

## MAHAMYEE MAHILA MAHAVIDYALAYA, BERHAMPUR, GANJAM, ODISHA

### CHEMISTRY COURSE OUTCOME

- **Core Course I – inorganic chemistry-I**
- Brief idea about structure of atom, Bohr's theory, wave mechanism and its significance, quantum numbers, different principles with limitations. Periodic properties of elements and their application.
- Concept of different types of ionic bond, covalent bond, Metallic bond, hybridization with examples. MO theory, VSEPR theory of molecules.
- Oxidation-reduction in inorganic reactions.
- **Core Course II – Physical chemistry-I**
- Gaseous state-postulates and derivation of kinetic gas equation, Maxwell distribution for velocity, behaviour of real gases, deviation from ideal gas behaviour.
- Liquid state-idea about surface tension, vapor pressure, coefficient of viscosity.
- Brief idea on different electrolytes, degree of ionization and its application. Salt hydrolysis, Acid-base titration, buffer solution and its uses.
- Solid state- nature, classification, symmetry and defects in solids.
- **Core Course III:- Organic chemistry-I**
- Basic concept about electron displacement in sigma and pi bond. Brief idea carbocation and carbanion.
- Stereochemistry :-different projections, isomerism and rules for structure elucidation and naming.
- Preparation and properties of saturated and unsaturated hydrocarbons. Conformational analysis of cycloalkanes, use of Bayer's strain theory for stability of compounds.
- **Core Course IV – Physical chemistry-II**
- Chemical thermodynamics- different systems, variables, functions, processes. different thermodynamic Laws, idea about entropy, enthalpy.

- Criteria of thermodynamic equilibrium , calculation of various equilibrium constants, thermodynamic derivations using chemical potential.
- **Core Course V- Inorganic chemistry-II**
- Different methods of purification of metals .
- Different concepts of acid-base and their application.
- Brief idea about s and p-block elements and their compounds . Occurrence of noble gases ,uses and bonding in their compounds.

- **Core Course VI:- Organic chemistry-II**

- Preparation and properties of halogenated hydrocarbons ,alcohol, phenol, ether, carbonyl compounds, carboxylic acids and their derivatives with their mechanism .
- Different types of name reaction with mechanism.
- Preparation and Synthetic application of aceto-acetic ester and malonic ester .

- **Core Course VII:- Physical chemistry-III**

- Concept of phases, components, degree of freedom, phase diagram of different molecules.
- Chemical kinetics- rate law, molecularity and order of a reaction, kinetics of complex reaction,

- **Core Course VIII:- Inorganic chemistry-III**

Coordination chemistry: naming, bonding, geometry, stability of coordination compounds.

Idea about transition and inner transition elements and their corresponding compounds.

Bio-inorganic chemistry: effect of metal ions in biological system and their application.

- **Core Course IX:- Organic chemistry-III**

- preparation, properties of nitrogen containing functional groups, related name reactions and distinction between different types of amines.
- Preparation ,properties of heterocyclic and polynuclear hydrocarbons.
- Structure elucidation and synthesis of alkaloids and terpenoids.

- **Core Course X:- Physical chemistry-IV**

- Conductivity , equivalent and molar conductance of electrolytes. different laws, effects, rules associated with this. Calculation of transport number and application of conductance measurement.
- Classification of chemical cells. Calculation and application of EMF.
- Brief knowledge on Electrical properties of atoms and molecules
- **Core Course XI:- Organic chemistry-IV**
- Brief idea about UV spectroscopy ,different laws related with this ,application of Woodward rules for unsaturated systems.
- Basic concepts on IR-spectroscopy and its application in functional group analysis.
- Basic principles of NMR spectra and interpretation of organic compounds.
- Basic principles ,instrumentation and application of Mass spectroscopy .
- Occurrence, classification, biological importance and structural inter-conversion of carbohydrates (mainly glucose and fructose)
- **Core Course XII:- Physical chemistry-V**
- quantum mechanical operators , postulates of quantum mechanism. Calculation of energies of different levels, degeneracy etc. for 1D,3D box. Idea about SHO and rigid rotor.
- Knowledge on VB and LCAO-MO theories and their application
- **Core Course XIII:- inorganic chemistry-IV**
- Classification of organo-metallic compounds. Preparation, structure and reactions of metal carbonyls and metal alkyls, ferrocene, Zeise's salt.
- Catalytic activity of some important organo-metallic compounds. Thermodynamic and kinetic aspects such as stability and reaction mechanism of metal complexes.
- **Core Course XIV:- Organic chemistry-V**
- Classification, synthesis and properties of amino acid, peptide and protein .
- Introduction, classification ,characterization of enzymes. Mechanism of enzyme action.
- Structure and synthesis of nucleic acid.

- Classification, color and constitution, synthesis and application of dyes.
- Structure ,classification and therapeutic uses of different types of drugs in pharmacy.
- **Core Course DSE-I:- Polymer chemistry**
- Preparation, structure, properties and application of polymers.
- Kinetics and mechanism of polymerization reaction and application of different types of polymer in day to day life .
- Determination of molecular weight of polymers and glass transition temperature .
- **Core Course DSE-II :- Green chemistry**
- Introduction ,principles and of green chemistry. Synthesis and uses in bio-gas, bio-diesel and bio-ethanol for sustainable development .
- **Core Course DSE-II I:-Industrial chemicals and Environments**
- Industrial gases, inorganic chemicals application ,hazards in handling.
- Air pollution, water pollution and their effects, treatments and managements. Working of Biogeochemical cycles.

