

## DEPARTMENT OF CHEMISTRY

The Outcomes of UG Course, B. Sc. in Chemistry 2020-21

Chemistry is the fundamental study of the structures, properties and reactions of all matter in existence throughout the universe and underpins the central sciences of Biology and Physics.

**Academic:** Students would pursue higher studies in this discipline.

**Research:** Students may go for research in new fields like medicinal, dye, nano chemistry, nuclear chemistry and marine science.

**Application – Environmental, Social, Scientific:**

It helps in training people to follow some social behaviour such as oral hygiene, body hygiene etc.

**Employability:** There is scope for employment in Pharma company as well as in Different industries like plastic, cement, glass etc.

### Course Outcomes

#### **C-I (Inorganic chemistry-I)**

- CO-1. Understand the Born Haber cycle to calculate lattices energy
- CO-2. Brief idea about Ionic bond, Covalent bond, Molecular orbital theory & VSEPR theory.
- CO-3. Study the structure of atom, Hund's rule, term symbol, calculation of microstate and selection rule.
- CO-4. An idea about S, P, block elements and role of Periodic table and their groups in the field of Inorganic chemistry.

#### **C-II (Physical chemistry-II)**

- CO-1. State and apply the concept of electrolyte, ionization, dissociation, buffer and calculation of P.H.
- CO-2. To apply the concepts of colloids and gels.
- CO-3. To learn depth knowledge about liquid states.
- CO-4. To learn about Classification of solids and laws of crystallography.

#### **C-III (Organic chemistry-I)**

- CO-1. The reactivity and stability of an organic molecule based on structure, including conformation and stereochemistry.
- CO-2. To learn about stable state of organic compound either boat or cyclic form and so on.
- CO-3. Learn aromaticity and mechanism of aromatic reactions.
- CO-4. Brief idea about Electrophile, nucleophiles, free radicals, electronegativity, resonance, and intermediates along the reaction pathways.
- CO-5. How to use their understanding of organic mechanisms to predict the outcome of reactions.

#### **C-IV (Physical chemistry-II)**

- CO-1. understand thermodynamic derivation of relations between the various equilibrium constants  $K_p$ ,  $K_c$  and  $K_x$ . Le-Chatelier principle (quantitative treatment); equilibrium between ideal gases and a pure condensed phase.
- CO-2. The relationship between microscopic properties of molecules with macroscopic

thermodynamic observable.

CO-3. The use of simple models for predictive understanding of physical phenomena associated to chemical thermodynamics.

CO-4. Able to differentiate colligative properties of solution like elevation of boiling point, depression of freezing point with relatively lowering the vapor pressure.

#### **C-V (Inorganic Chemistry-II)**

CO-1. Describe bonding, Preparation, uses and Properties of S and P block elements, Noble gases.

CO-2. The students familiar about the inorganic polymer compounds and acid base theory.

CO-3. also differentiates the metallurgy and corrosion theory of metal and metalloids.

#### **C-VI (Organic Chemistry-II)**

CO-1. Study of organic chemistry by discussing aromatic compounds, aldehydes and ketones,  
And Synthesis using carbanion and hydrocarbon

CO-2. Name reactions, uses of various reagents and the mechanism of their action.

#### **C-VII (Physical Chemistry-III)**

CO-1. Study about type of reactions, determination of rate, theories of reaction rate, steady state approximation.

CO-2. Langmuir, Freundlich – adsorption isotherms, significance, multilayer adsorption – theory and significance.

CO-3. Defines phase, equilibrium, component, degree of freedom and phase rule concepts.

CO-4. Define mechanism of catalytic action, acid base catalysis, enzyme catalysis.

#### **C-VIII (Inorganic Chemistry-III)**

CO-1. Use Crystal Field Theory to understand the magnetic properties (and in simple terms the colour)  
of coordination compounds.

CO-2. Understanding the nomenclature of coordination compounds/complexes, Molecular orbital theory, d-orbital splitting in tetrahedral, octahedral, square planar complexes, chelate effects.

CO-3. To know about the separation of Lanthanoids and Actinoids, its color, spectra and magnetic Properties.

CO-4. To study the bioinorganic chemistry of metals in biological systems.

CO-5. Hemoglobin and its importance in biological systems.

#### **C-IX (Organic Chemistry-III)**

CO-1. Heterocyclic compounds and their reactions.

