

DEPARTMENT : CHEMISTRY

COURSE OUTCOMES

CORE – 1

INORGANIC CHEMISTRY – I

Upon successful completion of these courses in chemistry students will be able to

- 1) Understand structure of atom, arrangement of electrons in different orbitals, spectrum of hydrogen and types of wave function.
- 2) Classify elements into different groups, study periodicity in properties of elements, their applications.
- 3) Study types of forces existing in different molecules and compounds, their hybridisation, determine lattice energy by Born-Haber cycle, Band theory of solids, their application to know semiconducting insulators defects in crystal
- 4) Have an idea on standard electrode potential and its applications to inorganic reaction.

CORE – 1- LAB

- 1) Develop skills in preparing molar molar and normal solution of various concentrations.
- 2) Determine concentration by volumetric and Redox titration method and know theory behind titrimetric analysis.

CORE – 2

PHYSICAL CHEMISTRY – I

After completion of this course, students will be able to

- 1) Learn behaviour of gases, their velocities, energy and critical phenomenon of gases.
- 2) Understand structure of liquid their physical properties like surface tension, viscosity also get knowledge on common ion effect and its application.
- 3) Understand unit cell, space lattice, lattice type, crystal system. Explain X-ray diffraction and structure analysis of crystal, point defects in solid.
- 4) Study degree of hydrolysis and PH of different type of salts. Buffer solution and buffer action in biochemical process, determine solubility and solubility product.

CORE – 2- LAB

- 1) Develop experimental skill in determining surface tension and viscosity of different liquid using stalagmometer, viscometer instrument.
- 2) Can prepare buffer solution of different PH using PH meter apparatus.

CORE – 3

ORGANIC CHEMISTRY – I

Students should be able to

- 1) Understand basic concepts, nomenclature, hybridisation, shape and electronic displacement, Resonance in organic compounds. Differentiate between carbocation, freeradicals. Study mechanism of addition, substitution and elimination reactions.
- 2) Distinguish between geometrical and optical isomerism, CIP Rules. Know the difference between Diastereo isomers. Enantiomers, Learn E, Z, R, S configuration of organic compounds.
- 3) Discuss kinetics, mechanism and stereochemistry of E1, E2, and energy level diagram of cycloalkane.
- 4) Study aromaticity of heterocyclic compounds and mechanisms of electrophilic aromatic substitution.

CORE-3-LAB

- (1) Purify Organic compounds in laboratory by using crystallisation method.
- (2) Determine melting and boiling point of compounds by using m.p & b.p apparatus.

CORE-4

(THERMODYNAMICS)

- (1) Learn the thermodynamic term internal energy, enthalpy, heat, work, entropy, enthalpy. 1st law, work done in ideal gas expansion process, different types of heat of reaction.
- (2) Understand concept of entropy, need, for 2nd law, study 3rd law. Differentiate between free energy, work, function. Learn Gibbs –Helmholtz equation.
- (3) Study various partial molar quantities, criteria, of thermodynamic equilibrium, application of Le –Chatelier's principle on gaseous reaction
- (4) Able to describe colligative properties of dilute solution like B.P elevation, freezing point, depression, osmotic pressure, thermodynamic relation between molecular mass of solute and colligative properties.

CORE-4 LAB :

- (1) Learn the technique of determination of heat capacity of calorimeter.
- (2) Determine Enthalpy of neutralisation, integral enthalpy of salt solution in laboratory using calorimeter apparatus.

CORE-5 :

INORGANIC CHEMISTRY – II

After completion of this course, students will be able to :

- (1) Learn general principles of metallurgy, explain the terms minerals, ore, concentration and roasting used in extraction of metal.

(2) Study the chemistry of elements and comparison of properties of elements of S and P – block .

(3) Know synthesis , reactions of compound of S and P block .

(4) Study occurrence and uses of noble gas .also synthesis , and structure of compounds of noble gases .

CORE-5 LAB (1) Develop skill on iodometric titration and know theory behind it using titrimetry.

(2) Prepare inorganic compounds in laboratory .

CORE- 6 (ORGANIC CHEMISTRY- II)

(1) Learn the chemistry of halogenated hydrocarbons , study SN1 ,SN 2 mechanism with stereochemical aspect and reactivity order of alkyl halide .

(2) Study preparation , properties of alcohol , phenol ,ethers.

