International Tables for Crystallography (2006). Vol. A1, Maximal subgroups of space group 203, pp. 356–357.

$F\,d\,\bar{3}$ No. 203 $F\,2/d\,\bar{3}$ T_h^4

ORIGIN CHOICE 1, Origin at 23, at $-\frac{1}{8},-\frac{1}{8},-\frac{1}{8}$ 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)

General position

Multiplicity, Wyckoff letter, Site symmetry			Coordinates $(0,0,0)+$	$(0,\frac{1}{2},\frac{1}{2})+$	$(\frac{1}{2},0,\frac{1}{2})+$	$(\frac{1}{2},\frac{1}{2},0)+$
96	g	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) $\bar{x}+\frac{1}{4},\bar{y}+\frac{1}{4},\bar{z}+\frac{1}{4}$	(14) $x+\frac{1}{4},y+\frac{1}{4},\bar{z}+\frac{1}{4}$	(15) $x+\frac{1}{4},\bar{y}+\frac{1}{4},z+\frac{1}{4}$	(16) $\bar{x}+\frac{1}{4},y+\frac{1}{4},z+\frac{1}{4}$
			(17) $\bar{z}+\frac{1}{4},\bar{x}+\frac{1}{4},\bar{y}+\frac{1}{4}$	(18) $\bar{z}+\frac{1}{4},x+\frac{1}{4},y+\frac{1}{4}$	(19) $z+\frac{1}{4},x+\frac{1}{4},\bar{y}+\frac{1}{4}$	(20) $z+\frac{1}{4},\bar{x}+\frac{1}{4},y+\frac{1}{4}$
			(21) $\bar{y}+\frac{1}{4},\bar{z}+\frac{1}{4},\bar{x}+\frac{1}{4}$	(22) $y+\frac{1}{4},\bar{z}+\frac{1}{4},x+\frac{1}{4}$	(23) $\bar{y}+\frac{1}{4},z+\frac{1}{4},x+\frac{1}{4}$	(24) $y+\frac{1}{4},z+\frac{1}{4},\bar{x}+\frac{1}{4}$

I Maximal *translationengleiche* subgroups

[2] $F23$ (196)	(1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12)+		
[3] $Fd1$ (70, $Fddd$)	(1; 2; 3; 4; 13; 14; 15; 16)+		
[4] $F1\bar{3}$ (148, $R\bar{3}$)	(1; 5; 9; 13; 17; 21)+	$1/2(-\mathbf{a}+\mathbf{b}),1/2(-\mathbf{b}+\mathbf{c}),\mathbf{a}+\mathbf{b}+\mathbf{c}$	$1/8,1/8,1/8$
[4] $F1\bar{3}$ (148, $R\bar{3}$)	(1; 6; 12; 13; 18; 24)+	$1/2(\mathbf{a}+\mathbf{b}),1/2(-\mathbf{b}-\mathbf{c}),-\mathbf{a}+\mathbf{b}-\mathbf{c}$	$3/8,1/8,3/8$
[4] $F1\bar{3}$ (148, $R\bar{3}$)	(1; 7; 10; 13; 19; 22)+	$1/2(-\mathbf{a}-\mathbf{b}),1/2(\mathbf{b}-\mathbf{c}),\mathbf{a}-\mathbf{b}-\mathbf{c}$	$1/8,3/8,3/8$
[4] $F1\bar{3}$ (148, $R\bar{3}$)	(1; 8; 11; 13; 20; 23)+	$1/2(\mathbf{a}-\mathbf{b}),1/2(\mathbf{b}+\mathbf{c}),-\mathbf{a}-\mathbf{b}+\mathbf{c}$	$3/8,3/8,1/8$

II Maximal *klassengleiche* subgroups

- **Loss of centring translations** none
- **Enlarged unit cell** none
- **Series of maximal isomorphic subgroups**

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

$Fd\bar{3}$ (203)	$\langle 2+(\frac{1}{2}+2u,\frac{1}{2}+2v,0);\ 3+(\frac{1}{2}+2u,0,\frac{1}{2}+2w);$ $5+(u-w,-u+v,-v+w);$ $13+(\frac{p}{4}+\frac{1}{4}+2u,\frac{p}{4}+\frac{1}{4}+2v,\frac{p}{4}+\frac{1}{4}+2w)\rangle$ $p>2;\ 0\le u<p;\ 0\le v<p;\ 0\le w<p$ p^3 conjugate subgroups for prime $p\equiv 3 \pmod 4$	$p\mathbf{a},p\mathbf{b},p\mathbf{c}$	$1/4+u,1/4+v,1/4+w$
$Fd\bar{3}$ (203)	$\langle 2+(2u,2v,0);\ 3+(2u,0,2w);$ $5+(u-w,-u+v,-v+w);$ $13+(\frac{p}{4}-\frac{1}{4}+2u,\frac{p}{4}-\frac{1}{4}+2v,\frac{p}{4}-\frac{1}{4}+2w)\rangle$ $p>2;\ 0\le u<p;\ 0\le v<p;\ 0\le w<p$ 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

[2] $Fd\bar{3}m$ (227); [2] $Fd\bar{3}c$ (228)

II Minimal non-isomorphic *klassengleiche* supergroups

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

[2] $\mathbf{a}'=\frac{1}{2}\mathbf{a},\ \mathbf{b}'=\frac{1}{2}\mathbf{b},\ \mathbf{c}'=\frac{1}{2}\mathbf{c}$ $Pn\bar{3}$ (201)

