

Space Group Symbols

This Appendix contains a big table of all the space group symbols recognized by ATOMS. The *index* of each space group denotes the order in which the groups appear in the International Tables of Crystallography and the *standard* symbol is the short Hermann-Maguin symbol in the standard setting of the group. The column labeled Schoenflies gives the Schoenflies symbol for each group in a form adapted to the keyboard. In the literature, you will find these symbols typeset. For example, space group #16, $P\ 2\ 2\ 2$, has Schoenflies symbol d_2^1 , which is given in Table [1](#) as d_2^1 .

The column labeled *settings* gives all the unique symbols of alternate settings of low symmetry space groups. These alternate settings are described in detail in Section [1](#). For monoclinic groups the full symbols are given to help avoid ambiguity and symbols are given for all three spacial settings of all three unique angles. The first three choices are for beta unique, the next three for gamma unique, and the last three for alpha unique. For orthorhombic groups, when all the alternate settings have unique symbols, they are in the order abc, ba-c, cab, -cba, bca, a-cb. For tetragonal groups, the F and C centered settings are given in this column.

The column labeled *1935/new* contains either the symbol from the 1935 edition of the International Tables when it is different from the standard symbol or the new symbol which uses *e* to denote a double glide plane.

The column labeled *nicknames* contains special strings recognized by ATOMS to denote the space groups of certain very common structures.

Except for the alternate settings of monoclinic groups, the full Hermann-Maguin symbols for the space groups do not appear in this table. If you choose to use full symbols, ATOMS will recognize them.

In print the Hermann-Maguin symbols are usually typeset, but in the table they are presented in a form accessible to the keyboard. Negated numbers such as -4 are usually typeset as $\bar{4}$, two digit numbers such as 21 as 2_1 , and two digit numbers with slashes such as $21/m$ as $2_1/m$.

Any symbol, including the indeces, will be recognized by ATOMS when given as input data.

Table [1](#): Space group symbols recognized by ATOMS. This table requires a browser which correctly displays tables. Alas, the information content of this table is lost in lynx.

index	standard	Schoenflies	settings	new/1935	nicknames
Triclinic					
1	P 1	c_1^1	.	.	.

2	P -1	c_i^1	.	.	.
Monoclinic					
3	P 2	c_2^1	p 1 2 1 p 1 1 2 p 2 1 1	.	.
4	P 21	c_2^2	p 1 21 1 p 1 1 21 p 21 1 1	.	.
5	C 2	c_2^3	c 1 2 1 a 1 2 1 i 1 2 1 a 1 1 2 b 1 1 2 i 1 1 2 b 2 1 1 i 2 1 1	.	.
6	P m	c_s^1	p 1 m 1 p 1 1 m p m 1 1	.	.
7	P c	c_s^2	p 1 c 1 p 1 n 1 p 1 a 1 p 1 1 a p 1 1 n p 1 1 b p b 1 1 p n 1 1 p c 1 1	.	.
8	C m	c_s^3	c 1 m 1 a 1 m 1 i 1 m 1 a 1 1 m b 1 1 m i 1 1 m b m 1 1 c m 1 1 i m 1 1	.	.

9	C c	c_s^4	c 1 c 1 a 1 n 1 i 1 a 1 a 1 1 a b 1 1 n i 1 1 b b b 1 1 c n 1 1 i c 1 1	.	.
10	P 2/m	c_2h^1	p 1 2/m 1 p 1 1 2/m p 2/m 1 1	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
11	P 21/m	c_2h^2	p 1 21/m 1 p 1 1 21/m p 21/m 1 1	.	.
12	C 2/m	c_2h^3	c 1 2/m 1 a 1 2/m 1 i 1 2/m 1 a 1 1 2/m b 1 1 2/m i 1 1 2/m b 2/m 1 1 c 2/m 1 1 i 2/m 1 1	.	.
13	P 2/c	c_2h^4	p 1 2/c 1 p 1 2/n 1 p 1 2/a 1 p 1 1 2/a p 1 1 2/n p 1 1 2/b p 2/a 1 1 p 2/n 1 1 p 2/c 1 1	.	.
14	P 21/c	c_2h^5	p 1 21/c 1 p 1 21/n 1 p 1 21/a 1 p 1 1 21/a p 1 1 21/n p 1 1 21/b p 21/a 1 1 p 21/n 1 1 p 21/c 1 1	.	.