(3) Know preparation of carbonyl compounds , their structure and reactivity using mechanism of different name reactions .

(4) Learn preparation , properties of carboxylic acid , their derivatives . Study the mechanism of organic name reaction .

CORE-6 LAB (1) Identify organic functional groups .

(2) Synthesize organic compounds and their derivatives .

CORE- 7 (PHYSICAL CHEMISTRY –II)

(1) After completion of these courses, students will be able to know the meaning of phase , components and degrees of freedom and apply it to homogenous and heterogeneous system , differentiate between congruent and incongruent melting point .

(2) Learn to apply phase rule to 3- component system , study the behaviour of binary liquid mixture .

(3) Study the kinetics of 1st ,2nd order and some complex reactions can solve numeric problems on rate constant . Know collision theory , activation energy , activated complex .

(4) Study catalytic efficiency of nanoparticles , mechanism of acid base catalysis .Get an idea about absorption , adsorption , significance of adsorption isotherm . Colloids and its applications .

CORE-7 LAB (1) Learn the technique of determination of distribution coefficient for 2-immiscible liquid .

(2) Derive rate constant for hydrolysis of ester and verify same by drawing graph .

CORE -8 : (INORGANIC CHEMISTRY – III)

- (1) Students will be able to understand co-ordination complex ,werner's theory . Identify the types of valencies . Know the limitations of VBT . Application of CFT to determine shape and degeneracy of d-orbitals . Draw geometrical and optical isomere of co- ordination complexes .
- (2) Study the electronic configuration , oxidation state , colour , spectrons , and magnetic properties of Lanthanides , actinides . Classification of elements according to their action in biological system . Use of chelating agent in medicine .
- (3) Explain properties and uses of transition elements . Comparative study of properties of 1st ,2nd , 3rd transition series elements .
- (4) Know the chemistry of some important binary compounds of transition metal in various oxidation states .

CORE-8 :- LAB (1) Develop skills in estimation of inorganic metal and compounds gravimetrically .

CORE- 9 : (ORGANIC CHEMISTRY III)

- (1) Learn synthesis , mechanism of important reactions of organic compounds containing nitrogen . Differentiate between primary , secondary & tertiary amines .
- (2) Organic preparation and synthetic applications of diazoniumsalts .
- (3) Establish the structure of polynuclearhydrocarbon , their preparation , properties and important derivatives . Study synthesis of reaction and mechanism of 5 and 6 membered heterocyclic compounds .
- (4) Know occurrence , isolation , physiological action of alkaloids. Establish the structure of cocaine , quinine , morphine and their medicinal application . Elucidation of structure of citral and its uses in daily life .

CORE-9 LAB : Analysis of organic compounds containing oxygen and nitrogen qualitatively .

CORE-10: PHYSICAL CHEMISTRY (III)

On completion of courses students will be able to :

- (1) Learn conductance, ionic mobility , inter ionic attraction theory , electro phoretic effect, asymmetric effect.
- (2) Study transference number, applications of conductance measurement, conduct metric titrations.
- (3) Get knowledge on electrolysis, its application in metallurgy and industry . Know electrochemical series and its application.
- (4) Study potentiometric titration, differentiate between diamagnetism, paramagnetism . Know magnetic susceptibility, D.M.

CORE-10-LAB: Develop experimental skills in conductometer , potentiometer using principle of migration of ions and E.M.F measurement respectively.

CORE-11: ORGANIC CHEMISTRY(IV)

On completion of courses students will be able to :

- (1) Study components of nucleic acid , structure of polynucleotide , classification and characteristics of enzyme. Mechanism of enzyme action , role of co-enzymes and cofactors in biological reactions.
- (2) Learn depth knowledge about amino acids, their classifications ,synthesis, properties.
- (3) Know the presence of fats and oils on fatty acids, also learn saponification value, acid value and iodine value of fats and oils.
- (4) Study synthesis and uses of antipyretic, analgesics, antibiotic antimalarials also know the medicinal value of neem, curcumin(haldi), vit-c and antacid

CORE-11-LAB:

- (1) Preparations of medicines like aspirin, phenacetin , aluminium hydroxide solution , milk of magnesia.
- (2) Determine saponification value and iodine no.of fats and oils.

