

# Space Group Encoding

This file contains the conversion tables for a compact space group encoding scheme. Table 1 lists the point symmetry parts of the 14 basic matrices, and Table 2 lists the conversions for the components of translation vectors. The remaining tables contain the generator strings for all 230 space groups. These tables should be used along with the information in section 10.7 (page 252) of the text book.<sup>1</sup>

Table 1: Explicit point symmetry matrices for the 14 matrices used to encode the space group generators.

$a = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$b = \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$c = \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$
$d = \begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{pmatrix}$	$e = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$f = \begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$
$g = \begin{pmatrix} 0 & -1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$h = \begin{pmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$i = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$
$j = \begin{pmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$k = \begin{pmatrix} 0 & -1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	$l = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}$
$m = \begin{pmatrix} 0 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{pmatrix}$	$n = \begin{pmatrix} 0 & -1 & 0 \\ 1 & -1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$	

Table 2: Conversions for the components of translation vectors in the space group encoding scheme.

$A = \frac{1}{6}$	$B = \frac{1}{4}$	$C = \frac{1}{3}$	$D = \frac{1}{2}$	$E = \frac{2}{3}$	$F = \frac{3}{4}$
$G = \frac{5}{6}$	$O = 0$	$X = -\frac{3}{8}$	$Y = -\frac{1}{4}$	$Z = -\frac{1}{8}$	

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<sup>1</sup>Four errors in the generator strings (for space groups 90, 107, 108, and 214) were pointed out by Matthew G. O'Brien and were corrected in this document on 9/25/2011.

Table 3: Generator strings for the 230 space groups.

