

CHEMISTRY: LESSON PLAN EVEN SEMESTER SESSION 2023-24

Session : 2023-24		Class - B.Sc. N.M. 6th sem	Sec A & B
Teacher's Name : Dr. Satish Kumar			
Date/Week	Topic to be covered		
08/02 to 10/02/2024	Unit-I: Periodicity in s and p-block elements w.r.t. Electronic configuration, Atomic and ionic size, Ionisation enthalpy		
12/02 to 17/02/2024	Periodicity in s and p-block elements w.r.t. Electronegativity (Pauling, Mulliken and Affred Rochow Scale), Allotropy in C, S, and P		
19/02 to 24/02/2024	Oxidation states with reference to elements in unusual and rare oxidation states like Carbides, and Nitrides.		
26/02 to 02/03/2024	Inert pair effect, diagonal relationship and anomalous behaviour of first member of each group		
04/03 to 09/03/2024	Unit II: Classification of Cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements		
11/03 to 16/03/2024	Ceramics: Important clays and feldspar, ceramics, their their types and manufacture. High tehnology ceramics and their applications. Superconducting and semiconducting oxides, fullerenes carbon nanotubes and carbon fibres.		
18/03 to 22/03/2024	Glass: Glassy state and its properties. Silicates and non silicate glasses. Manufacture and processing of glass. Composition and properties of different types of glasses.		
23/03 to 31/03/2024	Holi Vacations		
01/04 to 06/04/2024	Unit- III: Fertilizers types, Manufacturing of Urea, Ammonium Nitrate, Calcium ammonium nitrate, Amm. nitrate, Amm. Phosphate, Polyphosphates and superphosphateCompound and Mixed fertilizers, KCl, Pottasium sulphate. MINOR TEST.		
08/04 to 13/04/2024	Surface Coatings: Preliminary treatment of surface and classification of surface coatings, Different types paints and Fillers, Thinners, Enamels. Metal Coating, metal sprying and anodizing. Primary and Secondary batteries, their components and roles.		
15/04 to 20/04/2024	Working of following batteries: Pb acid, Li-battery, Solid state electrolyte battery, Fuel Cells Sollar Cells and Polymer Cell. Unit - IV: Classification of Alloys, Ferrous and non-ferrous alloys, Specific properties of elements in alloys.		
22/04 to 27/04/2024	Manufature of steel and surface treatment, Composition and properties of different types of steel. Homogenous and heterogenous Catalysis and their industrial applications.		

29/04 to 30/04/2024	Deactivation and regeneration of catalysis. Phase transfer catalysts. Applications of zeolites as catalysis. Origin of explosive properties in organic compounds. Preparation and explosive properties of lead azide, PETN, Cyclonite (RDX), Introduction to rocket propellants

Session : 2023-24		Class - B.Sc. N.M. 6th sem	Sec A & B
Teacher's Name : Dr. Anuj			
Date/Week	Topic to be covered		
08/02 to 10/02/2024	Interaction of electromagnetic radiation with molecules and various types of spectra.		
12/02 to 17/02/2024	Born Oppenheimer approximation. Rotational Spectroscopy: Selection Rules, intensities of spectral line, determination of bond lengths of diatomic and triatomic molecules, isotopic substitution		
19/02 to 24/02/2024	Vibrational Spectroscopy: Classical concept of vibration, computation of force constant, anharmonicity, Morse potential curve, dissociation energies, vibrating diatomic rotator, fundamental frequencies, overtones, hot bands, vibration-rotation spectroscopy: P, Q, R branches.		
26/02 to 02/03/2024	Raman Spectroscopy: Qualitative treatment of Rotational Raman effect, Effect of nuclear spin, Vibrational Raman spectra, Stokes and anti-stokes lines, their intensity and rule of mutual exclusion		
04/03 to 09/03/2024	Electronic Spectroscopy: Franck-Condon principle, electronic transitions, singlet and triplet states, fluorescence and phosphorescence, dissociation and predissociation, calculation of electronic transitions of polyenes using free electron model		
11/03 to 16/03/2024	Black-body radiation, Planck's radiation law, photoelectric effect, heat capacity of solids, Compton effect, wave function and its significance of Postulates of quantum mechanics, quantum mechanical operator, commutation relations		
18/03 to 22/03/2024	Hamiltonian operator, Hermitian operator, Role of operators in quantum mechanics, Schrodinger equation and its application to free particle and particle in a box problem,		
23/03 to 31/03/2024	Holi Vacations		
01/04 to 06/04/2024	quantization of energy levels, zero point energy and Heisenberg uncertainty principle, wave functions, distribution functions, nodal properties, Extension to three dimensional boxes, degeneracy.		
08/04 to 13/04/2024	Problem solving, revision and minor test.		
15/04 to 20/04/2024	Rigid rotator model of rotation of diatomic molecule, Schrödinger equation		