CORE-12: PHYSICAL CHEMISTRY(IV)

- (1) Differentiate between classical and quantum mechanics, Study postulates of quantum mechanics , schrodinger's equation for h atom and many electron system.
- (2) Learn valance bond and molecular orbital approach. LCAO treatment of H₂⁺ Comparison of LCAO molecular orbital and valence bond treatment of hydrogen.
- (3) Study interaction of electro magnetic radiation with matter, learn rotation and vibration of spectra of diatomic and tri atomic molecule , principles of Raman spectra.
- (4) Know the laws of photo chemistry ,quantum yields role of photo chemical reaction in bio chemical process.

CORE-12-LAB: Determine the concentration of HCL against NaoH using modern UV visible spectro photometer apparatus.

CORE-13: INORGANIC CHEMISTRY(V)

- (1) Learn methods of preparation, properties, structure of organometallic compounds using valence bond theory (VBT)
- (2) Study the concept of multi centre bonding reaction , and comparision of aromaticity and reactivity of organo metallic compounds.
- (3) Learn kinetics and mechanism to inorganic reaction, discuss thermo dynamic and kinetic stability of octahedral complexes
- (4) Study the principle involved in qualitative analysis of cation and anion concept of common ion effect and solubility product.

CORE-13-LAB: Analysis of presence of cations and anions in a mixture of salt containing interfering acid radicals and know the chemistry of different reactions.

CORE-14: ORGANIC CHEMISTRY-VI

- (1) Study principles UV, IR spectroscopy and its application for identifying various functional groups .
- (2) Get knowledge of basic principle of NMR and spectroscopy , also know instrumentation and study spectra of some organic compound classification , constitution and preparation of dyes.
- (3) Learn polymerization reactions .Liquid crystal polymers, examples of biodegradable and conducting polymers.

CORE-14-LAB:

- (1) Extraction of caffeine from tea leaves
- (2) Qualitative analysis of organic compounds containing carbohydrates , nitro and amino compounds in the laboratory

DSE-1: POLYMER CHEMISTRY

On completion of courses students will be able to

- (1) Know nomenclature, classification, texture and bonding in polymer.
- (2) Understand mechanism and kinetics of polymerization, study degree of crystallinity and morphology of crystalline polymer.
- (3) Know determination of molecular weight and glass transition temperature of polymer.
- (4) Learn criteria for solubility, entropy, enthalpy change on mixing of polymer solution, properties and application of different synthetic polymers.

DSE-1-LAB:

- (1) Preparation of urea-formaldehyde resin and phenol-formaldehyde resin(Bakelite).
- (2) Calculation of atom economy.

DSE-2: GREEN CHEMISTRY

On completion of course students will be able to

- (1) Know the need and goal of green chemistry , study 12 principle of green chemistry, atom economy , use of green solvent.
- (2) Have knowledge on use of micro wave and ultra sonic energy , have an idea new technique to prevent and minimize the generation of hazardous substances.
- (3) Learn examples of green synthesis.
- (4) Study green synthesis of compostable plastic healthier fats and oils ,productions of no trans fats and oils, study green chemistry in sustainable development .

DSE-2-LAB:

- (1) Preparation of bio diesel from vegetable oil.
- (2) Study clock reaction using vitamin-c tablets(sater materials).

DSE-III:

INDUSTRIAL CHEMISTRY

Upon successful completion of this courses students will able to:

- (1) Study large scale production , uses storage, hazards of industrial gases and inorganic chemicals.
- (2) knowledge on eco system , major sources of air pollutions and its effect on living organism, vegetarian , global warming, ozone depletion.
- (3) Sources and nature of water pollution , pollutants and its effect on eco system .Water purification methods .Industrial waste management.
- (4) Study of different sources of energy , disposal of nuclear disaster its management.

Study importance of green chemistry in chemical industry.

DSE-III-LAB:

- (1) Determination of chemical oxygen demand (COD) and Biochemical oxygen demand (BOD) in water .
- (2) Calculation of percentage of chlorine in bleaching power and salinity of water sample using titrimetry and the principles involved in it.

DSE-IV (PROJECT):

After completion of the project , students will be able to :

- (1) Identify the topic with consideration feasibility.
- (2) Learn the procedure of literature survey on the topic.
- (3) Study the methods of preparationof sample.
- (4) Analyse the sample using experimental methods.
- (5) Tabulate the findings.
- (6) Finally know manuscripts writing on the topic and presentation of the report.