Lesson Plan

Name of Assistant Professor: Abhishek Sharma Sub:- Chemistry

Class: B.Sc I N.M

Chemistry Lesson Plan: July 2024 to Nov 2024

Week 1: Atomic Structure Dual behavior of matter and radiation, de Broglie's relation Heisenberg's uncertainty principle, concept of atomic orbitals
Week 2: Significance of quantum numbers, radial and angular wave functions, normal and orthogonal wave functions, significance of Ψ and Ψ^2
Week 3: Shapes of s, p, d, f orbitals, Rules for filling electrons in various orbitals, effective nuclear charge, Slater's rules.
Week 4: Periodic table and atomic properties Classification of periodic table, definition of atomic and ionic radii Ionization energy, electron affinity and electronegativity, trend in periodic table (in s and p-block elements)
Week 5: Pauling, Mulliken, Allred Rachow and Mulliken Jaffe's electronegativity scale, Sanderson's electron density ratio.
Week 6: Gaseous State: Kinetic theory of gases, Maxwell's distribution of velocities and energies (derivation excluded) Test for Atomic Structure
Week 7: Calculation of root mean square velocity, average velocity, and most Probable velocity. Collision diameter, collision number, collision frequency and mean free path (Derivations excluded)
Week 8: Deviation of Real gases from ideal behavior, Derivation of Van der Waal' s Equation of State Application of Van der Waal' s Equation of State in the calculation of Boyle' s temperature (compression factor) Critical Phenomenon Concept of Critical temperature, critical pressure, critical

volume, relationship Between critical constants and Van der Waal's constants (Derivation excluded)
Week 9: Structure of liquids, Properties of liquids – surface tension, refractive index, Refractive index, Test for Gaseous State
Week 10: Viscosity, Vapour pressure and optical rotation
Week 12: Structure and Bonding, Localized and delocalized chemical bond, Van der Waals interactions, Concept of resonance and its applications, Hyperconjugation, inductive effect
Week 13: Electromeric effect and their comparison, Mechanism of Organic Reactions, Curved arrow notation, homolytic and heterolytic bond fission, Types of reagents: electrophiles and nucleophiles, Types of organic reactions: Substitution, Addition, Condensation, Elimination, Rearrangement, Isomerization, Pericyclic reactions
Week 14: Reactive intermediates: Carbocations, Carbanion, free Radicals, Carbenes
Week 15: Solid State: Classification of solids, Law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry and symmetry elements Test for Liquid State
Week 16: Seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, A simple account of Laue method, rotating crystal method and powder pattern method.
Week 17: Revision and Test

Lesson Plan

Name of Assistant Professor: Abhishek Sharma Sub. :- Chemistry

Class: B.Sc. III N.M Organic Chemistry

Chemistry Lesson Plan: July 2024 to Nov 2024

Week 1: NMR Spectroscopy Principle of nuclear magnetic resonance, the PMR spectrum
Week 2: Number of signals, peak areas, equivalent and nonequivalent protons positions of signals
Week 3: Chemical shift, shielding and deshielding of protons
Week 4: Proton counting, splitting of signals and coupling constants, magnetic equivalence of protons
Week 5: Discussion of PMR spectra of the molecules: ethyl bromide, n-propyl bromide, isopropyl bromide, 1,1-dibromoethane, ethanol, acetaldehyde, ethyl acetate, toluene, benzaldehyde and acetophenone
Week 6: To show quantum mechanically that position and momentum cannot be predicated simultaneously, Determination of wave function & energy of a particle in one dimensional box.
Week 7: Problems on PMR spectroscopy for structure determination of organic compounds.
Week 8: Carbohydrates Classification and nomenclature of Monosaccharides, mechanism of osazone formation Test on NMR

Week 9: Interconversion of glucose and fructose, chain lengthening and chain shortening of aldoses. Configuration of monosaccharides
Week 10: Erythro and threo diastereomers. Conversion of glucose into mannose. Formation of glycosides, Determination of ring size of glucose and fructose.
Week 12: Open chain and cyclic structure of D(+)-glucose & D(-) fructose. Mechanism of mutarotation. Structures of ribose and deoxyribose.
Week 13: An introduction to disaccharides (maltose, sucrose and lactose) and polysaccharides (starch and cellulose) without involving structure determination
Week 14: Organometallic Compounds Organomagnesium compounds: the Grignard reagents-formation, structure and chemical reactions.
Week 15: Organozinc compounds: formation and chemical reactions.
Week 16: Organolithium compounds: formation and chemical reactions.
Week 17: Revision and Test