22/04 to 27/04/2024	transformation to spherical polar coordinates, and separation of variables, Spherical harmonics, and qualitative discussion of solution
29/04 to 30/04/2024	Fast revision and doubt clearing.

Lesson Plan

Name of Teacher : Pankaj Devi

Class : B.Sc. 2nd (Medical) 4th Sem

Subject : Chemistry

Weeks	Dates	Topics
1	07/02/24 – 10/02/24	<p>Diazonium Salts: Mechanism of diazotisation, structure of benzene diazonium chloride, Replacement of diazo group by H, OH, F, Cl, Br, I, NO₂ and CN groups, reduction of diazonium salts to hyrazines, coupling reaction and its synthetic application.</p> <p>Nitro Compounds: Preparation of nitro alkanes and nitro arenes and their chemical reactions. Mechanism of electrophilic substitution reactions in nitro arenes and their reductions in acidic, neutral and alkaline medium., Test</p>
2	12/02/24 – 17/02/24	<p>Electrochemistry-I Electrolytic conduction, factors affecting electrolytic conduction, specific conductance, molar conductance, equivalent conductance and relation among them, their variation with concentration. Arrhenius theory of ionization, Ostwald's Dilution Law. Debye Huckel-Onsager's equation for strong electrolytes (elementary treatment only)</p> <p>Kohlrausch's Law and its application in calculation of conductance of weak electrolytes at infinite dilution. Applications of conductivity measurements: determination of degree of dissociation, determination of K_a of acids, determination of solubility product of sparingly soluble salts, conductometric titrations. Definition of pH and pK_a, Buffer solution, Henderson – Hazel equation, Buffer mechanism of buffer action.</p>

3	19/02/24 – 24/02/24	Test, Phase Equilibrium: phase component and degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibria of one component system –water, Carbon dioxide and Sulphur systems. Phase equilibria of two component systems, solid-liquid equilibria, simple eutectic Example Pb-Ag system.
4	26/02/24 – 02/03/24	Solutions: Dilute Solutions and Colligative Properties, Ideal and non-ideal solutions, activity and activity coefficient, Raoult's law, relative lowering of vapour pressure, Elevation in boiling point and depression of freezing point, molecular weight determination, Osmosis law, Thermodynamic derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal molar mass, degree of dissociation and association of solutes.
5	04/03/24 – 09/03/24	Test, Carbohydrates: Classification and nomenclature. Monosaccharides, mechanism of osazone formation, interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides.
6	11/03/24- 16/03/24	Erythro and threo diastereomers. Formation of glycosides, ethers and esters. Determination of ring size of glucose and fructose. Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism of mutarotation. Structures of ribose and deoxyribose. A brief introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination.
7	18/03/24- 22/03/24	Electrochemistry-II Electrolytic and Galvanic cells – reversible & Irreversible cells, conventional representation of electrochemical cells. EMF of cell and its measurement, activity and activity coefficients.
8	Holi Break	
9	01/04/24 – 06/04/24	Calculation of thermodynamic quantities of cell reaction (ΔG , ΔH & ΔS). Types of reversible electrodes – metal-metal ion gas electrode, metal-insoluble salt- anion and redox electrodes. Nernst equation, derivation of cell EMF and single electrode potential. Standard Hydrogen electrode, reference electrodes, standard electrodes potential, sign conventions, electrochemical series and its applications. Application of

		EMF measurement i.e., valency of ions, solubility product, activity coefficient; potentiometric titration (acid- base and redox). Determination of pH using Hydrogen electrode, Quinhydrone electrode and glass electrode.
10	08/04/24- 13/04/24	Amines: Structure and nomenclature of amines, physical properties. Separation of a mixture of primary, secondary and tertiary amines. Structural features affecting basicity of amines. Preparation of alkyl and aryl amines (reduction of nitro compounds, nitriles, reductive amination of aldehydic and ketonic compounds. Gabrielphthalimide reaction, Hofmann bromamide reaction. electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid.
11	15/04/24- 20/04/24	Amino Acids, Peptides & Proteins: Classification of amino acids, Acid-base behaviour, isoelectric point and electrophoresis. Preparation of D-amino acids. Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure determination, end group analysis, selective hydrolysis of peptides.
12	22/04/24- 27/04/24	Classical peptide synthesis, solid- phase peptide synthesis. Structures of peptides and proteins: Primary & Secondary structure.,Revision, Doubts, Test
13	29/04/24-30/04/24	Revision