Space Group	Generators	Space Group	Generators
1-P1 ( $C_1^1$ )	000	2-P1 ( $C_1^1$ )	100
3-P2 ( $C_2^1$ )	01c0000	4-P2 <sub>1</sub> ( $C_2^2$ )	01c0000
5-C2 ( $C_2^3$ )	02aDDOc0000	6-Pm ( $C_s^1$ )	01j0000
7-Pc ( $C_s^2$ )	01jOOD0	8-Cm ( $C_s^3$ )	02aDDOj0000
9-Cc ( $C_s^4$ )	02aDDOjOOD0	10-P2/m ( $C_{2h}^1$ )	11c0000
11-P2 <sub>1</sub> /m ( $C_{2h}^2$ )	11cOOD0	12-C2/m ( $C_{2h}^3$ )	12aDDOc0000
13-P2/c ( $C_{2h}^4$ )	11cOOD0	14-P2 <sub>1</sub> /c ( $C_{2h}^5$ )	11cOOD0
15-C2/c ( $C_{2h}^6$ )	12aDDOcOOD0	16-P222 ( $D_2^1$ )	02b000c0000
17-P222 <sub>1</sub> ( $D_2^2$ )	02bOODcOOD0	18-P2 <sub>1</sub> 2 <sub>1</sub> 2 ( $D_2^3$ )	02b000cDDO0
19-P2 <sub>1</sub> 2 <sub>1</sub> 2 <sub>1</sub> ( $D_2^4$ )	02bDODcODD0	20-C222 <sub>1</sub> ( $D_2^5$ )	03aDDObOODcOOD0
21-C222 ( $D_2^6$ )	03aDDOb000c0000	22-F222 ( $D_2^7$ )	04aODDaDODb000c0000
23-I222 ( $D_2^8$ )	03aDDDb000c0000	24-I2 <sub>1</sub> 2 <sub>1</sub> 2 <sub>1</sub> ( $D_2^9$ )	03aDDDbDODcODD0
25-Pmm2 ( $C_{2v}^1$ )	02b000j0000	26-Pmc2 <sub>1</sub> ( $C_{2v}^2$ )	02b000jOOD0
27-Pcc2 ( $C_{2v}^3$ )	02b000jOOD0	28-Pma2 ( $C_{2v}^4$ )	02b000jDOO0
29-Pca2 <sub>1</sub> ( $C_{2v}^5$ )	02b000jDOO0	30-Pnc2 ( $C_{2v}^6$ )	02b000jODD0
31-Pmn2 <sub>1</sub> ( $C_{2v}^7$ )	02bDODjDOD0	32-Pba2 ( $C_{2v}^8$ )	02b000jDDO0
33-Pna2 <sub>1</sub> ( $C_{2v}^9$ )	02b000jDDO0	34-Pnn2 ( $C_{2v}^{10}$ )	02b000jDDD0
35-Cmm2 ( $C_{2v}^{11}$ )	03aDDOb000j0000	36-Cmc2 <sub>1</sub> ( $C_{2v}^{12}$ )	03aDDObOODjOOD0
37-Ccc2 ( $C_{2v}^{13}$ )	03aDDOb000jOOD0	38-Amm2 ( $C_{2v}^{14}$ )	03aODDb000j0000
39-Abm2 ( $C_{2v}^{15}$ )	03aODDb000cODO0	40-Ama2 ( $C_{2v}^{16}$ )	03aODDb000jDOO0
41-Ab2 ( $C_{2v}^{17}$ )	03aODDb000jDDO0	42-Fmm2 ( $C_{2v}^{18}$ )	04aODDaDODb000j0000
43-Fdd2 ( $C_{2v}^{19}$ )	04aODDaDODb000jBBB0	44-Imm2 ( $C_{2v}^{20}$ )	03aDDDb000j0000
45-Iba2 ( $C_{2v}^{21}$ )	03aDDDb000jDDO0	46-Ima2 ( $C_{2v}^{22}$ )	03aDDDb000jDOO0
47-Pmmm ( $D_{2h}^1$ )	12b000c0000	48-Pnnn ( $D_{2h}^2$ )	03b000c000hDDD1BBB
49-Pccm ( $D_{2h}^3$ )	12b000cOOD0	50-Pban ( $D_{2h}^4$ )	03b000c000hDDO1BBO
51-Pmma ( $D_{2h}^5$ )	12bD00c0000	52-Pnna ( $D_{2h}^6$ )	12bD00cDDD0
53-Pmna ( $D_{2h}^7$ )	12bDODcDOD0	54-Pcca ( $D_{2h}^8$ )	12bD00cOOD0
55-Pbam ( $D_{2h}^9$ )	12b000cDDO0	56-Pccn ( $D_{2h}^{10}$ )	12bD00cODD0
57-Pbcm ( $D_{2h}^{11}$ )	12bOODcODD0	58-Pnmm ( $D_{2h}^{12}$ )	12b000cDDD0
59-Pmmn ( $D_{2h}^{13}$ )	03b000cDDOhDDO1BBO	60-Pbcn ( $D_{2h}^{14}$ )	12bDDDcOOD0
61-Pbca ( $D_{2h}^{15}$ )	12bDODcODD0	62-Pnma ( $D_{2h}^{16}$ )	12bDODcODO0
63-Cmcm ( $D_{2h}^{17}$ )	13aDDObOODcOOD0	64-Cmca ( $D_{2h}^{18}$ )	13aDDObODDcODD0
65-Cmmm ( $D_{2h}^{19}$ )	13aDDOb000c0000	66-Cccm ( $D_{2h}^{20}$ )	13aDDOb000cOOD0
67-Cmma ( $D_{2h}^{21}$ )	13aDDObODcODD0	68-Ccca ( $D_{2h}^{22}$ )	04aDDObDDOc000hODD1OBB
69-Fmmm ( $D_{2h}^{23}$ )	14aODDaDODb000c0000	70-Fddd ( $D_{2h}^{24}$ )	05aODDaDODb000c000hBBB1ZZZ
71-Immm ( $D_{2h}^{25}$ )	13aDDDb000c0000	72-Ibam ( $D_{2h}^{26}$ )	13aDDDb000cDDO0
73-Ibca ( $D_{2h}^{27}$ )	13aDDDbDODcODD0	74-Imma ( $D_{2h}^{28}$ )	13aDDDbODcODD0
75-P4 ( $C_4^1$ )	02b000g0000	76-P4 <sub>1</sub> ( $C_4^2$ )	02b000gOOb0
77-P4 <sub>2</sub> ( $C_4^3$ )	02b000gOOD0	78-P4 <sub>3</sub> ( $C_4^4$ )	02b000gOOf0
79-I4 ( $C_4^5$ )	03aDDDb000g0000	80-I4 <sub>1</sub> ( $C_4^6$ )	03aDDDbDDDgODB0

Table 3: Generator strings for the 230 space groups (continued).

