

1.5. TRANSFORMATIONS OF COORDINATE SYSTEMS

Table 1.5.4.4

List of space-group symbols for various settings and cells

TRICLINIC SYSTEM

No. of space group	Schoenflies symbol	Hermann–Mauguin symbol for all settings of the same unit cell
1	$C_1^1$	$P1$
2	$C_i^1$	$P\bar{1}$

MONOCLINIC SYSTEM

No. of space group	Schoenflies symbol	Standard short Hermann–Mauguin symbol	Extended Hermann–Mauguin symbols for various settings and cell choices						Unique axis <i>b</i> Unique axis <i>c</i> Unique axis <i>a</i>
			$\underline{abc}$	$\bar{cba}$	$\underline{abc}$	$\underline{ba\bar{c}}$	$\underline{abc}$	$\bar{a\bar{c}b}$	
3	$C_2^1$	$P2$	$P121$	$P121$	$P112$	$P112$	$P211$	$P211$	
4	$C_2^2$	$P2_1$	$P12_11$	$P12_11$	$P112_1$	$P112_1$	$P2_111$	$P2_111$	
5	$C_2^3$	$C2$	$C121$	$A121$	$A112$	$B112$	$B211$	$C211$	Cell choice 1
			$2_1$	$2_1$	$2_1$	$2_1$	$2_1$	$2_1$	Cell choice 2
			$A121$	$C121$	$B112$	$A112$	$C211$	$B211$	Cell choice 3
			$2_1$	$2_1$	$2_1$	$2_1$	$2_1$	$2_1$	
			$I121$	$I121$	$I112$	$I112$	$I211$	$I211$	
			$2_1$	$2_1$	$2_1$	$2_1$	$2_1$	$2_1$	
6	$C_s^1$	$Pm$	$P1m1$	$P1m1$	$P11m$	$P11m$	$Pm11$	$Pm11$	
7	$C_s^2$	$Pc$	$P1c1$	$P1a1$	$P11a$	$P11b$	$Pb11$	$Pc11$	Cell choice 1
			$P1n1$	$P1n1$	$P11n$	$P11n$	$Pn11$	$Pn11$	Cell choice 2
			$P1a1$	$P1c1$	$P11b$	$P11a$	$Pc11$	$Pb11$	Cell choice 3
8	$C_s^3$	$Cm$	$C1m1$	$A1m1$	$A11m$	$B11m$	$Bm11$	$Cm11$	Cell choice 1
			$a$	$c$	$b$	$a$	$b$	$c$	Cell choice 2
			$A1m1$	$C1m1$	$B11m$	$A11m$	$Cm11$	$Bm11$	Cell choice 3
			$c$	$a$	$a$	$b$	$b$	$c$	
			$I1m1$	$I1m1$	$I11m$	$I11m$	$Im11$	$Im11$	
			$n$	$n$	$n$	$n$	$n$	$n$	
9	$C_s^4$	$Cc$	$C1c1$	$A1a1$	$A11a$	$B11b$	$Bb11$	$Cc11$	Cell choice 1
			$n$	$n$	$n$	$n$	$n$	$n$	Cell choice 2
			$A1n1$	$C1n1$	$B11n$	$A11n$	$Cn11$	$Bn11$	Cell choice 3
			$a$	$c$	$b$	$a$	$c$	$b$	
			$I1a1$	$I1c1$	$I11b$	$I11a$	$Ic11$	$Ib11$	
			$c$	$a$	$a$	$b$	$b$	$c$	
10	$C_{2h}^1$	$P2/m$	$P1\frac{2}{m}1$	$P1\frac{2}{m}1$	$P11\frac{2}{m}$	$P11\frac{2}{m}$	$P\frac{2}{m}11$	$P\frac{2}{m}11$	
11	$C_{2h}^2$	$P2_1/m$	$P1\frac{2_1}{m}1$	$P1\frac{2_1}{m}1$	$P11\frac{2_1}{m}$	$P11\frac{2_1}{m}$	$P\frac{2_1}{m}11$	$P\frac{2_1}{m}11$	
12	$C_{2h}^3$	$C2/m$	$C1\frac{2}{m}1$	$A1\frac{2}{m}1$	$A11\frac{2}{m}$	$B11\frac{2}{m}$	$B\frac{2}{m}11$	$C\frac{2}{m}11$	Cell choice 1
			$\frac{2_1}{a}$	$\frac{2_1}{c}$	$\frac{2_1}{b}$	$\frac{2_1}{a}$	$\frac{2_1}{c}$	$\frac{2_1}{b}$	
			$A1\frac{2}{m}1$	$C1\frac{2}{m}1$	$B11\frac{2}{m}$	$A11\frac{2}{m}$	$C\frac{2}{m}11$	$B\frac{2}{m}11$	Cell choice 2
			$\frac{2_1}{c}$	$\frac{2_1}{a}$	$\frac{2_1}{a}$	$\frac{2_1}{b}$	$\frac{2_1}{b}$	$\frac{2_1}{c}$	
			$I1\frac{2}{m}1$	$I1\frac{2}{m}1$	$I11\frac{2}{m}$	$I11\frac{2}{m}$	$I\frac{2}{m}11$	$I\frac{2}{m}11$	Cell choice 3
			$\frac{2_1}{n}$	$\frac{2_1}{n}$	$\frac{2_1}{n}$	$\frac{2_1}{n}$	$\frac{2_1}{n}$	$\frac{2_1}{n}$	
13	$C_{2h}^4$	$P2/c$	$P1\frac{2}{c}1$	$P1\frac{2}{a}1$	$P11\frac{2}{a}$	$P11\frac{2}{b}$	$P\frac{2}{b}11$	$P\frac{2}{c}11$	Cell choice 1
			$P1\frac{2}{n}1$	$P1\frac{2}{n}1$	$P11\frac{2}{n}$	$P11\frac{2}{n}$	$P\frac{2}{n}11$	$P\frac{2}{n}11$	Cell choice 2
			$P1\frac{2}{a}1$	$P1\frac{2}{c}1$	$P11\frac{2}{b}$	$P11\frac{2}{a}$	$P\frac{2}{c}11$	$P\frac{2}{b}11$	Cell choice 3

1. INTRODUCTION TO SPACE-GROUP SYMMETRY

Table 1.5.4.4 (continued)

