


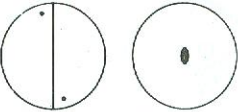
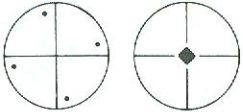

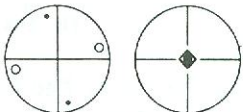
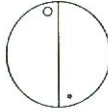

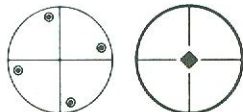
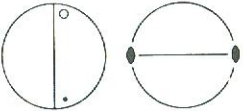
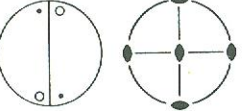
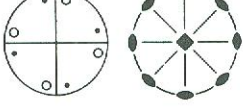
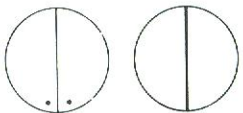
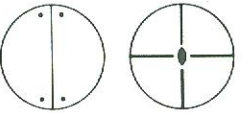
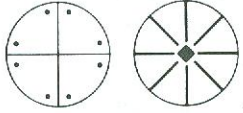
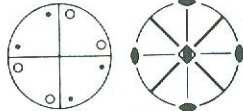
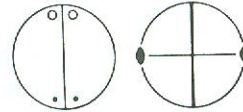
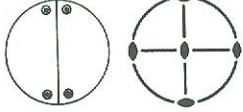

Triclinic	Monoclinic (1st setting)	Tetragonal
 C_1 (1)	 C_2 (2)	 C_4 (4)
—	 C_{1h} (m)	 S_4 ($\bar{4}$)
 S_2 ($\bar{1}$)	 C_{2h} (2/m)	 C_{4h} (4/m)
Monoclinic (2nd setting)	Orthorhombic	
 C_2 (2)	 D_2 (222)	 D_4 (422)
 C_{1h} (m)	 C_{2v} (mm2)	 C_{4v} (4mm)
—	—	 D_{2d} (42m)
 C_{2h} (2/m)	 D_{2h} (mmm)	 D_{4h} (4/mmm)

Fig. 1-5 Stereograms of the 32 crystallographic point groups.

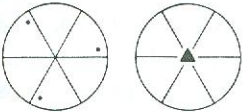
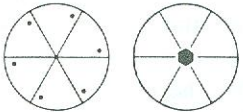
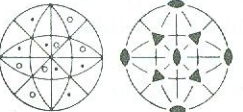
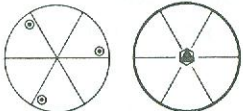
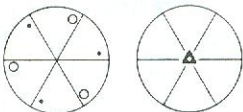
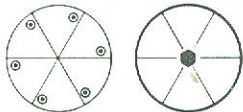
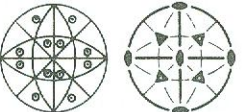
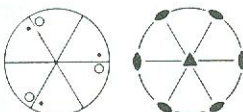
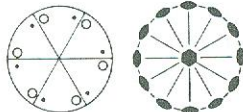
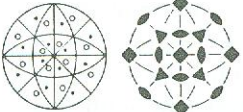
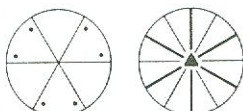
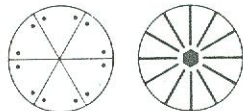
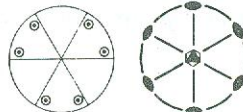
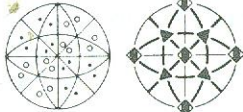
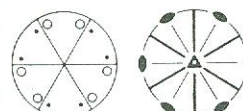
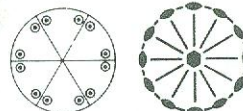
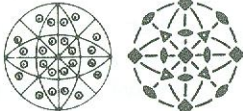
Trigonal	Hexagonal	Cubic
 C_3 (3)	 C_6 (6)	 T (23)
—	 C_{3h} ($\bar{6}$)	—
 S_6 ($\bar{3}$)	 C_{6h} (6/m)	 T_h (m3)
 D_3 (32)	 D_6 (622)	 O (432)
 C_{3v} (3m)	 C_{6v} (6mm)	—
—	 D_{3h} ($\bar{6}m2$)	 T_d ($\bar{4}3m$)
 D_{3d} ($\bar{3}m$)	 D_{6h} (6/mmm)	 O_h (m3m)

Fig. 1-5 Stereograms of the 32 crystallographic point groups.