Space Group	Generators	Space Group	Generators
81-P $\bar{4}$ ( $S_4^1$ )	$02bOOOmOOO0$	82-I $\bar{4}$ ( $S_4^2$ )	$03aDDDbOOOmOOO0$
83-P $4/m$ ( $C_{4h}^1$ )	$12bOOOgOOO0$	84-P $4_2/m$ ( $C_{4h}^2$ )	$12bOOOgOOD0$
85-P $4/n$ ( $C_{4h}^3$ )	$03bOOOgDDOhDDO1YBO$	86-P $4_2/n$ ( $C_{4h}^4$ )	$03bOOOgDDDhDDD1YYY$
87-I $4/m$ ( $C_{4h}^5$ )	$13aDDDbOOOgOOO0$	88-I $4_1/a$ ( $C_{4h}^6$ )	$04aDDDbDDdgODbODb1OYZ$
89-P $422$ ( $D_4^1$ )	$03bOOOgOOOcOOO0$	90-P $42_12$ ( $D_4^2$ )	$03bOOOgDDOcDDO0$
91-P $4_122$ ( $D_4^3$ )	$03bOODgOOBcOOO0$	92-P $4_12_12$ ( $D_4^4$ )	$03bOODgDBcDDB0$
93-P $4_222$ ( $D_4^5$ )	$03bOOOgOODcOOO0$	94-P $4_22_12$ ( $D_4^6$ )	$03bOOOgDDcDDD0$
95-P $4_322$ ( $D_4^7$ )	$03bOODgOOFcOOO0$	96-P $4_32_12$ ( $D_4^8$ )	$03bOODgDDFcDDF0$
97-I $422$ ( $D_4^9$ )	$04aDDDbOOOgOOOcOOO0$	98-I $4_122$ ( $D_4^{10}$ )	$04aDDDbDDdgODbODbDOF0$
99-P $4mm$ ( $C_{4v}^1$ )	$03bOOOgOOOjOOO0$	100-P $4bm$ ( $C_{4v}^2$ )	$03bOOOgOOOjDDO0$
101-P $4_2cm$ ( $C_{4v}^3$ )	$03bOOOgOODjOOD0$	102-P $4_2nm$ ( $C_{4v}^4$ )	$03bOOOgDDDjDDD0$
103-P $4cc$ ( $C_{4v}^5$ )	$03bOOOgOOOjOOD0$	104-P $4nc$ ( $C_{4v}^6$ )	$03bOOOgOOOjDDD0$
105-P $4_2mc$ ( $C_{4v}^7$ )	$03bOOOgOODjOOO0$	106-P $4_2bc$ ( $C_{4v}^8$ )	$03bOOOgOODjDDO0$
107-I $4mm$ ( $C_{4v}^9$ )	$04aDDDbOOOgOOOjOOO0$	108-I $4cm$ ( $C_{4v}^{10}$ )	$04aDDDbOOOgOOOjOOD0$
109-I $4_1md$ ( $C_{4v}^{11}$ )	$04aDDDbDDdgODbJOOO0$	110-I $4_1cd$ ( $C_{4v}^{12}$ )	$04aDDDbDDdgODbJOOD0$
111-P $\bar{4}2m$ ( $D_{2d}^1$ )	$03bOOOmOOOcOOO0$	112-P $\bar{4}2c$ ( $D_{2d}^2$ )	$03bOOOmOOOcOOD0$
113-P $\bar{4}2_1m$ ( $D_{2d}^3$ )	$03bOOOmOOOcDDO0$	114-P $\bar{4}2_1c$ ( $D_{2d}^5$ )	$03bOOOmOOOcDDD0$
115-P $\bar{4}m2$ ( $D_{2d}^5$ )	$03bOOOmOOOjOOO0$	116-P $\bar{4}c2$ ( $D_{2d}^6$ )	$03bOOOmOOOjOOD0$
117-P $\bar{4}b2$ ( $D_{2d}^7$ )	$03bOOOmOOOjDDO0$	118-P $\bar{4}n2$ ( $D_{2d}^8$ )	$03bOOOmOOOjDDD0$
119-I $\bar{4}m2$ ( $D_{2d}^9$ )	$04aDDDbOOOmOOOjOOO0$	120-I $\bar{4}c2$ ( $D_{2d}^{10}$ )	$04aDDDbOOOmOOOjOOD0$