No. of space group	Schoenflies symbol	Standard short Hermann–Mauguin symbol	Extended Hermann–Mauguin symbols for various settings and cell choices						Unique axis <i>b</i> Unique axis <i>c</i> Unique axis <i>a</i>
			$\underline{abc}$	$\overline{cba}$	$\underline{abc}$	$\underline{ba\bar{c}}$	$\underline{abc}$	$\overline{acb}$	
14	$C_{2h}^5$	$P2_1/c$	$P1\frac{2_1}{c}1$	$P1\frac{2_1}{a}1$	$P11\frac{2_1}{a}$	$P11\frac{2_1}{b}$	$P\frac{2_1}{b}11$	$P\frac{2_1}{c}11$	Cell choice 1
			$P1\frac{2_1}{n}1$	$P1\frac{2_1}{n}1$	$P11\frac{2_1}{n}$	$P11\frac{2_1}{n}$	$P\frac{2_1}{n}11$	$P\frac{2_1}{n}11$	Cell choice 2
			$P1\frac{2_1}{a}1$	$P1\frac{2_1}{c}1$	$P11\frac{2_1}{b}$	$P11\frac{2_1}{a}$	$P\frac{2_1}{c}11$	$P\frac{2_1}{b}11$	Cell choice 3
15	$C_{2h}^6$	$C2/c$	$C1\frac{2}{c}1$	$A1\frac{2}{a}1$	$A11\frac{2}{a}$	$B11\frac{2}{b}$	$B\frac{2}{b}11$	$C\frac{2}{c}11$	Cell choice 1
			$\frac{2_1}{n}$	$\frac{2_1}{n}$	$\frac{2_1}{n}$	$\frac{2_1}{n}$	$\frac{2_1}{n}$	$\frac{2_1}{n}$	
			$A1\frac{2}{n}1$	$C1\frac{2}{n}1$	$B11\frac{2}{n}$	$A11\frac{2}{n}$	$C\frac{2}{n}11$	$B\frac{2}{n}11$	Cell choice 2
			$\frac{2_1}{a}$	$\frac{2_1}{c}$	$\frac{2_1}{b}$	$\frac{2_1}{a}$	$\frac{2_1}{c}$	$\frac{2_1}{b}$	
			$I1\frac{2}{a}1$	$I1\frac{2}{c}1$	$I11\frac{2}{b}$	$I11\frac{2}{a}$	$I\frac{2}{c}11$	$I\frac{2}{b}11$	Cell choice 3
			$\frac{2_1}{c}$	$\frac{2_1}{a}$	$\frac{2_1}{a}$	$\frac{2_1}{b}$	$\frac{2_1}{b}$	$\frac{2_1}{c}$	
			$\frac{2_1}{c}$	$\frac{2_1}{a}$	$\frac{2_1}{a}$	$\frac{2_1}{b}$	$\frac{2_1}{b}$	$\frac{2_1}{c}$	

ORTHORHOMBIC SYSTEM

No. of space group	Schoenflies symbol	Standard full Hermann–Mauguin symbol $\underline{abc}$	Extended Hermann–Mauguin symbols for the six settings of the same unit cell						
			$\underline{abc}$ (standard)	$\underline{ba\bar{c}}$	$\underline{cab}$	$\overline{cba}$	$\underline{bca}$	$\overline{a\bar{c}b}$	
16	$D_2^1$	$P222$	$P222$	$P222$	$P222$	$P222$	$P222$	$P222$	$P222$
17	$D_2^2$	$P222_1$	$P222_1$	$P222_1$	$P2_122$	$P2_122$	$P22_12$	$P22_12$	$P22_12$
18	$D_2^3$	$P2_12_12$	$P2_12_12$	$P2_12_12$	$P22_12_1$	$P22_12_1$	$P2_122_1$	$P2_122_1$	$P2_122_1$
19	$D_2^4$	$P2_12_12_1$	$P2_12_12_1$	$P2_12_12_1$	$P2_12_12_1$	$P2_12_12_1$	$P2_12_12_1$	$P2_12_12_1$	$P2_12_12_1$
20	$D_2^5$	$C222_1$	$C222_1$	$C222_1$	$A2_122$	$A2_122$	$B22_12$	$B22_12$	$B22_12$
			$2_12_12_1$	$2_12_12_1$	$2_12_12_1$	$2_12_12_1$	$2_12_12_1$	$2_12_12_1$	$2_12_12_1$
21	$D_2^6$	$C222$	$C222$	$C222$	$A222$	$A222$	$B222$	$B222$	$B222$
			$2_12_12$	$2_12_12$	$22_12_1$	$22_12_1$	$2_122_1$	$2_122_1$	$2_122_1$
22	$D_2^7$	$F222$	$F222$	$F222$	$F222$	$F222$	$F222$	$F222$	$F222$
			$2_12_12$	$2_12_12$	$22_12_1$	$22_12_1$	$2_122_1$	$2_122_1$	$2_122_1$
			$22_12_1$	$2_122_1$	$2_122_1$	$2_12_12$	$2_12_12$	$2_12_12$	$22_12_1$
			$2_122_1$	$22_12_1$	$2_12_12$	$2_122_1$	$22_12_1$	$22_12_1$	$2_12_12$
23	$D_2^8$	$I222$	$I222$	$I222$	$I222$	$I222$	$I222$	$I222$	$I222$
			$2_12_12_1$	$2_12_12_1$	$2_12_12_1$	$2_12_12_1$	$2_12_12_1$	$2_12_12_1$	$2_12_12_1$
24	$D_2^9$	$I2_12_12_1$	$I2_12_12_1$	$I2_12_12_1$	$I2_12_12_1$	$I2_12_12_1$	$I2_12_12_1$	$I2_12_12_1$	$I2_12_12_1$
			$222$	$222$	$222$	$222$	$222$	$222$	$222$
25	$C_{2v}^1$	$Pmm2$	$Pmm2$	$Pmm2$	$P2mm$	$P2mm$	$Pm2m$	$Pm2m$	$Pm2m$
26	$C_{2v}^2$	$Pmc2_1$	$Pmc2_1$	$Pcm2_1$	$P2_1ma$	$P2_1am$	$Pb2_1m$	$Pb2_1m$	$Pm2_1b$
27	$C_{2v}^3$	$Pcc2$	$Pcc2$	$Pcc2$	$P2aa$	$P2aa$	$Pb2b$	$Pb2b$	$Pb2b$
28	$C_{2v}^4$	$Pma2$	$Pma2$	$Pbm2$	$P2mb$	$P2cm$	$Pc2m$	$Pc2m$	$Pm2a$
29	$C_{2v}^5$	$Pca2_1$	$Pca2_1$	$Pbc2_1$	$P2_1ab$	$P2_1ca$	$Pc2_1b$	$Pc2_1b$	$Pb2_1a$
30	$C_{2v}^6$	$Pnc2$	$Pnc2$	$Pcn2$	$P2na$	$P2an$	$Pb2n$	$Pb2n$	$Pn2b$
31	$C_{2v}^7$	$Pmn2_1$	$Pmn2_1$	$Pnm2_1$	$P2_1mn$	$P2_1nm$	$Pn2_1m$	$Pn2_1m$	$Pm2_1n$
32	$C_{2v}^8$	$Pba2$	$Pba2$	$Pba2$	$P2cb$	$P2cb$	$Pc2a$	$Pc2a$	$Pc2a$
33	$C_{2v}^9$	$Pna2_1$	$Pna2_1$	$Pbn2_1$	$P2_1nb$	$P2_1cn$	$Pc2_1n$	$Pc2_1n$	$Pn2_1a$
34	$C_{2v}^{10}$	$Pnn2$	$Pnn2$	$Pnn2$	$P2nn$	$P2nn$	$Pn2n$	$Pn2n$	$Pn2n$
35	$C_{2v}^{11}$	$Cmm2$	$Cmm2$	$Cmm2$	$A2mm$	$A2mm$	$Bm2m$	$Bm2m$	$Bm2m$
			$ba2$	$ba2$	$2cb$	$2cb$	$c2a$	$c2a$	$c2a$

1.5. TRANSFORMATIONS OF COORDINATE SYSTEMS

Table 1.5.4.4 (continued)

