

As Per National Education Policy (NEP - 2020)

BIOCHEMISTRY

M.SC. ZOOLOGY

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PREFACE

This book is designed to serve as a comprehensive guide to the principles and applications of photochemistry, with a focus on the academic requirements of M.Sc. students and aspirants of competitive exams like CSIR-NET. It blends theoretical insights with mechanistic understanding to prepare students for both examinations and research.

Beginning with the *Basics of Photochemistry*, the text introduces absorption, excitation processes, quantum yield, lifetimes of electronically excited states, and energy dissipation pathways. The *Photochemical Reactions* chapter explores interactions of electromagnetic radiation with matter, fate of excited species, actinometry, and excitation energy transfer.

Determination of Reaction Mechanisms covers the classification and kinetics of reactive energy states, including the influence of light intensity and gas-phase photolysis. *Photochemistry of Alkenes* discusses isomerization, cyclization, and rearrangements of dienes, while *Photochemistry of Carbonyl Compounds* focuses on intramolecular transformations and Paterno–Büchi reactions.

Further, the *Photochemistry of Aromatic Compounds* addresses isomerisation, substitution, and addition reactions. A dedicated section on *Miscellaneous Photochemical Reactions* includes the Photo-Fries and Barton reactions, singlet oxygen chemistry, photochemical smog, polymer degradation, and the photochemistry of vision.

With structured content, solved mechanisms, and targeted explanations, this book aims to equip students with conceptual clarity and analytical skills necessary for academic excellence and competitive success.

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SYLLABUS

- Unit 1:** Structure of molecules and chemical bonds, Stabilizing interaction (Vander Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.). Chemical structure and function of biomolecule carbohydrates, lipids, proteins, nucleic acids and vitamins.
- Unit 2:** Conformation of proteins (Ramachandran plot, secondary, tertiary and quaternary structure; domains; motif and folds), Stability of protein and nucleic acid structure. Conformation of nucleic acids (A-,B-,Z-,DNA), t-RNA micro-RNA).
- Unit 3:** Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes.
- Unit 4:** Catabolism of carbohydrates, lipids, amino acids and nucleotides
Anabolic pathways: Glycogenesis, gluconeogenesis, fatty acid synthesis, cholesterol synthesis, nucleotide synthesis, synthesis of essential amino acids
- Unit 5:** Principles of biophysical chemistry (pH, buffer, reaction kinetics thermodynamics, colligative properties).
Bioenergetics, oxidative phosphorylation, coupled reaction, group transfer, biological energy transducer.

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