121-I $\bar{4}2m$ ( $D_{2d}^{11}$ )	$04aDDDbOOOmOOOcOOO0$	122-I $\bar{4}2d$ ( $D_{2d}^{12}$ )	$04aDDDbOOOmOOOcDOF0$
123-P $4/mmm$ ( $D_{4h}^1$ )	$13bOOOgOOOcOOO0$	124-P $4/mcc$ ( $D_{4h}^2$ )	$13bOOOgOOOcOOD0$
125-P $4/nbm$ ( $D_{4h}^3$ )	$04bOOOgOOOcOOOhDDO1YYO$	126-P $4/nnc$ ( $D_{4h}^4$ )	$04bOOOgOOOcOOOhDDD1YYY$
127-P $4/mbm$ ( $D_{4h}^5$ )	$13bOOOgOOOcDDO0$	128-P $4/mnc$ ( $D_{4h}^6$ )	$13bOOOgOOOcDDD0$
129-P $4/nmm$ ( $D_{4h}^7$ )	$04bOOOgDDOcDDOhDDO1YBO$	130-P $4/ncc$ ( $D_{4h}^8$ )	$04bOOOgDDOcDDDhDDO1YBO$
131-P $4_2/mmc$ ( $D_{4h}^9$ )	$13bDDOgDOOcODD0$	132-P $4_2/mcm$ ( $D_{4h}^{10}$ )	$13bOOOgODcOOD0$
133-P $4_2/nbc$ ( $D_{4h}^{11}$ )	$04bOOOgDDDcOODhDDD1YBY$	134-P $4_2/nnm$ ( $D_{4h}^{12}$ )	$04bOOOgDDcOOOhDDD1YBY$
135-P $4_2/mbc$ ( $D_{4h}^{13}$ )	$13bOOOgOODcDDO0$	136-P $4_2/mnm$ ( $D_{4h}^{14}$ )	$13bOOOgDDDcDDD0$
137-P $4_2/nmc$ ( $D_{4h}^{15}$ )	$04bOOOgDDDcDDDhDDD1YBY$	138-P $4_2/nem$ ( $D_{4h}^{16}$ )	$04bOOOgDDDcDDOhDDD1YBY$
139-I $4/mmm$ ( $D_{4h}^{17}$ )	$14aDDDbOOOgOOOcOOO0$	140-I $4/mcm$ ( $D_{4h}^{18}$ )	$14aDDDbOOOgOOOcOOD0$
141-I $4_1/amd$ ( $D_{4h}^{19}$ )	$05aDDDbDDdgODbODbDOFhODb1OBZ$	142-I $4_1/acd$ ( $D_{4h}^{20}$ )	$05aDDDbDDdgODbODbDOFhODb1OBZ$
143-P $3$ ( $C_3^1$ )	$01nOOO0$	144-P $3_1$ ( $C_3^2$ )	$01nOOc0$
145-P $3_2$ ( $C_3^3$ )	$01nOOE0$	146-R $3$ ( $C_3^4$ )	$02aECCnOOO0$
147-P $\bar{3}$ ( $C_{3i}^1$ )	$11nOOO0$	148-R $\bar{3}$ ( $C_{3i}^2$ )	$12aECCnOOO0$
149-P $312$ ( $D_3^1$ )	$02nOOOfOOO0$	150-P $321$ ( $D_3^2$ )	$02nOOOcOOO0$
151-P $3_112$ ( $D_3^3$ )	$02nOOCfOOE0$	152-P $3_121$ ( $D_3^4$ )	$02nOOCeOOO0$
153-P $3_212$ ( $D_3^5$ )	$02nOOEfOOC0$	154-P $3_221$ ( $D_3^6$ )	$02nOOEeOOO0$
155-R $32$ ( $D_3^7$ )	$03aECCnOOOeOOO0$	156-P $3m1$ ( $C_{3v}^1$ )	$02nOOOkOOO0$
157-P $31m$ ( $C_{3v}^2$ )	$02nOOOlOOO0$	158-P $3c1$ ( $C_{3v}^3$ )	$02nOOOkOOD0$
159-P $31c$ ( $C_{3v}^4$ )	$02nOOOlOOD0$	160-R $3m$ ( $C_{3v}^5$ )	$03aECCnOOOkOOO0$