No. of space group	Schoenflies symbol	Standard full Hermann–Mauguin symbol <b>abc</b>	Extended Hermann–Mauguin symbols for the six settings of the same unit cell					
			<b>abc</b> (standard)	<b>ba<math>\bar{c}</math></b>	<b>cab</b>	<b><math>\bar{c}ba</math></b>	<b>bca</b>	<b>a<math>\bar{c}b</math></b>
36	$C_{2v}^{12}$	<i>Cmc</i> 2 <sub>1</sub>	<i>Cmc</i> 2 <sub>1</sub> <i>bn</i> 2 <sub>1</sub>	<i>Ccm</i> 2 <sub>1</sub> <i>na</i> 2 <sub>1</sub>	<i>A</i> 2 <sub>1</sub> <i>ma</i> 2 <sub>1</sub> <i>cn</i>	<i>A</i> 2 <sub>1</sub> <i>am</i> 2 <sub>1</sub> <i>nb</i>	<i>Bb</i> 2 <sub>1</sub> <i>m</i> <i>n</i> 2 <sub>1</sub> <i>a</i>	<i>Bm</i> 2 <sub>1</sub> <i>b</i> <i>c</i> 2 <sub>1</sub> <i>n</i>
37	$C_{2v}^{13}$	<i>Ccc</i> 2	<i>Ccc</i> 2 <i>nn</i> 2	<i>Ccc</i> 2 <i>nn</i> 2	<i>A</i> 2 <sub>1</sub> <i>aa</i> 2 <sub>1</sub> <i>nn</i>	<i>A</i> 2 <sub>1</sub> <i>aa</i> 2 <sub>1</sub> <i>nn</i>	<i>Bb</i> 2 <sub>1</sub> <i>b</i> <i>n</i> 2 <sub>1</sub> <i>n</i>	<i>Bb</i> 2 <sub>1</sub> <i>b</i> <i>n</i> 2 <sub>1</sub> <i>n</i>
38	$C_{2v}^{14}$	<i>Amm</i> 2	<i>Amm</i> 2 <i>nc</i> 2 <sub>1</sub>	<i>Bmm</i> 2 <i>cn</i> 2 <sub>1</sub>	<i>B</i> 2 <sub>1</sub> <i>mm</i> 2 <sub>1</sub> <i>na</i>	<i>C</i> 2 <sub>1</sub> <i>mm</i> 2 <sub>1</sub> <i>an</i>	<i>Cm</i> 2 <sub>1</sub> <i>m</i> <i>b</i> 2 <sub>1</sub> <i>n</i>	<i>Am</i> 2 <sub>1</sub> <i>m</i> <i>n</i> 2 <sub>1</sub> <i>b</i>
39†	$C_{2v}^{15}$	<i>Aem</i> 2	<i>Abm</i> 2 ( <i>Aem</i> 2) <i>cc</i> 2 <sub>1</sub>	<i>Bma</i> 2 ( <i>Bme</i> 2) <i>cc</i> 2 <sub>1</sub>	<i>B</i> 2 <sub>1</sub> <i>cm</i> ( <i>B2em</i> ) 2 <sub>1</sub> <i>aa</i>	<i>C</i> 2 <sub>1</sub> <i>mb</i> ( <i>C2me</i> ) 2 <sub>1</sub> <i>aa</i>	<i>Cm</i> 2 <sub>1</sub> <i>a</i> ( <i>Cm2e</i> ) <i>b</i> 2 <sub>1</sub> <i>b</i>	<i>Ac</i> 2 <sub>1</sub> <i>m</i> ( <i>Ae2m</i> ) <i>b</i> 2 <sub>1</sub> <i>b</i>
40	$C_{2v}^{16}$	<i>Ama</i> 2	<i>Ama</i> 2 <i>nn</i> 2 <sub>1</sub>	<i>Bbm</i> 2 <i>nn</i> 2 <sub>1</sub>	<i>B</i> 2 <sub>1</sub> <i>mb</i> 2 <sub>1</sub> <i>nn</i>	<i>C</i> 2 <sub>1</sub> <i>cm</i> 2 <sub>1</sub> <i>nn</i>	<i>Cc</i> 2 <sub>1</sub> <i>m</i> <i>n</i> 2 <sub>1</sub> <i>n</i>	<i>Am</i> 2 <sub>1</sub> <i>a</i> <i>n</i> 2 <sub>1</sub> <i>n</i>
41†	$C_{2v}^{17}$	<i>Aea</i> 2	<i>Aba</i> 2 ( <i>Aea</i> 2) <i>cn</i> 2 <sub>1</sub>	<i>Bba</i> 2 ( <i>Bbe</i> 2) <i>nc</i> 2 <sub>1</sub>	<i>B</i> 2 <sub>1</sub> <i>cb</i> ( <i>B2eb</i> ) 2 <sub>1</sub> <i>an</i>	<i>C</i> 2 <sub>1</sub> <i>cb</i> ( <i>C2ce</i> ) 2 <sub>1</sub> <i>na</i>	<i>Cc</i> 2 <sub>1</sub> <i>a</i> ( <i>Cc2e</i> ) <i>n</i> 2 <sub>1</sub> <i>b</i>	<i>Ac</i> 2 <sub>1</sub> <i>a</i> ( <i>Ae2a</i> ) <i>b</i> 2 <sub>1</sub> <i>n</i>
42	$C_{2v}^{18}$	<i>Fmm</i> 2	<i>Fmm</i> 2 <i>ba</i> 2 <i>nc</i> 2 <sub>1</sub> <i>cn</i> 2 <sub>1</sub>	<i>Fmm</i> 2 <i>ba</i> 2 <i>cn</i> 2 <sub>1</sub> <i>nc</i> 2 <sub>1</sub>	<i>F</i> 2 <sub>1</sub> <i>mm</i> 2 <sub>1</sub> <i>cb</i> 2 <sub>1</sub> <i>na</i> 2 <sub>1</sub> <i>an</i>	<i>F</i> 2 <sub>1</sub> <i>mm</i> 2 <sub>1</sub> <i>cb</i> 2 <sub>1</sub> <i>an</i> 2 <sub>1</sub> <i>na</i>	<i>Fm</i> 2 <sub>1</sub> <i>m</i> <i>c</i> 2 <sub>1</sub> <i>a</i> <i>b</i> 2 <sub>1</sub> <i>n</i> <i>n</i> 2 <sub>1</sub> <i>b</i>	<i>Fm</i> 2 <sub>1</sub> <i>m</i> <i>c</i> 2 <sub>1</sub> <i>a</i> <i>n</i> 2 <sub>1</sub> <i>b</i> <i>b</i> 2 <sub>1</sub> <i>n</i>
43	$C_{2v}^{19}$	<i>Fdd</i> 2	<i>Fdd</i> 2 <i>dd</i> 2 <sub>1</sub>	<i>Fdd</i> 2 <i>dd</i> 2 <sub>1</sub>	<i>F</i> 2 <sub>1</sub> <i>dd</i> 2 <sub>1</sub> <i>dd</i>	<i>F</i> 2 <sub>1</sub> <i>dd</i> 2 <sub>1</sub> <i>dd</i>	<i>Fd</i> 2 <sub>1</sub> <i>d</i> <i>d</i> 2 <sub>1</sub> <i>d</i>	<i>Fd</i> 2 <sub>1</sub> <i>d</i> <i>d</i> 2 <sub>1</sub> <i>d</i>
