

As per New Syllabus
CBCS Pattern
of Shivaji University, Kolhapur
B.Sc. Part-III : Semester-V

ORGANIC CHEMISTRY

(CHEMISTRY : DSE-E6 : PAPER-X)

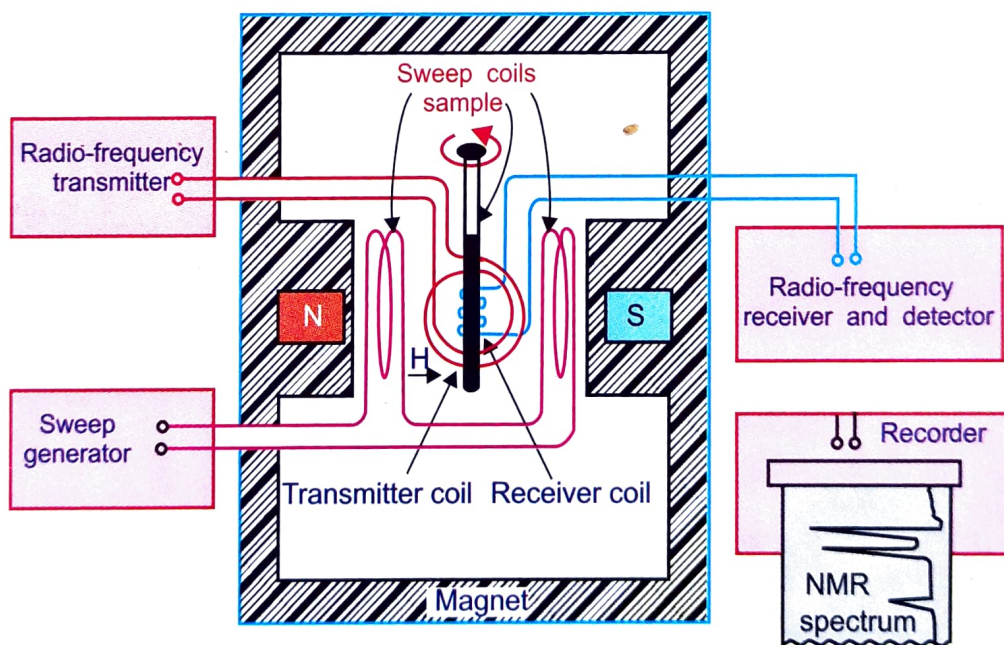
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Schematic diagram of a NMR spectrometer

A Text Book Of
ORGANIC CHEMISTRY

DSE - E6 : Paper - X

FOR
B.Sc. Part - III : Semester - V

As Per New Revised CBCS Pattern Syllabus of
Shivaji University, Kolhapur w.e.f. June 2020

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Syllabus

[03]

Unit I. Introduction to Spectroscopy

1. Meaning of spectroscopy.
2. Nature of electromagnetic radiation : Wavelength, frequency, energy, amplitude, wave number and their relationship.
3. Different units of measurement of wavelength and frequency.
4. Different regions of electromagnetic radiations.
5. Interaction of radiation with matter : Absorption, emission, fluorescence and scattering.
6. Types of spectroscopy and advantages of spectroscopic methods.
7. Energy types and energy levels of atoms and molecules.

[05]

Unit II. UV Spectroscopy

1. Introduction.
2. Beer-Lamberts law, Absorption of U.V. radiation by organic molecule leading to different excitations.
3. Terms used in U.V. spectroscopy: Chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic and hypochromic effect.
4. Modes of electromagnetic transitions.
5. Effect of conjugation on the position of U.V. band.
6. Calculation of λ_{max} by Woodward and Fisher rules for dienes and enones systems.
7. Colour and visible spectrum.
8. Applications of U.V. spectroscopy.

[06]

Unit III. IR Spectroscopy

1. Introduction.
2. Principle of IR spectroscopy.
3. IR Instrumentation, Schematic diagram.
4. Fundamental modes of vibrations - Types and calculations.
5. Condition for absorption of IR radiations.
6. Regions of IR spectrum, fundamental group region, finger print region.
7. Hooke's law for calculation of vibrational frequency.

8. Factors affecting on IR absorption frequency.
9. Characteristics of IR absorption of following functional groups :
(a) Alkanes, alkenes, alkynes, (b) Alcohol and phenols, (c) Ethers, (d) Carbonyl compounds, (e) Amines, (f) Nitro compounds and (g) Aromatic compounds.

Unit IV. NMR Spectroscopy

[09]

1. Introduction.
2. Principles of PMR spectroscopy.
3. NMR - Instrumentation, Schematic diagram.
4. Magnetic and nonmagnetic nuclei.
5. Chemical shift : Definition, measurement, calculation, factors affecting chemical shift.
6. Shielding and deshielding.
7. Peak integration.
8. Merits of TMS as PMR reference compounds.
9. Coupling constant.
10. Types of coupling constant.
11. Spin-spin splitting ($n + 1$ rule).
12. Applications.

Unit V. Mass Spectroscopy

[08]

1. Introduction.
2. Principle of mass spectroscopy.
3. Mass spectrometer - Schematic diagram.
4. Types of ions produced in mass spectrum.
5. Nitrogen rule.
6. Fragmentation patterns of : Alkanes, alkenes, aromatic hydrocarbons, alcohols, phenols, amines and carbonyl compounds.
7. McLafferty rearrangement.
8. Applications.

Unit VI. Combined Problems Based on UV, IR, NMR and Mass Spectral Data

[07]

Contents

1. Introduction to Spectroscopy

1.1 - 1.18

2. UV-Visible Spectroscopy

2.1 - 2.36

3. IR Spectroscopy

3.1 - 3.36

**4. Nuclear Magnetic Resonance (NMR)
Spectroscopy**

4.1 - 4.60

5. Mass Spectrometry

5.1 - 5.50

**6. Combined Problems Based on UV, IR, NMR and
Mass Spectral Data**

6.1 - 6.26

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