

Unit 1 Spectrophotometry, Measurements in Solution

The Absorption Spectrum, The General Absorption Characteristics of Molecules, Qualitative Analysis, Quantitative Treatment of the Absorption Intensity, Quantitative Analysis, The Method of the Standard Additions, Analysis of Mixtures of Absorbing Species, Spectrophotometric Titrations, Instrumentation, The Light Source, The Monochromator, The Sample Holder, The Detector, The Spectrophotometers, The Sample Measurement, The Instrumental Precision, Experimental Examples

Unit 2 Photochemical Techniques

Photochemical Apparatus, Light Sources, Selection of the Exciting Radiation, Reaction Cells, Optical Material, Control of Temperature and Stirring, Photoreaction Quantum Yield, Chemical Actinometers, Potassium Ferrioxalate, Potassium Reineckate, Azobenzene, Aberchrome 540, A Photochromic Diarylethene Compound, Irradiation Experiments.

Unit 3 Spectrofluorimetry, Spectroelectrochemistry & CD spectroscopy

Spectrofluorimetry, Reference Standards for the Determination of Fluorescence Quantum Yields, Reference Standards for the Determination of Phosphorescence Quantum Yields, Luminescence Measurements on Solid Samples, Sample Inhomogeneity, Concentration Effects, Spectroelectrochemistry Absorption and Emission Spectroscopy with Polarized Light, Linear and Circular Dichroism Spectroscopy, Polarized Light, Birefringence and Circular Dichroism, Linear Dichroism, Observables in Circular Dichroism Spectroscopy

Unit 4 Transient Absorption Spectroscopy

Transient Absorption with Nanosecond Resolution, Measure of Absorbance Change, The Sample Compartment, The Optical System, The Electronic Detection System, Transient Absorption Spectroscopy in Supramolecular Systems, Fullerene Derivatives, Ligand-Protein Complexes, Sub-Nanosecond Transient Absorption, Shortening the Laser Pulse, Ti: Sapphire Laser, Chirped Pulse Amplification, Regenerative Amplification, Ultrafast Transient Absorption Spectroscopy, Femtochemistry, Pump and Probe Experiments, Photoinduced Electron Transfer in a Multichromophoric System, Femtosecond Systems, Experimental Suggestions

Unit 5- Supramolecular Photochemistry

Definition of a Supramolecular System, Photoinduced Energy and Electron Transfer in Supramolecular Systems, Excimers and Exciplexes, Electron Transfer Processes, Marcus Theory, Quantum Mechanical Theory, Optical Electron Transfer, Energy Transfer Processes, Coulombic Mechanism, Exchange Mechanism, The Role of the Bridge in Supramolecular Systems

TEXT BOOKS/ REFERENCES:

1. The Exploration of Supramolecular Systems and Nanostructures by Photochemical Techniques -Paola Ceroni Springer, 2012.
2. Electrochemistry of Functional Supramolecular Systems (The Wiley Series on Electrocatalysis and Electrochemistry) -Paola Ceroni, Alberto Credi, Margherita Venturi Wiley-Interscience, 2010.
3. Supramolecular Photochemistry- Vincenzo Balzani, Springer, 1987.
4. Designing Dendrimers - Sebastiano Campagna, Paola Ceroni, Fausto Puntoriero, Wiley, 2011.
5. Electron Transfer in Chemistry: Molecules-level electronics, imaging and information, energy and the environment; Volume 5 of Electron Transfer in Chemistry- Vincenzo Balzani, Wiley- VCH, 2001