Course Outcome

Department of Science

Subject: Chemistry

B. N. M. College, Barhiya

Principal
B.N.M. College, Barhiya

U.G. (Chemistry)

Course Outcome: (CO)

Class	Name of the paper	Course outcome
B.Sc.I(Honours)	**Physical Chemistry-IA** Group-A: The States of matter	CO1 Describe the properties of gaseous state and how it links to thermodynamics system. CO2 Relate the concepts of thermodynamics with statistical thermodynamics. CO3 Explain Qualitative treatment of the structure of the liquid state physical properties of liquids. CO4 Apply Seven crystal systems, law of rational indices, Miller indices, point and space groups, elementary idea of symmetry and symmetry elements. CO5 Describe preparation of colloidal solution and their purification, properties of colloids.
	Group-B: Equilibrium	CO6 Relate reversible and irreversible reaction CO7 Compare equilibrium constant for homogeneous and heterogeneous reaction. CO8 Expain Le Chatelier's Principle and relate between enthalpy H and internal energy U. CO9 Explain thermodynamic isothermal and adiabatic processes for ideal gas. CO10 Relate ionic Equilibrium, buffer solution, solubility product, HSAB concept.
	Group-C: Changes	CO11 Apply the concept of kinetics for first order reaction and half life, understand the importance of colligative property. CO12 Explain elementary idea of crystal growths and catalytic activity at surfaces.
	Inorganic Chemistry- IB Group-A: Foundation	CO1 Describe H-spectra and limitation, refinement of Bohr theory, Bohr-Sommerfeld theory. CO-2 Understand the mechanism in transition metal complexes, Born Haber cycle to calculate lattices energy. CO-3. Study the structure of atom, Hunds rule, term symbol, calculation of microstate and selection rule.

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		CO-4 Understand orbital overlap and hybridization, Van der Waal's forces, H-bonding. Know Nomenclature of inorganic Compounds CO-5 Explain aqua acids, periodic trends in aqua acid strength, HSAB concept. CO-6 Define periodicity and influence on their reactivity , periodic anomalies.
	Group-B Systematic chemistry of the elements	CO-7 Understand hydrogen and hydrides, bonding, preparation, properties, structure and uses. CO-8 Analyse general methods of extraction of metals, their position in electrochemical series and CO-9 Calculate Gibbs free energy principles of various concentration methods.
	GROUP-C: Miscellaneous topics	CO-10 Apply molecular Symmetry and relate magnetic behaviours, paramagnetism, diamagnetism and ferromagnetism. CO-11 Describe the principle of volumetric analysis and gravimetric. estimation. CO-12 Explain Tracer technique and applications, radiocarbon dating.
	Organic Chemistry - IC Group-A: Foundation	CO-1 Describe shapes and structure of organic molecules. CO-2 Naming the organic compounds by IUPAC nomenclature. CO-3 Explain geometrical and optical isomerism. CO-4 Apply principles of Organic Chemistry for understanding the scientific phenomenon in Reaction mechanism.
	Group-B Detailed study of the different classes of compounds	CO-5 Explain preparation and properties of different classes of alcohol Differentiate between alcohols and phenols. CO-6 Application of organometallic compounds in the preparation of different functional groups. CO-7 Use of different reagents for the inter conversions of aldehydes, carboxylic acids and acid derivatives. Separation, distinction identification and estimation. CO-8 Describe Aromaticity and Structure of Benzene.