15	C 2/c	c_2h^4	c 1 2/c 1 a 1 2/n 1 i 1 2/a 1 a 1 1 2/a b 1 1 2/n i 1 1 2/b b 2/a 1 1 c 2/n 1 1 i 2/c 1 1	.	.
Orthorhombic					
16	P 2 2 2	d_2^1	.	.	.
17	P 2 2 21	d_2^2	p 21 2 2 p 2 21 2	.	.
18	P 21 21 2	d_2^3	p 2 21 21 p 21 2 21	.	.
19	P 21 21 21	d_2^4	.	.	.
20	C 2 2 21	d_2^5	a 21 2 2 b 2 21 2	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
21	C 2 2 2	d_2^6	a 2 2 2 b 2 2 2	.	.
22	F 2 2 2	d_2^7	.	.	.
23	I 2 2 2	d_2^8	.	.	.
24	I 21 21 21	d_2^9	.	.	.
25	P m m 2	c_2v^1	p 2 m m p m 2 m	.	.
26	P m c 21	c_2v^2	p c m 21 p 21 m a p 21 a m p b 21 m p m 21 b	.	.
27	P c c 2	c_2v^3	p 2 a a p b 2 b	.	.
28	P m a 2	c_2v^4	p b m 2 p 2 m b p 2 c m p m 2 a	.	.
			p b c 21 p 21 a b p 21 c a		

			p c 21 b p b 21 a		
30	P n c 2	c_2v^6	p c n 2 p 2 n a p 2 a n p b 2 n p n 2 b	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
31	P m n 21	c_2v^7	p n m 21 p 21 m n p 21 n m p n 21 m p m 21 n	.	.
32	P b a 2	c_2v^8	p 2 c b p c 2 a	.	.
33	P n a 21	c_2v^9	p b n 21 p 21 n b p 21 c n p c 21 n p n 21 a	.	.
34	P n n 2	c_2v^10	p 2 n n p n 2 n	.	.
35	C m m 2	c_2v^11	a 2 m m b m 2 m	.	.
36	C m c 21	c_2v^12	c c m 21 a 21 m a a 21 a m b b 21 m b m 21 b	.	.
37	C c c 2	c_2v^13	a 2 a a b b 2 b	.	.
38	A m m 2	c_2v^14	b m m 2 b 2 m m c 2 m m c m 2 m a m 2 m	.	.
39	A b m 2	c_2v^15	b m a 2 b 2 c m c 2 m b c m 2 a a c 2 m	a e m 2	.

40	A m a 2	c_2v^16	b b m 2 b 2 m b c 2 c m c c m 2 a m 2 a	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
41	A b a 2	c_2v^17	b b a 2 b 2 c b c 2 c b c c 2 a a c 2 a	a e a 2	.
42	F m m 2	c_2v^18	f 2 m m f m 2 m	.	.
43	F d d 2	c_2v^19	f 2 d d f d 2 d	.	.
44	I m m 2	c_2v^20	i 2 m m i m 2 m	.	.
45	I b a 2	c_2v^21	i 2 c b i c 2 a	.	.
46	I m a 2	c_2v^22	i b m 2 i 2 m b i 2 c m i c 2 m i m 2 a	.	.
47	P m m m	d_2h^1	.	.	.
48	P n n n	d_2h^2	.	.	.
49	P c c m	d_2h^3	p m a a p b m b	.	.
50	P b a n	d_2h^4	p n c b p c n a	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
51	P m m a	d_2h^5	p m m b p b m m p c m m p m c m p m a m	.	.
52	P n n a	d_2h^6	p n n b p b n n p c n n p n c n p n a n	.	.