## PRACTICAL .

### CC-1:-

- acid base titration:-Estimation of carbonate, bi-carbonate, hydroxide ,free alkali present in a mixture or detergent.
- Standardization of  $\text{KMnO}_4$  with standard sodium oxalate and estimation of  $\text{Fe(II)}$  ion using standardized  $\text{KMnO}_4$  solution.
- **CC-2:-**
- Determination of surface tension by (i) drop number and (ii) drop weight method
- Determination of viscosity of aqueous solutions of ethanol and sugar solution at room temperature.
- Preparation of buffer solution of different pH (i) sodium acetate and acetic acid
- (ii) ammonium chloride and ammonium hydroxide
- pH metric titration of strong acid vs. strong base
- **CC-3:-**

- Determination of melting point and effect of impurities on the melting point-mixed melting point of two unknown organic compounds.
- Determination of boiling point of liquid compound[ boiling point lower than and more than 100 C
- Identification of unknown organic compound of CHO system
- Separation and purification of any one component of following binary solid mixture based on the solubility in common laboratory reagents like water ,dilute HCl, dil. NaOH and determination of its melting point.
- **CC-4:-**
- Determination of heat capacity of calorimeter of different volume using change of enthalpy data of a known system.
- Determination of heat capacity of calorimeter and enthalpy of neutralization of HCl with NaOH.
- Determination of enthalpy of hydration of copper sulphate.
- **CC-5:-**
- Iodometric titration :- (i) Standardization of sodium thiosulphate solution by standard potassium dichromate solution.(ii) estimation of Cu(II)ion using Standard sodium thiosulphate solution(iii) estimation of available chlorine in bleaching powder iodometrically
- Inorganic preparation:- preparation of cuprous chloride, potash alum.
- **CC-6:-**
- Acetylation of amines and phenol by using (i) conventional method (ii) green approach
- Benzoylation of amines and phenol Schotten –Baumman reaction
- Bromination of acetanilide by (i) conventional method (ii) green approach
- Nitration of acetanilide or nitrobenzene by conventional method and Nitration of salicylic acid by green approach .
- **CC-7:-**
- Study of kinetics of the following reaction
  - (i) integrated rate method- acid hydrolysis of methyl acetate with HCl
  - (ii) saponification of ethyl acetate
  - (iii) compare the strength of HCl and H<sub>2</sub>SO<sub>4</sub> by studying kinetics of hydrolysis of methyl acetate
  - (iv) verify the Freundlich and Langmuir isotherm for adsorption of acetic acid on activated charcoal.
- **CC-8:-**

- Preparation of complexes of (i) hexamine nickel(II)
- (II) Tetraamminecopper(II)sulphate(iii) Tetra ammine carbonato cobalt(III) nitrate.
- Complexometric titration (i) estimation of Ca by EDTA (ii) estimation of Mg by EDTA
- Gravimetric analysis (i) estimation of nickel(II) using DMG
- CC-9:-
- Detection of extra element (N,X,S)in organic compound by Lassaigne's test
- Quantitative analysis of unknown organic compound under CHN system and determination of melting point and boiling point and preparation of their derivative.
- CC-10:-
- Conductometric (i) Determination of cell constant(ii) Conductometric titration of strong acid vs. strong base
- Potentiometric :- Potentiometric titration of (a) strong acid vs. strong base(b) weak acid vs. strong base
- CC-11:-
- Qualitative analysis of unknown organic compound containing simple bifunctional group
- Quantitative estimation of sugar(i) estimation of glucose and sucrose by titrating with Fehling's solution
- CC-12:-
- Spectroscopy /colorimetric:- study of absorption spectra of  $\text{KMnO}_4$  and determine the  $\lambda(\text{max})$  value
- Verify Lambert's -Beer's Law and determine the concentration and potassium dichromate in a solution of unknown concentration of copper sulphate, potassium permanganate
- (i)Determine concentration of HCl against 0.1N NaOH (ii) find out the strength of copper sulphate by titrating with EDTA by spectro photometrically.
- CC-13:-
- Qualitative analysis of mixture containg two cationic and two anionic radicals.
- CC-14:-
- Preparation of aspirin and methyl orange.

- estimation of phenol and aniline by bromination method.
- **DSE-1:-**
- Preparation of (i)Nylon-6,6 (ii)phenol-formaldehyde resin(iii) urea- formaldehyde resin
- estimation of the amount of the formaldehyde in the given solution by sodium sulphite method.
- **DSE-2:-**
- Acetylation of primary amine by using zinc dust.
- Nitration of salicylic acid by green method
- Bromination of acetanilide using ceric ammonium nitrate
- Detection of element by green method
- Base catalysed aldol-condensation
- **DSE-3:-**
- Determination of dissolved oxygen in water ,COD and BOD
- Percentage of available chlorine in bleaching powder.
- estimation of total alkalinity of water sample using double titration method.
- **DSE-4:**
- DISSERTATION

*Apurva*

HOD

*KS*  
 PRINCIPAL  
 MAHARAJA MAHILA MAHAVIDYALAYA  
 BERRYPAL