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	Group-C: Application techniques	CO-8 Estimation of C, H, N, S, P and halogens Qualitatively and quantitatively in organic compounds. CO-9 Determine molecular weight of organic acids and organic bases. CO-9 Describe criteria of purity and purification techniques to purify organic compounds. CO-10 know chemistry and application of polymers like synthetic fibres and plastics. CO-11 Understand manufacture of soaps and detergents including chemistry of their cleansing actions.
	Practical Paper-II	CO-1 Detect functional groups and Identify simple organic functional groups. CO-2 Analyse volumetrically unknown solutions.
B.Sc.II(Honours)	**Paper-III (Physical chemistry)** Group-A States of matter	CO-1 Relate critical phenomena and Andrew's experiment, critical state, Law of corresponding states. CO-2 Analyse viscosity, refractive index, idea of liquid crystals. CO-3 Explain Bragg's Law, crystal structures, radius ratio rule. CO-4 Describe lyophilic and lyophobic colloids, coagulation, dialysis, Hardy Schulze Law, Tyndall effect, Brownian movement, electrophoresis, origin of charge, gold number, size determination, electrokinetic potential, gel, emulsion.
	Group-B (Equilibrium)	CO-5 Know Gibbs Helmholtz Equation, Clausius-Clapyeron equation and its applications. Ideal gases entropy of mixing of ideal gases. CO-6 Explain salt hydrolysis, theory of acid-base indicators. CO-7 one component water and sulphur systems, two component solid and liquid systems Eutectic mixture, azeotropic mixture, congruent and incongruent compounds. CO-8 Understand Nernst distribution law, association dissociation and chemical change.
	Group-C (Changes)	CO-9 Describe second order reaction, acid catalysed hydrolysis of methyl acetate, saponification of ester and inversion of cane sugar, first order gas phase reaction.

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		CO-10 Understand acid base catalysis, auto catalysis, enzyme catalysis, promoter, inhibitor, catalytic poison. CO-11 Calculate conductance of electrolytes andPrinciples of Kohlrausch's law and conductometeric titration. CO-12 Understand principles and application of electrochemical Cells, Nernst equation, potentiometric titrations.
	PAPER-III B (Inorganic Chemistry) Group-A: Foundation	CO-1 Determine electronic change and e/m ratio' particles or waves, uncertainty principle. CO-2 Idea of group of group state term symbols. CO-3 Know the meaning of various terms involved in co-ordination chemistry CO-4 Understand Werner‟s formulation of complexes and identify the types of valences CO-5 Know the limitations of VBT CO-6 Describe shapes of d-orbital‟s and degeneracy of d-orbital‟s CO-5. Draw the geometrical and optical isomerism of complexes
	GROUP-B Systematic chemistry of the elements	CO-7 Explain Noble gas compounds, Pseudo halogens and poly halides. CO-8 Know transition metal-chemistry. General chemistry of d & f block element. CO-9 know carbides, sillicates and tetrahalides, idea of fullerenes and zeolites.
	Group-C: Miscellaneous topics	CO-10 Understand principles and simple applications of UV-vis spectroscopy. CO-11 Analyse inorganic mixture qualitatively , group separation in inorganic qualitative cationic analysis. CO-12 Know concepts of oxidation and reduction: redox half reactions, redox stability in water, oxidation by atmospheric oxygen. CO-13 Understand role of metal complexes in biological system..
	Paper-III C: Organic chemistry Group-A: Foundation	CO-1 Understand Stereochemistry, diastereo isomerism, asymmetry and dissymmetry. CO-2 Know tautomerism , keto and enol tautomerism, estimation of ketonic and enolic content.

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		CO-3 Understand reactivity and mechanism of name reactions reactions.
	Group-B Detailed study of the different classes of compounds	CO-4 Explain structure and configuration of glucose and fructose. Mechanism of Ruff degradation, Kiliani Fischer Synthesis, Osazone formation. CO-5 Know aromaticity , preparation and properties of aromatic compounds. CO-6 Discuss properties of hydroxy carboxylic acids. Preparation and properties of Lactic acid, citric acid. CO-7 Understand Baeyer's Strain Theory. Preparation and properties Polymethylenes .
	Group-C: Applied organic chemistry	CO-8 Understand principle and working of TLC, paper and gas chromatography. CO-9 Know synthetic applications of reagents aluminium isopropoxide & aluminium chloride. CO-10 Describe structure of proteins.
	Practical Paper-IV	CO-1 Determine Molecular weight of volatile liquids using Duma's bulb & Victor Meyer method. CO-2 Know principles and experimental determination of surface tension, viscosity & partition coefficient. CO-3 Determine experimentally rate constant & refractive index and calculate heat of neutralisation.
B.Sc.III(Honours)	**V-A (Physical chemistry)** Group-A States and structure	CO-1 Know collision theory of gases & determination of characteristic parameters, temperature and pressure dependence of viscosity. CO-2 Describe Co-ordination number of ions, stoichiometric and non-stoichiometric defects. Elementary idea of X-ray diffraction. CO-3 Know the principle and application of IR, UV-vis spectroscopy. CO-4 Explain Photochemistry and it's principles Lambert-Beer Law, Stark Einstein Law , calculate quantum yield and define various Photochemical reactions.
	Group-B (Equilibrium)	CO-5 Apply Maxwell thermodynamic relations, chemical potential in an ideal gas mixture, Absolute entropy. CO-6 Understand phase equilibrium : Three component systems of partially miscible liquids and role of added salts.

