

1. GENERAL RELATIONSHIPS AND TECHNIQUES

Table A1.4.2.7. Hall symbols

The first column, n:c, lists the space-group numbers and axis codes† separated by a colon. The second column lists the Hermann–Mauguin symbols in computer-entry format. The third column lists the Hall symbols in computer-entry format and the fourth column lists the Hall symbols as described in Tables A1.4.2.2–A1.4.2.6.

n:c	H–M entry	Hall entry	Hall symbol	n:c	H–M entry	Hall entry	Hall symbol
1	P 1	p 1	P 1	10:a	P 2/m 1 1	-p 2x	$\bar{P} 2^x$
2	P -1	-p 1	$\bar{P} 1$	11:b	P 1 21/m 1	-p 2yb	$\bar{P} 2_b^y$
3:b	P 1 2 1	p 2y	P 2 ^y	11:c	P 1 1 21/m	-p 2c	$\bar{P} 2_c$
3:c	P 1 1 2	p 2	P 2	11:a	P 21/m 1 1	-p 2xa	$\bar{P} 2_a^x$
3:a	P 2 1 1	p 2x	P 2 ^x	12:b1	C 1 2/m 1	-c 2y	$\bar{C} 2^y$
4:b	P 1 21 1	p 2yb	P 2 ^y _b	12:b2	A 1 2/m 1	-a 2y	$\bar{A} 2^y$
4:c	P 1 1 21	p 2c	P 2 _c	12:b3	I 1 2/m 1	-i 2y	$\bar{I} 2^y$
4:a	P 21 1 1	p 2xa	P 2 ^x _a	12:c1	A 1 1 2/m	-a 2	$\bar{A} 2$
5:b1	C 1 2 1	c 2y	C 2 ^y	12:c2	B 1 1 2/m	-b 2	$\bar{B} 2$
5:b2	A 1 2 1	a 2y	A 2 ^y	12:c3	I 1 1 2/m	-i 2	$\bar{I} 2$
5:b3	I 1 2 1	i 2y	I 2 ^y	12:a1	B 2/m 1 1	-b 2x	$\bar{B} 2^x$
5:c1	A 1 1 2	a 2	A 2	12:a2	C 2/m 1 1	-c 2x	$\bar{C} 2^x$
5:c2	B 1 1 2	b 2	B 2	12:a3	I 2/m 1 1	-i 2x	$\bar{I} 2^x$
5:c3	I 1 1 2	i 2	I 2	13:b1	P 1 2/c 1	-p 2yc	$\bar{P} 2_c^y$
5:a1	B 2 1 1	b 2x	B 2 ^x	13:b2	P 1 2/n 1	-p 2yac	$\bar{P} 2_{ac}^y$
5:a2	C 2 1 1	c 2x	C 2 ^x	13:b3	P 1 2/a 1	-p 2ya	$\bar{P} 2_a^y$
5:a3	I 2 1 1	i 2x	I 2 ^x	13:c1	P 1 1 2/a	-p 2a	$\bar{P} 2_a$
6:b	P 1 m 1	p -2y	P 2 ^y _̄	13:c2	P 1 1 2/n	-p 2ab	$\bar{P} 2_{ab}$
6:c	P 1 1 m	p -2	P 2 _̄	13:c3	P 1 1 2/b	-p 2b	$\bar{P} 2_b$
6:a	P m 1 1	p -2x	P 2 ^x _̄	13:a1	P 2/b 1 1	-p 2xb	$\bar{P} 2_b^x$
7:b1	P 1 c 1	p -2yc	P 2 ^y _c	13:a2	P 2/n 1 1	-p 2xbc	$\bar{P} 2_{bc}^x$
7:b2	P 1 n 1	p -2yac	P 2 ^y _{ac}	13:a3	P 2/c 1 1	-p 2xc	$\bar{P} 2_c^x$
7:b3	P 1 a 1	p -2ya	P 2 ^y _a	14:b1	P 1 21/c 1	-p 2ybc	$\bar{P} 2_{bc}^y$
7:c1	P 1 1 a	p -2a	P 2 _a	14:b2	P 1 21/n 1	-p 2yn	$\bar{P} 2_n^y$
7:c2	P 1 1 n	p -2ab	P 2 _{ab}	14:b3	P 1 21/a 1	-p 2yab	$\bar{P} 2_{ab}^y$
7:c3	P 1 1 b	p -2b	P 2 _b	14:c1	P 1 1 21/a	-p 2ac	$\bar{P} 2_{ac}$
7:a1	P b 1 1	p -2xb	P 2 ^x _b	14:c2	P 1 1 21/n	-p 2n	$\bar{P} 2_n$
7:a2	P n 1 1	p -2xbc	P 2 ^x _{bc}	14:c3	P 1 1 21/b	-p 2bc	$\bar{P} 2_{bc}$
7:a3	P c 1 1	p -2xc	P 2 ^x _c	14:a1	P 21/b 1 1	-p 2xab	$\bar{P} 2_{ab}^x$
8:b1	C 1 m 1	c -2y	C 2 ^y _̄	14:a2	P 21/n 1 1	-p 2xn	$\bar{P} 2_n^x$
8:b2	A 1 m 1	a -2y	A 2 ^y _̄	14:a3	P 21/c 1 1	-p 2xac	$\bar{P} 2_{ac}^x$
8:b3	I 1 m 1	i -2y	I 2 ^y _̄	15:b1	C 1 2/c 1	-c 2yc	$\bar{C} 2_c^y$
8:c1	A 1 1 m	a -2	A 2 _̄	15:b2	A 1 2/n 1	-a 2yab	$\bar{A} 2_{ab}^y$
8:c2	B 1 1 m	b -2	B 2 _̄	15:b3	I 1 2/a 1	-i 2ya	$\bar{I} 2_a^y$
8:c3	I 1 1 m	i -2	I 2 _̄	15-b1	A 1 2/a 1	-a 2ya	$\bar{A} 2_a^y$
8:a1	B m 1 1	b -2x	B 2 ^x _̄	15-b2	C 1 2/n 1	-c 2yac	$\bar{C} 2_{ac}^y$
8:a2	C m 1 1	c -2x	C 2 ^x _̄	15-b3	I 1 2/c 1	-i 2yc	$\bar{I} 2_c^y$
8:a3	I m 1 1	i -2x	I 2 ^x _̄	15:c1	A 1 1 2/a	-a 2a	$\bar{A} 2_a$
9:b1	C 1 c 1	c -2yc	C 2 ^y _c	15:c2	B 1 1 2/n	-b 2ab	$\bar{B} 2_{ab}$
9:b2	A 1 n 1	a -2yab	A 2 ^y _{ab}	15:c3	I 1 1 2/b	-i 2b	$\bar{I} 2_b$
9:b3	I 1 a 1	i -2ya	I 2 ^y _a	15-c1	B 1 1 2/b	-b 2b	$\bar{B} 2_b$
9:-b1	A 1 a 1	a -2ya	A 2 ^y _a	15-c2	A 1 1 2/n	-a 2ab	$\bar{A} 2_{ab}$
9:-b2	C 1 n 1	c -2yac	C 2 ^y _{ac}	15-c3	I 1 1 2/a	-i 2a	$\bar{I} 2_a$
9:-b3	I 1 c 1	i -2yc	I 2 ^y _c	15:a1	B 2/b 1 1	-b 2xb	$\bar{B} 2_b^x$
9:c1	A 1 1 a	a -2a	A 2 _a	15:a2	C 2/n 1 1	-c 2xac	$\bar{C} 2_{ac}^x$
9:c2	B 1 1 n	b -2ab	B 2 _{ab}	15:a3	I 2/c 1 1	-i 2xc	$\bar{I} 2_c^x$
9:c3	I 1 1 b	i -2b	I 2 _b	15-a1	C 2/c 1 1	-c 2xc	$\bar{C} 2_c^x$
9:-c1	B 1 1 b	b -2b	B 2 _b	15-a2	B 2/n 1 1	-b 2xab	$\bar{B} 2_{ab}^x$
9:-c2	A 1 1 n	a -2ab	A 2 _{ab}	15-a3	I 2/b 1 1	-i 2xb	$\bar{I} 2_b^x$
9:-c3	I 1 1 a	i -2a	I 2 _a	16	P 2 2 2	p 2 2	P 2 2
9:a1	B b 1 1	b -2xb	B 2 ^x _b	17	P 2 2 21	p 2c 2	P 2 _c 2
9:a2	C n 1 1	c -2xac	C 2 ^x _{ac}	17:cab	P 21 2 2	p 2a 2a	P 2 _a 2 _a
9:a3	I c 1 1	i -2xc	I 2 ^x _c	17:bca	P 2 21 2	p 2 2b	P 2 2 _b
9:-a1	C c 1 1	c -2xc	C 2 ^x _c	18	P 21 21 2	p 2 2ab	P 2 2 _{ab}
9:-a2	B n 1 1	b -2xab	B 2 ^x _{ab}	18:cab	P 2 21 21	p 2bc 2	P 2 _{bc} 2
9:-a3	I b 1 1	i -2xb	I 2 ^x _b	18:bca	P 21 2 21	p 2ac 2ac	P 2 _{ac} 2 _{ac}
10:b	P 1 2/m 1	-p 2y	$\bar{P} 2^y$	19	P 21 21 21	p 2ac 2ab	P 2 _{ac} 2 _{ab}
10:c	P 1 1 2/m	-p 2	$\bar{P} 2$	20	C 2 2 21	c 2c 2	C 2 _c 2

