

GOVT. DEGREE COLLEGE KANDA, BAGESHWAR

DEPARTMENT OF CHEMISTRY

Programme Outcomes

- The Importance of chemistry arises because so many other disciplines draw on certain chemical principles and concepts.
- Will become familiar with the different branches of chemistry like analytical, organic, inorganic, physical, environmental, polymer and biochemistry.
- Understand the importance of the elements in the periodic table including their physical and chemical nature and role in the daily life.
- Will have a familiarity with, and application of safety and chemical hygiene regulations and practices.
- Will acquire the ability to synthesise, separate and characterize compounds using laboratory and instrumentation techniques.
- Apply appropriate techniques for the qualitative and quantitative analysis of chemicals in laboratories and in industries.
- Achieve the skills required to gain entry into professional schools, graduate programs, and the chemical industry like cement industries, Agro-product, Paint industries, Rubber industries, Petrochemical industries, Food processing industries, Fertilizer industries etc.
- Understand the concept of chemistry to inter relate and interact to the other subject like mathematics, physics, biological science etc.
- Expand the knowledge available opportunities related to chemistry in the government services through public service commission particularly in the field of food safety, health inspector, pharmacist etc.
- The purpose of the undergraduate chemistry program at the university and college level is to prepare our students for all those fields where basic knowledge of chemistry is required including academia for careers as professionals in various industries and research institutions.
- Students will have a firm foundation in the fundamentals and applications of chemical and scientific theories including those in analytical, inorganic, organic and physical chemistry

DEPARTMENT OF CHEMISTRY

Course Outcome B.Sc.

SEMESTER I

Paper I (Fundamentals of Chemistry-I)

- Understand the fundamental concepts of organic chemistry i.e., resonance, hyperconjugation, inductive effect etc. And their application.
- Gain the basic knowledge of reactive intermediates and mechanism of organic reactions.
- Understand the fundamental concepts of stereochemistry chemistry i.e., isomerism and types of isomerism and nomenclature of different isomers.
- Reaction mechanism gives the fundamental knowledge of carrying out an organic reaction in a step-by-step manner.
- Current bonding models for simple inorganic and organic molecules in order to predict structures and important bonding parameters.
- It describes reactive intermediates, transition states and states of all the bonds broken and formed.

Paper II (Practical)

Chemical Analysis-I

- Understand the laboratory methods and tests related to inorganic mixture analysis and estimation of surface tension of commercial products.
- Qualitatively estimate anions and cations in samples.
- Determine the relative surface tension of a given liquid.
- Find out the absolute configuration of organic molecules.

SEMESTER II

Paper I (Fundamentals of Chemistry-II)

- Calculate bond order of different molecules and draw MO diagrams of different molecules.
- Upon successful completion of this course, the students will be able to describe the reactions shown by aliphatic and aromatic compounds.

- They will also be able to understand the bonding in inorganic molecules, salient features of s- and p- block elements, different aspects of chemical kinetics, catalysis and first law of thermodynamics.
- Reaction and Mechanism of Nitration, Halogenation, Sulphonation, and Friedel- Crafts reactions.
- The study Order of reaction like zero order, first order, second order and pseudo-order reactions.

Paper II (Practical)

Chemical Analysis-II

- Determination of relative viscosity of the given liquid using Ostwald viscometer.
- After completing this course, the students will be able to quantitatively find out the amount of acid or base in the samples, to qualitatively differentiate among different classes of organic compounds.
- Laboratory hazards and safety precautions.
- Differentiation between aliphatic and aromatic compounds using chemical and physical tests.

SEMESTER III

Paper I (General Chemistry-I)

- This paper provides detailed knowledge of synthesis of various classes of organic compounds and functional groups inter conversion. Organic synthesis is the most important branch of organic chemistry which provides jobs in production & QC departments related to chemicals, drugs, medicines, FMCG etc. industries.
- It relates and gives an analytical aptitude for synthesizing various industrially important compounds. This paper also provides a detailed knowledge on the elements present in our surroundings, their occurrence in nature. Their position in periodic table, their physical and chemical properties. This paper also gives detailed understanding of the d-block elements and their characteristics.

- After successful completion of this course, the students will be able to gather the information regarding Werner's theory and VBT of transition metal complexes.
- Students will be able to learn the basic concepts of spontaneity, chemical and phase equilibrium and able to apply these concepts in predicting the spontaneous reactions and will be able to solve the numerical problems based on these concepts.
- Understand the nomenclature, methods of formation, physical, chemical properties and Important Name Reactions with mechanism of Alkyl Halides, Aryl Halides, Alcohols and Phenol.