44	$C_{2v}^{20}$	<i>Imm</i> 2	<i>Imm</i> 2 <i>nn</i> 2 <sub>1</sub>	<i>Imm</i> 2 <i>nn</i> 2 <sub>1</sub>	<i>I</i> 2 <sub>1</sub> <i>mm</i> 2 <sub>1</sub> <i>nn</i>	<i>I</i> 2 <sub>1</sub> <i>mm</i> 2 <sub>1</sub> <i>nn</i>	<i>Im</i> 2 <sub>1</sub> <i>m</i> <i>n</i> 2 <sub>1</sub> <i>n</i>	<i>Im</i> 2 <sub>1</sub> <i>m</i> <i>n</i> 2 <sub>1</sub> <i>n</i>
45	$C_{2v}^{21}$	<i>Iba</i> 2	<i>Iba</i> 2 <i>cc</i> 2 <sub>1</sub>	<i>Iba</i> 2 <i>cc</i> 2 <sub>1</sub>	<i>I</i> 2 <sub>1</sub> <i>cb</i> 2 <sub>1</sub> <i>aa</i>	<i>I</i> 2 <sub>1</sub> <i>cb</i> 2 <sub>1</sub> <i>aa</i>	<i>Ic</i> 2 <sub>1</sub> <i>a</i> <i>b</i> 2 <sub>1</sub> <i>b</i>	<i>Ic</i> 2 <sub>1</sub> <i>a</i> <i>b</i> 2 <sub>1</sub> <i>b</i>
46	$C_{2v}^{22}$	<i>Ima</i> 2	<i>Ima</i> 2 <i>nc</i> 2 <sub>1</sub>	<i>Ibm</i> 2 <i>cn</i> 2 <sub>1</sub>	<i>I</i> 2 <sub>1</sub> <i>mb</i> 2 <sub>1</sub> <i>na</i>	<i>I</i> 2 <sub>1</sub> <i>cm</i> 2 <sub>1</sub> <i>an</i>	<i>Ic</i> 2 <sub>1</sub> <i>m</i> <i>b</i> 2 <sub>1</sub> <i>n</i>	<i>Im</i> 2 <sub>1</sub> <i>a</i> <i>n</i> 2 <sub>1</sub> <i>b</i>
47	$D_{2h}^1$	$P \frac{2\ 2\ 2}{m\ m\ m}$	<i>Pmmm</i>	<i>Pmmm</i>	<i>Pmmm</i>	<i>Pmmm</i>	<i>Pmmm</i>	<i>Pmmm</i>
48	$D_{2h}^2$	$P \frac{2\ 2\ 2}{n\ n\ n}$	<i>Pnnn</i>	<i>Pnnn</i>	<i>Pnnn</i>	<i>Pnnn</i>	<i>Pnnn</i>	<i>Pnnn</i>
49	$D_{2h}^3$	$P \frac{2\ 2\ 2}{c\ c\ m}$	<i>Pccm</i>	<i>Pccm</i>	<i>Pmaa</i>	<i>Pmaa</i>	<i>Pbmb</i>	<i>Pbmb</i>
50	$D_{2h}^4$	$P \frac{2\ 2\ 2}{b\ a\ n}$	<i>Pban</i>	<i>Pban</i>	<i>Pncb</i>	<i>Pncb</i>	<i>Pcna</i>	<i>Pcna</i>
51	$D_{2h}^5$	$P \frac{2_1\ 2\ 2}{m\ m\ a}$	<i>Pmma</i>	<i>Pmmb</i>	<i>Pbmm</i>	<i>Pcmm</i>	<i>Pmcm</i>	<i>Pmam</i>
52	$D_{2h}^6$	$P \frac{2\ 2_1\ 2}{n\ n\ a}$	<i>Pnna</i>	<i>Pnnb</i>	<i>Pbnn</i>	<i>Pcnn</i>	<i>Pncn</i>	<i>Pnan</i>
53	$D_{2h}^7$	$P \frac{2\ 2_1\ 2_1}{m\ n\ a}$	<i>Pmna</i>	<i>Pnmb</i>	<i>Pbmn</i>	<i>Pcnm</i>	<i>Pncm</i>	<i>Pman</i>
54	$D_{2h}^8$	$P \frac{2_1\ 2_1\ 2}{c\ c\ a}$	<i>Pcca</i>	<i>Pccb</i>	<i>Pbaa</i>	<i>Pcaa</i>	<i>Pbcb</i>	<i>Pbab</i>
55	$D_{2h}^9$	$P \frac{2_1\ 2_1\ 2}{b\ a\ m}$	<i>Pbam</i>	<i>Pbam</i>	<i>Pmcb</i>	<i>Pmcb</i>	<i>Pcma</i>	<i>Pcma</i>
56	$D_{2h}^{10}$	$P \frac{2_1\ 2_1\ 2}{c\ c\ n}$	<i>Pccn</i>	<i>Pccn</i>	<i>Pnaa</i>	<i>Pnaa</i>	<i>Pbnb</i>	<i>Pbnb</i>
57	$D_{2h}^{11}$	$P \frac{2\ 2_1\ 2_1}{b\ c\ m}$	<i>Pbcm</i>	<i>Pcam</i>	<i>Pmca</i>	<i>Pmab</i>	<i>Pbma</i>	<i>Pcmb</i>
58	$D_{2h}^{12}$	$P \frac{2_1\ 2_1\ 2}{n\ n\ m}$	<i>Pnnm</i>	<i>Pnnm</i>	<i>Pmnn</i>	<i>Pmnn</i>	<i>Pnmn</i>	<i>Pnmn</i>
59	$D_{2h}^{13}$	$P \frac{2_1\ 2_1\ 2}{m\ m\ n}$	<i>Pmnn</i>	<i>Pmnn</i>	<i>Pnmm</i>	<i>Pnmm</i>	<i>Pnmn</i>	<i>Pnmn</i>
60	$D_{2h}^{14}$	$P \frac{2_1\ 2_1\ 2_1}{b\ c\ n}$	<i>Pbcn</i>	<i>Pcan</i>	<i>Pnca</i>	<i>Pnab</i>	<i>Pbna</i>	<i>Pcnb</i>
61	$D_{2h}^{15}$	$P \frac{2_1\ 2_1\ 2_1}{b\ c\ a}$	<i>Pbca</i>	<i>Pcab</i>	<i>Pbca</i>	<i>Pcab</i>	<i>Pbca</i>	<i>Pcab</i>
62	$D_{2h}^{16}$	$P \frac{2_1\ 2_1\ 2_1}{n\ m\ a}$	<i>Pnma</i>	<i>Pmnb</i>	<i>Pbnm</i>	<i>Pcmm</i>	<i>Pmcn</i>	<i>Pnam</i>
63	$D_{2h}^{17}$	$C \frac{2\ 2_1\ 2_1}{m\ c\ m}$	<i>Cmcm</i> <i>bn</i> n	<i>Ccmm</i> <i>nan</i>	<i>Amma</i> <i>ncn</i>	<i>Amam</i> <i>nnb</i>	<i>Bbmm</i> <i>nna</i>	<i>Bmmb</i> <i>cnn</i>
64†	$D_{2h}^{18}$	$C \frac{2\ 2_1\ 2_1}{m\ c\ e}$	<i>Cmca</i> ( <i>Cmce</i> ) <i>bn</i> b	<i>Ccmb</i> ( <i>Ccme</i> ) <i>naa</i>	<i>Abma</i> ( <i>Aema</i> ) <i>ccn</i>	<i>Acam</i> ( <i>Aeam</i> ) <i>bn</i> b	<i>Bbcm</i> ( <i>Bbem</i> ) <i>naa</i>	<i>Bmab</i> ( <i>Bmeb</i> ) <i>cnn</i>

