

Department of Chemistry
Tarakeswar Degree College
Course Outcomes
for the
Syllabus of Chemistry (General) for
SEM-I to SEM-VI under CBCS
(The University of Burdwan)

IST SEMESTER

Semester 1: Discipline 1 (Chemistry): CC-1A (Theo)

Course Title: **Atomic Structure, Chemical Periodicity, Acids and Bases, Redox Reactions, General Organic Chemistry & Aliphatic Hydrocarbons**

1. To introduce of quantum mechanical model of the atom, quantum numbers, electronic configuration, radial and angular distribution curves and shapes of various orbitals
2. To comprehend the concept and periodic trends in atomic radii, ionic radii, ionization energy and electron affinity of elements
3. To understand the basics of Acids and Bases and calculate the pH of various acidic and Basic solutions
4. To identify an oxidation – reduction (redox) reaction based on changes in oxidation numbers across the chemical change.

Organic Chemistry Section

1. To understand nucleophile and electrophile groups and their properties.
2. To predict the hybridization, electron geometry, and approximate bond angles relative to atoms in a molecule
3. To associate different bond types of carbon and its hybrid orbitals.
4. To evaluate effects of atomic properties on acidity and basicity.
5. To interpret reactivity of alkane, alkene and alkyne.
6. To design reactions of aliphatic hydrocarbons.

Discipline 1 (Chemistry): CC-1A (Prac) 2 Credits Course Title: Atomic Structure, Chemical Periodicity, Acids And Bases, Redox Reactions, General Organic Chemistry & Aliphatic Hydrocarbons

Course Outcomes:

1. To learn the calibration and use of apparatus
2. To prepare solutions of titrants of different Molarity/Normality
3. To learn the principles of acid-base titrations and redox titrations
4. To understand various common indicators and their selection criterion during titration
5. To develop an understanding on techniques like crystallization, melting point determination, boiling point determination along with the hands-on experience.
6. To gain better understanding of the organic functional groups and their reactivity

2ND SEMESTER

Discipline 1 (Chemistry): CC-1B (Theo) 4 Credits Course Title: States of Matter & Chemical Kinetics, Chemical Bonding & Molecular Structure, P-Block Elements

Course Outcome:

1. To explain gas pressure, temperature, and the distribution of molecular speeds in terms of kinetic theory
2. To learn to calculate the most probable speed, the average speed and the root mean square speed of the molecules of a gas
3. To acquire knowledge about - Theories and laws of real gases, liquid state, the various crystalline structures and their defects and colloids and their properties.
4. To understand the concept of rate of change associated with chemical change, recognizing that the rate of change and how it can be measured.
5. To explain different types of bonds formed by the atoms [differentiate between ionic and covalent bonds.]
6. To describe the nature of the bonding in molecular compounds.
7. Explain the trends in physical and chemical properties of p block elements and anomalies there in.

Discipline 1 (Chemistry): CC-1B (Practical) 2 Credits Course Title: States of Matter & Chemical Kinetics, Chemical Bonding & Molecular Structure, P-Block Elements

1. To determine the Surface tension of Unknown Liquids using Stalagmometer
2. To determine the Viscosity of Unknown Liquids using Viscometer
3. To acquire skills in handling and measurement of reaction rate related data.
4. To investigate the systematic analysis of anions and cations within a mixture of inorganic salts.

3RD SEMESTER

Discipline 1 (Chemistry): CC-1C (Theo) 4 Credits Course Title: Chemical energetic, equilibria, organic chemistry

Course Outcomes:

1. To apply the concepts of thermodynamics, enthalpy, entropy, and free energy to predict the spontaneity and direction of chemical reactions.
2. To comprehend the unique reactivity and properties of aromatic hydrocarbons and organometallic compounds.
3. To identify and classify different types of alcohols and aldehydes based on their functional groups and reactivity.

Course Outcomes (Practical)

1. To be able to calibrate and operate a pH meter following proper calibration and thereafter, to accurately determine pH of various solutions.
2. To gain hands-on experience in preparing buffer solutions using different techniques.
3. To master the tricks to identify unknown organic compounds

SEC-1 : Analytical Clinical Biochemistry

Course Outcomes: (Theory)

1. To gain mastery in identifying and analyzing key biomolecules like carbohydrates, proteins, and DNA structures.
2. To understand the intricate world of enzymes, their mechanisms, and their regulation.
3. To become proficient in interpreting blood and urine analyses as powerful diagnostic tools.