53	P m n a	d_2h^7	p n m b p b m n p c n m p n c m p m a n	.	.
54	P c c a	d_2h^8	p c c b p b a a p c a a p b c b p b a b	.	.
55	P b a m	d_2h^9	p m c b p c m a	.	.
56	P c c n	d_2h^10	p n a a p b n b p b n a	.	.
57	P b c m	d_2h^11	p c a m p m c a p m a b p b m a p c m b	.	.
58	P n n m	d_2h^12	p m n n p n m n	.	.
59	P m m n	d_2h^13	p n m m p m n m	.	.
60	P b c n	d_2h^14	p c a n p n c a p n a b p b n a p c n b	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
61	P b c a	d_2h^15	p c a b	.	.
62	P n m a	d_2h^16	p m n b p b n m p c m n p m c n p n a m	.	.
63	C m c m	d_2h^17	c c m m a m m a a m a m b b m m b m m b	.	.

64	C m c a	d_2h^18	c c m b a b m a a c a m b b c m b m a b	c m c e	.
65	C m m m	d_2h^19	a m m m b m m m	.	.
66	C c c m	d_2h^20	a m a a b b m b	.	.
67	C m m a	d_2h^21	c m m b a b m m a c m m b m c m b m a m	c m m e	.
68	C c c a	d_2h^22	c c c b a b a a a c a a b b c b b b a b	c c c e	.
69	F m m m	d_2h^23	.	.	.
70	F d d d	d_2h^24	.	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
71	I m m m	d_2h^25	.	.	.
72	I b a m	d_2h^26	i m c b i c m a	.	.
73	I b c a	d_2h^27	i c a b	.	.
74	I m m a	d_2h^28	i m m b i b m m i c m m i m c m i m a m	.	.
Tetragonal					
75	P 4	c_4^1	c 4	.	.
76	P 41	c_4^2	c 41	.	.
77	P 42	c_4^3	c 42	.	.
78	P 43	c_4^4	c 43	.	.
79	I 4	c_4^5	f 4	.	.
80	I 41	c_4^6	f 41	.	.

index	standard	Schoenflies	settings	new/1935	nicknames
81	P -4	s ₄ ¹	c -4	.	.
82	I -4	s ₄ ²	f -4	.	.
83	P 4/m	c _{4h} ¹	c 4/m	.	.
84	P 42/m	c _{4h} ²	c 42/m	.	.
85	P 4/n	c _{4h} ³	c 4/a	.	.
86	P 42/n	c _{4h} ⁴	c 42/a	.	.
87	I 4/m	c _{4h} ⁵	f 4/m	.	.
88	I 41/a	c _{4h} ⁶	f 41/d	.	.
89	P 4 2 2	d ₄ ¹	c 4 2 2	p 4 2	.
90	P 4 21 2	d ₄ ²	c 4 21 2	p 4 21	.
index	standard	Schoenflies	settings	new/1935	nicknames
91	P 41 2 2	d ₄ ³	c 41 2 2	p 41 2	.
92	P 41 21 2	d ₄ ⁴	c 41 2 21	p 41 21	.
93	P 42 2 2	d ₄ ⁵	c 42 2 2	p 42 2	.
94	P 42 21 2	d ₄ ⁶	c 42 2 21	p 42 21	.
95	P 43 2 2	d ₄ ⁷	c 43 2 2	p 43 2	.
96	P 43 21 2	d ₄ ⁸	c 43 2 21	p 43 21	.
97	I 4 2 2	d ₄ ⁹	f 4 2 2	i 4 2	.
98	I 41 2 2	d ₄ ¹⁰	f 41 2 2	p 41 2	.
99	P 4 m m	c _{4v} ¹	c 4 m m	.	.
100	P 4 b m	c _{4v} ²	c 4 m g1	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
101	P 42 c m	d _{4v} ³	c 42 m c	.	.
102	P 42 n m	c _{4v} ⁴	c 42 m g2	.	.
103	P 4 c c	c _{4v} ⁵	c 4 c c	.	.
104	P 4 n c	p _{4v} ⁶	c 4 c g2	.	.
105	P 42 m c	c _{4v} ⁷	c 42 c m	.	.
106	P 42 b c	c _{4v} ⁸	c 42 c g1	.	.
107	I 4 m m	c _{4v} ⁹	f 4 m m	.	.
108	I 4 c m	c _{4v} ¹⁰	f 4 m c	.	.