Table 1-2 The 32 crystallographic point groups.

Schoenflies	International	Full Int.	Symmetry Elements	Generating Elements	Space Groups
Triclinic					
C_1	1	1	E	E	1
$S_2(C_i)$	$\bar{1}$	$\bar{1}$	E i	i	2
Monoclinic					
C_2	2	2	E C_2	C_2	3-5
$C_{1h}(C_s)$	m	m	E σ_h	σ_h	6-9
C_{2h}	2/m	$\frac{2}{m}$	E C_2 i σ_h	i C_2	10-17
Orthorhombic					
$D_2(V)$	222	222	E C_2 C_2' C_2''	C_2 C_2''	16-24
C_{2v}	mm2	mm2	E C_2 σ_v σ_v'	C_2 σ_v''	25-46
$D_{2h}(V_h)$	mmm	$\frac{2}{m} \frac{2}{m} \frac{2}{m}$	E C_2 C_2' C_2'' i σ_h σ_v σ_v'	i σ_v'' C_2	47-74
Tetragonal					
C_4	4	4	E $2C_4$ C_2	C_4	75-80
S_4	$\bar{4}$	$\bar{4}$	E $2S_4$ C_2	S_4^3	81-82
C_{4h}	4/m	$\frac{4}{m}$	E $2C_4$ C_2 i $2S_4$ σ_h	i C_4	83-88
D_4	422	422	E $2C_4$ C_2 $2C_2'$ $2C_2''$	C_2'' C_4	89-98
C_{4v}	4mm	4mm	E $2C_4$ C_2 $2\sigma_v$ $2\sigma_d$	σ_v'' C_4	99-110
$D_{2d}(V_d)$	$\bar{4}2m$	$\bar{4}2m$	E C_2 $2C_2'$ $2\sigma_d$ $2S_4$	C_2'' S_4^3	111-122
D_{4h}	4/mmm	$\frac{4}{m} \frac{2}{m} \frac{2}{m}$	E $2C_4$ C_2 $2C_2'$ $2C_2''$ i $2S_4$ σ_h $2\sigma_v$ $2\sigma_d$	i C_2'' C_4	123-142
Trigonal (Rhombohedral)					
C_3	3	3	E $2C_3$	C_3	143-146
$S_6(C_{3i})$	$\bar{3}$	$\bar{3}$	E $2C_3$ i $2S_6$	i C_3	147-148
D_3	32	32	E $2C_3$ $3C_2'$	C_2'' C_3	149-155
C_{3v}	3m	3m	E $2C_3$ $3\sigma_v$	σ_v'' C_3	156-161
D_{3d}	$\bar{3}m$	$\bar{3} \frac{2}{m}$	E $2C_3$ $3C_2'$ i $2S_6$ $3\sigma_v$	i C_2'' C_3	162-176
Hexagonal					
C_6	6	6	E $2C_6$ $2C_3$ C_2	C_2 C_3	168-173
C_{3h}	$\bar{6}$	$\bar{6}$	E $2C_3$ σ_h $2S_3$	σ_h C_3	174
C_{6h}	6/m	$\frac{6}{m}$	E $2C_6$ $2C_3$ C_2 i $2S_3$ $2S_6$ σ_h	i C_2 C_3	175-176
D_6	622	622	E $2C_6$ $2C_3$ C_2 $3C_2'$ $3C_2''$	C_2 C_2'' C_3	177-182
C_{6v}	6mm	6mm	E $2C_6$ $2C_3$ C_2 $3\sigma_v$ $3\sigma_d$	C_2 σ_v'' C_3	183-186
D_{3h}	$\bar{6}m2$	$\bar{6}m2$	E $2C_3$ $3C_2'$ σ_h $2S_3$ $3\sigma_v$	C_2'' σ_h C_3	187-190
D_{6h}	6/mmm	$\frac{6}{m} \frac{2}{m} \frac{2}{m}$	E $2C_6$ $2C_3$ C_2 $3C_2'$ $3C_2''$ i $2S_3$ $2S_6$ σ_h $3\sigma_v$ $3\sigma_d$	i C_2'' C_2 C_3	191-194
Cubic					
T	23	23	E $8C_3$ $3C_2$	C_2 C_3 [111]	195-199
T_h	m3	$\frac{2}{m} \bar{3}$	E $8C_3$ $3C_2$ i $8S_6$ $3\sigma_h$	i C_2 C_3 [111]	200-206
O	432	432	E $8C_3$ $3C_2$ $6C_2'$ $6C_4$	C_4 C_3 [111]	207-214
T_d	$\bar{4}3m$	$\bar{4}3m$	E $8C_3$ $3C_2$ $6\sigma_d$ $6S_4$	S_4^3 C_3 [111]	215-220
O_h	m3m	$\frac{4}{m} \bar{3} \frac{2}{m}$	E $8C_3$ $3C_2$ $6C_2'$ $6C_4$ i $8S_6$ $3\sigma_h$ $6\sigma_d$ $6S_4$	i C_4 C_3 [111]	221-230