Paper II (Practical)

Analytical Procedures-I

- Complete analysis of inorganic mixture including both acid and basic radicals.
- Functional group tests for alcohols and phenols. Differentiation between alcohols and phenols using chemical and physical tests.
- Determination of critical solution temperature (CST)

SEMESTER IV

Paper I (General Chemistry-II)

- This paper provides detailed knowledge of synthesis of aldehydes, ketones, carboxylic acids and functional groups inter conversion.
- Provides detailed knowledge of important name reactions with mechanism of aldehydes, ketones, carboxylic acids.
- The students will be able to describe the concepts of electrochemistry in detail and its applications. Also, they will be able to solve the numerical problems based on these concepts.
- Students will be able to define the acids and bases on the basis of various concepts/ theories and will be able to identify the position of various elements in the periodic table and able to explain their properties on the basis of their position.

- Chemistry of Lanthanides and Actinides of Electronic configuration, oxidation states, atomic and ionic radii.

Paper II (Practical)
Analytical Procedures-II

- After completing this course, the students will be able to determine the concentrations of oxidising and reducing agents through double titration, qualitatively differentiate between aldehydes, ketones and carboxylic acids.
- Laboratory hazards and safety precautions.
- Volumetric exercises (double titration) based on redox reactions involving internal as well as external indicators.
- Preliminary and Functional group tests for aldehydes, ketones and carboxylic acids (both aliphatic and aromatic) compounds and Determination of solubility of salts.

SEMESTER V

Paper I (Inorganic Chemistry)

- Understand thermodynamic and kinetic aspects of coordination compounds.
- Know the salient features of valence bond theory (VBT), crystal field theory (CFT), crystal field splitting energy (CFSE), their application and limitations.
- Upon successful completion of this course, the students will be able to describe the stability, crystal field theory, electronic spectra and magnetic properties of coordination compounds.
- They will also learn about organometallic compounds, some industrially important inorganic materials and their applications in various industries. It will assist them to get a suitable job in the relevant industrial and scientific field.
- Study of Orgel energy level diagram for d^1 , d^4 and d^6 , d^9 tetrahedral and octahedral complexes.

Paper II (Organic Chemistry)

- Study of Carbohydrates like definitions, classifications and glycosidic linkage.
- Upon successful completion of this course, the students should be able to describe the chemistry of nitrogen containing compounds, the basic understanding of the chemistry of industrially important materials such as lipids, fats, soaps, detergents, dyes, paints and reagents in organic synthesis.
- Upon completion of this course students may get job opportunities in food, soap, detergent, paint and other organic material based synthetic labs and industries. Biomolecules are important for the functioning of living organisms. These molecules perform or trigger important biochemical reactions in living organisms.
- This course aims to introduce the students with basic experimental understanding of carbohydrates and proteins.

Paper III (Practical)

Analytical Procedures-III

- Analysis of Nitrogen containing organic compounds (detection of elements, amines, nitro, amides and anilides) and Binary mixture of organic compounds separable by water.
- Upon completion of this course, the students will have the knowledge and skills to understand the synthetic methods related to inorganic and organic fields.
- They can easily analyze the nitrogen containing compounds and separate the binary organic mixture.

SEMESTER VI

Paper I (Physical Chemistry)

- The core concepts of Physical Chemistry have been included in this semester with a view that students' command over these topics will help them to understand the higher chemistry in PG classes.

- Their understanding of Photochemistry and Solutions will help him to explain the day today phenomenon of the relevant field whereas. Thermodynamics will help them to understand the natural flow of energy.
- Learning the Quantum Mechanics will help them to praise the beauty of behavior of fundamental particles. It will assist them to get a suitable job in the relevant industrial and scientific field.

Paper II (Analytical Chemistry)

- After completion of this course, the students will be able to understand the chemistry of biomolecules. They will become acquainted in the field of data analysis. The new frontiers of chemistry such as nano-chemistry and green chemistry are the part of syllabi of this course which boost the knowledge of the students in these fields.
- The chemistry of industrially important inorganic materials such as cement, ceramics, glass and inorganic fertilizers has been incorporated in the course to enhance the skills and capability of the students pursuing this course.
- The students will also be able to understand the analytical techniques such as electro-gravimetric analysis, coulometric analysis, thermogravimetry, polarography and chromatography.
- Students will be able to explore new areas of research in both chemistry and allied fields of science and technology and Students will be able to function as a member of an interdisciplinary problem solving team.
- Students will gain an understanding of how to determine the structure of organic molecules using UV, IR and NMR spectroscopic techniques.

Paper III (Practical)

Analytical Procedures-IV

- Laboratory hazards and safety precautions.
- Upon completion of this course, the students will have the knowledge and skills to determine the heat of neutralization, solubility of organic compounds by titration method.
- They will be able to estimate different metal ions through gravimetric exercise. Spectroscopic and chromatographic exercise will train them to

interpret the spectral data and chromatograms of organic compounds and will make them job ready for suitable industries.

- The study of Functional Group determination by UV and IR Spectroscopy; analysis of organic compounds including alcohols, phenols, carboxylic acids, carbonyl compounds, nitrogen containing compounds.



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