

D_{4h}^{18}
 $I4/m2/c2/m$

No. 140

 $I4/mcm$
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); (9)

General position

 Multiplicity,
Wyckoff letter,
Site symmetry

Coordinates

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

32	<i>m</i>	1	(1) x, y, z	(2) \bar{x}, \bar{y}, z	(3) \bar{y}, x, z	(4) y, \bar{x}, z
			(5) $\bar{x}, y, \bar{z} + \frac{1}{2}$	(6) $x, \bar{y}, \bar{z} + \frac{1}{2}$	(7) $y, x, \bar{z} + \frac{1}{2}$	(8) $\bar{y}, \bar{x}, \bar{z} + \frac{1}{2}$
			(9) $\bar{x}, \bar{y}, \bar{z}$	(10) x, y, \bar{z}	(11) y, \bar{x}, \bar{z}	(12) \bar{y}, x, \bar{z}
			(13) $x, \bar{y}, z + \frac{1}{2}$	(14) $\bar{x}, y, z + \frac{1}{2}$	(15) $\bar{y}, \bar{x}, z + \frac{1}{2}$	(16) $y, x, z + \frac{1}{2}$

I Maximal translationengleiche subgroups

[2] $I\bar{4}2m$ (121)	(1; 2; 5; 6; 11; 12; 15; 16)+	0, 1/2, 1/4
[2] $I\bar{4}c2$ (120)	(1; 2; 7; 8; 11; 12; 13; 14)+	
[2] $I4cm$ (108)	(1; 2; 3; 4; 13; 14; 15; 16)+	
[2] $I422$ (97)	(1; 2; 3; 4; 5; 6; 7; 8)+	0, 0, 1/4
[2] $I4/m11$ (87, $I4/m$)	(1; 2; 3; 4; 9; 10; 11; 12)+	
[2] $I2/m2/c1$ (72, $Ibam$)	(1; 2; 5; 6; 9; 10; 13; 14)+	
[2] $I2/m12/m$ (69, $Fmmm$)	(1; 2; 7; 8; 9; 10; 15; 16)+	a - b, a + b, c 0, 1/2, 0

II Maximal klassengleiche subgroups

• Loss of centring translations

[2] $P4_2/ncm$ (138)	1; 2; 7; 8; 11; 12; 13; 14; (3; 4; 5; 6; 9; 10; 15; 16) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	1/4, 3/4, 1/4
[2] $P4_2/mbc$ (135)	1; 2; 7; 8; 9; 10; 15; 16; (3; 4; 5; 6; 11; 12; 13; 14) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	0, 1/2, 0
[2] $P4_2/nbc$ (133)	1; 2; 5; 6; 11; 12; 15; 16; (3; 4; 7; 8; 9; 10; 13; 14) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	1/4, 3/4, 1/4
[2] $P4_2/mcm$ (132)	1; 2; 5; 6; 9; 10; 13; 14; (3; 4; 7; 8; 11; 12; 15; 16) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	0, 1/2, 0
[2] $P4/ncc$ (130)	1; 2; 3; 4; 13; 14; 15; 16; (5; 6; 7; 8; 9; 10; 11; 12) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	1/4, 1/4, 1/4
[2] $P4/mbm$ (127)	1; 2; 3; 4; 9; 10; 11; 12; (5; 6; 7; 8; 13; 14; 15; 16) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	
[2] $P4/nbm$ (125)	1; 2; 3; 4; 5; 6; 7; 8; (9; 10; 11; 12; 13; 14; 15; 16) + $(\frac{1}{2}, \frac{1}{2}, \frac{1}{2})$	1/4, 1/4, 1/4
[2] $P4/mcc$ (124)	1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16	

• Enlarged unit cell

[3] $c' = 3c$		
$\left\{ \begin{array}{l} I4/mcm \text{ (140)} \\ I4/mcm \text{ (140)} \\ I4/mcm \text{ (140)} \end{array} \right.$	$\langle 2; 3; 9; 5 + (0,0,1) \rangle$ $\langle 2; 3; 5 + (0,0,3); 9 + (0,0,2) \rangle$ $\langle 2; 3; 5 + (0,0,5); 9 + (0,0,4) \rangle$	a, b, 3c a, b, 3c a, b, 3c
		0, 0, 1 0, 0, 2

• Series of maximal isomorphic subgroups

[<i>p</i>] $c' = pc$		
$I4/mcm$ (140)	$\langle 2; 3; 5 + (0,0, \frac{p}{2} - \frac{1}{2} + 2u); 9 + (0,0,2u) \rangle$ $p > 2; 0 \leq u < p$ p conjugate subgroups for the prime p	a, b, pc 0, 0, u
[p^2] $a' = pa, b' = pb$		
$I4/mcm$ (140)	$\langle (2; 9) + (2u, 2v, 0); 3 + (u + v, -u + v, 0); 5 + (\frac{p}{2} - \frac{1}{2} + 2u, 0, 0) \rangle$ $p > 2; 0 \leq u < p; 0 \leq v < p$ p^2 conjugate subgroups for the prime p	pa, pb, c $u, v, 0$

I Minimal translationengleiche supergroups

 [3] $Fm\bar{3}c$ (226)

II Minimal non-isomorphic klassengleiche supergroups

• Additional centring translations

none

• Decreased unit cell

 [2] $c' = \frac{1}{2}c$ $C4/mmm$ (123, $P4/mmm$)