ORIGIN CHOICE 2, Origin at centre $(\bar{3})$, at $\frac{1}{8},\frac{1}{8},\frac{1}{8}$ 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)

General position

Multiplicity, Wyckoff letter, Site symmetry			Coordinates			
			$(0,0,0)+$	$(0,\frac{1}{2},\frac{1}{2})+$	$(\frac{1}{2},0,\frac{1}{2})+$	$(\frac{1}{2},\frac{1}{2},0)+$
96	g	1	(1) x,y,z	(2) $\bar{x}+\frac{3}{4},\bar{y}+\frac{3}{4},z$	(3) $\bar{x}+\frac{3}{4},y,\bar{z}+\frac{3}{4}$	(4) $x,\bar{y}+\frac{3}{4},\bar{z}+\frac{3}{4}$
			(5) z,x,y	(6) $z,\bar{x}+\frac{3}{4},\bar{y}+\frac{3}{4}$	(7) $\bar{z}+\frac{3}{4},\bar{x}+\frac{3}{4},y$	(8) $\bar{z}+\frac{3}{4},x,\bar{y}+\frac{3}{4}$
			(9) y,z,x	(10) $\bar{y}+\frac{3}{4},z,\bar{x}+\frac{3}{4}$	(11) $y,\bar{z}+\frac{3}{4},\bar{x}+\frac{3}{4}$	(12) $\bar{y}+\frac{3}{4},\bar{z}+\frac{3}{4},x$
			(13) $\bar{x},\bar{y},\bar{z}$	(14) $x+\frac{1}{4},y+\frac{1}{4},\bar{z}$	(15) $x+\frac{1}{4},\bar{y},z+\frac{1}{4}$	(16) $\bar{x},y+\frac{1}{4},z+\frac{1}{4}$
			(17) $\bar{z},\bar{x},\bar{y}$	(18) $\bar{z},x+\frac{1}{4},y+\frac{1}{4}$	(19) $z+\frac{1}{4},x+\frac{1}{4},\bar{y}$	(20) $z+\frac{1}{4},\bar{x},y+\frac{1}{4}$
			(21) $\bar{y},\bar{z},\bar{x}$	(22) $y+\frac{1}{4},\bar{z},x+\frac{1}{4}$	(23) $\bar{y},z+\frac{1}{4},x+\frac{1}{4}$	(24) $y+\frac{1}{4},z+\frac{1}{4},\bar{x}$

I Maximal *translationengleiche* subgroups

[2] $F23$ (196)	(1; 2; 3; 4; 5; 6; 7; 8; 9; 10; 11; 12)+		$1/8,1/8,1/8$
[3] $Fd1$ (70, $Fddd$)	(1; 2; 3; 4; 13; 14; 15; 16)+		
[4] $F1\bar{3}$ (148, $R\bar{3}$)	(1; 5; 9; 13; 17; 21)+	$1/2(-\mathbf{a}+\mathbf{b}),1/2(-\mathbf{b}+\mathbf{c}),\mathbf{a}+\mathbf{b}+\mathbf{c}$	
[4] $F1\bar{3}$ (148, $R\bar{3}$)	(1; 6; 12; 13; 18; 24)+	$1/2(\mathbf{a}+\mathbf{b}),1/2(-\mathbf{b}-\mathbf{c}),-\mathbf{a}+\mathbf{b}-\mathbf{c}$	$1/4,0,1/4$
[4] $F1\bar{3}$ (148, $R\bar{3}$)	(1; 7; 10; 13; 19; 22)+	$1/2(-\mathbf{a}-\mathbf{b}),1/2(\mathbf{b}-\mathbf{c}),\mathbf{a}-\mathbf{b}-\mathbf{c}$	$0,1/4,1/4$
[4] $F1\bar{3}$ (148, $R\bar{3}$)	(1; 8; 11; 13; 20; 23)+	$1/2(\mathbf{a}-\mathbf{b}),1/2(\mathbf{b}+\mathbf{c}),-\mathbf{a}-\mathbf{b}+\mathbf{c}$	$1/4,1/4,0$

II Maximal *klassengleiche* subgroups

- **Loss of centring translations** none
- **Enlarged unit cell** none
- **Series of maximal isomorphic subgroups**

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

$Fd\bar{3}$ (203) $\langle 2+(\frac{3p}{4}-\frac{3}{4}+2u,\frac{3p}{4}-\frac{3}{4}+2v,0);$ $3+(\frac{3p}{4}-\frac{3}{4}+2u,0,\frac{3p}{4}-\frac{3}{4}+2w);$ $5+(u-w,-u+v,-v+w);\ 13+(2u,2v,2w)\rangle$ $p>2;\ 0\le u<p;\ 0\le v<p;\ 0\le w<p$ p^3 conjugate subgroups for the prime p — $p\mathbf{a},p\mathbf{b},p\mathbf{c}$ — u,v,w

I Minimal *translationengleiche* supergroups

[2] $Fd\bar{3}m$ (227); [2] $Fd\bar{3}c$ (228)

II Minimal non-isomorphic *klassengleiche* supergroups

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

[2] $\mathbf{a}'=\frac{1}{2}\mathbf{a},\ \mathbf{b}'=\frac{1}{2}\mathbf{b},\ \mathbf{c}'=\frac{1}{2}\mathbf{c}$ $Pn\bar{3}$ (201)