

O_h^5 $F\bar{4}/m\bar{3}2/m$

No. 225

 $Fm\bar{3}m$ **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); (5); (13); (25)**General position**Multiplicity,
Wyckoff letter,
Site symmetry(0,0,0)+ (0, $\frac{1}{2}$, $\frac{1}{2}$) + ($\frac{1}{2}$, 0, $\frac{1}{2}$) + ($\frac{1}{2}$, $\frac{1}{2}$, 0) +

192	l	1	(1) x, y, z	(2) \bar{x}, \bar{y}, z	(3) \bar{x}, y, \bar{z}	(4) x, \bar{y}, \bar{z}	(5) z, x, y	(6) z, \bar{x}, \bar{y}	(7) \bar{z}, \bar{x}, y	(8) \bar{z}, x, \bar{y}
			(9) y, z, x	(10) \bar{y}, z, \bar{x}	(11) y, \bar{z}, \bar{x}	(12) \bar{y}, \bar{z}, x	(13) y, x, \bar{z}	(14) $\bar{y}, \bar{x}, \bar{z}$	(15) y, \bar{x}, z	(16) \bar{y}, x, z
			(17) x, z, \bar{y}	(18) \bar{x}, z, y	(19) $\bar{x}, \bar{z}, \bar{y}$	(20) x, \bar{z}, y	(21) z, y, \bar{x}	(22) z, \bar{y}, x	(23) \bar{z}, y, x	(24) $\bar{z}, \bar{y}, \bar{x}$
			(25) $\bar{x}, \bar{y}, \bar{z}$	(26) x, y, \bar{z}	(27) x, \bar{y}, z	(28) \bar{x}, y, z	(29) $\bar{z}, \bar{x}, \bar{y}$	(30) \bar{z}, x, y	(31) z, x, \bar{y}	(32) z, \bar{x}, y
			(33) $\bar{y}, \bar{z}, \bar{x}$	(34) y, \bar{z}, x	(35) \bar{y}, z, x	(36) y, z, \bar{x}	(37) \bar{y}, \bar{x}, z	(38) y, x, z	(39) \bar{y}, x, \bar{z}	(40) y, \bar{x}, \bar{z}
			(41) \bar{x}, \bar{z}, y	(42) x, \bar{z}, \bar{y}	(43) x, z, y	(44) \bar{x}, z, \bar{y}	(45) \bar{z}, \bar{y}, x	(46) \bar{z}, y, \bar{x}	(47) z, \bar{y}, \bar{x}	(48) z, y, x

I Maximal translationengleiche subgroups

[2] $F\bar{4}3m$ (216)	(1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 37; 38; 39; 40; 41; 42; 43; 44; 45; 46; 47; 48) +	
[2] $F432$ (209)	(1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 21; 22; 23; 24) +	
[2] $Fm\bar{3}1$ (202, $Fm\bar{3}$)	(1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 25; 26; 27; 28; 29; 30; 31; 32; 33; 34; 35; 36) +	
{ [3] $F4/m12/m$ (139, $I4/mmm$)	(1; 2; 3; 4; 13; 14; 15; 16; 25; 26; 27; 28; 37; 38; 39; 40) +	$1/2(\mathbf{a} - \mathbf{b}), 1/2(\mathbf{a} + \mathbf{b}), \mathbf{c}$
{ [3] $F4/m12/m$ (139, $I4/mmm$)	(1; 4; 2; 3; 18; 19; 17; 20; 25; 28; 26; 27; 42; 43; 41; 44) +	$1/2(\mathbf{b} - \mathbf{c}), 1/2(\mathbf{b} + \mathbf{c}), \mathbf{a}$
{ [3] $F4/m12/m$ (139, $I4/mmm$)	(1; 3; 4; 2; 22; 24; 23; 21; 25; 27; 28; 26; 46; 48; 47; 45) +	$1/2(-\mathbf{a} + \mathbf{c}), 1/2(\mathbf{a} + \mathbf{c}), \mathbf{b}$
{ [4] $F1\bar{3}2/m$ (166, $R\bar{3}m$)	(1; 5; 9; 14; 19; 24; 25; 29; 33; 38; 43; 48) +	$1/2(-\mathbf{a} + \mathbf{b}), 1/2(-\mathbf{b} + \mathbf{c}), \mathbf{a} + \mathbf{b} + \mathbf{c}$
{ [4] $F1\bar{3}2/m$ (166, $R\bar{3}m$)	(1; 6; 12; 13; 18; 24; 25; 30; 36; 37; 42; 48) +	$1/2(\mathbf{a} + \mathbf{b}), 1/2(-\mathbf{b} - \mathbf{c}), -\mathbf{a} + \mathbf{b} - \mathbf{c}$
{ [4] $F1\bar{3}2/m$ (166, $R\bar{3}m$)	(1; 7; 10; 13; 19; 22; 25; 31; 34; 37; 43; 46) +	$1/2(-\mathbf{a} - \mathbf{b}), 1/2(\mathbf{b} - \mathbf{c}), \mathbf{a} - \mathbf{b} - \mathbf{c}$
{ [4] $F1\bar{3}2/m$ (166, $R\bar{3}m$)	(1; 8; 11; 14; 18; 22; 25; 32; 35; 38; 42; 46) +	$1/2(\mathbf{a} - \mathbf{b}), 1/2(\mathbf{b} + \mathbf{c}), -\mathbf{a} - \mathbf{b} + \mathbf{c}$