1. INTRODUCTION TO SPACE-GROUP SYMMETRY

Table 1.5.4.4 (continued)

No. of space group	Schoenflies symbol	Standard full Hermann–Mauguin symbol <b>abc</b>	Extended Hermann–Mauguin symbols for the six settings of the same unit cell					
			<b>abc</b> (standard)	<b>ba<math>\bar{c}</math></b>	<b>cab</b>	<b><math>\bar{c}ba</math></b>	<b>bca</b>	<b>a<math>\bar{c}b</math></b>
65	$D_{2h}^{19}$	$C \frac{2\ 2\ 2}{m\ m\ m}$	<i>Cmmm</i> <i>ban</i>	<i>Cmmm</i> <i>ban</i>	<i>Ammm</i> <i>ncb</i>	<i>Ammm</i> <i>ncb</i>	<i>Bmmm</i> <i>cna</i>	<i>Bmmm</i> <i>cna</i>
66	$D_{2h}^{20}$	$C \frac{2\ 2\ 2}{c\ c\ m}$	<i>Cccm</i> <i>nnn</i>	<i>Cccm</i> <i>nnn</i>	<i>Amaa</i> <i>nnn</i>	<i>Amaa</i> <i>nnn</i>	<i>Bbmb</i> <i>nnn</i>	<i>Bbmb</i> <i>nnn</i>
67†	$D_{2h}^{21}$	$C \frac{2\ 2\ 2}{m\ m\ e}$	<i>Cmma</i> ( <i>Cmme</i> ) <i>bab</i>	<i>Cmmb</i> ( <i>Cmme</i> ) <i>baa</i>	<i>Abmm</i> ( <i>Aemm</i> ) <i>ccb</i>	<i>Acmm</i> ( <i>Aemm</i> ) <i>bc b</i>	<i>Bmcm</i> ( <i>Bmem</i> ) <i>caa</i>	<i>Bmam</i> ( <i>Bmem</i> ) <i>cca</i>
68†	$D_{2h}^{22}$	$C \frac{2\ 2\ 2}{c\ c\ e}$	<i>Ccca</i> ( <i>Ccce</i> ) <i>n nb</i>	<i>Cccb</i> ( <i>Ccce</i> ) <i>n na</i>	<i>Abaa</i> ( <i>Aeaa</i> ) <i>c nn</i>	<i>Acaa</i> ( <i>Aeaa</i> ) <i>b nn</i>	<i>Bbcb</i> ( <i>Bbeb</i> ) <i>nan</i>	<i>Bbab</i> ( <i>Bbeb</i> ) <i>nc n</i>
69	$D_{2h}^{23}$	$F \frac{2\ 2\ 2}{m\ m\ m}$	<i>Fmmm</i> <i>ban</i> <i>nc b</i> <i>c na</i>	<i>Fmmm</i> <i>ban</i> <i>c na</i> <i>nc b</i>	<i>Fmmm</i> <i>nc b</i> <i>c na</i> <i>ban</i>	<i>Fmmm</i> <i>nc b</i> <i>ban</i> <i>c na</i>	<i>Fmmm</i> <i>c na</i> <i>ban</i> <i>nc b</i>	<i>Fmmm</i> <i>c na</i> <i>nc b</i> <i>ban</i>
70	$D_{2h}^{24}$	$F \frac{2\ 2\ 2}{d\ d\ d}$	<i>Fddd</i>	<i>Fddd</i>	<i>Fddd</i>	<i>Fddd</i>	<i>Fddd</i>	<i>Fddd</i>
71	$D_{2h}^{25}$	$I \frac{2\ 2\ 2}{m\ m\ m}$	<i>I mmm</i> <i>nnn</i>	<i>I mmm</i> <i>nnn</i>	<i>I mmm</i> <i>nnn</i>	<i>I mmm</i> <i>nnn</i>	<i>I mmm</i> <i>nnn</i>	<i>I mmm</i> <i>nnn</i>
72	$D_{2h}^{26}$	$I \frac{2\ 2\ 2}{b\ a\ m}$	<i>I bam</i> <i>cc n</i>	<i>I bam</i> <i>cc n</i>	<i>I mcb</i> <i>na a</i>	<i>I mcb</i> <i>na a</i>	<i>I cma</i> <i>bn b</i>	<i>I cma</i> <i>bn b</i>
73	$D_{2h}^{27}$	$I \frac{2_1\ 2_1\ 2_1}{b\ c\ a}$	<i>I bca</i> <i>cab</i>	<i>I cab</i> <i>bca</i>	<i>I bca</i> <i>cab</i>	<i>I cab</i> <i>bca</i>	<i>I bca</i> <i>cab</i>	<i>I cab</i> <i>bca</i>
74	$D_{2h}^{28}$	$I \frac{2_1\ 2_1\ 2_1}{m\ m\ a}$	<i>I mma</i> <i>n nb</i>	<i>I mmb</i> <i>n na</i>	<i>I bmm</i> <i>c nn</i>	<i>I cmm</i> <i>b nn</i>	<i>I mcm</i> <i>na n</i>	<i>I mam</i> <i>nc n</i>

† For the five space groups *Aem2* (39), *Aea2* (41), *Cmce* (64), *Cmme* (67) and *Ccce* (68), the ‘new’ space-group symbols, containing the symbol ‘e’ for the ‘double’ glide plane, are given for all settings. These symbols were first introduced in the fourth edition of this volume (1995). For further explanations, see Sections 1.2.3 and 2.1.2, and de Wolff *et al.* (1992).

TETRAGONAL SYSTEM

No. of space group	Schoenflies symbol	Hermann–Mauguin symbols for standard cell <i>P</i> or <i>I</i>		Multiple cell <i>C</i> or <i>F</i>	
		Short	Extended	Short	Extended
75	$C_4^1$	<i>P4</i>		<i>C4</i>	
76	$C_4^2$	<i>P4<sub>1</sub></i>		<i>C4<sub>1</sub></i>	
77	$C_4^3$	<i>P4<sub>2</sub></i>		<i>C4<sub>2</sub></i>	
78	$C_4^4$	<i>P4<sub>3</sub></i>		<i>C4<sub>3</sub></i>	
79	$C_4^5$	<i>I4</i>	<i>I4</i> <i>4<sub>2</sub></i>	<i>F4</i>	<i>F4</i> <i>4<sub>2</sub></i>
80	$C_4^6$	<i>I4<sub>1</sub></i>	<i>I4<sub>1</sub></i> <i>4<sub>3</sub></i>	<i>F4<sub>1</sub></i>	<i>F4<sub>1</sub></i> <i>4<sub>3</sub></i>
81	$S_4^1$	<i>P<math>\bar{4}</math></i>		<i>C<math>\bar{4}</math></i>	
82	$S_4^2$	<i>I<math>\bar{4}</math></i>		<i>F<math>\bar{4}</math></i>	
83	$C_{4h}^1$	<i>P4/m</i>		<i>C4/m</i>	<i>C4<sub>2</sub>/m</i> <i>n</i>
84	$C_{4h}^2$	<i>P4<sub>2</sub>/m</i>		<i>C4<sub>2</sub>/m</i>	<i>C4<sub>2</sub>/m</i> <i>n</i>
85	$C_{4h}^3$	<i>P4/n</i>		<i>C4/e</i>	<i>C4/a</i> <i>b</i>
86	$C_{4h}^4$	<i>P4<sub>2</sub>/n</i>		<i>C4<sub>2</sub>/e</i>	<i>C4<sub>2</sub>/a</i> <i>b</i>
87	$C_{4h}^5$	<i>I4/m</i>	<i>I4/m</i> <i>4<sub>2</sub>/n</i>	<i>F4/m</i>	<i>F4/m</i> <i>4<sub>2</sub>/a</i>
88	$C_{4h}^6$	<i>I4<sub>1</sub>/a</i>	<i>I4<sub>1</sub>/a</i> <i>4<sub>3</sub>/b</i>	<i>F4<sub>1</sub>/d</i>	<i>F4<sub>1</sub>/d</i> <i>4<sub>3</sub>/d</i>
89	$D_4^1$	<i>P422</i>	<i>P422</i> <i>2<sub>1</sub></i>	<i>C422</i>	<i>C422</i> <i>2<sub>1</sub></i>
90	$D_4^2$	<i>P42<sub>1</sub>2</i>	<i>P42<sub>1</sub>2</i> <i>2<sub>1</sub></i>	<i>C422<sub>1</sub></i>	<i>C422<sub>1</sub></i> <i>2<sub>1</sub></i>

