CH 801: Symmetry in Chemistry

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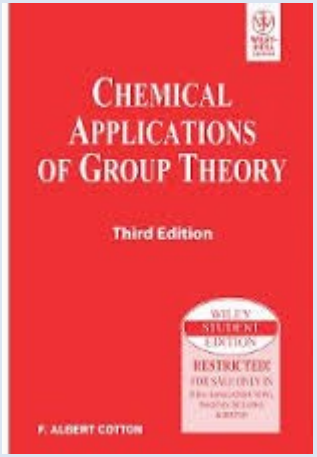
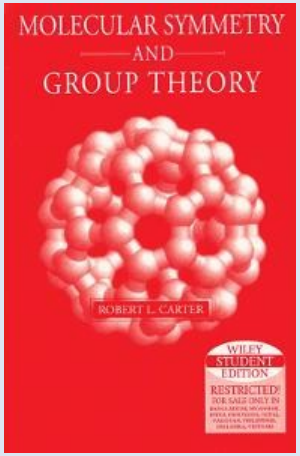
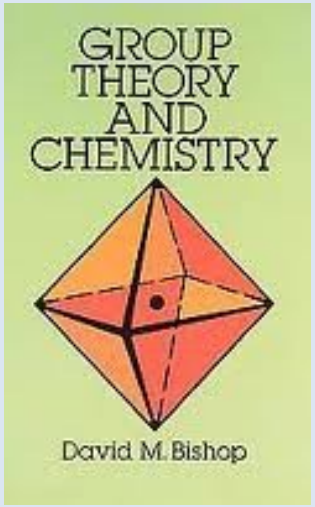
What we will learn

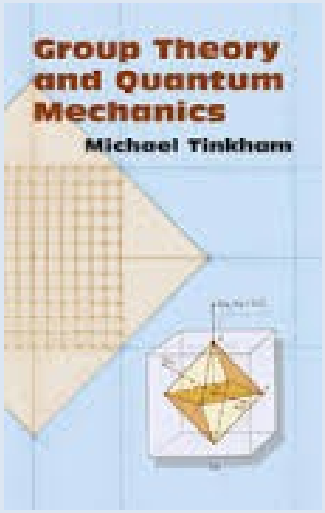
- Symmetry classification of molecules: Symmetry Point Groups
- Matrices: Geometry to algebra
- Representations: Reducible and Irreducible
- Group theory: Great Orthogonality Theorem
- Character Tables: What, how and why
- Symmetry Adapted Linear Combinations (SALCs)
- Molecular Orbital Theory of Organic Compounds using SALCs
- Inorganic Complexes
- Molecular Vibrations *(if time permits)*

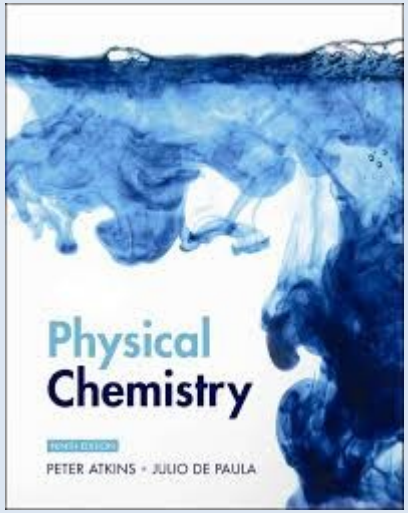
Text books


CHEMICAL APPLICATIONS OF GROUP THEORY
Third Edition
F. ALBERT COTTON


MOLECULAR SYMMETRY AND GROUP THEORY
ROBERT L. CARTER


GROUP THEORY AND CHEMISTRY
David M. Bishop


Group Theory and Quantum Mechanics
Michael Tinkham


Physical Chemistry
PETER ATKINS • JULIO DE PAULA

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Let us get going

Symmetry element and operation

Symmetry Operation

Something done to a molecule that leaves it in an equivalent configuration

Symmetry element

A geometrical entity with respect to which the operation is performed

Point:	Inversion (i)
Line:	Simple rotation (C_n)
	Complex Rotation (S_n)
Plane:	Reflection