CO-2. reaction mechanism of nitrogen containing functional groups and diazonium compounds.

CO-3. Classification, structure, mechanism of reactions of few selected alkaloids and terpenes.

#### **C-X (PHYSICAL CHEMISTRY-IV)**

Brief idea about electrochemistry related terms (cell constant, conductance, degree of Dissociation)

**C-XI (Organic chemistry-IV)**

CO-1. Discuss about Energy concept, Amino acids, Lipids, Pharmaceutical Compounds.

CO-2. Study the structure activity and drug targets.

CO-3. Study of antimicrobial drugs, antibacterial, antifungal, antiviral, antimalarial etc.

**C-XII (PHYSICAL CHEMISTRY-V)**

CO-1. Details about Physical spectroscopy (Rotational, Vibrational, Raman and Electronic).

CO-2. Realize the terms ionic strength, activity coefficient, DHO equation.

CO-3. Know the Eigen function, Eigen value, operator and postulates of quantum mechanics.

CO-4. Learn two and three dimensional box, mechanics of particle.

**C-XIII (INORGANIC CHEMISTRY-IV)**

CO-1. An idea about Reaction mechanism and application of Homogeneous and Heterogeneous Catalyst.

CO-2. Known the preparation and properties of transition metal carbonyls

CO-3. To understand the 18 electron rule and its application.

**C-XIV (ORGANIC CHEMISTRY-V)**

CO-1. Applications of IR, UV, MASS & NMR Spectroscopy for identification of simple organic Molecules.

CO-2. Study of carbohydrates: Introduction of sugar, structure of triose, tetrose, pentose, hexoses, stereochemistry of glucose.

## **Programme Outcomes**

**Academic.** Students may go for higher studies in different branches of science, also they may go for research in different fields. Students will be able to explain

why science study is an integral activity for addressing social, Economical and Environmental problems.

**Research.** Students may go for research in the specific discipline and the allied Branches as well.

**Application – Environmental, Social, Scientific:**

It helps in developing scientific temper among the people of society.

It helps social awareness: how to prevent waterlogging, to disinfect in Water, to test P.H of soil etc.

**Employability.** Employment is more in science and science related sector. There is Scope for employment in different industries like soap, drug dyes, Cement, plastic etc.

PO-1. can demonstrate chemistry proficiency in all four disciplines of chemistry: analytical, inorganic, Organic and Physical.

PO-2. Solve the problem and also think methodically, independently and draw a logical conclusion:

PO-3. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions.

PO-4. Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community.

PO-5. Find out the green route for chemical reaction for sustainable development.

PO-6. To inculcate the scientific temperament in the students and outside the scientific community.

PO-7. Determine molecular structure by using UV, IR and NMR.

PO-8. Study of medicinal chemistry for lead compound.

PO-9. Improve the Skill of student in organic research area.

PO10. Synthesis of Natural products and drugs by using proper mechanisms.

PO11. Study of Asymmetric synthesis.

PO12. Determine the aromaticity of different compounds.

PO13. Solve the reaction mechanisms and assign the final product.

PO14. Communicate the concepts and results of laboratory experiments through effective writing and oral communication skills.

### Programme Specific Outcomes

- PSO-1. Are able to communicate the results of their work to chemists and non-chemists.
- PSO-2. To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.
- PSO-3. Identify chemical formulae and solve numerical problems.
- PSO-4. Use modern chemical tools, Models, Charts and equipment.
- PSO-5. Know structure-activity relationship.
- PSO-6. Understand good laboratory practices and safety.
- PSO-7. Develop research-oriented skills.
- PSO-8. make aware and handle the sophisticated instruments/ equipment
- PSO-9. Know the structure and bonding in molecules/ ions and predict the Structure of molecule/ions.
- PSO10. Understand and apply principles of Organic Chemistry for understanding the scientific phenomenon in Reaction mechanisms.
- PSO11. Learn the Familiar name reactions and their reaction mechanisms.
- PSO-12. Understand good laboratory practices and safety.
- PSO-13. Study of organometallic reactions.
- PSO-14. Study of free radical, bicyclic compound, conjugate addition of Enolates and pericyclic reactions.
- PSO-15. Are able to use modern library searching and retrieval methods to obtain information about a topic, chemical, chemical technique, or an issue relating to chemistry.