1.4. SYMMETRY IN RECIPROCAL SPACE

Table A1.4.2.7 (cont.)

n:c	H-M entry	Hall entry	Hall symbol	n:c	H-M entry	Hall entry	Hall symbol
20:cab	A 21 2 2	a 2a 2a	$A \bar{2}_a \bar{2}_a$	36:ba-c	C c m 21	c 2c -2c	$C \bar{2}_c \bar{2}_c$
20:bca	B 2 21 2	b 2 2b	$B \bar{2} \bar{2}_b$	36:cab	A 21 m a	a -2a 2a	$A \bar{2}_a \bar{2}_a$
21	C 2 2 2	c 2 2	$C \bar{2} \bar{2}$	36:-cba	A 21 a m	a -2 2a	$A \bar{2} \bar{2}_a$
21:cab	A 2 2 2	a 2 2	$A \bar{2} \bar{2}$	36:bca	B b 21 m	b -2 -2b	$B \bar{2} \bar{2}_b$
21:bca	B 2 2 2	b 2 2	$B \bar{2} \bar{2}$	36:a-cb	B m 21 b	b -2b -2	$B \bar{2}_b \bar{2}$
22	F 2 2 2	f 2 2	$F \bar{2} \bar{2}$	37	C c c 2	c 2 -2c	$C \bar{2} \bar{2}_c$
23	I 2 2 2	i 2 2	$I \bar{2} \bar{2}$	37:cab	A 2 a a	a -2a 2	$A \bar{2}_a \bar{2}$
24	I 21 21 21	i 2b 2c	$I \bar{2}_b \bar{2}_c$	37:bca	B b 2 b	b -2b -2b	$B \bar{2}_b \bar{2}_b$
25	P m m 2	p 2 -2	$P \bar{2} \bar{2}$	38	A m m 2	a 2 -2	$A \bar{2} \bar{2}$
25:cab	P 2 m m	p -2 2	$P \bar{2} \bar{2}$	38:ba-c	B m m 2	b 2 -2	$B \bar{2} \bar{2}$
25:bca	P m 2 m	p -2 -2	$P \bar{2} \bar{2}$	38:cab	B 2 m m	b -2 2	$B \bar{2} \bar{2}$
26	P m c 21	p 2c -2	$P \bar{2}_c \bar{2}$	38:-cba	C 2 m m	c -2 2	$C \bar{2} \bar{2}$
26:ba-c	P c m 21	p 2c -2c	$P \bar{2}_c \bar{2}_c$	38:bca	C m 2 m	c -2 -2	$C \bar{2} \bar{2}$
26:cab	P 21 m a	p -2a 2a	$P \bar{2}_a \bar{2}_a$	38:a-cb	A m 2 m	a -2 -2	$A \bar{2} \bar{2}$
26:-cba	P 21 a m	p -2 2a	$P \bar{2} \bar{2}_a$	39	A b m 2	a 2 -2b	$A \bar{2} \bar{2}_b$
26:bca	P b 21 m	p -2 -2b	$P \bar{2} \bar{2}_b$	39:ba-c	B m a 2	b 2 -2a	$B \bar{2} \bar{2}_a$
26:a-cb	P m 21 b	p -2b -2	$P \bar{2}_b \bar{2}$	39:cab	B 2 c m	b -2a 2	$B \bar{2}_a \bar{2}$
27	P c c 2	p 2 -2c	$P \bar{2} \bar{2}_c$	39:-cba	C 2 m b	c -2a 2	$C \bar{2}_a \bar{2}$
27:cab	P 2 a a	p -2a 2	$P \bar{2}_a \bar{2}$	39:bca	C m 2 a	c -2a -2a	$C \bar{2}_a \bar{2}_a$
27:bca	P b 2 b	p -2b -2b	$P \bar{2}_b \bar{2}_b$	39:a-cb	A c 2 m	a -2b -2b	$A \bar{2}_b \bar{2}_b$
28	P m a 2	p 2 -2a	$P \bar{2} \bar{2}_a$	40	A m a 2	a 2 -2a	$A \bar{2} \bar{2}_a$
28:ba-c	P b m 2	p 2 -2b	$P \bar{2} \bar{2}_b$	40:ba-c	B b m 2	b 2 -2b	$B \bar{2} \bar{2}_b$
28:cab	P 2 m b	p -2b 2	$P \bar{2}_b \bar{2}$	40:cab	B 2 m b	b -2b 2	$B \bar{2}_b \bar{2}$
28:-cba	P 2 c m	p -2c 2	$P \bar{2}_c \bar{2}$	40:-cba	C 2 c m	c -2c 2	$C \bar{2}_c \bar{2}$
28:bca	P c 2 m	p -2c -2c	$P \bar{2}_c \bar{2}_c$	40:bca	C c 2 m	c -2c -2c	$C \bar{2}_c \bar{2}_c$
28:a-cb	P m 2 a	p -2a -2a	$P \bar{2}_a \bar{2}_a$	40:a-cb	A m 2 a	a -2a -2a	$A \bar{2}_a \bar{2}_a$
29	P c a 21	p 2c -2ac	$P \bar{2}_c \bar{2}_{ac}$	41	A b a 2	a 2 -2ab	$A \bar{2} \bar{2}_{ab}$
29:ba-c	P b c 21	p 2c -2b	$P \bar{2}_c \bar{2}_b$	41:ba-c	B b a 2	b 2 -2ab	$B \bar{2} \bar{2}_{ab}$
29:cab	P 21 a b	p -2b 2a	$P \bar{2}_b \bar{2}_a$	41:cab	B 2 c b	b -2ab 2	$B \bar{2}_{ab} \bar{2}$
29:-cba	P 21 c a	p -2ac 2a	$P \bar{2}_{ac} \bar{2}_a$	41:-cba	C 2 c b	c -2ac 2	$C \bar{2}_{ac} \bar{2}$
