

Pondicherry University
CHEMISTRY SYLLABUS FOR OTHER B.Sc. COURSES
Choice Based Credit System (From 2017 onwards)

DSC – 1A: UCHEM A01: CHEMISTRY – I

3-1-0-3

Objective:

- To Study classification, nomenclature and some fundamentals of organic chemistry.
- To Study isomerism in organic compounds and conformational analysis
- To Study the stoichiometry and some basic concepts of chemical equilibrium
- To Study radioactivity and its applications
- To study carbohydrates

UNIT-I

(12 Hrs)

Classification and IUPAC nomenclature of organic compounds, hybridization (sp^3 , sp^2 and sp) in organic compounds. Localized and delocalized orbitals. Hydrogen bonding. Dipole moments in organic molecules. Homolytic and hetrolytic bond cleavage – electrophiles, nucleophiles and free radicals – carbo cations and carbanions.

UNIT-II

(12 Hrs)

Isomerism in organic compounds – Structural and Stereo isomerism, Geometrical isomerism – Cis, trans isomers, E and Z nomenclature of simple compounds; Optical isomerism – optical activity – specific rotation, enantiomers, diastereomers, and meso compounds. R, S configuration in organic molecules with single symmetric centre. Conformers – Newman and sawhorse projection formulae, conformational analysis of ethane, n-butane and cyclohexane.

UNIT-III

(12 Hrs)

Stoichiometry – mole and equivalent concepts – concentration units – molarity, molality, percentage, ppm, and ppb. Types of solutions, stoichiometric calculations.

Basic concepts of chemical equilibrium- equilibrium constants. Concepts of acids and bases. Ionisation of weak acids and weak bases. Hydrogen ion concentration – pH of acids and bases. Buffer solutions, Henderson's equation of buffer. Physiological buffers.

UNIT-IV**(12 Hrs)**

Radioactivity – properties of α , β and γ -radiations – rate of disintegration – half life period – nuclear fission and fusion – fertile and fissile nuclei – radioactive isotopes. Application in medicine, agriculture, geology and industry. Brief account of nuclear reactors. Neutron activation analysis.

UNIT-V**(12 Hrs)**

Carbohydrate – classification, preparation, properties and structures of ribose, glucose, fructose, and sucrose (structural elucidation not required) - mutarotation, epimers and anomers. Poly saccharides – starch and cellulose (only uses) test for sugars.

TEXT BOOKS AND REFERENCES:

1. Advanced Organic Chemistry by Bahl and Arun Bahl
2. Text Book of Organic Chemistry by P.S. Soni
3. Modern Inorganic Chemistry by R.D. Madan
4. Principles of Inorganic Chemistry by Puri and Sharma
5. Principles of Physical Chemistry by Puri and Sharma
6. Physical Chemistry by Bahl and Tuli.
7. Analytical Chemistry by Gopalan et al.

A. Volumetric Analysis

1. Determination of sodium carbonate and sodium bi-carbonate in a mixture using selective indicator method (Acidimetry)
2. Determination of sodium hydroxide and sodium carbonate in a mixture using selective indicator method (Acidimetry)
3. Determination of oxalic acid (Permanganometry)
4. Determination of FAS (Permanganometry)
5. Determination of iron (Dichrometry)
6. Determination of potassium dichromate (Iodometry)
7. Determination of copper (Iodometry)
8. Determination of silver nitrate (argentometry)

B. Other Experiments:

1. Determination of melting point of organic compounds using water bath (m.pt.< 100 °C).
2. Determination of viscosity of the given liquid using Ostwald's Viscometer.
3. Purification of organic compounds by recrystallisation.
4. Chromatographic separation of mixture by paper chromatography (for demonstration only)

Scheme of Valuation:

Record	-----	5 marks
Any one experiment in (B)	-----	5 marks
Volumetric Analysis in (A)	-----	15 marks (based on error % - see below)
Up to 2% error	-----	15 marks
2% to 3%	-----	13 marks
3% to 4%	-----	11marks
4% to 5%	-----	7 marks
More than 5% error or expt. is incomplete	-----	5 marks

For calculation mistake: 1 marks to be deducted; for no calculation: 2 marks to be deducted.

Objective:

- To Study thermodynamics and chemical kinetics
- To Study chromatography and solid state
- To Study amino acids, proteins and enzymes
- To Study polymers and dyes
- To study nucleic acids and drugs

UNIT-I

(12 Hrs)

Thermodynamics and Chemical Kinetics

First Law of Thermodynamics – Statement, concepts of heat, work and internal energy. – Enthalpy and heat capacity, exothermic and endothermic reactions, Second Law of Thermodynamics, spontaneous and non spontaneous processes –entropy concept.

Chemical Kinetics: Rate of reaction – Factors affecting the rate of reaction, order and molecularity. Examples for first and second order reaction.

UNIT-II

(12 Hrs)

Chromatography and Solid State:

Separation techniques – Paper, thin layer and column chromatography, Adsorption, physisorption and chemisorption – factors affecting them. Langmuir Adsorption Isotherm. Bonding in metals and crystal defects – Metallic bond, Band theory of solids – Applications to conductor, semiconductor and insulators, crystal defects- Schottky and Frenkel defect, metal excess and metal deficiency defects.

UNIT-III

(12 Hrs)

Amino acids, proteins and enzymes

Amino acids: Classification, stereochemistry of amino acids – preparation and properties of amino acids – isoelectric point. Tests for amino acids.

Proteins – Classification and structure of proteins.

Enzymes – Characteristics of enzyme – mechanism of enzyme action, Michaelis Menten equation.

UNIT-IV

(12 Hrs)

Polymers and Dyes

Polymers – Preparation and uses of nylon (6,6), Terylene, polythene, polyvinyl chloride, natural rubber and synthetic rubber (Buna-S rubber and neoprene) Vulcanization;

Dyes – Modern classification and examples (Indigo, congo red – malachite green, Alizarin and Phenolphthalein)

UNIT-V

(12 Hrs)

Nucleic acid and Drugs

Nucleic acid – Structure of DNA and RNA, brief account of m-RNA, t-RNA and 9-RNA – differences between DNA and RNA.

Drugs – Antiseptic (Dettol), Antipyretic (Paracetamol, Analgesic (Aspirin), Antimalarial (Quinine), Antibiotic (Penicillin), Sulfa Drug (Sulfadiazine) - Structural elucidation not required.

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4. Principles of Inorganic Chemistry by Puri and Sharma
5. Principles of Physical Chemistry by Puri and Sharma
6. Physical Chemistry by Bahl and Tuli.
7. Analytical Chemistry by Gopalan et al.

DSC- 4A: UCHEM A04: CHEMISTRY PRACTICAL – II

0-1-4-2

A. Organic Qualitative Analysis

Systematic analysis of organic compounds containing single functional group:

1. Phenols
2. Carboxylic acids (mono and di)
3. Aldehydes
4. Ketones
5. Aromatic Primary Amine
6. Aliphatic Diamide
7. Reducing sugars

B. Separation of the following mixtures:

1. Naphthalene and Benzoic acid
2. Benzoic acid and Glucose
3. Naphthalene and Glucose.

Scheme of Valuation:

Record	-----	5 marks
Any one separation in (B)	-----	5 marks
Organic Analysis	-----	15 marks (see below)
Saturated/unsaturated	-----	2 marks
Aromatic/aliphatic	-----	2 marks
N, S, Halogens	-----	3 marks
Functional Group	-----	6 marks
Confirmatory test (to show)	-----	2 marks