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		CO-7 Understand De-Broglie hypothesis and Uncertainty principle CO-7. Derive Schrodinger"s time dependent and independent equation. Wave Mechanics: de-Broglie equation. Schrodinger equation, Idea of operators.
	Group-C (Changes)	CO-8 Explain kinetics of third order reactions, opposing reactions and consecutive reactions. CO-9 Know the principles of Concentration cells, E.M.F. measurements, Reference, Electrodes. CO-10 Discuss Dynamic Electrochemistry: Transport number, Gouy-Chapman, fuel cells & corrosion. CO-11 Explain isotherm, Freundlich, Langmuir and Gibbs adsorption isotherms.
	VI (Inorganic chemistry) Group-A Theoretical inorganic chemistry	CO-1 Study wave function, normal and orthogonal wave functions. Probability density pattern for *H*-atom. CO-2 Explain LCAO combinations, MO diagrams. CO-3 Determine Structure of ionic compounds, idea of delocalization of electrons. CO-4 Understand C.F.T, C.F.S.E, chelates. CO-5 Explain structure of interstitial alloys, superconductivity.
	Group - B Systematic chemistry of the elements	CO-6 Explain nuclear properties, radioactive decay law, radioactive series, stellar-energy.
	Group -C Introduction to advanced topics	CO-7 Study Organometallic Chemistry. Explain nomenclature, electron deficient compounds, metal alkyls of groups 1, 2 and 13 elements, carbonyls, nitrosyls and ferrocenes. CO-8 Role of Na, K, Mg, Ca, Fe and Co in biological system. CO-9 Describe Principles and applications of Raman spectroscopy & Mossbaner spectroscopy. CO-10 Explain Inorganic Chains, Rings, Cages and Clusters, hetero polyanions, borazines, boranes and metal-metal bonding.
	VII (Organic chemistry) Group -A	CO-1 Know basic of organic electronic transitions. Characterise carbocations, carbanion carbenes, nitrenes and benzyne.

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	Reactions and mechanism	CO-2 Discuss kinetics, mechanism and stereochemistry of SN1 and SN2 reactions. CO-3 Compare between E1 and E2 reactions. Know Saytzeff rule. CO-5. Understand the evidences, reactivity and mechanism of various elimination and substitution reactions. CO-6 know Addition reactions Electrophilic & Nucleophilic substitution at saturated and unsaturated carbon. electrophilic and benzene. CO-7 Understand mechanisms Name reactions and rearrangements.
	Group - B Detailed study of different classes of organic compounds	CO-8 Know Polynuclear hydrocarbons and Amino acids. CO-9 Preparation , properties and application of Heterocyclic CompoundsFuran, thiophene, Pyrrole, pyridine, quinoline and isoquinoline. CO-10 Know types , methods of preperation and uses in daily life of synthetic dyes :Azo, TPM dyes, Phthalein dyes, Zanthene dyes, Vat dyes, CO-11 Study Natural colouring pigment, their source , structure and use. CO-12 Learn types ,extraction methods of Alkaloids and Terpenes
	Group - C Analytical and applied organic chemistry	CO-13 Types, synthesis and uses of Sulfa drugs, antimalarials antibiotics, analgesics, pyrigenic sedatives, antiseptics. CO-14 Use and application of Reagents *HIO4*, lead tetra-acetate, N.B.S., *Br2*, *SeO2*. CO-15 Know uses and types of Explosives, insecticides, adhesives.
	Practical Paper-VIII	CO-1 Analyse qualitatively six radicals inorganic mixture. CO-2 Know oxidation, nitration, esterification and hydrolysis methods of preparation of organic compounds.

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