1.5. TRANSFORMATIONS OF COORDINATE SYSTEMS

Table 1.5.4.4 (continued)

No. of space group	Schoenflies symbol	Hermann–Mauguin symbols for standard cell <i>P</i> or <i>I</i>		Multiple cell <i>C</i> or <i>F</i>	
		Short	Extended	Short	Extended
91	$D_4^3$	$P4_122$	$P4_122$ $2_1$	$C4_122$	$C4_122$ $2_1$
92	$D_4^4$	$P4_12_12$	$P4_12_12$ $2_1$	$C4_122_1$	$C4_122_1$ $2_1$
93	$D_4^5$	$P4_222$	$P4_222$ $2_1$	$C4_222$	$C4_222$ $2_1$
94	$D_4^6$	$P4_22_12$	$P4_22_12$ $2_1$	$C4_222_1$	$C4_222_1$ $2_1$
95	$D_4^7$	$P4_322$	$P4_322$ $2_1$	$C4_322$	$C4_322$ $2_1$
96	$D_4^8$	$P4_32_12$	$P4_32_12$ $2_1$	$C4_322_1$	$C4_322_1$ $2_1$
97	$D_4^9$	$I422$	$I422$ $4_22_12_1$	$F422$	$F422$ $4_22_12_1$
98	$D_4^{10}$	$I4_122$	$I4_122$ $4_32_12_1$	$F4_122$	$F4_122$ $4_32_12_1$
99	$C_{4v}^1$	$P4mm$	$P4mm$ $g$	$C4mm$	$C4mm$ $b$
100	$C_{4v}^2$	$P4bm$	$P4bm$ $g$	$C4mg_1$	$C4mg_1$ $b$
101	$C_{4v}^3$	$P4_2cm$	$P4_2cm$ $g$	$C4_2mc$	$C4_2mc$ $b$
102	$C_{4v}^4$	$P4_2nm$	$P4_2nm$ $g$	$C4_2mg_2$	$C4_2mg_2$ $b$
103	$C_{4v}^5$	$P4cc$	$P4cc$ $n$	$C4cc$	$C4cc$ $n$
104	$C_{4v}^6$	$P4nc$	$P4nc$ $n$	$C4cg_2$	$C4cg_2$ $n$
105	$C_{4v}^7$	$P4_2mc$	$P4_2mc$ $n$	$C4_2cm$	$C4_2cm$ $n$
106	$C_{4v}^8$	$P4_2bc$	$P4_2bc$ $n$	$C4_2cg_1$	$C4_2cg_1$ $n$
107	$C_{4v}^9$	$I4mm$	$I4mm$ $4_2nc$	$F4mm$	$F4mm$ $4_2cg_2$
108	$C_{4v}^{10}$	$I4cm$	$I4cc$ $4_2bm$	$F4mc$	$F4cc$ $4_2mg_1$
109	$C_{4v}^{11}$	$I4_1md$	$I4_1md$ $4_1nd$	$F4_1dm$	$F4_1dm$ $4_3dg_2$
110	$C_{4v}^{12}$	$I4_1cd$	$I4_1cd$ $4_3bd$	$F4_1dc$	$F4_1dc$ $4_3dg_1$
111	$D_{2d}^1$	$P\bar{4}2m$	$P\bar{4}2m$ $g$	$C\bar{4}m2$	$C\bar{4}m2$ $b$
112	$D_{2d}^2$	$P\bar{4}2c$	$P\bar{4}2c$ $n$	$C\bar{4}c2$	$C\bar{4}c2$ $n$
113	$D_{2d}^3$	$P\bar{4}2_1m$	$P\bar{4}2_1m$ $g$	$C\bar{4}m2_1$	$C\bar{4}m2_1$ $b$
114	$D_{2d}^4$	$P\bar{4}2_1c$	$P\bar{4}2_1c$ $n$	$C\bar{4}c2_1$	$C\bar{4}c2_1$ $n$
115	$D_{2d}^5$	$P\bar{4}m2$	$P\bar{4}m2$ $2_1$	$C\bar{4}2m$	$C\bar{4}2m$ $2_1$
116	$D_{2d}^6$	$P\bar{4}c2$	$P\bar{4}c2$ $2_1$	$C\bar{4}2c$	$C\bar{4}2c$ $2_1$
117	$D_{2d}^7$	$P\bar{4}b2$	$P\bar{4}b2$ $2_1$	$C\bar{4}2g_1$	$C\bar{4}2g_1$ $2_1$
118	$D_{2d}^8$	$P\bar{4}n2$	$P\bar{4}n2$ $2_1$	$C\bar{4}2g_2$	$C\bar{4}2g_2$ $2_1$
119	$D_{2d}^9$	$I\bar{4}m2$	$I\bar{4}m2$ $n2_1$	$F\bar{4}2m$	$F\bar{4}2m$ $2_1g_2$
120	$D_{2d}^{10}$	$I\bar{4}c2$	$I\bar{4}c2$ $b2_1$	$F\bar{4}2c$	$F\bar{4}2c$ $2_1n$
121	$D_{2d}^{11}$	$I\bar{4}2m$	$I\bar{4}2m$ $2_1c$	$F\bar{4}m2$	$F\bar{4}m2$ $c2_1$
122	$D_{2d}^{12}$	$I\bar{4}2d$	$I\bar{4}2d$ $2_1d$	$F\bar{4}d2$	$F\bar{4}d2$ $d2_1$

1. INTRODUCTION TO SPACE-GROUP SYMMETRY

Table 1.5.4.4 (continued)

