

$Fd\bar{3}c$ 

No. 228

 $F4_1/d\bar{3}2/c$  $O_h^8$ ORIGIN CHOICE 1, Origin at 23, at  $-\frac{3}{8}, -\frac{3}{8}, -\frac{3}{8}$  from centre ( $\bar{3}$ )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

## Coordinates

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

## I Maximal translationengleiche subgroups

[2] $F\bar{4}3c$ (219)	(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] $F4_132$ (210)	(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] $Fd\bar{3}1$ (203, $Fd\bar{3}$ )	(1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 25; 26; 27; 28; 29; 30; 31; 32; 33; 34; 35; 36)+		$1/4, 1/4, 1/4$
[3] $F4_1/d12/c$ (142, $I4_1/acd$ )	(1; 2; 3; 4; 13; 14; 15; 16; 25; 26; 27; 28; 37; 38; 39; 40)+	$1/2(\mathbf{a}-\mathbf{b}), 1/2(\mathbf{a}+\mathbf{b}), \mathbf{c}$	$0, 0, 1/4$
[3] $F4_1/d12/c$ (142, $I4_1/acd$ )	(1; 4; 2; 3; 18; 19; 17; 20; 25; 28; 26; 27; 42; 43; 41; 44)+	$1/2(\mathbf{b}-\mathbf{c}), 1/2(\mathbf{b}+\mathbf{c}), \mathbf{a}$	$1/4, 0, 0$
[3] $F4_1/d12/c$ (142, $I4_1/acd$ )	(1; 3; 4; 2; 22; 24; 23; 21; 25; 27; 28; 26; 46; 48; 47; 45)+	$1/2(-\mathbf{a}+\mathbf{c}), 1/2(\mathbf{a}+\mathbf{c}), \mathbf{b}$	$0, 1/4, 0$
[4] $F1\bar{3}2/c$ (167, $R\bar{3}c$ )	(1; 5; 9; 14; 19; 24; 25; 29; 33; 38; 43; 48)+	$1/2(-\mathbf{a}+\mathbf{b}), 1/2(-\mathbf{b}+\mathbf{c}), \mathbf{a}+\mathbf{b}+\mathbf{c}$	$3/8, 3/8, 3/8$
[4] $F1\bar{3}2/c$ (167, $R\bar{3}c$ )	(1; 6; 12; 13; 18; 24; 25; 30; 36; 37; 42; 48)+	$1/2(\mathbf{a}+\mathbf{b}), 1/2(-\mathbf{b}-\mathbf{c}), -\mathbf{a}+\mathbf{b}-\mathbf{c}$	$1/8, 3/8, 1/8$
[4] $F1\bar{3}2/c$ (167, $R\bar{3}c$ )	(1; 7; 10; 13; 19; 22; 25; 31; 34; 37; 43; 46)+	$1/2(-\mathbf{a}-\mathbf{b}), 1/2(\mathbf{b}-\mathbf{c}), \mathbf{a}-\mathbf{b}-\mathbf{c}$	$3/8, 1/8, 1/8$
[4] $F1\bar{3}2/c$ (167, $R\bar{3}c$ )	(1; 8; 11; 14; 18; 22; 25; 32; 35; 38; 42; 46)+	$1/2(\mathbf{a}-\mathbf{b}), 1/2(\mathbf{b}+\mathbf{c}), -\mathbf{a}-\mathbf{b}+\mathbf{c}$	$1/8, 1/8, 3/8$

## II Maximal klassengleiche subgroups

- Loss of centring translations none
- Enlarged unit cell none

• Series of maximal isomorphic subgroups

$[p^3] \mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}, \mathbf{c}' = p\mathbf{c}$

