

LEARNING OUTCOMES / COURSE OUTCOMES

Chemistry as Discipline Specific Course (DSC)

Second B.Sc., Semester – III (NEP) : GMC 260

CHEMISTRY : III

Course Objectives:

1. Inter relationship among frequency, wavelength and wave number and importance of validation parameters of an instrumental method will be taught.
2. Principle, instrumentation and applications of spectrophotometry, nephelometry and turbidometry will be taught.
3. Inter relationship among frequency, wavelength and wave number and importance of validation parameters of an instrumental method will be taught.
4. The concept of mechanism and its importance will be taught to the student.
5. Concept and importance of intermediates in organic chemistry will be taught taking proper examples.
6. The various techniques for identification of reaction mechanism will be taught to the student taking proper examples.
7. Different types of bonding in molecules/compounds/ions.
8. The theoretical and experimental aspects of chemical kinetics including basic theories of reaction rates and methods of determining order.
9. Electrochemistry dealing with electrolytes in solution, Conductance measurements and applications. Concept of ionic mobility and their determination.

Course Specific Outcomes:

After the completion of this course, the student would be able to;

1. Understand the importance of fundamental law and validation parameters in chemical analysis.
2. Apply solvent extraction method for quantitative determination of metal ions in different samples.
3. Utilize the ion-exchange chromatography for domestic and industrial applications.
4. Explain mechanism for a given reaction.
5. Predict the probable mechanism for a reaction.
6. Explain the importance of reaction intermediates, its role and techniques of generating such intermediates.
7. Predict the nature of the bond formed between different elements.
8. Identify the possible type of arrangements of ions in ionic compounds.
9. Write Born - Haber cycle for different ionic compounds.
10. Relate different energy parameters like, lattice energy, entropy, enthalpy and solvation energy in the dissolution of ionic solids.

11. Explain covalent nature in ionic compounds.

12. Understand the concept of rate of a chemical reaction, integrated rate equations, energy of activation and determination of order of a reaction based on experimental data.

13. Know different types of electrolytes, usefulness of conductance and ionic mobility measurements and to determine the transport numbers.

CHEMISTRY LAB
Second B.Sc.: Semester –III (NEP)

Practical Chemistry - Paper-III : GMCP 260

Course objectives: To attain practical knowledge about;

1. Analytical skills in detecting the constituents present in unknown samples by systematically carrying out the qualitative analysis.
2. The methods of determining rates of chemical reactions.
3. Designing electrochemical cells and making measurements related to it.
4. Determination of physical characteristics of electrolytes using conductivity measurements in solution.
5. Adsorption phenomenon, mechanism and basic models to explain adsorption.
6. Simple techniques like conductometry to obtain physicochemical parameters of electrolytes.

Course Specific outcomes;

At the end of the course student would be able to;

1. Understand the chemical reactions involved in the detection of cations and anions.
2. Explain basic principles involved in classification of ions into groups in semi-micro qualitative analysis of salt mixture.
3. Carryout the separation of cations into groups and understand the concept of common ion effect.
4. Understand the choice of group reagents used in the analysis.
5. Analyze a simple inorganic salt mixture containing two anions and cations.
6. Use instruments like conductivity meter to obtain various physicochemical parameters.
7. Apply the theory about chemical kinetics and determine the velocity constants of various reactions.
8. Learn about the reaction mechanisms.
9. Interpret the behavior of interfaces, the phenomena of physisorption and chemisorption's and their applications in chemical and industrial processes.
10. Learn to fit experimental data with theoretical models and interpret the data.

LEARNING OUTCOMES / COURSE OUTCOMES

Chemistry as Discipline Specific Course (DSC)

Second B.Sc., Semester – IV (NEP)

CHEMISTRY - IV : GMD 260

Course Objectives:

1. Principle, instrumentation and applications of spectrophotometry, nephelometry and turbidometry will be taught.
2. Principle, types and applications of solvent extraction will be taught.
3. Concept of stereochemistry and its importance will be taught.
4. The various projection formulae and the techniques of designating the molecules in to R, S, D, L will be taught taking proper examples.
5. The theory and concept of cis- , trans- isomerism and its importance and the techniques to differentiate between them will be taught taking examples.
6. The structures of molecules/compounds/ions based on different models/theories.
7. Properties of compounds based on bonding and structure.
8. The fundamentals of thermodynamics including the laws, the concept of entropy and free energy functions and their applications.
9. The concepts of surface chemistry, catalysis and their applications.

