbf{b}$   $p2mm$  (6)