$Fd\bar{3}c$ (228)	$\langle 2 + (\frac{1}{2} + 2u, \frac{p}{2} + 2v, \frac{p}{2} - \frac{1}{2}); 3 + (\frac{p}{2} + 2u, \frac{p}{2} - \frac{1}{2}, \frac{1}{2} + 2w);$ $5 + (u - w, -u + v, -v + w);$ $13 + (\frac{3p}{4} - \frac{3}{4} + u - v, \frac{p}{4} - \frac{1}{4} - u + v, \frac{3p}{4} - \frac{1}{4} + 2w);$ $25 + (\frac{3p}{4} - \frac{1}{4} + 2u, \frac{3p}{4} - \frac{1}{4} + 2v, \frac{3p}{4} - \frac{1}{4} + 2w) \rangle$ $p > 2; 0 \leq u < p; 0 \leq v < p; 0 \leq w < p$ $p^3$ conjugate subgroups for prime $p \equiv 3 \pmod{4}$	$p\mathbf{a}, p\mathbf{b}, p\mathbf{c}$	$1/4 + u, 1/4 + v, 1/4 + w$
$Fd\bar{3}c$ (228)	$\langle 2 + (2u, \frac{p}{2} - \frac{1}{2} + 2v, \frac{p}{2} - \frac{1}{2}); 3 + (\frac{p}{2} - \frac{1}{2} + 2u, \frac{p}{2} - \frac{1}{2}, 2w);$ $5 + (u - w, -u + v, -v + w);$ $13 + (\frac{3p}{4} - \frac{3}{4} + u - v, \frac{p}{4} - \frac{1}{4} - u + v, \frac{3p}{4} - \frac{3}{4} + 2w);$ $25 + (\frac{3p}{4} - \frac{3}{4} + 2u, \frac{3p}{4} - \frac{3}{4} + 2v, \frac{3p}{4} - \frac{3}{4} + 2w) \rangle$ $p > 4; 0 \leq u < p; 0 \leq v < p; 0 \leq w < p$ $p^3$ conjugate subgroups for prime $p \equiv 1 \pmod{4}$	$p\mathbf{a}, p\mathbf{b}, p\mathbf{c}$	$u, v, w$

I Minimal *translationengleiche* supergroups

none

II Minimal non-isomorphic *klassengleiche* supergroups

• Additional centring translations

none

• Decreased unit cell

$[2] \mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}, \mathbf{c}' = \frac{1}{2}\mathbf{c} \text{ } Pn\bar{3}m$  (224)

(Continued from the following page)

• Series of maximal isomorphic subgroups

$[p^3] \mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}, \mathbf{c}' = p\mathbf{c}$

$Fd\bar{3}c$ (228)	$\langle 2 + (\frac{p}{4} - \frac{1}{4} + 2u, \frac{3p}{4} - \frac{3}{4} + 2v, \frac{p}{2} - \frac{1}{2});$ $3 + (\frac{3p}{4} - \frac{3}{4} + 2u, \frac{p}{2} - \frac{1}{2}, \frac{p}{4} - \frac{1}{4} + 2w);$ $5 + (u - w, -u + v, -v + w);$ $13 + (\frac{3p}{4} - \frac{3}{4} + u - v, \frac{p}{4} - \frac{1}{4} - u + v, 2w); 25 + (2u, 2v, 2w) \rangle$ $p > 2; 0 \leq u < p; 0 \leq v < p; 0 \leq w < p$ $p^3$ conjugate subgroups for the prime $p$	$p\mathbf{a}, p\mathbf{b}, p\mathbf{c}$	$u, v, w$
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I Minimal *translationengleiche* supergroups

none

II Minimal non-isomorphic *klassengleiche* supergroups

• Additional centring translations

none

• Decreased unit cell

$[2] \mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}, \mathbf{c}' = \frac{1}{2}\mathbf{c} \text{ } Pn\bar{3}m$  (224)

ORIGIN CHOICE 2, Origin at centre ( $\bar{3}$ ), at  $\frac{3}{8}, \frac{3}{8}, \frac{3}{8}$  from 23

**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

### Coordinates

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

### I Maximal translationengleiche subgroups

[2] $F\bar{4}3c$ (219)	(1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 37; 38; 39; 40; 41; 42; 43; 44; 45; 46; 47; 48)+	1/8, 1/8, 1/8
[2] $F4_132$ (210)	(1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 21; 22; 23; 24)+	1/8, 1/8, 1/8
[2] $Fd\bar{3}1$ (203, $Fd\bar{3}$ )	(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] $F4_1/d12/c$ (142, $I4_1/acd$ )	(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] $F4_1/d12/c$ (142, $I4_1/acd$ )	(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] $F4_1/d12/c$ (142, $I4_1/acd$ )	(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] $F1\bar{3}2/c$ (167, $R\bar{3}c$ )	(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] $F1\bar{3}2/c$ (167, $R\bar{3}c$ )	(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] $F1\bar{3}2/c$ (167, $R\bar{3}c$ )	(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] $F1\bar{3}2/c$ (167, $R\bar{3}c$ )	(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 none
- Enlarged unit cell none