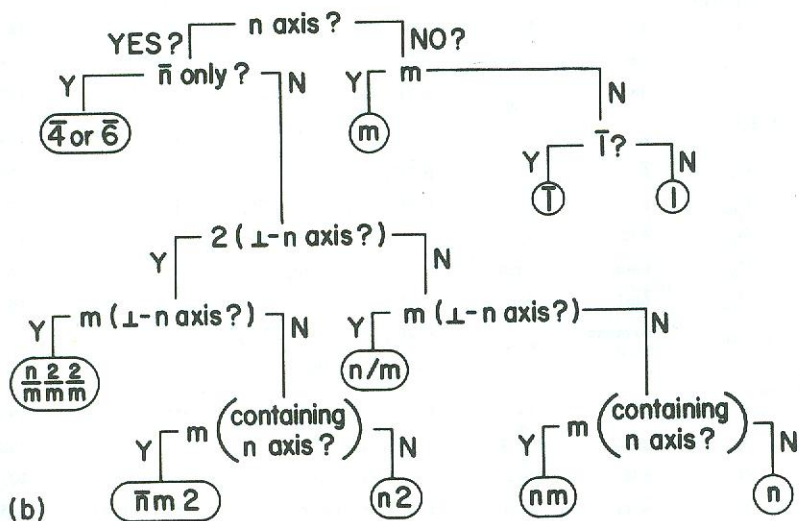
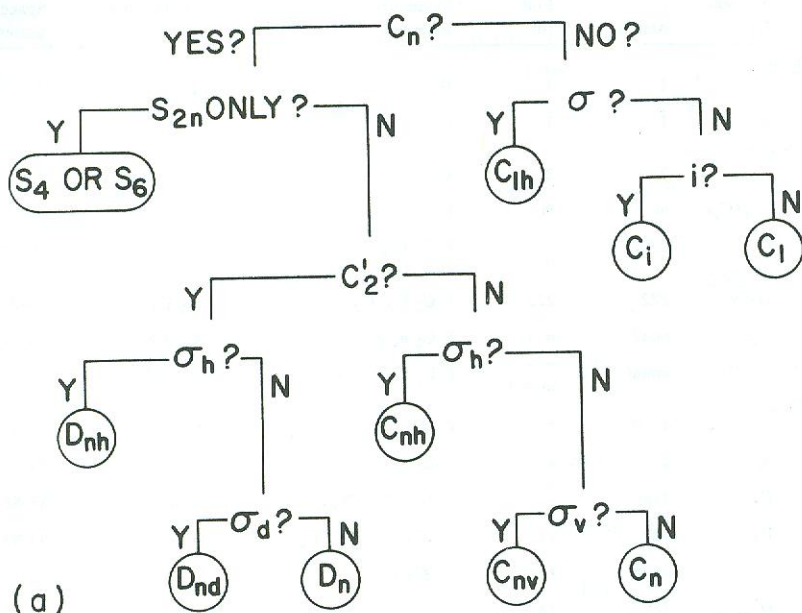


Fig. 1-6 A flowchart showing a systematic way to determine the appropriate point group in the (a) Schoenflies notation and (b) International notation.

