

$C_{2v}^{19}$ 
 $Fdd2$ 

No. 43

 $Fdd2$ 
**Generators selected** (1);  $t(1,0,0)$ ;  $t(0,1,0)$ ;  $t(0,0,1)$ ;  $t(0, \frac{1}{2}, \frac{1}{2})$ ;  $t(\frac{1}{2}, 0, \frac{1}{2})$ ; (2); (3)

**General position**

 Multiplicity,  
Wyckoff letter,  
Site symmetry

Coordinates

16	$b$	1	(1) $x, y, z$	(2) $\bar{x}, \bar{y}, z$	(3) $x + \frac{1}{4}, \bar{y} + \frac{1}{4}, z + \frac{1}{4}$	(4) $\bar{x} + \frac{1}{4}, y + \frac{1}{4}, z + \frac{1}{4}$			

**I Maximal translationengleiche subgroups**

[2] $F1d1$ (9, $C1c1$ )	(1; 3)+	– $\mathbf{c}, \mathbf{b}, 1/2(\mathbf{a} + \mathbf{c})$	0, 1/8, 0
[2] $Fd11$ (9, $C1c1$ )	(1; 4)+	– $\mathbf{b}, \mathbf{a}, 1/2(\mathbf{b} + \mathbf{c})$	1/8, 0, 0
[2] $F112$ (5, $A112$ )	(1; 2)+	$1/2(\mathbf{a} - \mathbf{b}), \mathbf{b}, \mathbf{c}$	

**II Maximal klassengleiche subgroups**

- **Loss of centring translations** none
- **Enlarged unit cell**

[3] $\mathbf{a}' = 3\mathbf{a}$			
$\left\{ \begin{array}{l} Fdd2 \text{ (43)} \\ Fdd2 \text{ (43)} \\ Fdd2 \text{ (43)} \end{array} \right.$	$\langle (2; 3) + (\frac{1}{2}, \frac{1}{2}, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	1/4, 1/4, 0
	$\langle 2 + (\frac{5}{2}, \frac{1}{2}, 0); 3 + (\frac{1}{2}, \frac{1}{2}, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	5/4, 1/4, 0
	$\langle 2 + (\frac{9}{2}, \frac{1}{2}, 0); 3 + (\frac{1}{2}, \frac{1}{2}, 0) \rangle$	$3\mathbf{a}, \mathbf{b}, \mathbf{c}$	9/4, 1/4, 0
[3] $\mathbf{b}' = 3\mathbf{b}$			
$\left\{ \begin{array}{l} Fdd2 \text{ (43)} \\ Fdd2 \text{ (43)} \\ Fdd2 \text{ (43)} \end{array} \right.$	$\langle 2 + (\frac{1}{2}, \frac{1}{2}, 0); 3 + (0, 1, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	1/4, 1/4, 0
	$\langle 2 + (\frac{1}{2}, \frac{5}{2}, 0); 3 + (0, 3, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	1/4, 5/4, 0
	$\langle 2 + (\frac{1}{2}, \frac{9}{2}, 0); 3 + (0, 5, 0) \rangle$	$\mathbf{a}, 3\mathbf{b}, \mathbf{c}$	1/4, 9/4, 0
[3] $\mathbf{c}' = 3\mathbf{c}$			
$Fdd2$ (43)	$\langle 2 + (\frac{1}{2}, \frac{1}{2}, 0); 3 + (0, \frac{1}{2}, \frac{1}{2}) \rangle$	$\mathbf{a}, \mathbf{b}, 3\mathbf{c}$	1/4, 1/4, 0

- **Series of maximal isomorphic subgroups**

[ $p$ ] $\mathbf{a}' = p\mathbf{a}$			
$\left\{ \begin{array}{l} Fdd2 \text{ (43)} \\ Fdd2 \text{ (43)} \end{array} \right.$	$\langle 2 + (2u, 0, 0); 3 + (\frac{p}{4} - \frac{1}{4}, 0, 0) \rangle$ prime $p > 4$ ; $0 \leq u < p$ $p$ conjugate subgroups for $p = 4n + 1$	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	$u, 0, 0$
	$\langle 2 + (\frac{1}{2} + 2u, \frac{1}{2}, 0); 3 + (\frac{p}{4} - \frac{1}{4}, \frac{1}{2}, 0) \rangle$ prime $p > 2$ ; $0 \leq u < p$ $p$ conjugate subgroups for $p = 4n - 1$	$p\mathbf{a}, \mathbf{b}, \mathbf{c}$	$1/4 + u, 1/4, 0$
[ $p$ ] $\mathbf{b}' = p\mathbf{b}$			
$\left\{ \begin{array}{l} Fdd2 \text{ (43)} \\ Fdd2 \text{ (43)} \end{array} \right.$	$\langle 2 + (0, 2u, 0); 3 + (0, \frac{p}{4} - \frac{1}{4} + 2u, 0) \rangle$ prime $p > 4$ ; $0 \leq u < p$ $p$ conjugate subgroups for $p = 4n + 1$	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$0, u, 0$
	$\langle 2 + (\frac{1}{2}, \frac{1}{2} + 2u, 0); 3 + (0, \frac{p}{4} + \frac{1}{4} + 2u, 0) \rangle$ prime $p > 2$ ; $0 \leq u < p$ $p$ conjugate subgroups for $p = 4n - 1$	$\mathbf{a}, p\mathbf{b}, \mathbf{c}$	$1/4, 1/4 + u, 0$
[ $p$ ] $\mathbf{c}' = p\mathbf{c}$			
$\left\{ \begin{array}{l} Fdd2 \text{ (43)} \\ Fdd2 \text{ (43)} \end{array} \right.$	$\langle 2; 3 + (0, 0, \frac{p}{4} - \frac{1}{4}) \rangle$ prime $p > 4$ ; $p = 4n + 1$ no conjugate subgroups	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	
	$\langle 2 + (\frac{1}{2}, \frac{1}{2}, 0); 3 + (0, \frac{1}{2}, \frac{p}{4} - \frac{1}{4}) \rangle$ prime $p > 2$ ; $p = 4n - 1$ no conjugate subgroups	$\mathbf{a}, \mathbf{b}, p\mathbf{c}$	$1/4, 1/4, 0$

**I Minimal translationengleiche supergroups**

 [2]  $Fddd$  (70); [2]  $I4_1md$  (109); [2]  $I4_1cd$  (110); [2]  $I\bar{4}2d$  (122)

**II Minimal non-isomorphic klassengleiche supergroups**

- **Additional centring translations** none
- **Decreased unit cell**

[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}, \mathbf{c}' = \frac{1}{2}\mathbf{c}$	$Pnn2$ (34)
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