29:bca	P c 21 b	p -2bc -2c	$P \bar{2}_{bc} \bar{2}_c$	41:bca	C c 2 a	c -2ac -2ac	$C \bar{2}_{ac} \bar{2}_{ac}$
29:a-cb	P b 21 a	p -2a -2ab	$P \bar{2}_a \bar{2}_{ab}$	41:a-cb	A c 2 a	a -2ab -2ab	$A \bar{2}_{ab} \bar{2}_{ab}$
30	P n c 2	p 2 -2bc	$P \bar{2} \bar{2}_{bc}$	42	F m m 2	f 2 -2	$F \bar{2} \bar{2}$
30:ba-c	P c n 2	p 2 -2ac	$P \bar{2} \bar{2}_{ac}$	42:cab	F 2 m m	f -2 2	$F \bar{2} \bar{2}$
30:cab	P 2 n a	p -2ac 2	$P \bar{2}_{ac} \bar{2}$	42:bca	F m 2 m	f -2 -2	$F \bar{2} \bar{2}$
30:-cba	P 2 a n	p -2ab 2	$P \bar{2}_{ab} \bar{2}$	43	F d d 2	f 2 -2d	$F \bar{2} \bar{2}_d$
30:bca	P b 2 n	p -2ab -2ab	$P \bar{2}_{ab} \bar{2}_{ab}$	43:cab	F 2 d d	f -2d 2	$F \bar{2}_d \bar{2}$
30:a-cb	P n 2 b	p -2bc -2bc	$P \bar{2}_{bc} \bar{2}_{bc}$	43:bca	F d 2 d	f -2d -2d	$F \bar{2}_d \bar{2}_d$
31	P m n 21	p 2ac -2	$P \bar{2}_{ac} \bar{2}$	44	I m m 2	i 2 -2	$I \bar{2} \bar{2}$
31:ba-c	P n m 21	p 2bc -2bc	$P \bar{2}_{bc} \bar{2}_{bc}$	44:cab	I 2 m m	i -2 2	$I \bar{2} \bar{2}$
31:cab	P 21 m n	p -2ab 2ab	$P \bar{2}_{ab} \bar{2}_{ab}$	44:bca	I m 2 m	i -2 -2	$I \bar{2} \bar{2}$
31:-cba	P 21 n m	p -2 2ac	$P \bar{2} \bar{2}_{ac}$	45	I b a 2	i 2 -2c	$I \bar{2} \bar{2}_c$
31:bca	P n 21 m	p -2 -2bc	$P \bar{2} \bar{2}_{bc}$	45:cab	I 2 c b	i -2a 2	$I \bar{2}_a \bar{2}$
31:a-cb	P m 21 n	p -2ab -2	$P \bar{2}_{ab} \bar{2}$	45:bca	I c 2 a	i -2b -2b	$I \bar{2}_b \bar{2}_b$
32	P b a 2	p 2 -2ab	$P \bar{2} \bar{2}_{ab}$	46	I m a 2	i 2 -2a	$I \bar{2} \bar{2}_a$
32:cab	P 2 c b	p -2bc 2	$P \bar{2}_{bc} \bar{2}$	46:ba-c	I b m 2	i 2 -2b	$I \bar{2} \bar{2}_b$
32:bca	P c 2 a	p -2ac -2ac	$P \bar{2}_{ac} \bar{2}_{ac}$	46:cab	I 2 m b	i -2b 2	$I \bar{2}_b \bar{2}$
33	P n a 21	p 2c -2n	$P \bar{2}_c \bar{2}_n$	46:-cba	I 2 c m	i -2c 2	$I \bar{2}_c \bar{2}$
33:ba-c	P b n 21	p 2c -2ab	$P \bar{2}_c \bar{2}_{ab}$	46:bca	I c 2 m	i -2c -2c	$I \bar{2}_c \bar{2}_c$
33:cab	P 21 n b	p -2bc 2a	$P \bar{2}_{bc} \bar{2}_a$	46:a-cb	I m 2 a	i -2a -2a	$I \bar{2}_a \bar{2}_a$
33:-cba	P 21 c n	p -2n 2a	$P \bar{2}_n \bar{2}_a$	47	P m m m	-p 2 2	$\bar{P} \bar{2} \bar{2}$
33:bca	P c 21 n	p -2n -2ac	$P \bar{2}_n \bar{2}_{ac}$	48:1	P n n n:1	p 2 2 -1n	$P \bar{2} \bar{2} \bar{1}_n$
33:a-cb	P n 21 a	p -2ac -2n	$P \bar{2}_{ac} \bar{2}_n$	48:2	P n n n:2	-p 2ab 2bc	$\bar{P} \bar{2}_{ab} \bar{2}_{bc}$
34	P n n 2	p 2 -2n	$P \bar{2} \bar{2}_n$	49	P c c m	-p 2 2c	$\bar{P} \bar{2} \bar{2}_c$
34:cab	P 2 n n	p -2n 2	$P \bar{2}_n \bar{2}$	49:cab	P m a a	-p 2a 2	$\bar{P} \bar{2}_a \bar{2}$
34:bca	P n 2 n	p -2n -2n	$P \bar{2}_n \bar{2}_n$	49:bca	P b m b	-p 2b 2b	$\bar{P} \bar{2}_b \bar{2}_b$
35	C m m 2	c 2 -2	$C \bar{2} \bar{2}$	50:1	P b a n:1	p 2 2 -1ab	$P \bar{2} \bar{2} \bar{1}_{ab}$
35:cab	A 2 m m	a -2 2	$A \bar{2} \bar{2}$	50:2	P b a n:2	-p 2ab 2b	$\bar{P} \bar{2}_{ab} \bar{2}_b$
35:bca	B m 2 m	b -2 -2	$B \bar{2} \bar{2}$	50:1cab	P n c b:1	p 2 2 -1bc	$P \bar{2} \bar{2} \bar{1}_{bc}$
36	C m c 21	c 2c -2	$C \bar{2}_c \bar{2}$	50:2cab	P n c b:2	-p 2b 2bc	$\bar{P} \bar{2}_b \bar{2}_{bc}$