Lesson Plan

Name of Assistant Professor: Abhishek Sharma

Class: B.Sc III N.M Physical Chemistry

Chemistry Lesson Plan: July 2024 to Nov 2024

Week 1: Quantum Mechanics-I Black-body radiation, Plank's radiation law, photoelectric effect
Week 2: Postulates of quantum mechanics
Week 3: Quantum mechanical operators, commutation relations
Week 4: Hamiltonian operator, Hermitian operator
Week 5: Average value of square of Hermitian as a positive quantity, Role of operators in quantum mechanics
Week 6: To show quantum mechanically that position and momentum cannot be predicated simultaneously, Determination of wave function & energy of a particle in one dimensional box.
Week 7: Physical Properties and Molecular Structure Optical activity
Week 8: Polarization – (Clausius – Mossotti equation- derivation excluded). Orientation of dipoles in an electric field Test for Quantum Mechanics
Week 9: Dipole moment, induced dipole moment, measurement of dipole moment-temperature method and refractivity method, dipole moment and structure of molecules

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Week 10: Magnetic permeability, Magnetic susceptibility and its determination. Application of magnetic susceptibility, magnetic properties – paramagnetism, diamagnetism and ferromagnetism.
Week 12: Spectroscopy Introduction: Electromagnetic radiation, regions of spectrum, basic features of spectroscopy, statement of Born-oppenheimer approximation, Degrees of freedom. Test for Physical Properties and Molecular Structure
Week 13: Rotational Spectrum Selection rules, Energy levels of rigid rotator (semi-classical principles), rotational spectra of diatomic molecules, spectral intensity distribution using population distribution (Maxwell-Boltzmann distribution),
Week 14: Determination of bond length and isotopic effect Vibrational spectrum Selection rules, Energy levels of simple harmonic oscillator, pure vibrational spectrum of diatomic molecules, determination of force constant and qualitative relation of force constant and bond energy
Week 15: Idea of vibrational frequencies of different functional groups.
Week 16: Raman Spectrum Concept of polarizability, pure rotational and pure vibrational Raman spectra of diatomic molecules, selection rules, Quantum theory of Raman spectra.
Week 17: Numerical problems of all spectroscopy

Lesson Plan

Name of Assistant Professor: Abhishek Sharma

Class: MDC (Introductory Chemistry-I)

Chemistry Lesson Plan: From July 2024 to November 2024

Week 1: Introduction, Elementary introduction of atomic structure and chemical bonding
Week 2: Representation of elements/ atoms, Lewis structure,
Week 3: Electronic configurations (1-30)
Week 4: Carbon and Its Compounds: Introduction, Tetravalency of Carbon, allotropes of carbon
Week 5: Allotropes of carbon and their properties,
Week 6: Hydrocarbons (1-5), nomenclature (linear compounds),
Week 7: Applications of hydrocarbons.
Week 8: Polymer: Introduction, elementary idea of synthetic and natural polymers,
Week 9: Homo polymers and copolymers, uses and properties
Week 10: Natural rubber, Vulcanized rubber, Polyethene, PVC
Week 11: Styrene, Teflon, PAN, Nylon-66
Week 12: Elementary idea of natural and synthetic food preservatives
Week 13: Rancidity, uses and properties
Week 14: Different food preservation processes (pickle, Jam), artificial sweeteners, uses and properties
Week 15: Revision
Week 16: Revision
Week 17: Revision

