Government College, Chhachhrauli

Lesson Plan

Name of Teacher: Ms. Meenu Rani Academic Session: 2023-24

Class: B.Sc. I Sem: 2nd Subject: Chemistry Major

Sr. No.	Topic/ Chapters Covered	Duration
1.	Valence bond theory approach, shapes of simple inorganic molecules and ions based on valence shell electron pair repulsion (VSEPR) theory and hybridization with suitable examples	01-07 Jan
2.	d hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. Molecular orbital theory of homonuclear (N2, O2) and heteronuclear (CO and NO)	08-14 Jan
3.	diatomic molecules, dipole moment and percentage ionic character in covalent bond.	15-21 Jan
4.	Ionic Solids Ionic structures (NaCl, CsCl, ZnS (Zinc blende), CaF2) size effects, radius ratio rule and its limitations, Concept of Lattice energy, Born- Haber cycle	22-28 Jan
5.	Solvation energy and its relationship with solubility of Ionic solids, Polarizing power and Polarisability of ions, Fajan's rule	29 -4 Feb
6.	Chemical Kinetics Concept of reaction rates, rate equation, factors influencing the rate of reaction, Order and molecularity of a reaction,	5-11 Feb
7.	integrated rate expression for zero, first, Half-life period of a reaction, Arrhenius equation. Distribution Law Nernst distribution law – its thermodynamic derivation	12-18 Feb
8.	Nernst distribution law after association and dissociation of solute in one of the phases, of distribution law: (i) Determination of degree of hydrolysis and hydrolysis constant of aniline hydrochloride	19-25 Feb
9.	Alkanes and Cycloalkanes Nomenclature, classification of carbon atoms in alkanes and its structure. Isomerism in alkanes, sources. Methods of formation: Wurtz reaction, Kolbe reaction, Corey- House reaction and	26-03 March

	decarboxylation of carboxylic acids, physical properties	
10.	Mechanism of free radical halogenation of alkanes: reactivity and selectivity. Nomenclature of Cycloalkanes, Baeyer' s strain theory and its limitations, theory of strainless r ings.	04-10 March
11.	Alkenes Nomenclature of alkenes and its structure. Methods of formation: dehydration of alcohols, dehydrohalogenation of alkyl halide, Hofmann elimination and their mechanism. The Saytzeff rule and relative stabilities of alkenes	11-17 March
12.	. Chemical reactions: electrophilic and free radical additions, addition of halogens, halogen acids, hydroboration–oxidation, oxymercuration-reduction, ozonolysis and hydration. Markownikoff's rule of addition.	18-24 March
13.	Hydrogen Bonding and Van der Waals forces Hydrogen Bonding – Definition, types, effects of hydrogen bonding on properties of substances, application	25- 31 March
14.	Brief discussion of various types of Van der Waals forces.	01-07 April
15.	Metallic Bond and semiconductors Metallic bond – Qualitative idea of valence bond and Band theories of metallic bond (conductors, semiconductors, insulators). Semiconductors – Introduction, types, and applications	08-14 april
16.	Revision	15-21 April
17.	Revision	22-30 April

Government College, Chhachhrauli

Lesson Plan

Name of Teacher: Ms. Meenu Rani Academic Session: 2023-24

Class: B.Sc. I Sem: 2nd Subject: Chemistry Minor

Sr. No.	Topic / Chapters Covered	Duration
1.	Periodic table and atomic properties Atomic properties: atomic and ionic radii, ionisation energy, electron affinity and electronegativity definition, methods of determination or evaluation,	01-07 Jan
2.	trend in periodic table, effective nuclear charge, Slater's rules. Directional characteristics of covalent bond,	08-14 Jan
3.	various type of hybridisation and shapes of simple inorganic molecules and ions (BeF2, BF3, CH4, PF5, SF6, IF7, SO4 -2 , ClO4 -1 , NO3 -1	15-21 Jan
4.	various type of hybridisation and shapes of simple inorganic molecules and ions (BeF2, BF3, CH4, PF5, SF6, IF7, SO4 -2 , ClO4 -1 , NO3 -1	22-28 Jan
5.	Ionic Solids: Stoichiometric and Non-stoichiometric defects in crystals,	29 -4 Feb
6.	Lattice energy and Born- Haber cycle, Solvation energy and its relationship with solubility of Ionic	5-11 Feb
7.	solids, Polarizing power and Polarisability of ions, Fajan's rule. Metallic bond –	12-18 Feb
8.	Qualitative idea of valence bond and Band theories of metallic bond (conductors, semiconductors, insulators)	19-25 Feb
9.	Metallic Bond and semiconductors Semiconductors – Introduction, types, and applications. Structure and Bonding in Organic Compounds	26 -03 March
10.	Localized and delocalized chemic al bond, Van der Waal's interactions, resonance: conditions, resonance effect and its applications.	04-10 March
11.	hyperconjugation, inductive effect, Electromeric effect & their comparison	11-17 March
12.	Stereochemistry of Organic Compounds Concept of isomerism. Types of isomerism. Optical isomerism, element s of symmetry	18-24 March
13.	enantiomers, stereo genic centre, optical activity, properties of enantiomers, chiral and achiral molecules (upto two stereo genic centres),	25- 31 March
14.	diastereomers, threo and erythrodiastereomers, meso compounds Relative and absolute configuration,	01-07 April