(Continued on the preceding page)

• Series of maximal isomorphic subgroups

$[p^3] \mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}, \mathbf{c}' = p\mathbf{c}$

$Fd\bar{3}c$ (228)	$\langle 2 + (\frac{1}{2} + 2u, \frac{p}{2} + 2v, \frac{p}{2} - \frac{1}{2}); 3 + (\frac{p}{2} + 2u, \frac{p}{2} - \frac{1}{2}, \frac{1}{2} + 2w);$ $5 + (u - w, -u + v, -v + w);$ $13 + (\frac{3p}{4} - \frac{3}{4} + u - v, \frac{p}{4} - \frac{1}{4} - u + v, \frac{3p}{4} - \frac{1}{4} + 2w);$ $25 + (\frac{3p}{4} - \frac{1}{4} + 2u, \frac{3p}{4} - \frac{1}{4} + 2v, \frac{3p}{4} - \frac{1}{4} + 2w) \rangle$ $p > 2; 0 \leq u < p; 0 \leq v < p; 0 \leq w < p$ $p^3$ conjugate subgroups for prime $p \equiv 3 \pmod{4}$	$p\mathbf{a}, p\mathbf{b}, p\mathbf{c}$	$1/4 + u, 1/4 + v, 1/4 + w$
$Fd\bar{3}c$ (228)	$\langle 2 + (2u, \frac{p}{2} - \frac{1}{2} + 2v, \frac{p}{2} - \frac{1}{2}); 3 + (\frac{p}{2} - \frac{1}{2} + 2u, \frac{p}{2} - \frac{1}{2}, 2w);$ $5 + (u - w, -u + v, -v + w);$ $13 + (\frac{3p}{4} - \frac{3}{4} + u - v, \frac{p}{4} - \frac{1}{4} - u + v, \frac{3p}{4} - \frac{3}{4} + 2w);$ $25 + (\frac{3p}{4} - \frac{3}{4} + 2u, \frac{3p}{4} - \frac{3}{4} + 2v, \frac{3p}{4} - \frac{3}{4} + 2w) \rangle$ $p > 4; 0 \leq u < p; 0 \leq v < p; 0 \leq w < p$ $p^3$ conjugate subgroups for prime $p \equiv 1 \pmod{4}$	$p\mathbf{a}, p\mathbf{b}, p\mathbf{c}$	$u, v, w$

I Minimal *translationengleiche* supergroups

none

II Minimal non-isomorphic *klassengleiche* supergroups

• Additional centring translations

none

• Decreased unit cell

$[2] \mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}, \mathbf{c}' = \frac{1}{2}\mathbf{c} \text{ } Pn\bar{3}m$  (224)

(Continued from the following page)

• Series of maximal isomorphic subgroups

$[p^3] \mathbf{a}' = p\mathbf{a}, \mathbf{b}' = p\mathbf{b}, \mathbf{c}' = p\mathbf{c}$

$Fd\bar{3}c$ (228)	$\langle 2 + (\frac{p}{4} - \frac{1}{4} + 2u, \frac{3p}{4} - \frac{3}{4} + 2v, \frac{p}{2} - \frac{1}{2});$ $3 + (\frac{3p}{4} - \frac{3}{4} + 2u, \frac{p}{2} - \frac{1}{2}, \frac{p}{4} - \frac{1}{4} + 2w);$ $5 + (u - w, -u + v, -v + w);$ $13 + (\frac{3p}{4} - \frac{3}{4} + u - v, \frac{p}{4} - \frac{1}{4} - u + v, 2w); 25 + (2u, 2v, 2w) \rangle$ $p > 2; 0 \leq u < p; 0 \leq v < p; 0 \leq w < p$ $p^3$ conjugate subgroups for the prime $p$	$p\mathbf{a}, p\mathbf{b}, p\mathbf{c}$	$u, v, w$
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I Minimal *translationengleiche* supergroups

none

II Minimal non-isomorphic *klassengleiche* supergroups

• Additional centring translations

none

• Decreased unit cell

$[2] \mathbf{a}' = \frac{1}{2}\mathbf{a}, \mathbf{b}' = \frac{1}{2}\mathbf{b}, \mathbf{c}' = \frac{1}{2}\mathbf{c} \text{ } Pn\bar{3}m$  (224)