No. of space group	Schoenflies symbol	Hermann–Mauguin symbols for standard cell <i>P</i> or <i>I</i>		Multiple cell <i>C</i> or <i>F</i>	
		Short	Extended	Short	Extended
123	$D_{4h}^1$	$P4/mmm$	$P4/m\ 2/m\ 2/m\ 2_1/g$	$C4/mmm$	$C4/mmm\ nb$
124	$D_{4h}^2$	$P4/mcc$	$P4/m\ 2/c\ 2/c\ 2_1/n$	$C4/mcc$	$C4/mcc\ nn$
125	$D_{4h}^3$	$P4/nbm$	$P4/n\ 2/b\ 2/m\ 2_1/g$	$C4/emg_1$	$C4/amg_1\ bb$
126	$D_{4h}^4$	$P4/nnc$	$P4/n\ 2/n\ 2/c\ 2_1/n$	$C4/ecg_2$	$C4/acg_2\ bn$
127	$D_{4h}^5$	$P4/mbm$	$P4/m\ 2_1/b\ 2/m\ 2_1/g$	$C4/mmg_1$	$C4/mng_1\ nb$
128	$D_{4h}^6$	$P4/mnc$	$P4/m\ 2_1/n\ 2/c\ 2_1/n$	$C4/mcg_2$	$C4/mcg_2\ nn$
129	$D_{4h}^7$	$P4/nmm$	$P4/n\ 2_1/m\ 2/m\ 2_1/g$	$C4/emm$	$C4amm\ bb$
130	$D_{4h}^8$	$P4/ncc$	$P4/n\ 2_1/c\ 2/c\ 2_1/n$	$C4/ecc$	$C4/acc\ bn$
131	$D_{4h}^9$	$P4_2/mmc$	$P4_2/m\ 2/m\ 2/c\ 2_1/n$	$C4_2/mcm$	$C4_2/mcm\ nn$
132	$D_{4h}^{10}$	$P4_2/mcm$	$P4_2/m\ 2/c\ 2/m\ 2_1/g$	$C4_2/mmc$	$C4_2/mmc\ nb$
133	$D_{4h}^{11}$	$P4_2/nbc$	$P4_2/n\ 2/b\ 2/c\ 2_1/n$	$C4_2/ecg_1$	$C4_2/acg_1\ bn$
134	$D_{4h}^{12}$	$P4_2/nmm$	$P4_2/n\ 2/n\ 2/m\ 2_1/g$	$C4_2/emg_2$	$C4_2/amg_2\ bb$
135	$D_{4h}^{13}$	$P4_2/mbc$	$P4_2/m\ 2_1/b\ 2/c\ 2_1/n$	$C4_2/mcg_1$	$C4_2/mcg_1\ nn$
136	$D_{4h}^{14}$	$P4_2/mnm$	$P4_2/m\ 2_1/n\ 2/m\ 2_1/g$	$C4_2/mmg_2$	$C4_2/mmg_2\ nb$
137	$D_{4h}^{15}$	$P4_2/nmc$	$P4_2/n\ 2_1/m\ 2/c\ 2_1/n$	$C4_2/ecm$	$C4_2/acm\ bn$
138	$D_{4h}^{16}$	$P4_2/ncm$	$P4_2/n\ 2_1/c\ 2/m\ 2_1/g$	$C4_2/emc$	$C4_2/amc\ bb$
139	$D_{4h}^{17}$	$I4/mmm$	$I4/m\ 2/m\ 2/m\ 4_2/n\ 2_1/n\ 2_1/c$	$F4/mmm$	$F4/mmm\ 4_2/acg_2$
140	$D_{4h}^{18}$	$I4/mcm$	$I4/m\ 2/c\ 2/c\ 4_2/n\ 2_1/b\ 2_1/m$	$F4/mmc$	$F4/mcc\ 4_2/amg_1$
141	$D_{4h}^{19}$	$I4_1/amd$	$I4_1/a\ 2/m\ 2/d\ 4_3/b\ 2_1/n\ 2_1/d$	$F4_1/ddm$	$F4_1/ddm\ 4_3/ddg_2$
142	$D_{4h}^{20}$	$I4_1/acd$	$I4_1/a\ 2/c\ 2/d\ 4_3/b\ 2_1/b\ 2_1/d$	$F4_1/ddc$	$F4_1/ddc\ 4_3/ddg_1$

Note: The glide planes  $g$ ,  $g_1$  and  $g_2$  have the glide components  $g(\frac{1}{2}, \frac{1}{2}, 0)$ ,  $g_1(\frac{1}{4}, \frac{1}{4}, 0)$  and  $g_2(\frac{1}{4}, \frac{1}{4}, \frac{1}{2})$ . For the glide plane symbol 'e', see Sections 1.2.3 and 2.1.2, and de Wolff *et al.* (1992).

TRIGONAL SYSTEM

No. of space group	Schoenflies symbol	Hermann–Mauguin symbols for standard cell <i>P</i> or <i>R</i>			Triple cell <i>H</i>
		Short	Full	Extended	
143	$C_3^1$	$P3$			$H3$
144	$C_3^2$	$P3_1$			$H3_1$
145	$C_3^3$	$P3_2$			$H3_2$
146	$C_3^4$	$R3$		$R3\ 3_{1,2}$	
147	$C_{3i}^1$	$P\bar{3}$			$H\bar{3}$
148	$C_{3i}^2$	$R\bar{3}$		$R\bar{3}\ 3_{1,2}$	
149	$D_3^1$	$P312$		$P312\ 2_1$	$H321$
150	$D_3^2$	$P321$		$P321\ 2_1$	$H312$
151	$D_3^3$	$P3_12$		$P3_12\ 2_1$	$H3_121$

1.5. TRANSFORMATIONS OF COORDINATE SYSTEMS

Table 1.5.4.4 (continued)

No. of space group	Schoenflies symbol	Hermann–Mauguin symbols for standard cell <i>P</i> or <i>R</i>			Triple cell <i>H</i>
		Short	Full	Extended	
152	$D_3^4$	$P3_121$		$P3_121$ $2_1$	$H3_112$
153	$D_3^5$	$P3_212$		$P3_212$ $2_1$	$H3_221$
154	$D_3^6$	$P3_221$		$P3_221$ $2_1$	$H3_212$
155	$D_3^7$	$R32$		$R3\ 2$ $3_{1,2}2_1$	
156	$C_{3v}^1$	$P3m1$		$P3m1$ <i>b</i>	$H31m$
157	$C_{3v}^2$	$P31m$		$P31m$ <i>a</i>	$H3m1$
158	$C_{3v}^3$	$P3c1$		$P3c1$ <i>n</i>	$H31c$
159	$C_{3v}^4$	$P31c$		$P31c$ <i>n</i>	$H3c1$
160	$C_{3v}^5$	$R3m$		$R3\ m$ $3_{1,2}b$	
161	$C_{3v}^6$	$R3c$		$R3\ c$ $3_{1,2}n$	
162	$D_{3d}^1$	$\bar{P}31m$	$\bar{P}312/m$	$\bar{P}312/m$ $2_1/a$	$\bar{H}3m1$
163	$D_{3d}^2$	$\bar{P}31c$	$\bar{P}312/c$	$\bar{P}312/c$ $2_1/n$	$\bar{H}3c1$
164	$D_{3d}^3$	$\bar{P}3m1$	$\bar{P}32/m1$	$\bar{P}32/m1$ $2_1/b$	$\bar{H}31m$
165	$D_{3d}^4$	$\bar{P}3c1$	$\bar{P}32/c1$	$\bar{P}32/c1$ $2_1/n$	$\bar{H}31c$
166	$D_{3d}^5$	$\bar{R}3m$	$\bar{R}32/m$	$\bar{R}3\ 2/m$ $3_{1,2}2_1/b$	
167	$D_{3d}^6$	$\bar{R}3c$	$\bar{R}32/c$	$\bar{R}3\ 2/c$ $3_{1,2}2_1/n$	

HEXAGONAL SYSTEM

No. of space group	Schoenflies symbol	Hermann–Mauguin symbols for standard cell <i>P</i>			Triple cell <i>H</i>
		Short	Full	Extended	
168	$C_6^1$	$P6$			$H6$
169	$C_6^2$	$P6_1$			$H6_1$
170	$C_6^3$	$P6_5$			$H6_5$
171	$C_6^4$	$P6_2$			$H6_2$
172	$C_6^5$	$P6_4$			$H6_4$
173	$C_6^6$	$P6_3$			$H6_3$
174	$C_{3h}^1$	$\bar{P}6$			$\bar{H}6$
175	$C_{6h}^1$	$P6/m$			$H6/m$
176	$C_{6h}^2$	$P6_3/m$			$H6_3/m$
177	$D_6^1$	$P622$		$P62\ 2$ $2_12_1$	$H622$
178	$D_6^2$	$P6_122$		$P6_12\ 2$ $2_12_1$	$H6_122$
179	$D_6^3$	$P6_522$		$P6_52\ 2$ $2_12_1$	$H6_522$
180	$D_6^4$	$P6_222$		$P6_22\ 2$ $2_12_1$	$H6_222$
181	$D_6^5$	$P6_422$		$P6_42\ 2$ $2_12_1$	$H6_422$
182	$D_6^6$	$P6_322$		$P6_32\ 2$ $2_12_1$	$H6_322$

## 1. INTRODUCTION TO SPACE-GROUP SYMMETRY

Table 1.5.4.4 (continued)

