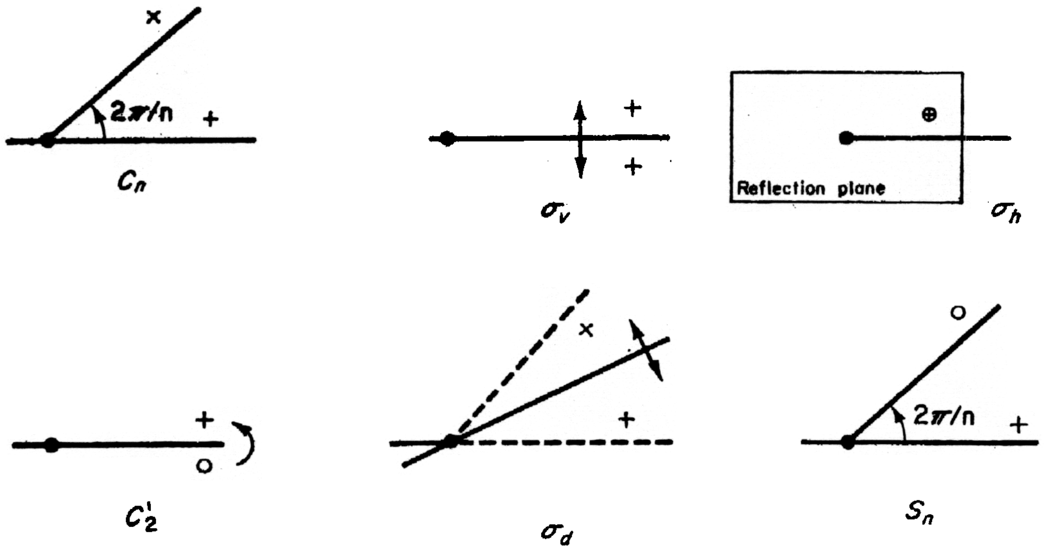


FIG. 3.4. Types of axial group operation.

C_n = positive rotation through $2\pi/n$

σ_v = reflection across vertical plane (used for family which includes xz plane).

σ_h = reflection across horizontal plane (plane of paper)

C_2' = rotation through π about axis normal to principal axis

σ_d = reflection across "dihedral" plane, containing principal axis and bisecting angle between adjacent 2-fold axes (also used in C_{4v} and C_{6v} for planes of the family which does *not* include the xz plane)

S_n = improper positive rotation through $2\pi/n$ ($S_n = \sigma_h C_n = i\bar{C}_n$). (The bar is used to indicate a *negative* rotation. S_2 is usually denoted by i.)

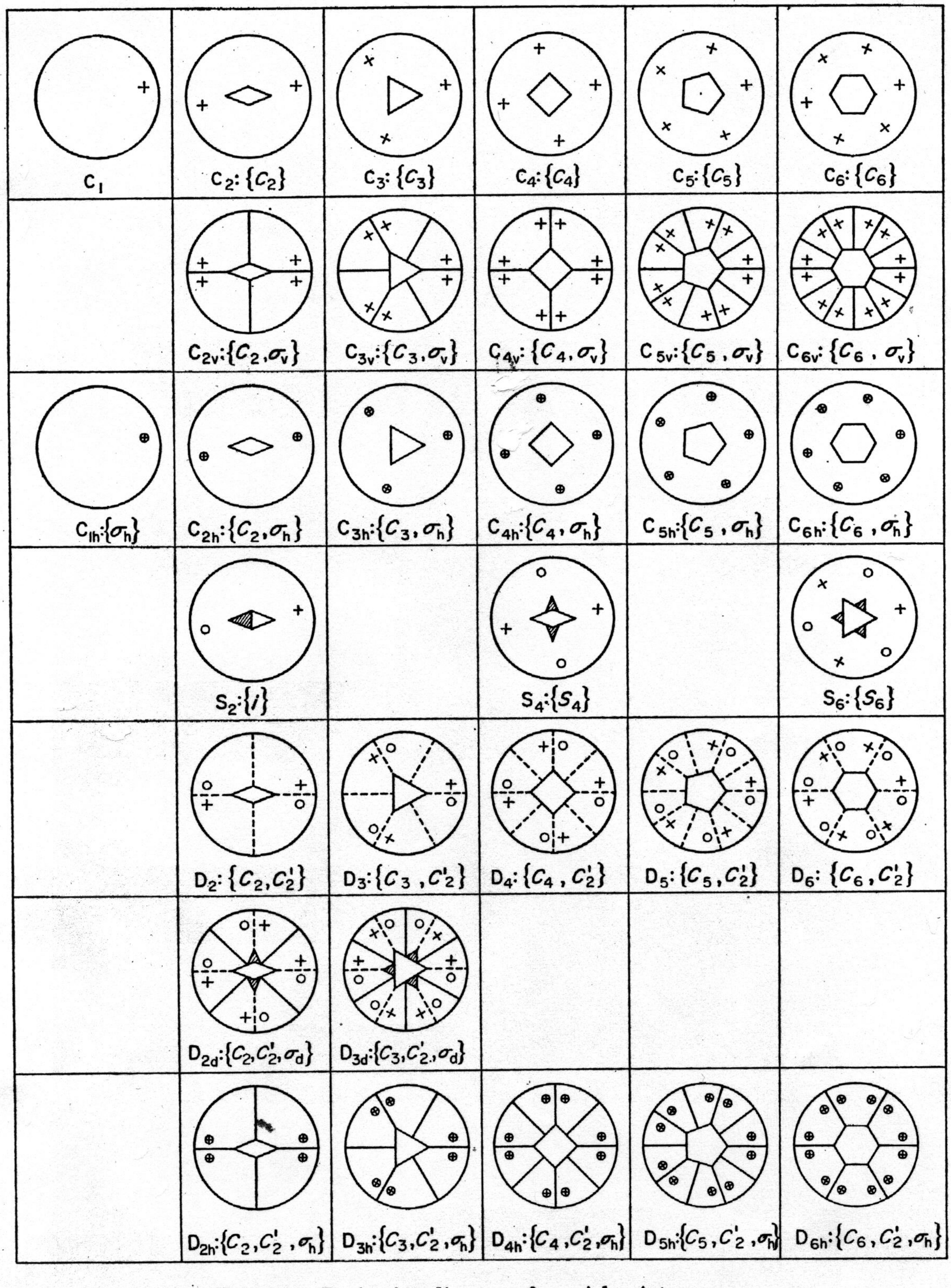
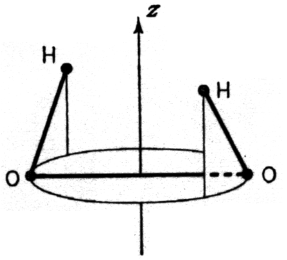
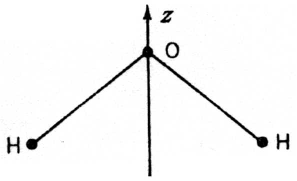