Table 3: Generator strings for the 230 space groups (continued).

Space Group	Generators	Space Group	Generators
161- <b>R3c</b> ( $C_{3v}^6$ )	<i>03aECCnOOOkOOD0</i>	162- <b>P31m</b> ( $D_{3d}^1$ )	<i>12nOOOfOOO0</i>
163- <b>P31c</b> ( $D_{3d}^2$ )	<i>12nOOOfOOD0</i>	164- <b>P3m1</b> ( $D_{3d}^3$ )	<i>12nOOOeOOO0</i>
165- <b>P3c1</b> ( $D_{3d}^4$ )	<i>12nOOOeOOD0</i>	166- <b>R3m</b> ( $D_{3d}^5$ )	<i>13aECCnOOOeOOO0</i>
167- <b>R3c</b> ( $D_{3d}^6$ )	<i>13aECCnOOOeOOD0</i>	168- <b>P6</b> ( $C_6^1$ )	<i>02nOOObOOO0</i>
169- <b>P61</b> ( $C_6^2$ )	<i>02nOOCbOOD0</i>	170- <b>P65</b> ( $C_6^3$ )	<i>02nOOEbOOD0</i>
171- <b>P62</b> ( $C_6^4$ )	<i>02nOOEbOOO0</i>	172- <b>P64</b> ( $C_6^5$ )	<i>02nOOCbOOO0</i>
173- <b>P63</b> ( $C_6^6$ )	<i>02nOOObOOD0</i>	174- <b>P6</b> ( $C_{3h}^1$ )	<i>02nOOOiOOO0</i>
175- <b>P6/m</b> ( $C_{6h}^1$ )	<i>12nOOObOOO0</i>	176- <b>P63/m</b> ( $C_{6h}^2$ )	<i>12nOOObOOD0</i>
177- <b>P622</b> ( $D_6^1$ )	<i>03nOOObOOOeOOO0</i>	178- <b>P6122</b> ( $D_6^2$ )	<i>03nOOCbOODeOOC0</i>
179- <b>P6522</b> ( $D_6^3$ )	<i>03nOOEbOODeOOE0</i>	180- <b>P6222</b> ( $D_6^4$ )	<i>03nOOEbOOOeOOE0</i>
181- <b>P6422</b> ( $D_6^5$ )	<i>03nOOCbOOOeOOC0</i>	182- <b>P6322</b> ( $D_6^6$ )	<i>03nOOObOODeOOO0</i>
183- <b>P6mm</b> ( $C_{6v}^1$ )	<i>03nOOObOOOkOOO0</i>	184- <b>P6cc</b> ( $C_{6v}^2$ )	<i>03nOOObOOOkOOD0</i>
185- <b>P63cm</b> ( $C_{6v}^3$ )	<i>03nOOObOODkOOD0</i>	186- <b>P63mc</b> ( $C_{6v}^4$ )	<i>03nOOObOODkOOO0</i>
187- <b>P6m2</b> ( $D_{3h}^1$ )	<i>03nOOOiOOOkOOO0</i>	188- <b>P6c2</b> ( $D_{3h}^2$ )	<i>03nOOOiOODkOOD0</i>
189- <b>P62m</b> ( $D_{3h}^3$ )	<i>03nOOOiOOOeOOO0</i>	190- <b>P62c</b> ( $D_{3h}^4$ )	<i>03nOOOiOODeOOO0</i>
191- <b>P6/mmm</b> ( $D_{6h}^1$ )	<i>13nOOObOOOeOOO0</i>	192- <b>P6/mcc</b> ( $D_{6h}^2$ )	<i>13nOOObOOOeOOD0</i>
193- <b>P63/mcm</b> ( $D_{6h}^3$ )	<i>13nOOObOODeOOD0</i>	194- <b>P63/mmc</b> ( $D_{6h}^4$ )	<i>13nOOObOODeOOO0</i>
195- <b>P23</b> ( $T^1$ )	<i>03bOOOcOOOdOOO0</i>	196- <b>F23</b> ( $T^2$ )	<i>05aODDaDODbOOOcOOOdOOO0</i>