1. GENERAL RELATIONSHIPS AND TECHNIQUES

Table A1.4.2.7 (cont.)

n:c	H-M entry	Hall entry	Hall symbol	n:c	H-M entry	Hall entry	Hall symbol
50:1bca	P c n a:1	p 2 2 -1ac	$\bar{P} 2 2 \bar{1}_{ac}$	62:a-cb	P n a m	-p 2c 2n	$\bar{P} 2_c 2_n$
50:2bca	P c n a:2	-p 2a 2c	$\bar{P} 2_a 2_c$	63	C m c m	-c 2c 2	$\bar{C} 2_c 2$
51	P m m a	-p 2a 2a	$\bar{P} 2_a 2_a$	63:ba-c	C c m m	-c 2c 2c	$\bar{C} 2_c 2_c$
51:ba-c	P m m b	-p 2b 2	$\bar{P} 2_b 2$	63:cab	A m m a	-a 2a 2a	$\bar{A} 2_a 2_a$
51:cab	P b m m	-p 2 2b	$\bar{P} 2 2_b$	63:-cba	A m a m	-a 2 2a	$\bar{A} 2 2_a$
51:-cba	P c m m	-p 2c 2c	$\bar{P} 2_c 2_c$	63:bca	B b m m	-b 2 2b	$\bar{B} 2 2_b$
51:bca	P m c m	-p 2c 2	$\bar{P} 2_c 2$	63:a-cb	B m m b	-b 2b 2	$\bar{B} 2_b 2$
51:a-cb	P m a m	-p 2 2a	$\bar{P} 2 2_a$	64	C m c a	-c 2ac 2	$\bar{C} 2_{ac} 2$
52	P n n a	-p 2a 2bc	$\bar{P} 2_a 2_{bc}$	64:ba-c	C c m b	-c 2ac 2ac	$\bar{C} 2_{ac} 2_{ac}$
52:ba-c	P n n b	-p 2b 2n	$\bar{P} 2_b 2_n$	64:cab	A b m a	-a 2ab 2ab	$\bar{A} 2_{ab} 2_{ab}$
52:cab	P b n n	-p 2n 2b	$\bar{P} 2_n 2_b$	64:-cba	A c a m	-a 2 2ab	$\bar{A} 2 2_{ab}$
52:-cba	P c n n	-p 2ab 2c	$\bar{P} 2_{ab} 2_c$	64:bca	B b c m	-b 2 2ab	$\bar{B} 2 2_{ab}$
52:bca	P n c n	-p 2ab 2n	$\bar{P} 2_{ab} 2_n$	64:a-cb	B m a b	-b 2ab 2	$\bar{B} 2_{ab} 2$
52:a-cb	P n a n	-p 2n 2bc	$\bar{P} 2_n 2_{bc}$	65	C m m m	-c 2 2	$\bar{C} 2 2$
53	P m n a	-p 2ac 2	$\bar{P} 2_{ac} 2$	65:cab	A m m m	-a 2 2	$\bar{A} 2 2$
53:ba-c	P n m b	-p 2bc 2bc	$\bar{P} 2_{bc} 2_{bc}$	65:bca	B m m m	-b 2 2	$\bar{B} 2 2$
53:cab	P b m n	-p 2ab 2ab	$\bar{P} 2_{ab} 2_{ab}$	66	C c c m	-c 2 2c	$\bar{C} 2 2_c$
53:-cba	P c n m	-p 2 2ac	$\bar{P} 2 2_{ac}$	66:cab	A m a a	-a 2a 2	$\bar{A} 2_a 2$
53:bca	P n c m	-p 2 2bc	$\bar{P} 2 2_{bc}$	66:bca	B b m b	-b 2b 2b	$\bar{B} 2_b 2_b$
53:a-cb	P m a n	-p 2ab 2	$\bar{P} 2_{ab} 2$	67	C m m a	-c 2a 2	$\bar{C} 2_a 2$
54	P c c a	-p 2a 2ac	$\bar{P} 2_a 2_{ac}$	67:ba-c	C m m b	-c 2a 2a	$\bar{C} 2_a 2_a$
54:ba-c	P c c b	-p 2b 2c	$\bar{P} 2_b 2_c$	67:cab	A b m m	-a 2b 2b	$\bar{A} 2_b 2_b$
54:cab	P b a a	-p 2a 2b	$\bar{P} 2_a 2_b$	67:-cba	A c m m	-a 2 2b	$\bar{A} 2 2_b$
54:-cba	P c a a	-p 2ac 2c	$\bar{P} 2_{ac} 2_c$	67:bca	B m c m	-b 2 2a	$\bar{B} 2 2_a$
54:bca	P b c b	-p 2bc 2b	$\bar{P} 2_{bc} 2_b$	67:a-cb	B m a m	-b 2a 2	$\bar{B} 2_a 2$
54:a-cb	P b a b	-p 2b 2ab	$\bar{P} 2_b 2_{ab}$	68:1	C c c a:1	c 2 2 -1ac	$C 2 2 \bar{1}_{ac}$
55	P b a m	-p 2 2ab	$\bar{P} 2 2_{ab}$	68:2	C c c a:2	-c 2a 2ac	$\bar{C} 2_a 2_{ac}$
55:cab	P m c b	-p 2bc 2	$\bar{P} 2_{bc} 2$	68:1ba-c	C c c b:1	c 2 2 -1ac	$C 2 2 \bar{1}_{ac}$
55:bca	P c m a	-p 2ac 2ac	$\bar{P} 2_{ac} 2_{ac}$	68:2ba-c	C c c b:2	-c 2a 2c	$\bar{C} 2_a 2_c$