FIG. 3.2. Projection diagrams for axial point groups.



Hydrogen peroxide



Water

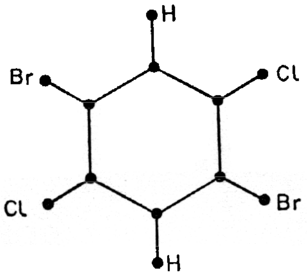
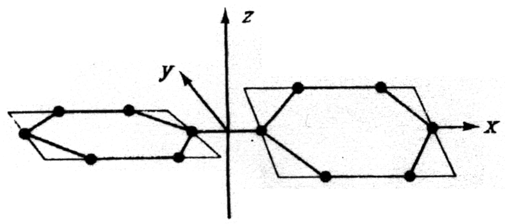
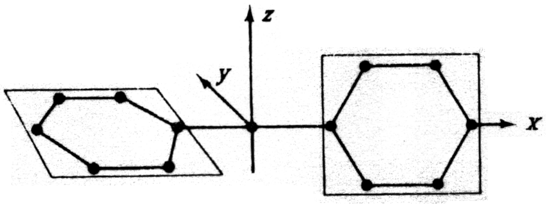


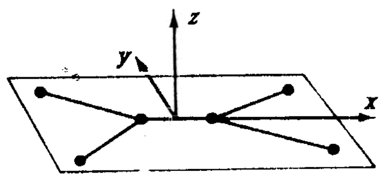
FIG. 3.7. Molecules of symmetry



Diphenyl



Allene



Ethylene

FIG. 3.8. Molecules of symmetry In diphenyl the rings are twisted out of plane by steric hindrance between hydrogens (not shown). In allene the rings are perpendicular and the x axis is an improper 4-fold axis.

D_5	E	$2C_5$	$2C_5^2$	$5C_2$		
A_1	1	1	1	1		x^2+y^2, z^2
A_2	1	1	1	−1	z, R_z	
E_1	2	2 cos 72°	2 cos 144°	0	$(x, y)(R_x, R_y)$	(xz, yz)
E_2	2	2 cos 144°	2 cos 72°	0		(x^2-y^2, xy)

D_6 (622)	E	$2C_6$	$2C_3$	C_2	$3C_2'$	$3C_2''$		
A_1	1	1	1	1	1	1		x^2+y^2, z^2
A_2	1	1	1	1	−1	−1	z, R_z	
B_1	1	−1	1	−1	1	−1		
B_2	1	−1	1	−1	−1	1		
E_1	2	1	−1	−2	0	0	$(x, y)(R_x, R_y)$	(xz, yz)
E_2	2	−1	−1	2	0	0		(x^2-y^2, xy)

4. The Groups C_{nv} ($n = 2, 3, 4, 5, 6$)

C_{2v} (2mm)	E	C_2	$\sigma_v(xz)$	$\sigma_v'(yz)$		
A_1	1	1	1	1	z	x^2, y^2, z^2
A_2	1	1	−1	−1	R_z	xy
B_1	1	−1	1	−1	x, R_y	xz
B_2	1	−1	−1	1	y, R_x	yz

C_{3v} (3m)	E	$2C_3$	$3\sigma_v$		
A_1	1	1	1	z	x^2+y^2, z^2
A_2	1	1	−1	R_z	
E	2	−1	0	$(x, y)(R_x, R_y)$	$(x^2-y^2, xy)(xz, yz)$

C_{4v} (4mm)	E	$2C_4$	C_2	$2\sigma_v$	$2\sigma_d$		
A_1	1	1	1	1	1	z	x^2+y^2, z^2
A_2	1	1	1	−1	−1	R_z	
B_1	1	−1	1	1	−1		x^2-y^2
B_2	1	−1	1	−1	1		xy
E	2	0	−2	0	0	$(x, y)(R_x, R_y)$	(xz, yz)