109	I 41 m d	c_4v^11	f 41 d m	.	.
110	I 41 c d	c_4v^12	f 41 d c	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
111	P -4 2 m	d_2d^1	c -4 m 2	.	.
112	P -4 2 c	d_2d^2	c -4 c 2	.	.
113	P -4 21 m	d_2d^3	c -4 m 21	.	.
114	P -4 21 c	d_2d^4	c -4 c 21	.	.
115	P -4 m 2	d_2d^5	c -4 2 m	.	.
116	P -4 c 2	d_2d^6	c -4 2 c	.	.
117	P -4 b 2	d_2d^7	c -4 2 g	.	.
118	P -4 n 2	d_2d^8	c -4 2 g	.	.
119	I -4 m 2	d_2d^9	f -4 2 m	.	.
120	I -4 c 2	d_2d^10	f -4 2 c	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
121	I -4 2 m	d_2d^11	f -4 m 2	.	.
122	I -4 2 d	d_2d^12	f -4 d 2	.	.
123	P 4/m m m	d_4h^1	c 4/m m m	.	.
124	P 4/m c c	d_4h^2	c 4/m c c	.	.
125	P 4/n b m	d_4h^3	c 4/a m b	.	.
126	P 4/n n c	d_4h^4	c 4/a c n	.	.
127	P 4/m b m	d_4h^5	c 4/m m b	.	.
128	P 4/m n c	d_4h^6	c 4/m c n	.	.
129	P 4/n m m	d_4h^7	c 4/a m m	.	.
130	P 4/n c c	d_4h^8	c 4/a c c	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
131	P 42/m m c	d_4h^9	c 42/m c m	.	.
132	P 42/m c m	d_4h^10	c 42/m m c	.	.
133	P 42/n b c	d_4h^11	c 42/a c b	.	.
134	P 42/n n m	d_4h^12	c 42/a m n	.	.
135	P 42/m b c	d_4h^13	c 42/m c b	.	.
136	P 42/m n m	d_4h^14	c 42/m m n	.	.

137	P 42/n m c	d _{4h} ¹⁵	c 42/a c m	.	.
138	P 42/n c m	d _{4h} ¹⁶	c 42/a m c	.	.
139	I 4/m m m	d _{4h} ¹⁷	f 4/m m m	.	.
140	I 4/m c m	d _{4h} ¹⁸	f 4/m m c	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
141	I 41/a m d	d _{4h} ¹⁹	f 41/d d m	.	.
142	I 41/a c d	d _{4h} ²⁰	f 41/d d c	.	.
Trigonal					
143	P 3	c ₃ ¹	.	.	.
144	P 31	c ₃ ²	.	.	.
145	P 32	c ₃ ³	.	.	.
146	R 3	c ₃ ⁴	.	.	.
147	P -3	c _{3i} ¹	.	.	.
148	R -3	c _{3i} ²	.	.	.
149	P 3 1 2	d ₃ ¹	.	.	.
150	P 3 2 1	d ₃ ²	.	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
151	P 31 1 2	d ₃ ³	.	.	.
152	P 31 2 1	d ₃ ⁴	.	.	.
153	P 32 1 2	d ₃ ⁵	.	.	.
154	P 32 2 1	d ₃ ⁶	.	.	.
155	R 3 2	d ₃ ⁷	.	.	.
156	P 3 m 1	c _{3v} ¹	.	.	.
157	P 3 1 m	c _{3v} ²	.	.	.
158	P 3 c 1	c _{3v} ³	.	.	.
159	P 3 1 c	c _{3v} ⁴	.	.	.
160	R 3 m	c _{3v} ⁵	.	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
161	R 3 c	c _{3v} ⁶	.	.	.
162	P -3 1 m	d _{3d} ¹	.	.	.
163	P -3 1 c	d _{3d} ²	.	.	.