56	P c c n	-p 2ab 2ac	$\bar{P} 2_{ab} 2_{ac}$	68:1cab	A b a a:1	a 2 2 -1ab	$A 2 2 \bar{1}_{ab}$
56:cab	P n a a	-p 2ac 2bc	$\bar{P} 2_{ac} 2_{bc}$	68:2cab	A b a a:2	-a 2a 2b	$\bar{A} 2_a 2_b$
56:bca	P b n b	-p 2bc 2ab	$\bar{P} 2_{bc} 2_{ab}$	68:1-cba	A c a a:1	a 2 2 -1ab	$A 2 2 \bar{1}_{ab}$
57	P b c m	-p 2c 2b	$\bar{P} 2_c 2_b$	68:2-cba	A c a a:2	-a 2ab 2b	$\bar{A} 2_{ab} 2_b$
57:ba-c	P c a m	-p 2c 2ac	$\bar{P} 2_c 2_{ac}$	68:1bca	B b c b:1	b 2 2 -1ab	$B 2 2 \bar{1}_{ab}$
57:cab	P m c a	-p 2ac 2a	$\bar{P} 2_{ac} 2_a$	68:2bca	B b c b:2	-b 2ab 2b	$\bar{B} 2_{ab} 2_b$
57:-cba	P m a b	-p 2b 2a	$\bar{P} 2_b 2_a$	68:1a-cb	B b a b:1	b 2 2 -1ab	$B 2 2 \bar{1}_{ab}$
57:bca	P b m a	-p 2a 2ab	$\bar{P} 2_a 2_{ab}$	68:2a-cb	B b a b:2	-b 2b 2ab	$\bar{B} 2_b 2_{ab}$
57:a-cb	P c m b	-p 2bc 2c	$\bar{P} 2_{bc} 2_c$	69	F m m m	-f 2 2	$\bar{F} 2 2$
58	P n n m	-p 2 2n	$\bar{P} 2 2_n$	70:1	F d d d:1	f 2 2 -1d	$F 2 2 \bar{1}_d$
58:cab	P m n n	-p 2n 2	$\bar{P} 2_n 2$	70:2	F d d d:2	-f 2uv 2vw	$\bar{F} 2_{uv} 2_{vw}$
58:bca	P n m n	-p 2n 2n	$\bar{P} 2_n 2_n$	71	I m m m	-i 2 2	$\bar{I} 2 2$
59:1	P m m n:1	p 2 2ab -1ab	$P 2 2_{ab} \bar{1}_{ab}$	72	I b a m	-i 2 2c	$\bar{I} 2 2_c$
59:2	P m m n:2	-p 2ab 2a	$\bar{P} 2_{ab} 2_a$	72:cab	I m c b	-i 2a 2	$\bar{I} 2_a 2$
59:1cab	P n m m:1	p 2bc 2 -1bc	$P 2_{bc} 2 \bar{1}_{bc}$	72:bca	I c m a	-i 2b 2b	$\bar{I} 2_b 2_b$
59:2cab	P n m m:2	-p 2c 2bc	$\bar{P} 2_c 2_{bc}$	73	I b c a	-i 2b 2c	$\bar{I} 2_b 2_c$
59:1bca	P m n m:1	p 2ac 2ac -1ac	$P 2_{ac} 2_{ac} \bar{1}_{ac}$	73:ba-c	I c a b	-i 2a 2b	$\bar{I} 2_a 2_b$
59:2bca	P m n m:2	-p 2c 2a	$\bar{P} 2_c 2_a$	74	I m m a	-i 2b 2	$\bar{I} 2_b 2$
60	P b c n	-p 2n 2ab	$\bar{P} 2_n 2_{ab}$	74:ba-c	I m m b	-i 2a 2a	$\bar{I} 2_a 2_a$
60:ba-c	P c a n	-p 2n 2c	$\bar{P} 2_n 2_c$	74:cab	I b m m	-i 2c 2c	$\bar{I} 2_c 2_c$
60:cab	P n c a	-p 2a 2n	$\bar{P} 2_a 2_n$	74:-cba	I c m m	-i 2 2b	$\bar{I} 2 2_b$
60:-cba	P n a b	-p 2bc 2n	$\bar{P} 2_{bc} 2_n$	74:bca	I m c m	-i 2 2a	$\bar{I} 2 2_a$
60:bca	P b n a	-p 2ac 2b	$\bar{P} 2_{ac} 2_b$	74:a-cb	I m a m	-i 2c 2	$\bar{I} 2_c 2$
60:a-cb	P c n b	-p 2b 2ac	$\bar{P} 2_b 2_{ac}$	75	P 4	p 4	P 4
61	P b c a	-p 2ac 2ab	$\bar{P} 2_{ac} 2_{ab}$	76	P 41	p 4w	P 4_w
61:ba-c	P c a b	-p 2bc 2ac	$\bar{P} 2_{bc} 2_{ac}$	77	P 42	p 4c	P 4_c
62	P n m a	-p 2ac 2n	$\bar{P} 2_{ac} 2_n$	78	P 43	p 4cw	P 4_{cw}
62:ba-c	P m n b	-p 2bc 2a	$\bar{P} 2_{bc} 2_a$	79	I 4	i 4	I 4
62:cab	P b n m	-p 2c 2ab	$\bar{P} 2_c 2_{ab}$	80	I 41	i 4bw	I 4_{bw}
62:-cba	P c m n	-p 2n 2ac	$\bar{P} 2_n 2_{ac}$	81	P -4	p -4	P -4
62:bca	P m c n	-p 2n 2a	$\bar{P} 2_n 2_a$	82	I -4	i -4	I -4