	sequence rules,	
15.	R & S systems of nomenclature. Geometrical isomerism. Determination of configuration of geometric isomers.	08-14 april
16.	Revision	15-21 April
17.	Revision	22-30 April

Government College, Chhachhrauli

Lesson Plan

Name of Teacher: Ms. Meenu Rani Academic Session: 2023-24

Class: B.Sc. II Sem: 4th Subject: Chemistry

Sr. No.	Topic / Chapters Covered	Duration
1.	Chemistry of f-Block elements Lanthanides: Electronic structure, oxidation states, magnetic properties, complex formation, colour, ionic radii and lanthanide contraction, occurrence, separation of lanthanides, Lanthanide compounds	01-07 Jan
2.	Actinides: General characteristics of actinides, chemistry of separation of Np, Pu and Am from uranium, Transuranic elements, comparison of properties of Lanthanides and actinides with transition elements.	08-14 Jan
3.	Theory of Qualitative and Quantitative Analysis Chemistry of analysis of various groups of basic and acidic radicals, chemistry of identification of acid radicals in typical combination, chemistry of interference of acid radicals including their removal in the analysis of basic radicals	15-21 Jan
4.	common ion effect, solubility product, theory of precipitation, co-precipitation, post precipitation, purification of precipitates	22-28 Jan
5.	Thermodynamics Second law of thermodynamics, need for the law, different statements of the law, Carnot's cycles and its efficiency, Carnot's theorm, Thermodynamics scale of temperature. Concept of entropy – entropy as a state function, entropy as a function of V & T, entropy as a function of P & T, entropy change in physical change, entropy as a criteria of spontaneity and equilibrium.	29 -4 Feb
6.	Third law of thermodynamics: Nernst heat theorem, statement of concept of residual entropy, evaluation of absolute entropy fro m heat capacity data. Gibbs function (G) and Helmholtz function (A) as thermodynamic quantities, G as criteria for thermodynamic equilibrium and spontaneity, its advantage over entropy change. Variation of G with P, V and T.	5-11 Feb
7.	Electrochemistry Electrolytic and Galvanic cells – reversible & irreversible cells, conventional representation of electrochemical cells. Calculation of thermodynamic quantities of cell reaction (▲G, ▲H & K). Types of reversible electrodes – metal-	12-18 Feb

	metal ion, gas electrode, metal –insoluble salt- anion and redox electrodes. Electrode reactions, Nernst equations, derivation of cell EMF and single electrode potential.	
8.	Standard Hydrogen electrode, reference electrodes, standard electrode potential, sign conventions, Concentration cells with and without transference, liquid junction potential and its measurement.Applications of EMF measurement in solubility product and potentiometric titrations using glass electrode. More stress on numerical problems	19-25 Feb
9.	Infrared (IR) absorption spectroscopy Molecular vibrations, Hooke's law, selection rules, intensity and position of IR bands, measurement of IR spectrum, fingerprint region, characteristic absorptions of various functional groups and interpretation of IR spectra of simple organic compounds. Applications of IR spectroscopy in structure elucidation of simple organic compounds.	26 -03 March
10.	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	04-10 March
11.	Gabrielphthalimide reaction, Hofmann bromamide reaction. Electrophilic aromatic substitution in aryl amines, reactions of amines with nitrous acid.Diazonium Salts Mechanism of diazotisation, structure of benzene diazonium chloride,	11-17 March
12.	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.	18-24 March
13.	reaction and its synthetic application. Aldehydes and Ketones Nomenclature and structure of the carbonyl group. Synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides, advantage of oxidation of alcohols with chromium trioxide (Sarett reagent) pyridiniumchlorochromate (PCC) and pyridinium dichromate	25- 31 March
14.	Physical properties, Comparison of reactivities of aldehydes and ketones. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on benzoin, aldol, Perkin and Knoevenagel condensations.	01-07 April
15.	s. Condensation with ammonia and its derivatives. Wittig reaction. Mannichreaction.Oxidation of aldehydes, Baeyer– Villiger oxidation of ketones, Cannizzaro reaction. MPV, Clemmensen, WolffKishner, LiAlH4 and NaBH4 reductions.	08-14 april
16.	Revision	15-21 April