No. of space group	Schoenflies symbol	Hermann–Mauguin symbols for standard cell $P$			Triple cell $H$
		Short	Full	Extended	
183	$C_{6v}^1$	$P6mm$		$P6mm$ $ba$	$H6mm$
184	$C_{6v}^2$	$P6cc$		$P6cc$ $nn$	$H6cc$
185	$C_{6v}^3$	$P6_3cm$		$P6_3cm$ $na$	$H6_3mc$
186	$C_{6v}^4$	$P6_3mc$		$P6_3mc$ $bn$	$H6_3cm$
187	$D_{3h}^1$	$P\bar{6}m2$		$P\bar{6}m2$ $b2_1$	$H\bar{6}2m$
188	$D_{3h}^2$	$P\bar{6}c2$		$P\bar{6}c2$ $n2_1$	$H\bar{6}2c$
189	$D_{3h}^3$	$P\bar{6}2m$		$P\bar{6}2m$ $2_1a$	$H\bar{6}m2$
190	$D_{3h}^4$	$P\bar{6}2c$		$P\bar{6}2c$ $2_1n$	$H\bar{6}c2$
191	$D_{6h}^1$	$P6/mmm$	$P6/m2/m2/m$	$P6/m$ $2/m$ $2/m$ $2_1/b$ $2_1/a$	$H6/mmm$
192	$D_{6h}^2$	$P6/mcc$	$P6/m2/c2/c$	$P6/m$ $2/c$ $2/c$ $2_1/n$ $2_1/n$	$H6/mcc$
193	$D_{6h}^3$	$P6_3/mcm$	$P6_3/m2/c2/m$	$P6_3/m$ $2/c$ $2/m$ $2_1/b$ $2_1/a$	$H6_3/mmc$
194	$D_{6h}^4$	$P6_3/mmc$	$P6_3/m2/m2/c$	$P6_3/m$ $2/m$ $2/c$ $2_1/b$ $2_1/n$	$H6_3/mcm$

## CUBIC SYSTEM

No. of space group	Schoenflies symbol	Hermann–Mauguin symbols		
		Short	Full	Extended†
195	$T^1$	$P23$		
196	$T^2$	$F23$		$F23$ $2$ $2_1$ $2_1$
197	$T^3$	$I23$		$I23$ $2_1$
198	$T^4$	$P2_13$		
199	$T^5$	$I2_13$		$I2_13$ $2$
200	$T_h^1$	$Pm\bar{3}$	$P2/m\bar{3}$	
201	$T_h^2$	$Pn\bar{3}$	$P2/n\bar{3}$	
202	$T_h^3$	$Fm\bar{3}$	$F2/m\bar{3}$	$F2/m\bar{3}$ $2/n$ $2_1/b$ $2_1/a$
203	$T_h^4$	$Fd\bar{3}$	$F2/d\bar{3}$	$F2/d\bar{3}$ $2/d$ $2_1/d$ $2_1/d$
204	$T_h^5$	$Im\bar{3}$	$I2/m\bar{3}$	$I2/m\bar{3}$ $2_1/n$
205	$T_h^6$	$Pa\bar{3}\ddagger$	$P2_1/a\bar{3}\ddagger$	
206	$T_h^7$	$Ia\bar{3}$	$I2_1/a\bar{3}$	$I2_1/a\bar{3}$ $2/b$
207	$O^1$	$P432$		$P432$ $2_1$
208	$O^2$	$P4_232$		$P4_232$ $2_1$



## 1.5. TRANSFORMATIONS OF COORDINATE SYSTEMS

Table 1.5.4.4 (continued)

No. of space group	Schoenflies symbol	Hermann–Mauguin symbols		
		Short	Full	Extended†
209	$O^3$	$F432$		$F432$ 42 $4_2 2_1$ $4_2 2_1$
210	$O^4$	$F4_1 32$		$F4_1 32$ $4_1 2$ $4_3 2_1$ $4_3 2_1$
211	$O^5$	$I432$		$I432$ $4_2 2_1$
212	$O^6$	$P4_3 32$		$P4_3 32$ $2_1$
213	$O^7$	$P4_1 32$		$P4_1 32$ $2_1$
214	$O^8$	$I4_1 32$		$I4_1 32$ $4_3 2_1$
215	$T_d^1$	$P\bar{4}3m$		$P\bar{4}3m$ $g$
216	$T_d^2$	$F\bar{4}3m$		$F\bar{4}3m$ $g$ $g_2$ $g_2$
217	$T_d^3$	$I\bar{4}3m$		$I\bar{4}3m$ $n$
218	$T_d^4$	$P\bar{4}3n$		$P\bar{4}3n$ $c$
219	$T_d^5$	$F\bar{4}3c$		$F\bar{4}3n$ $c$ $g_1$ $g_1$
220	$T_d^6$	$I\bar{4}3d$		$I\bar{4}3d$ $d$
221	$O_h^1$	$Pm\bar{3}m$	$P4/m\bar{3}2/m$	$P4/m\bar{3}2/m$ $2_1/g$
222	$O_h^2$	$Pn\bar{3}n$	$P4/n\bar{3}2/n$	$P4/n\bar{3}2/n$ $2_1/c$
223	$O_h^3$	$Pm\bar{3}n$	$P4_2/m\bar{3}2/n$	$P4_2/m\bar{3}2/n$ $2_1/c$
224	$O_h^4$	$Pn\bar{3}m$	$P4_2/n\bar{3}2/m$	$P4_2/n\bar{3}2/m$ $2_1/g$
225	$O_h^5$	$Fm\bar{3}m$	$F4/m\bar{3}2/m$	$F4/m\bar{3}2/m$ $4/n 2/g$ $4_2/b 2_1/g_2$ $4_2/a 2_1/g_2$
226	$O_h^6$	$Fm\bar{3}c$	$F4/m\bar{3}2/c$	$F4/m\bar{3}2/n$ $4/n 2/c$ $4_2/b 2_1/g_1$ $4_2/a 2_1/g_1$
227	$O_h^7$	$Fd\bar{3}m$	$F4_1/d\bar{3}2/m$	$F4_1/d\bar{3}2/m$ $4_1/d 2/g$ $4_3/d 2_1/g_2$ $4_3/d 2_1/g_2$
228	$O_h^8$	$Fd\bar{3}c$	$F4_1/d\bar{3}2/c$	$F4_1/d\bar{3}2/n$ $4_1/d 2/c$ $4_3/d 2_1/g_1$ $4_3/d 2_1/g_1$
229	$O_h^9$	$Im\bar{3}m$	$I4/m\bar{3}2/m$	$I4/m\bar{3}2/m$ $4_2/n 2_1/n$
230	$O_h^{10}$	$Ia\bar{3}d$	$I4_1/a\bar{3}2/d$	$I4_1/a\bar{3}2/d$ $4_3/b 2_1/d$

† Axes  $3_1$  and  $3_2$  parallel to axes 3 are not indicated in the extended symbols: cf. Section 1.5.4.1. ‡ The alternative setting  $Pb\bar{3}$  ( $P2_1/b\bar{3}$ ) of  $Pa\bar{3}$  is of importance for diffraction studies, cf. Section 1.5.4.3 and Table 1.6.4.25. Note: The glide planes  $g$ ,  $g_1$  and  $g_2$  have the glide components  $g(\frac{1}{2}, \frac{1}{2}, 0)$ ,  $g_1(\frac{1}{4}, \frac{1}{4}, 0)$  and  $g_2(\frac{1}{4}, \frac{1}{4}, \frac{1}{2})$ .