II Maximal klassengleiche subgroups

• Loss of centring translations

[4] $Pn\bar{3}m$ (224)	1; 5; 9; 14; 19; 24; 25; 29; 33; 38; 43; 48; (2; 7; 12; 13; 17; 21; 26; 31; 36; 37; 41; 45) + ($\frac{1}{2}, \frac{1}{2}, 0$); (3; 8; 10; 15; 20; 22; 27; 32; 34; 39; 44; 46) + ($\frac{1}{2}, 0, \frac{1}{2}$); (4; 6; 11; 16; 18; 23; 28; 30; 35; 40; 42; 47) + (0, $\frac{1}{2}, \frac{1}{2}$)	
[4] $Pn\bar{3}m$ (224)	1; 6; 12; 13; 18; 24; 25; 30; 36; 37; 42; 48; (2; 8; 9; 14; 20; 21; 26; 32; 33; 38; 44; 45) + ($\frac{1}{2}, \frac{1}{2}, 0$); (3; 7; 11; 16; 17; 22; 27; 31; 35; 40; 41; 46) + ($\frac{1}{2}, 0, \frac{1}{2}$); (4; 5; 10; 15; 19; 23; 28; 29; 34; 39; 43; 47) + (0, $\frac{1}{2}, \frac{1}{2}$)	1/2, 0, 1/2
[4] $Pn\bar{3}m$ (224)	1; 7; 10; 13; 19; 22; 25; 31; 34; 37; 43; 46; (2; 5; 11; 14; 17; 23; 26; 29; 35; 38; 41; 47) + ($\frac{1}{2}, \frac{1}{2}, 0$); (3; 6; 9; 16; 20; 24; 27; 30; 33; 40; 44; 48) + ($\frac{1}{2}, 0, \frac{1}{2}$); (4; 8; 12; 15; 18; 21; 28; 32; 36; 39; 42; 45) + (0, $\frac{1}{2}, \frac{1}{2}$)	0, 1/2, 1/2
[4] $Pn\bar{3}m$ (224)	1; 8; 11; 14; 18; 22; 25; 32; 35; 38; 42; 46; (2; 6; 10; 13; 20; 23; 26; 30; 34; 37; 44; 47) + ($\frac{1}{2}, \frac{1}{2}, 0$); (3; 5; 12; 15; 17; 24; 27; 29; 36; 39; 41; 48) + ($\frac{1}{2}, 0, \frac{1}{2}$); (4; 7; 9; 16; 19; 21; 28; 31; 33; 40; 43; 45) + (0, $\frac{1}{2}, \frac{1}{2}$)	1/2, 1/2, 0
[4] $Pm\bar{3}m$ (221)	1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 21; 22; 23; 24; 25; 26; 27; 28; 29; 30; 31; 32; 33; 34; 35; 36; 37; 38; 39; 40; 41; 42; 43; 44; 45; 46; 47; 48	
[4] $Pm\bar{3}m$ (221)	1; 2; 3; 4; 13; 14; 15; 16; 25; 26; 27; 28; 37; 38; 39; 40; (5; 6; 7; 8; 21; 22; 23; 24; 29; 30; 31; 32; 33; 34; 35; 45; 46; 47; 48) + ($\frac{1}{2}, 0, \frac{1}{2}$); (9; 10; 11; 12; 17; 18; 19; 20; 33; 34; 35; 36; 41; 42; 43; 44) + (0, $\frac{1}{2}, \frac{1}{2}$)	1/2, 1/2, 0
[4] $Pm\bar{3}m$ (221)	1; 2; 3; 4; 17; 18; 19; 20; 25; 26; 27; 28; 41; 42; 43; 44; (5; 6; 7; 8; 13; 14; 15; 16; 29; 30; 31; 32; 37; 38; 39; 40) + ($\frac{1}{2}, \frac{1}{2}, 0$); (9; 10; 11; 12; 21; 22; 23; 24; 33; 34; 35; 36; 45; 46; 47; 48) + ($\frac{1}{2}, 0, \frac{1}{2}$)	0, 1/2, 1/2
[4] $Pm\bar{3}m$ (221)	1; 2; 3; 4; 21; 22; 23; 24; 25; 26; 27; 28; 45; 46; 47; 48; (5; 6; 7; 8; 17; 18; 19; 20; 29; 30; 31; 32; 41; 42; 43; 44) + (0, $\frac{1}{2}, \frac{1}{2}$); (9; 10; 11; 12; 13; 14; 15; 16; 33; 34; 35; 36; 37; 38; 39; 40) + ($\frac{1}{2}, \frac{1}{2}, 0$)	1/2, 0, 1/2

• Enlarged unit cell	none		
• Series of maximal isomorphic subgroups			
[p^3] $\mathbf{a}' = p\mathbf{a}$, $\mathbf{b}' = p\mathbf{b}$, $\mathbf{c}' = p\mathbf{c}$			
Fm $\bar{3}$ m (225)	$\langle 2 + (2u, 2v, 0); 3 + (2u, 0, 2w);$ $5 + (u - w, -u + v, -v + w);$ $13 + (u - v, -u + v, 2w); 25 + (2u, 2v, 2w) \rangle$ $p > 2; 0 \leq u < p; 0 \leq v < p; 0 \leq w < p$ p^3 conjugate subgroups for the prime p	$p\mathbf{a}, p\mathbf{b}, p\mathbf{c}$	u, v, w
I Minimal <i>translationengleiche</i> supergroups	none		
II Minimal non-isomorphic <i>klassengleiche</i> supergroups			
• Additional centring translations	none		
• Decreased unit cell			
[2] $\mathbf{a}' = \frac{1}{2}\mathbf{a}$, $\mathbf{b}' = \frac{1}{2}\mathbf{b}$, $\mathbf{c}' = \frac{1}{2}\mathbf{c}$ Pm $\bar{3}$ m (221)			