17.	Revision	22-30 April

Government College, Chhachhrauli

Lesson Plan

Name of Teacher: Ms. Meenu Rani Academic Session: 2023-24

Classn: B.Sc. III Sem: 6th Subject: Chemistry

Sr. No.	Topic / Chapters Covered	Duration
1.	Acids and Bases Arrhenius, Bronsted-lowry, Lux-flood, solvent system and Lewis concept of acids and bases, relative strength of acids and bases, levelling solvents, hard and soft acids and bases(HSAB), Applications of HSAB principle.	01-07 Jan
2.	Organometallic chemistry Definition, classification and nomenclature of organometallic compounds, preparation, properties and bonding of alkyls of Li, Al, Hg and Sn, concept of hapticity of organic ligand, Structure and bonding in metal-ethylenic complexes, Structure of Ferrocene, classification in metal carbonyls, preparation, properties and bonding in mononuclear carbonyls.	08-14 Jan
3.	Bio inorganic chemistry Metal ions present in biological system, classification on the basis of action (essential, non essential, trace, toxic),	15-21 Jan
4.	Metalloporphyrins with special reference to haemoglobin and myoglobin. Biological role of Na^+ , K^+ , Ca^{+2}, Mg^{+2} , Fe^{+2} ions, Cooperative effect, Bohr effect	22-28 Jan
5.	Silicones and Phosphazenes Nomenclature, classification, prepration and uses of silicones, elastomers, polysiloxane copolymers, poly phosphazenes and bonding in triphosphazene.	29 -4 Feb
6.	Introduction to statistical mechanics Need for statistical thermodynamics, thermodynamic probability, Maxwell Boltzmann distribution statistics, Born oppenheimer approximation, partition function and its physical significance. Factorization of partition function	5-11 Feb
7.	Photochemistry Interaction of radiation with matter, difference between thermal and photochemical processes. Laws of photochemistry: Grotthus-Drapper law, StarkEinstein law (law of photochemical equivalence), Jablonski diagram depiciting various processes occurring in the excited state, qualitative description of fluorescence,	12-18 Feb

	phosphorescence, non-radiative	
8.	processes (internal conversion, intersystem crossing), quantum yield, photosensitized reactions-energy transfer processes (simple examples).Solutions, Dilute Solutions and Colligative Properties Ideal and non-ideal solutions, methods of expressing concentrations of solutions, Dilute solutions, Raoult's law. Colligative properties: (i) relative lowering of vapour pressure (ii) Elevation in boiling point (iii) depression in freezing point (iv) osmotic pressure	19-25 Feb
9.	Thermodynamic derivation of relation between amount of solute and elevation in boiling point and depression in freezing point.. Applications in calculating molar masses of normal, dissociated and associated solutes in solution. Phase Equillibrium Statement and meaning of the terms – phase, component and degree of freedom, thermodynamic derivation of Gibbs phase rule, phase equilibria of one component system –Example – water system.	26 -03 March
10.	Phase equilibria of two component systems solid-liquid equilibria, simple eutectic Example Pb-Ag system, desilverisation of lead. Organic Synthesis via Enolates Acidity of α-hydrogens, alkylation of diethyl malonate and ethyl acetoacetate. Synthesis of ethyl acetoacetate: the Claisen condensation. Keto-enol tautomerism of ethyl acetoacetate.	04-10 March
11.	Heterocyclic Compounds Introduction: Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions with particular emphasis on the mechanism of electrophilic substitution. Mechanism of nucleophilic substitution reactions in pyridine derivatives. Comparison of basicity of pyridine, piperidine and pyrrole.	11-17 March
12.	Introduction to condensed five and six- membered heterocycles. Prepration and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis. Mechanism of electrophilic substitution reactions of, quinoline and isoquinoline.	18-24 March
13.	Amino Acids, Peptides& Proteins Classification, of amino acids. Acid-base behavior, isoelectric point and electrophoresis. Preparation of α-amino acids. Structure and nomenclature of peptides and proteins. Classification of proteins. Peptide structure	25- 31 March
14.	e determination, end group analysis, selective hydrolysis of peptides. Classical peptide synthesis, solid– phase peptide synthesis. Structures of peptides and proteins: Primary & Secondary structure. Synthetic Poly mers Addition or chain-growth polymerization. Free radical vinyl polymerization,	01-07 April

	ionic vinyl polymerization	
15.	Ziegler-Natta polymerization and vinyl polymers. Condensation or step growth polymerization. Polyesters, polyamides, phenol formaldehyde resins. Natural and synthetic rubbers	08-14 april
16.	Revision	15-21 April
17.	Revision	22-30 April