Course Specific Outcomes: After the completion of this course, the student would be able to;

1. Understand the importance of fundamental law and validation parameters in chemical analysis.
2. Know how different analytes in different matrices (water and real samples) can be determined by spectrophotometric, nephelometric and turbidimetric methods.
3. Explain the importance of Stereochemistry in predicting the structure and property of organic molecules.
4. Predict the configuration of an organic molecule and able to designate it.
5. Identify the chiral molecules and predict its actual configuration.
6. Write the M.O energy diagrams for simple molecules.
7. Differentiate bonding in metals from their compounds.
8. Learn important laws of thermodynamics and their applications to various thermodynamic systems.
9. Understand adsorption processes and their mechanisms and the function and purpose of a catalyst.
10. Apply adsorption as a versatile method for waste water purification.

CHEMISTRY LAB

Second B.Sc. : Semester –III (NEP)

Practical Chemistry - Paper-III : GMDP 260

Course objectives:

1. To impart skills related to preparation of stock and working solutions and handling of instrumental methods.
2. To know the principle of colorimetric analysis and construction of calibration plot.
3. To understand the chemistry involved in colorimetric determination of metal ions and anions.
4. To determine R_f values of different metal ions present in a mixture.
5. To impart knowledge on the importance of functional groups in organic compounds.
6. Techniques to identify the functional groups in a compound by performing physical and chemical tests.
7. To record its melting point/boiling point.
8. To prepare suitable derivative for that compound and to characterize it.

Course Specific outcomes: After the completion of this course, the student be able to

1. Understand the importance of instrumental methods for quantitative applications.
2. Apply colorimetric methods for accurate determination of metal ions and anions in water or real samples.
3. Understand how functional group in a compound is responsible for its characteristic properties.
4. Learn the importance of qualitative tests in identifying functional groups.
5. Learn how to prepare a derivative for particular functional groups and how to purify it.

OPEN ELECTIVE COURSE

Second B.Sc. : III SEMESTER (NEP)

OEC-3: Atomic Structure, Bonding and Concepts in Organic Chemistry

Course Objectives:

1. To develop an understanding of principles of atomic structure.
2. To know the importance of quantum numbers, writing of electronic configurations and representation of orbitals.
3. To develop an understanding of the periodic trends.
4. To understand the nature of bonding and to predict the shapes of molecules.
5. To construct MO energy level diagrams and predict the properties of molecules.
6. To understand the formation of sigma and pi bonds and the bond strength.
7. To study the classification of organic reactions.
8. To learn nomenclature preparation and reactions of alkanes, alkenes, alkynes and stability of alicyclic compounds.

Course Specific Outcomes; on completion of the course the student will learn and be able to understand/explain;

1. The concept of atomic structure, significance of quantum numbers, filling of electrons of atoms/ions in various orbitals as per rules.
2. The trends in periodic properties.
3. The structures of ionic solids, applications of B-H cycle, solubility of compounds and consequences of polarization of ions.
4. The shapes of molecules/ions based on VSEPR theory.
5. The construction of MO energy level diagrams and prediction of properties of molecules/ions like bond order, bond energies, bond lengths and magnetic properties.
6. The formation of sigma and pi bonds and the bond strength.
7. The classification of organic reactions.
8. Nomenclature preparation and reactions of alkanes, alkenes, alkynes and stability of alicyclic compounds.

OPEN ELECTIVE COURSE
Second B.Sc. : IV SEMESTER (NEP)

OEC-4: Electrochemistry, Corrosion and Metallurgy

Course Objectives: This course will deal with

1. Types of conductance, concept of electrolytes, electrolysis, redox reactions and EMF.
2. Concept of different types of electrochemical cells, Types of electrodes and electrode potential. Application of electrochemical series.
3. Basic principles and applications of conductometric, potentiometric and pH titrations.
4. Different types of Batteries their principle construction and working - lead-acid storage and lithium ion battery. Study of fuels cells.
5. Concept of corrosion, types of corrosion and its prevention by different methods. Introduction to electroplating.
6. Introduction to ores and minerals, extraction of metals from their ores, and purification. Eg., Manganese, Titanium and Uranium. Study of alloys, classification, production and uses of alloys.

Course Specific Outcomes: Upon completion of the course students will be able to:

1. Understand the concept of conductance in electrolytic solutions, electrolysis and redox reactions involved in electrode reactions.
2. Learn the different types of electrochemical cells, their symbolical representation and application of electrochemical series.
3. Apply conductometric, potentiometric and pH titrations.
4. Know the principle, construction and working of batteries.
5. Understand different types of corrosion and its prevention by different methods.
6. Learn the methods of extraction of metals from their ores and purification.