164	P -3 m 1	d _{3d} ³	.	.	.
165	P -3 c 1	d _{3d} ⁴	.	.	.
166	R -3 m	d _{3d} ⁵	.	.	.
167	R -3 c	d _{3d} ⁶	.	.	.
Hexagonal					
168	P 6	c ₆ ¹	.	.	.
169	P 61	c ₆ ²	.	.	.
170	P 65	c ₆ ³	.	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
171	P 62	c ₆ ⁴	.	.	.
172	P 64	c ₆ ⁵	.	.	.
173	P 63	c ₆ ⁶	.	.	.
174	P -6	c _{3h} ¹	.	.	.
175	P 6/m	c _{6h} ¹	.	.	.
176	P 63/m	c _{6h} ²	.	.	.
177	P 6 2 2	d ₆ ¹	.	.	.
178	P 61 2 2	d ₆ ²	.	.	.
179	P 65 2 2	d ₆ ³	.	.	.
180	P 62 2 2	d ₆ ⁴	.	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
181	P 64 2 2	d ₆ ⁵	.	.	.
182	P 63 2 2	d ₆ ⁶	.	.	.
183	P 6 m m	c _{6v} ¹	.	.	.
184	P 6 c c	c _{6v} ²	.	.	.
185	P 63 c m	c _{6v} ³	.	.	.
186	P 63 m c	c _{6v} ⁴	.	.	graphite gra
187	P -6 m 2	d _{3h} ¹	.	.	.
188	P -6 c 2	d _{3h} ²	.	.	.
189	P -6 2 m	d _{3h} ³	.	.	.
190	P -6 2 c	d _{3h} ⁴	.	.	.

index	standard	Schoenflies	settings	new/1935	nicknames
191	P 6/m m m	d _{6h} ¹	.	.	.
192	P 6/m c c	d _{6h} ²	.	.	.
193	P 63/m c m	d _{6h} ³	.	.	.
194	P 63/m m c	d _{6h} ⁴	.	.	hex hcp
Cubic					
195	P 2 3	t ¹	.	.	.
196	F 2 3	t ²	.	.	.
197	I 2 3	t ³	.	.	.
198	P 21 3	t ⁴	.	.	.
199	I 21 3	t ⁵	.	.	.
200	P m -3	t _h ¹	.	p m 3	.
index	standard	Schoenflies	settings	new/1935	nicknames
201	P n -3	t _h ³	.	p n 3	.
202	F m -3	t _h ³	.	f m 3	.
203	F d -3	t _h ⁴	.	f d 3	.
204	I m -3	t _h ⁵	.	i m 3	.
205	P a -3	t _h ⁶	.	p a 3	.
206	I a -3	t _h ⁷	.	i a 3	.
207	P 4 3 2	o ¹	.	p 4 3	.
208	P 42 3 2	o ²	.	p 42 3	.
209	F 4 3 2	o ³	.	f 4 3	.
210	F 41 3 2	o ⁴	.	f 41 3	.
index	standard	Schoenflies	settings	new/1935	nicknames
211	I 4 3 2	o ⁵	.	i 4 3	.
212	P 43 3 2	o ⁶	.	p 43 3	.
213	P 41 3 2	o ⁷	.	p 41 3	.
214	I 41 3 2	o ⁸	.	i 41 3	.
215	P -4 3 m	t _d ¹	.	.	.
216	F -4 3 m	t _d ²	.	.	zincblende zns

217	I -4 3 m	t_d^3	.	.	.
218	P -4 3 n	t_d^4	.	.	.
219	F -4 3 c	t_d^5	.	.	.
220	I -4 3 d	t_d^6	.	.	.
index	standard	Schoenflies	settings	new/1935	nicknames
221	P m -3 m	o_h^1	.	p m 3 m	cubic csc1 perov perovskite
222	P n -3 n	o_h^2	.	p n 3 n	.
223	P m -3 n	o_h^3	.	p m 3 n	.
224	P n -3 m	o_h^4	.	p n 3 m	.
225	F m -3 m	o_h^5	.	f m 3 m	fcc salt nacl
226	F m -3 c	o_h^6	.	f m 3 c	.
227	F d -3 m	o_h^7	.	f d 3 m	diamond
228	F d -3 c	o_h^8	.	f d 3 c	.
229	I m -3 m	o_h^9	.	i m 3 m	bcc
230	I a -3 d	o_h^10	.	i a 3 d	.

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