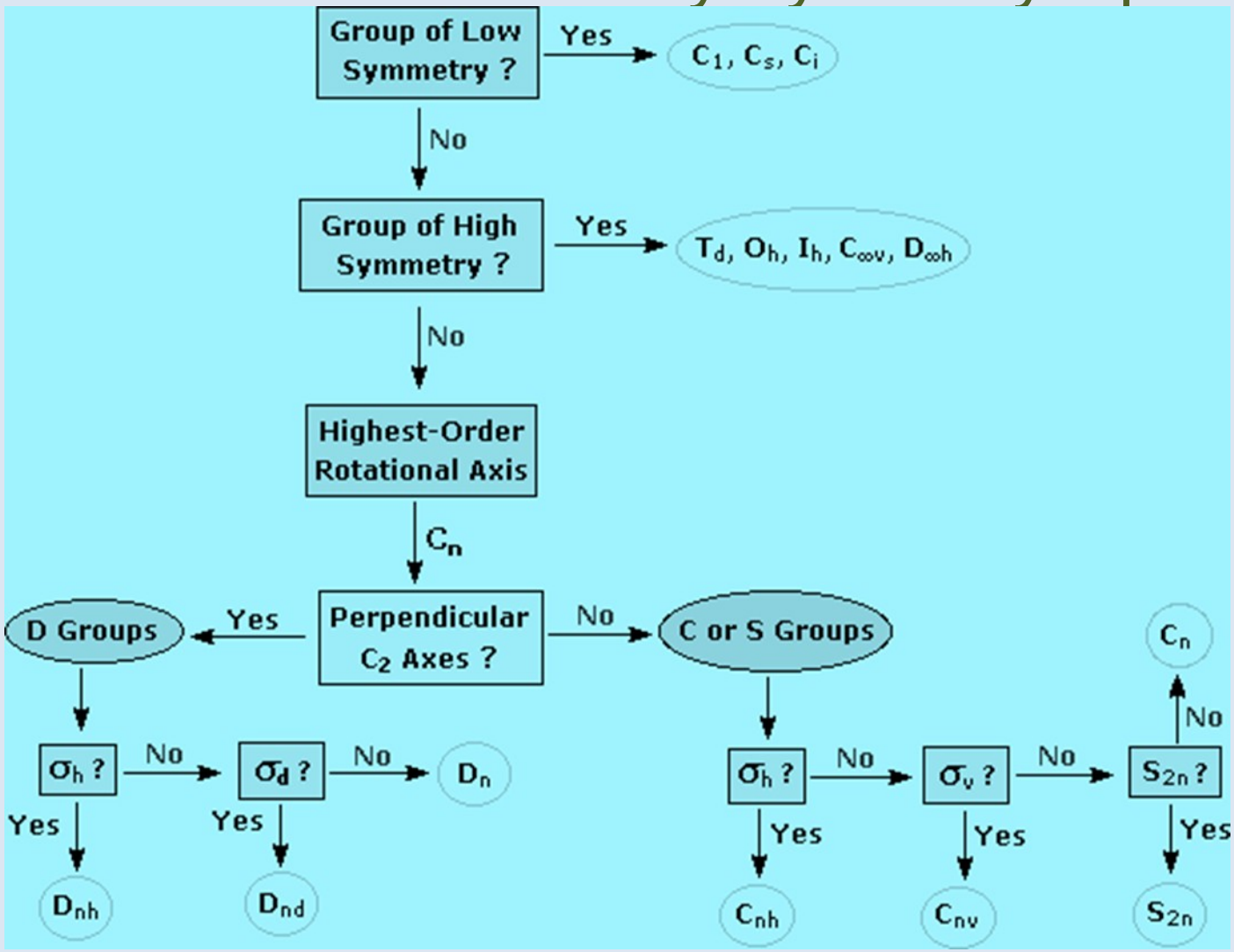
Principal axis of symmetry: The axis with the largest n value

Horizontal plane: Plane of reflection to which the principal axis is perpendicular