1.4. SYMMETRY IN RECIPROCAL SPACE

Table A1.4.2.7 (cont.)

n:c	H-M entry	Hall entry	Hall symbol	n:c	H-M entry	Hall entry	Hall symbol
83	P 4/m	-p 4	$\bar{P} 4$	134:2	P 42/n n m:2	-p 4ac 2bc	$\bar{P} 4_{ac} 2_{bc}$
84	P 42/m	-p 4c	$\bar{P} 4_c$	135	P 42/m b c	-p 4c 2ab	$\bar{P} 4_c 2_{ab}$
85:1	P 4/n:1	p 4ab -1ab	$P 4_{ab} \bar{1}_{ab}$	136	P 42/m n m	-p 4n 2n	$\bar{P} 4_n 2_n$
85:2	P 4/n:2	-p 4a	$\bar{P} 4_a$	137:1	P 42/n m c:1	p 4n 2n -1n	$P 4_n 2_n \bar{1}_n$
86:1	P 42/n:1	p 4n -1n	$P 4_n \bar{1}_n$	137:2	P 42/n m c:2	-p 4ac 2a	$\bar{P} 4_{ac} 2_a$
86:2	P 42/n:2	-p 4bc	$\bar{P} 4_{bc}$	138:1	P 42/n c m:1	p 4n 2ab -1n	$P 4_n 2_{ab} \bar{1}_n$
87	I 4/m	-i 4	$\bar{I} 4$	138:2	P 42/n c m:2	-p 4ac 2ac	$\bar{P} 4_{ac} 2_{ac}$
88:1	I 41/a:1	i 4bw -1bw	$I 4_{bw} \bar{1}_{bw}$	139	I 4/m m m	-i 4 2	$\bar{I} 4 2$
88:2	I 41/a:2	-i 4ad	$\bar{I} 4_{ad}$	140	I 4/m c m	-i 4 2c	$\bar{I} 4 2_c$
89	P 4 2 2	p 4 2	$P 4 2$	141:1	I 41/a m d:1	i 4bw 2bw -1bw	$I 4_{bw} 2_{bw} \bar{1}_{bw}$
90	P 4 21 2	p 4ab 2ab	$P 4_{ab} 2_{ab}$	141:2	I 41/a m d:2	-i 4bd 2	$\bar{I} 4_{bd} 2$
91	P 41 2 2	p 4w 2c	$P 4_w 2_c$	142:1	I 41/a c d:1	i 4bw 2aw -1bw	$I 4_{bw} 2_{aw} \bar{1}_{bw}$
92	P 41 21 2	p 4abw 2nw	$P 4_{abw} 2_{nw}$	142:2	I 41/a c d:2	-i 4bd 2c	$\bar{I} 4_{bd} 2_c$
93	P 42 2 2	p 4c 2	$P 4_c 2$	143	P 3	p 3	$P 3$
94	P 42 21 2	p 4n 2n	$P 4_n 2_n$	144	P 31	p 31	$P 3_1$
95	P 43 2 2	p 4cw 2c	$P 4_{cw} 2_c$	145	P 32	p 32	$P 3_2$
96	P 43 21 2	p 4nw 2abw	$P 4_{nw} 2_{abw}$	146:h	R 3:h	r 3	$R 3$
97	I 4 2 2	i 4 2	$I 4 2$	146:r	R 3:r	p 3*	$P 3^*$
98	I 41 2 2	i 4bw 2bw	$I 4_{bw} 2_{bw}$	147	P -3	-p 3	$\bar{P} 3$
99	P 4 m m	p 4 -2	$P 4 \bar{2}$	148:h	R -3:h	-r 3	$\bar{R} 3$
100	P 4 b m	p 4 -2ab	$P 4 \bar{2}_{ab}$	148:r	R -3:r	-p 3*	$\bar{P} 3^*$
101	P 42 c m	p 4c -2c	$P 4_c \bar{2}_c$	149	P 3 1 2	p 3 2	$P 3 2$
102	P 42 n m	p 4n -2n	$P 4_n \bar{2}_n$	150	P 3 2 1	p 3 2"	$P 3 2''$
103	P 4 c c	p 4 -2c	$P 4 \bar{2}_c$	151	P 31 1 2	p 31 2 (0 0 4)	$P 3_1 2 (0 0 4)$
104	P 4 n c	p 4 -2n	$P 4 \bar{2}_n$	152	P 31 2 1	p 31 2"	$P 3_1 2''$
105	P 42 m c	p 4c -2	$P 4_c \bar{2}$	153	P 32 1 2	p 32 2 (0 0 2)	$P 3_2 2 (0 0 2)$
106	P 42 b c	p 4c -2ab	$P 4_c \bar{2}_{ab}$	154	P 32 2 1	p 32 2"	$P 3_2 2''$
107	I 4 m m	i 4 -2	$I 4 \bar{2}$	155:h	R 3 2:h	r 3 2"	$R 3 2''$
108	I 4 c m	i 4 -2c	$I 4 \bar{2}_c$	155:r	R 3 2:r	p 3* 2	$P 3^* 2$
109	I 41 m d	i 4bw -2	$I 4_{bw} \bar{2}$	156	P 3 m 1	p 3 -2"	$P 3 \bar{2}''$