197- <b>I23</b> ( $T^3$ )	<i>04aDDDbOOOcOOOdOOO0</i>	198- <b>P213</b> ( $T^4$ )	<i>03bDODcODDdOOO0</i>
199- <b>I213</b> ( $T^5$ )	<i>04aDDDbDODcODDdOOO0</i>	200- <b>Pm3</b> ( $T_h^1$ )	<i>13bOOOcOOOdOOO0</i>
201- <b>Pn3</b> ( $T_h^2$ )	<i>04bOOOcOOOdOOOhDDD1YYY</i>	202- <b>Fm3</b> ( $T_h^3$ )	<i>15aODDaDODbOOOcOOOdOOO0</i>
203- <b>Fd3</b> ( $T_h^4$ )	<i>06aODDaDODbOOOcOOOdOOOhBBB1ZZZ</i>	204- <b>Im3</b> ( $T_h^5$ )	<i>14aDDDbOOOcOOOdOOO0</i>
205- <b>Pa3</b> ( $T_h^6$ )	<i>13bDODcODDdOOO0</i>	206- <b>Ia3</b> ( $T_h^7$ )	<i>14aDDDbDODcODDdOOO0</i>
207- <b>P432</b> ( $O^1$ )	<i>04bOOOcOOOdOOOeOOO0</i>	208- <b>P4232</b> ( $O^2$ )	<i>04bOOOcOOOdOOOeDDD0</i>
209- <b>F432</b> ( $O^3$ )	<i>06aODDaDODbOOOcOOOdOOOeOOO0</i>	210- <b>F4132</b> ( $O^4$ )	<i>06aODDaDODbODDcDDOdOOOeFBF0</i>
211- <b>I432</b> ( $O^5$ )	<i>05aDDDbOOOcOOOdOOOeOOO0</i>	212- <b>P4332</b> ( $O^6$ )	<i>04bDODcODDdOOOeBFF0</i>
213- <b>P4132</b> ( $O^7$ )	<i>04bDODcODDdOOOeFBB0</i>	214- <b>I4132</b> ( $O^8$ )	<i>05aDDDbDODcODDdOOOeFBB0</i>
215- <b>P43m</b> ( $T_d^1$ )	<i>04bOOOcOOOdOOOlOOO0</i>	216- <b>F43m</b> ( $T_d^2$ )	<i>06aODDaDODbOOOcOOOdOOOlOOO0</i>
217- <b>I43m</b> ( $T_d^3$ )	<i>05aDDDbOOOcOOOdOOOlOOO0</i>	218- <b>P43n</b> ( $T_d^4$ )	<i>04bOOOcOOOdOOOlDDD0</i>
219- <b>F43c</b> ( $T_d^5$ )	<i>06aODDaDODbOOOcOOOdOOOlDDD0</i>	220- <b>I43d</b> ( $T_d^6$ )	<i>05aDDDbDODcODDdOOOlBBB0</i>
221- <b>Pm3m</b> ( $O_h^1$ )	<i>14bOOOcOOOdOOOeOOO0</i>	222- <b>Pn3n</b> ( $O_h^2$ )	<i>14bDDOcDODdOOOeOOD1YYY</i>
223- <b>Pm3n</b> ( $O_h^3$ )	<i>14bOOOcOOOdOOOeDDD0</i>	224- <b>Pn3m</b> ( $O_h^4$ )	<i>05bOOOcOOOdOOOeDDDhDDD1YYY</i>
225- <b>Fm3m</b> ( $O_h^5$ )	<i>16aODDaDODbOOOcOOOdOOOeOOO0</i>	226- <b>Fm3c</b> ( $O_h^6$ )	<i>16aODDaDODbOOOcOOOdOOOeDDD0</i>
227- <b>Fd3m</b> ( $O_h^7$ )	<i>07aODDaDODbODDcDDOdOOOeFBFhBBB1ZZZ</i>	228- <b>Fd3c</b> ( $O_h^8$ )	<i>07aODDaDODbODDcDDOdOOOeFBFhFFF1XXX</i>
229- <b>Im3m</b> ( $O_h^9$ )	<i>15aDDDbOOOcOOOdOOOeOOO0</i>	230- <b>Ia3d</b> ( $O_h^{10}$ )	<i>15aDDDbDODcODDdOOOeFBB0</i>