Vertical Plane: Contains the principal axis

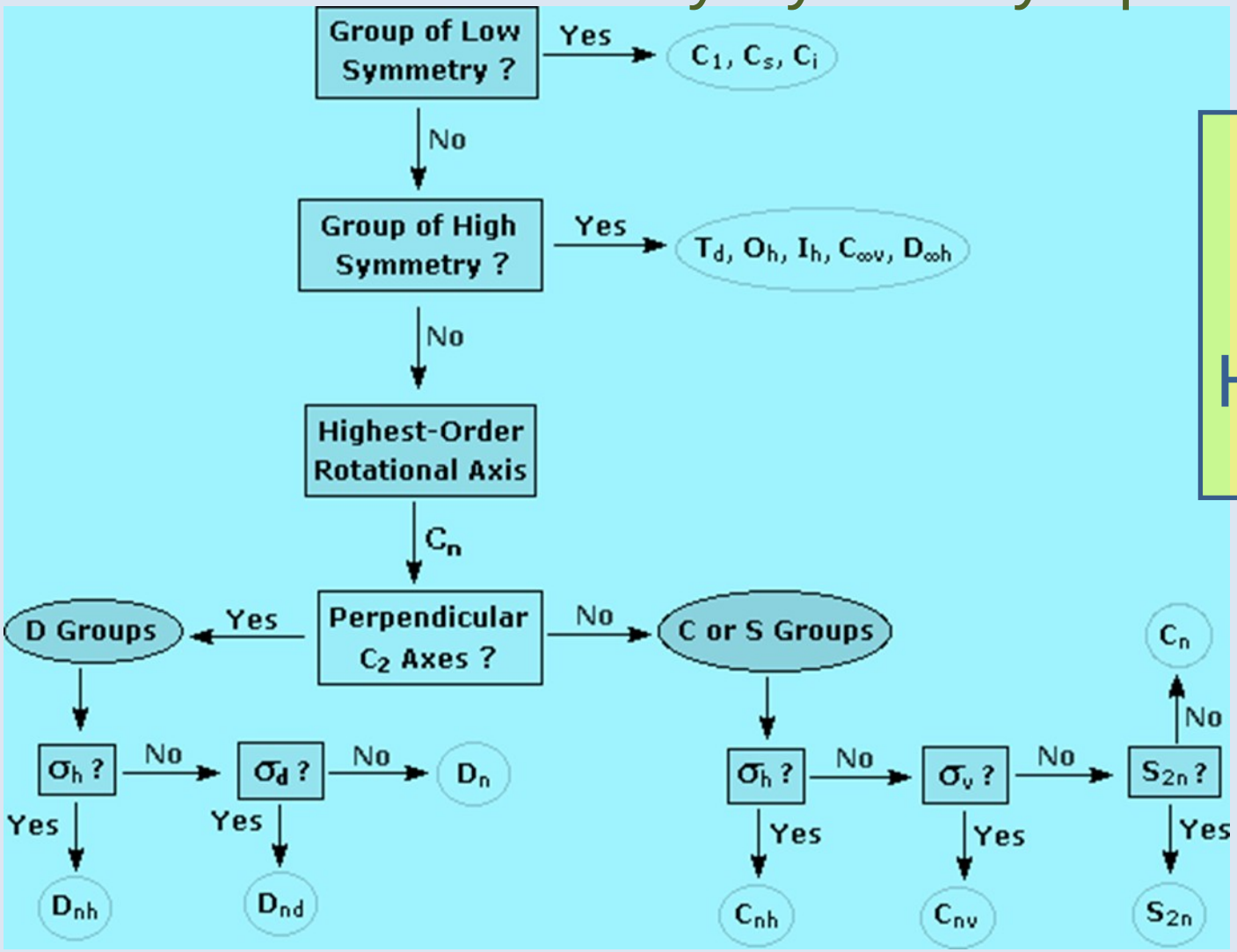
Dihedral plane: Vertical plane which bisects the angle between C_2 axes

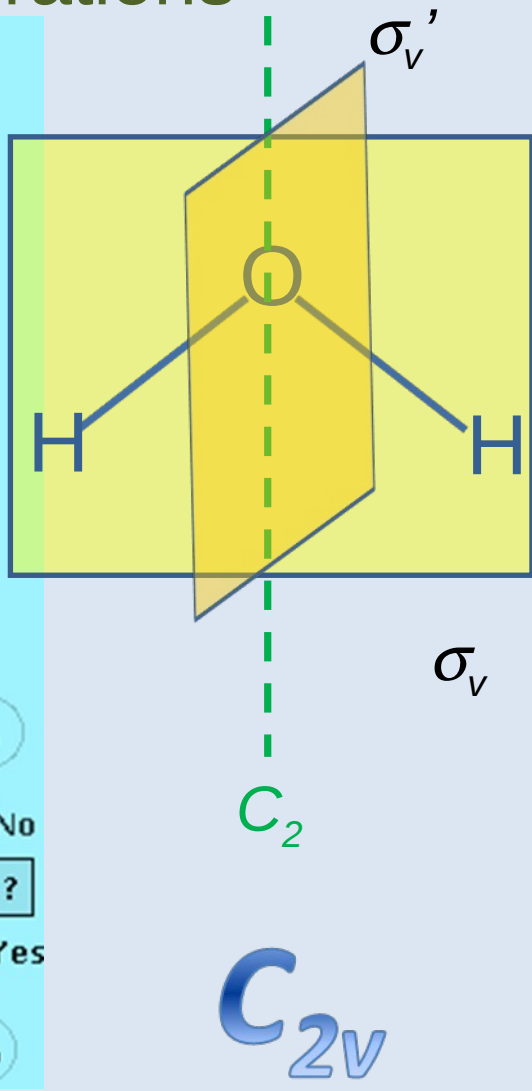
Symmetry point groups: Classification by Symmetry Operations



https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/symmetry/symmtry.htm

Symmetry point groups: Classification by Symmetry Operations





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