Lesson Plan

Class: B.Sc. 2nd Semester

Subject : Chemistry

Lecture Time: 10:30 AM to 11:15 AM (3rd)

Sr. No.	Topics to be covered	Start Date	End Date
1.	Chemistry of s block elements : comparative study , anomalous behavior and diagonal relationship ,Boron family diboranes: properties, structure and preparation, borazene: properties and structure, relative strength of trihalides of B as Lewis acid, structure of Al chlorides and Carbon family (Group 14 elements) with comparative study, catenation , carbides, silicates.	19 February	24 February
2.	Chemistry of p block elements : Nitrogen family, Oxygen family, Halogen family and chemistry of	26 February	2 march

	noble gases : their comparative study and hydro and oxo acids of N ,P, O, S and Cl. Oxides and fluorides of Xe.		
3.	Alkyl halides: SN1, SN2 and SNi reaction , reactions and preparation of alkyl halides and elimination vs substitution reaction. Aryl halides: Preparation and reactions, Benzene mechanism, reactivity and relative strength of C halogen bond in alkyl, aryl, benzyl, vinyl, and aryl halide.	4 March	9 March
4.	Aldehyde and Ketone: Preparation and reactions, Iodoform test, Aldol condensation, Cannizzaro reaction, Wittig reaction, Benzoin condensation, Clemmensen reduction and Wolff-Kishner reduction, Meerwein-Ponndorf-Verley reduction.	11 March	16 March
5.	Revision, Class Test and , assignment, Presentation of s and p block elements	18 March	22 March
6.	Holi Holidays	23 March	31 March
7.	Alcohol and Phenol: Preparation and reactions	1 April	6 April
8.	Aromatic hydrocarbons: preparation from phenol by decarboxylation from acetylene, from benzene sulphonic acid. Reaction: Nitration, halogenation, sulphonation, Friedel-Crafts Reaction, side chain oxidation of alkyl benzenes.	8 April	13 April
9.	Thermodynamics I : zeroth law, first law of Thermodynamics internal energy, enthalpy, heat capacity, Joule's law, calculation of w,q,dU and dH for expansion of ideal gas under isothermal and adiabatic conditions for reversible process, temperature dependence of enthalpy, Kirchhoff's equation, bond energies and applications of bond energy.	15 April	20 April
10.	Thermodynamics II : Carnot cycle and its efficiency, concept of entropy as a state function, entropy as function of V and T, P and T, entropy change in physical change, entropy as a criteria of spontaneity and equilibrium, entropy change in ideal gases and mixing of gases, 3 rd law of thermodynamics. Nernst equation, concept of residual entropy, entropy from heat capacity data, Gibbs and Helmholtz function, A and G for thermodynamic equilibrium and spontaneity and advantage over entropy change, variation of A and G with PVT.	22 April	27 April
11.	Revision, Test and Presentation	29 April	30 April

Lesson Plan

Name of Teacher: Seema

Class : B.Sc. 1st (Non- Medical) 2nd Sem

Subject : Chemistry (Section A & B)

Weeks	Dates	Topics
1	07/02/24 – 10/02/24	Zeroth Law of thermodynamics, First law of thermodynamics: statement, definition of internal energy and enthalpy
2	12/02/24 – 17/02/24	Heat capacity, heat capacities at constant volume and pressure and their relationship. Joule's law – Joule – Thomson coefficient for ideal gas and real gas:
3	19/02/24 – 24/02/24	inversion temperature. Calculation of w, q, dU & dH for the expansion of ideal gases under isothermal and adiabatic conditions for reversible process, Temperature dependence of enthalpy
4	26/02/24 – 02/03/24	Kirchoffs equation. Bond energies and applications of bond energies
5	04/03/24 – 09/03/24	Unit-2 Thermodynamics-II: Second law of thermodynamics, Carnot's cycles and its efficiency, Concept of entropy – entropy as a state function,
6	11/03/24- 16/03/24	entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, entropy as a criterion of spontaneity and equilibrium. Entropy change in ideal gases and mixing of gases.
7	18/03/24- 22/03/24	Third law of thermodynamics: Nernst heat theorem, statement of concept of residual entropy, evaluation of absolute entropy from heat capacity data. Gibbs and Helmholtz functions; Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities.
8	Holi Break	
9	01/04/24 – 06/04/24	A & G as criteria for thermodynamic equilibrium and spontaneity, their advantage over entropy change. Variation of