110	I 41 c d	i 4bw -2c	$I 4_{bw} \bar{2}_c$	157	P 3 1 m	p 3 -2	$P 3 \bar{2}$
111	P -4 2 m	p -4 2	$P \bar{4} 2$	158	P 3 c 1	p 3 -2" c	$P 3 \bar{2}''_c$
112	P -4 2 c	p -4 2c	$P \bar{4} 2_c$	159	P 3 1 c	p 3 -2c	$P 3 \bar{2}_c$
113	P -4 21 m	p -4 2ab	$P \bar{4} 2_{ab}$	160:h	R 3 m:h	r 3 -2"	$R 3 \bar{2}''$
114	P -4 21 c	p -4 2n	$P \bar{4} 2_n$	160:r	R 3 m:r	p 3* -2	$P 3^* \bar{2}$
115	P -4 m 2	p -4 -2	$P \bar{4} \bar{2}$	161:h	R 3 c:h	r 3 -2" c	$R 3 \bar{2}''_c$
116	P -4 c 2	p -4 -2c	$P \bar{4} \bar{2}_c$	161:r	R 3 c:r	p 3* -2n	$P 3^* \bar{2}_n$
117	P -4 b 2	p -4 -2ab	$P \bar{4} \bar{2}_{ab}$	162	P -3 1 m	-p 3 2	$\bar{P} 3 2$
118	P -4 n 2	p -4 -2n	$P \bar{4} \bar{2}_n$	163	P -3 1 c	-p 3 2c	$\bar{P} 3 2_c$
119	I -4 m 2	i -4 -2	$I \bar{4} \bar{2}$	164	P -3 m 1	-p 3 2"	$\bar{P} 3 2''$
120	I -4 c 2	i -4 -2c	$I \bar{4} \bar{2}_c$	165	P -3 c 1	-p 3 2" c	$\bar{P} 3 2''_c$
121	I -4 2 m	i -4 2	$I \bar{4} 2$	166:h	R -3 m:h	-r 3 2"	$\bar{R} 3 2''$
122	I -4 2 d	i -4 2bw	$I \bar{4} 2_{bw}$	166:r	R -3 m:r	-p 3* 2	$\bar{P} 3^* 2$
123	P 4/m m m	-p 4 2	$\bar{P} 4 2$	167:h	R -3 c:h	-r 3 2" c	$\bar{R} 3 2''_c$
124	P 4/m c c	-p 4 2c	$\bar{P} 4 2_c$	167:r	R -3 c:r	-p 3* 2n	$\bar{P} 3^* 2_n$
125:1	P 4/n b m:1	p 4 2 -1ab	$P 4 2 \bar{1}_{ab}$	168	P 6	p 6	$P 6$
125:2	P 4/n b m:2	-p 4a 2b	$\bar{P} 4_a 2_b$	169	P 61	p 61	$P 6_1$
126:1	P 4/n n c:1	p 4 2 -1n	$P 4 2 \bar{1}_n$	170	P 65	p 65	$P 6_5$
126:2	P 4/n n c:2	-p 4a 2bc	$\bar{P} 4_a 2_{bc}$	171	P 62	p 62	$P 6_2$
127	P 4/m b m	-p 4 2ab	$\bar{P} 4 2_{ab}$	172	P 64	p 64	$P 6_4$
128	P 4/m n c	-p 4 2n	$\bar{P} 4 2_n$	173	P 63	p 6c	$P 6_c$
129:1	P 4/n m m:1	p 4ab 2ab -1ab	$P 4_{ab} 2_{ab} \bar{1}_{ab}$	174	P -6	p -6	$\bar{P} 6$
129:2	P 4/n m m:2	-p 4a 2a	$\bar{P} 4_a 2_a$	175	P 6/m	-p 6	$\bar{P} 6$
130:1	P 4/n c c:1	p 4ab 2n -1ab	$P 4_{ab} 2_n \bar{1}_{ab}$	176	P 63/m	-p 6c	$\bar{P} 6_c$
130:2	P 4/n c c:2	-p 4a 2ac	$\bar{P} 4_a 2_{ac}$	177	P 6 2 2	p 6 2	$P 6 2$
131	P 42/m m c	-p 4c 2	$\bar{P} 4_c 2$	178	P 61 2 2	p 61 2 (0 0 5)	$P 6_1 2 (0 0 5)$
132	P 42/m c m	-p 4c 2c	$\bar{P} 4_c 2_c$	179	P 65 2 2	p 65 2 (0 0 1)	$P 6_5 2 (0 0 1)$
133:1	P 42/n b c:1	p 4n 2c -1n	$P 4_n 2_c \bar{1}_n$	180	P 62 2 2	p 62 2 (0 0 4)	$P 6_2 2 (0 0 4)$
133:2	P 42/n b c:2	-p 4ac 2b	$\bar{P} 4_{ac} 2_b$	181	P 64 2 2	p 64 2 (0 0 2)	$P 6_4 2 (0 0 2)$
134:1	P 42/n n m:1	p 4n 2 -1n	$P 4_n 2 \bar{1}_n$	182	P 63 2 2	p 6c 2c	$P 6_c 2_c$

