22SC806 Introduction to Fluorescence Spectroscopy 3 0 1 4

Objectives

1. Provide understanding of fluorescence spectroscopy

2. Describe knowledge of Instrumentation for Fluorescence Spectroscopy

UNIT-1

Fluorescence: Brief history, light-matter interaction, Absorption of light, Lambert- Beer Law, Absorption cross section, Time taken for absorption, Electric field vs. magnetic field of light, Electromagnetic spectrum, Units in spectroscopy, Energy levels of the molecules, Electronic transition in atom

UNIT-2

Absorption spectra, The shape of absorption spectra, Franck Condon principle: Electronic transition, Absorption spectrophotometer: Single beam spectrophotometer, Double beam spectrophotometer, Solvatochromism.

UNIT-3

Fate of excited molecule, Jabolnski diagram, Properties of fluorescence, Parameters of fluorescence, Basic instrumentation of fluorimeter, quantum counter method, Effect of sample concentration, Inner filter effect, Modified instrumentation of fluorimeter, Corrected emission and excitation spectrum

UNIT-4

Measurement of fluorescence quantum yield, Solvent effect on fluorescence, Solvation dynamics, Lifetime measurement, TCSPC method, Fluorescence quenching: dynamic and static, Application of Fluorescence quenching.

UNIT-5

Fluorescence anisotropy, Energy transfer process, excited state proton transfer, Excimer and Exciplex, Single molecule spectroscopy

Reference Books

1. Albrecht, C., 2008. Joseph R. Lakowicz: Principles of fluorescence spectroscopy.

Preparatory Course Material

PROF. PRATIK SEN Department of Chemistry IIT Kanpur, NPTEL- Basics of Fluorescence Spectroscopy https://youtu.be/vOtUy11ps3M