		G and A with P, V and T . Test
10	08/04/24- 13/04/24	Unit-3. Alcohols: Preparation: Preparation of alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters. Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO ₄ , acidic dichromate, conc. HNO ₃). Oppeneauer oxidation Diols: (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement
11	15/04/24- 20/04/24	Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. ReimerTiemann Reaction, Gattermann-Koch Reaction, Houben-Hoesch Condensation, Schotten –Baumann Reaction. Ethers (aliphatic and aromatic): Cleavage of ethers with HI.
12	22/04/24- 27/04/24	Unit-4. Aldehydes and ketones (aliphatic and aromatic): (Formaldehyde, acetaldehyde, acetone and benzaldehyde) Preparation: from acid chlorides and from nitriles. Reactions – Reaction with HCN, ROH, NaHSO ₃ , NH ₂ -G derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction,
13	29/04/24-30/04/24	Wittig reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. MeerweinPondorff Verley reduction. Revision & doubt classes

Lesson Plan

Name of Teacher : Seema
 Class : B.Sc. 1st (physics honours) 2nd Sem
 Subject : Chemistry

Weeks	Dates	Topics
1	07/02/24 – 10/02/24	Revisit to Thermodynamics & Kinetic theory: Basic concepts ,laws of thermodynamics, concepts of heat & energy, temperature, internal energy, work, state function, reversible & irreversible process

2	12/02/24 – 17/02/24	isothermal & adiabatic processes , Carnot cycle, gas laws, vander Waals equation, Kinetic theory of gases, Maxwell Boltzmann velocity distribution.
3	19/02/24 – 24/02/24	Thermochemistry : Enthalpy ,heat of fusion & vaporisation ,enthalpy of a chemical reaction (heat of combustion ,solution, & neutralization),
4	26/02/24 – 02/03/24	enthalpy of formation , standard reaction enthalpy ,Hess's law, Kirchoff's law, bond energy ,dissociation energy
5	04/03/24 – 09/03/24	Entropy :Formulation of Second law (different statements),entropy change in a phase transition & other processes,entropy and Gibbs energy of mixing
6	11/03/24- 16/03/24	Trouton's Rule, calculation of absolute (Third law) entropy,entropy change in a chemical reaction.Free energy functions: Criteria for spontaneity and equilibrium of closed systems,
7	18/03/24- 22/03/24	variation of Gibbs free energy with pressure and temperature,Gibbs Helmholtz equation,the concept of chemical potential,partial molar quantity ,Gibbs Duhem equation.Phase equilibrium : Simple systems: Solid– liquid ,liquid– vapour ,vapour– solid transitions ,phase diagrams: water,carbon dioxide, sulphur ,phase equilibrium condition,
8	Holi Break	
9	01/04/24 – 06/04/24	Gibb's phase rule, Clapeyron & Clausius–Clapeyron equation.Ideal Solutions: Chemical potential of a solute in a binary ideal solution, Raoult's Law, colligative properties :vapour pressure lowering,. Test
10	08/04/24- 13/04/24	freezing point depression, boiling point elevation ,osmotic pressure ,van't Hoff equation. Chemical equilibrium: Gibbs free energy change of a reaction, standard reaction Gibbs free energy ,condition for chemical equilibrium ,equilibrium constant,
11	15/04/24- 20/04/24	reactions involving gases and pure substances, effect of temperature,pressure on the equilibrium ,Le Chatelier principle and applications. Electrochemical systems : Chemical potential of a charged

		species ,electrochemical cell (galvanic and electrolytic) . half-cell potential (electrode potential),relation with free energy, Nernst equation.
12	22/04/24- 27/04/24	Molecular thermodynamics :Concept of ensembles,partition function,evaluation ofpartition function for vibrational, rotational ,electronic energies, evaluation of free energy,entropy and equilibrium constants from partition functions
13	29/04/24-30/04/24	Revision &doubt classes