1. GENERAL RELATIONSHIPS AND TECHNIQUES

Table A1.4.2.7 (cont.)

n:c	H-M entry	Hall entry	Hall symbol	n:c	H-M entry	Hall entry	Hall symbol
183	P 6 m m	p 6 -2	$P 6 \bar{2}$	208	P 42 3 2	p 4n 2 3	$P 4_n 2 3$
184	P 6 c c	p 6 -2c	$P 6 \bar{2}_c$	209	F 4 3 2	f 4 2 3	$F 4 2 3$
185	P 63 c m	p 6c -2	$P 6_c \bar{2}$	210	F 41 3 2	f 4d 2 3	$F 4_d 2 3$
186	P 63 m c	p 6c -2c	$P 6_c \bar{2}_c$	211	I 4 3 2	i 4 2 3	$I 4 2 3$
187	P -6 m 2	p -6 2	$P \bar{6} 2$	212	P 43 3 2	p 4acd 2ab 3	$P 4_{acd} 2_{ab} 3$
188	P -6 c 2	p -6c 2	$P \bar{6}_c 2$	213	P 41 3 2	p 4bd 2ab 3	$P 4_{bd} 2_{ab} 3$
189	P -6 2 m	p -6 -2	$P \bar{6} \bar{2}$	214	I 41 3 2	i 4bd 2c 3	$I 4_{bd} 2_c 3$
190	P -6 2 c	p -6c -2c	$P \bar{6}_c \bar{2}_c$	215	P -4 3 m	p -4 2 3	$P \bar{4} 2 3$
191	P 6/m m m	-p 6 2	$\bar{P} 6 2$	216	F -4 3 m	f -4 2 3	$F \bar{4} 2 3$
192	P 6/m c c	-p 6 2c	$\bar{P} 6 2_c$	217	I -4 3 m	i -4 2 3	$I \bar{4} 2 3$
193	P 63/m c m	-p 6c 2	$\bar{P} 6_c 2$	218	P -4 3 n	p -4n 2 3	$P \bar{4}_n 2 3$
194	P 63/m m c	-p 6c 2c	$\bar{P} 6_c 2_c$	219	F -4 3 c	f -4a 2 3	$F \bar{4}_a 2 3$
195	P 2 3	p 2 2 3	$P 2 2 3$	220	I -4 3 d	i -4bd 2c 3	$I \bar{4}_{bd} 2_c 3$
196	F 2 3	f 2 2 3	$F 2 2 3$	221	P m -3 m	-p 4 2 3	$\bar{P} 4 2 3$
197	I 2 3	i 2 2 3	$I 2 2 3$	222:1	P n -3 n:1	p 4 2 3 -1n	$P 4 2 3 \bar{I}_n$
198	P 21 3	p 2ac 2ab 3	$P 2_{ac} 2_{ab} 3$	222:2	P n -3 n:2	-p 4a 2bc 3	$\bar{P} 4_a 2_{bc} 3$
199	I 21 3	i 2b 2c 3	$I 2_b 2_c 3$	223	P m -3 n	-p 4n 2 3	$\bar{P} 4_n 2 3$
200	P m -3	-p 2 2 3	$\bar{P} 2 2 3$	224:1	P n -3 m:1	p 4n 2 3 -1n	$P 4_n 2 3 \bar{I}_n$
201:1	P n -3:1	p 2 2 3 -1n	$P 2 2 3 \bar{I}_n$	224:2	P n -3 m:2	-p 4bc 2bc 3	$\bar{P} 4_{bc} 2_{bc} 3$
201:2	P n -3:2	-p 2ab 2bc 3	$\bar{P} 2_{ab} 2_{bc} 3$	225	F m -3 m	-f 4 2 3	$\bar{F} 4 2 3$
202	F m -3	-f 2 2 3	$\bar{F} 2 2 3$	226	F m -3 c	-f 4a 2 3	$\bar{F} 4_a 2 3$
203:1	F d -3:1	f 2 2 3 -1d	$F 2 2 3 \bar{I}_d$	227:1	F d -3 m:1	f 4d 2 3 -1d	$F 4_d 2 3 \bar{I}_d$
203:2	F d -3:2	-f 2uv 2vw 3	$\bar{F} 2_{uv} 2_{vw} 3$	227:2	F d -3 m:2	-f 4vw 2vw 3	$\bar{F} 4_{vw} 2_{vw} 3$
204	I m -3	-i 2 2 3	$\bar{I} 2 2 3$	228:1	F d -3 c:1	f 4d 2 3 -1ad	$F 4_d 2 3 \bar{I}_{ad}$
205	P a -3	-p 2ac 2ab 3	$\bar{P} 2_{ac} 2_{ab} 3$	228:2	F d -3 c:2	-f 4ud 2vw 3	$\bar{F} 4_{ud} 2_{vw} 3$
206	I a -3	-i 2b 2c 3	$\bar{I} 2_b 2_c 3$	229	I m -3 m	-i 4 2 3	$\bar{I} 4 2 3$
207	P 4 3 2	p 4 2 3	$P 4 2 3$	230	I a -3 d	-i 4bd 2c 3	$\bar{I} 4_{bd} 2_c 3$

The codes appended to the space-group numbers listed in the first column identify the relationship between the symmetry elements and the crystal cell. Where no code is given the first choice listed below applies. *Monoclinic*. Code = <unique axis><cell choice>; unique axis choices [cf. *IT A* (2005) Table 4.3.2.1] b, -b, c, -c, a, -a; cell choices [cf. *IT A* (2005) Table 4.3.2.1] 1, 2, 3. *Orthorhombic*. Code = <origin choice><setting>; origin choices 1, 2; setting choices [cf. *IT A* (2005) Table 4.3.2.1] abc, ba-c, cab, -cba, bca, a-cb. *Tetragonal, cubic*. Code = <origin choice>; origin choices 1, 2. *Trigonal*. Code = <cell choice>; cell choices h (hexagonal), r (rhombohedral).