4TH SEMESTER

Discipline 1 (Chemistry): CC-1D (Theo) 4 Credits Course Title: Solutions, Phase Equilibria, Conductance, Electrochemistry & Analytical and Environmental Chemistry

Course Outcomes:

1. To gain a deep understanding of solutions, phase equilibria, and their principles
2. To predict the behavior of mixtures, interpret phase diagrams, and apply thermodynamic concepts to analyze chemical systems
3. To apply acquired knowledge of solutions, equilibria, and electrochemistry to solve practical problems in environmental clean-up, material science, and chemical sensing.
4. To analyze the environmental and societal implications of chemical reactions and industrial processes.

Discipline 1 (Chemistry): CC-1D (Prac)

1. To learn experimental techniques for analyzing chemical equilibria and ionic behavior.
2. To gain hands-on experience in applying principles of distribution law, conductance, and potentiometry through diverse practical exercises.
3. To gain hands-on experience in determining water hardness using titrimetric methods.
4. To develop a deep understanding of the role of catalysts in chemical reactions and apply this knowledge to optimize reaction conditions.
5. To develop critical thinking skills in evaluating the reliability and limitations of colorimetric analyses, and effectively communicate results through graphical representation and written reports, emphasizing the importance of precision in quantitative studies.

Course Code: SEC-2 2 Credits Course Title: Pharmaceuticals Chemistry

Course Outcome:

1. To understand the relationship between chemical structure and pharmacological activity of drugs.
2. To apply principles of medicinal chemistry to predict drug targets, design potential drug candidates, and analyze the influence of molecular modifications on therapeutic efficacy and side effects.

5TH SEMESTER

Course Code: SEC-3: Course Title: Basics & Application of Computer in Chemistry

Course Outcomes:

1. To gain a solid foundation in the fundamental principles of computer applications in chemistry.
2. To be proficient in using software tools commonly employed in the field of chemistry.
3. To equip students with the skills to integrate computer techniques seamlessly into experimental design and analysis in the field of chemistry.

Discipline 1 (Chemistry): DSE-1A (Theo) Course Title: Transition Metal & Coordination Chemistry, Analytical and Industrial Chemistry.

Course Outcomes:

1. To gain a deep understanding of the electronic structure, bonding theories (VBT, CFT, LFT), and reactivity of transition metals.

2. To be able to predict and explain the formation, properties, and isomerism of coordination complexes, applying this knowledge to diverse areas.
3. To understand the concept of error in measurements, its various sources (systematic, random), and methods for calculating and propagating errors.
4. To understand the principles and technologies used in various industrial processes like petrochemical refining, polymer synthesis, fertilizer, and cement etc.

Discipline 1 (Chemistry): DSE-1A (Prac.)

Course Title: Transition Metal & Coordination Chemistry, Analytical and Industrial Chemistry.

1. To gain strong proficiency in both gravimetric and complexometric methods for accurately determining the concentration of metal ions in various samples.
2. To be able to design and execute appropriate procedures, weigh precipitates with precision, calculate analytical results using stoichiometry and calibration curves, and analyze the sources of potential errors.
3. To calculate the percentage of available oxygen in pyrolusite samples from analytical data and interpret the results in the context of industrial standards and pyrolusite quality.

6TH SEMESTER

Course Code: SEC-4 Course Title: Polymer Chemistry

Course Outcomes:

1. To understand of the principles governing the structure and properties of polymers.
2. To develop proficiency in relating polymer structure to properties, enabling them to make informed decisions in designing polymers for specific applications.
3. To be able to assess and propose solutions to real-world challenges using their knowledge of polymer chemistry.

Discipline 1 (Chemistry): DSE-1B (Theo)

Course Title: Functional Group Organic Chemistry and Industrial Chemistry

Course Outcomes:

1. To understand the structure, reactivity, and synthesis of major functional groups covered, including carboxylic acids and their derivatives, amines and diazonium salts, as well as amino acids and carbohydrates.
2. To be able to predict and rationalize the reactions associated with these functional groups, considering both their chemical and stereochemical aspects.

3. To develop the ability to design and execute synthetic routes for the preparation of compounds containing carboxylic acids and derivatives, amines, diazonium salts, amino acids, and carbohydrates.
4. To gain in-depth knowledge of the components of paints and varnishes, including pigments, binders, solvents, polymers and additives etc.
5. To be able to analyze the factors influencing dye performance, such as lightfastness, wash fastness, and compatibility with various textiles and substrates.

Discipline 1 (Chemistry): DSE-1B (Prac)

Course Title: Functional Group Organic Chemistry and Industrial Chemistry Organic Chemistry

1. To demonstrate proficiency in essential laboratory techniques related to organic synthesis.
2. To develop hands-on skills in techniques such as nitration of aromatic compounds, condensation reactions, hydrolysis of amides, acetylation of aromatic amines, and benzylation of aromatic amines.
3. To critically analyze experimental results and troubleshoot common issues encountered during the synthesis processes.