LESSON PLAN

Name of Assistant Professor: Sahil

Class: B. Sc III Inorganic Chemistry

Chemistry lesson Plan: July 2024 to Nov 2024

Week 1: Metal- Ligand Bonding in Transition Metal complexes Limitations of valence bond theory, an elementary idea of crystal field theory
Week 2: Crystal field splitting in octahedral, tetrahedral and square planer complexes
Week 3: Crystal field splitting in square planer complexes
Week 4: Factors affecting the crystal field parameters.
Week 5: Thermodynamics and Kinetic Aspects of metal complexes A brief outline of thermodynamic stability of metal complexes
Week 6: Factors affecting the stability of Complexes
Week 7: Irving William Series, substitution reactions of square planer complexes of Pt[II]
Week 8: Trans effect Revision and Test
Week 9: Magnetic properties of Transition metal complexes Types of magnetic materials, magnetic susceptibility
Week 10: Method of determining magnetic susceptibility, spin only formula, L-S coupling
Week 12: Correlation of μs and μeff values, orbital contribution to magnetic moments, application of magnetic moment data for 3d metal complexes.

Week 13: Electronic spectra of Transition metal complexes Selection rules for d-d transition
Week 14: Spectroscopic ground states
Week 15: Spectrochemical series
Week 16: Orgel energy level diagram for d^1 and d^9 states
Week 17: Discussion of electronic spectrum of $[Ti(H2O)6]^{+3}$ complex ion.
Week 18: Revision and Test
Week 19: Revision and Test

Summary of Lesson Plan of College Faculty

Name of College: S.M.S.L. Government College, Julana

AcademicSession:2024-25 **Semester: Odd**

Name of Asst. Prof: Mr. Sahil **Class: B.Sc. 2nd** **Name of Subject: Chemistry**

22nd– 27thJuly	**s and p-Block Elements** Salient features of hydrides, oxides, halides, hydroxides of s-block elements (methods of preparation excluded).
28thJuly	**SUNDAY**
29th- 03rdAugust	Structure, preparation and properties of Diborane and Borazine. Catenation, carbides, fluorocarbons, silicates (structural aspects),
04thAugust	**SUNDAY**
5th- 10thAugust	structure of oxides of Nitrogen and Phosphorous, structure of white and red phosphorus,. Structure of oxyacids of Nitrogen.
11thAugust	**SUNDAY**
12th- 17thAugust	oxyacids of phosphorous, sulphur and chlorine and comparison of acidic strength of oxyacids
18thAugust	**SUNDAY**
19th- 24thAugust	low chemical reactivity of noble gases, chemistry of xenon, structure and bonding in fluorides, oxides and oxyfluorides of xenon.
25thAugust	**SUNDAY**
26th– 31stAugust	**Electrochemistry-I** Electrolytic conduction, factors affecting electrolytic conduction, specific conductance, molar conductance, equivalent conductance and relation among them, their variation with concentration.
1st September	**SUNDAY**
2nd -7th September	Application of Kohlrausch' s Law in calculation of conductance of weak electrolytes at infinite dilution (Numericals), Concepts of pH and pKa, Buffer solution, Buffer action, Henderson – Hazel equation, Buffer mechanism of buffer action.
08th September	**SUNDAY**
9th-14th September	**Electrochemistry-II** Reversible & irreversible cells, Calculation of thermodynamic quantities of cell reaction (▲G, ▲H & K).
15th September	**SUNDAY**
16th-21st September	Types of reversible electrodes – metal- metal ion, gas electrode, metal – insoluble saltanion and redox electrodes. Nernst equation, Standard Hydrogen electrode, reference electrodes.
22nd September	**SUNDAY**
23th-28th September	Applications of EMF measurement in solubility product and potentiometric titrations using glass electrode. **Alkynes** Nomenclature and its structure. Methods of formation: using Calcium carbide, dehydrohalogenation, Kolbe's electrolysis
29th September	**SUNDAY**
30th Sep -05th October	Chemical reactions: Mechanism of electrophilic and nucleophilic addition reactions, formation of metal acetylides, addition of bromine and alkaline KMnO4, ozonolysis. Acidity of alkynes.

06th October	**SUNDAY**
07th-12th October	**Stereochemistry of Organic Compounds** Concept of isomerism: Structural and Stereoisomerism. Symmetry elements, enantiomers, optical activity, properties of enantiomers, chiral and achiral molecules (up-to 2 asymmetric centres), diastereomers, threo- and erythro- nomenclature, mesocompounds, Relative and absolute configuration
13th October	**SUNDAY**
14th-19th October	sequence rules, R and S system of nomenclature. Cis- Trans isomerism, E & Z system of nomenclature, Conformational analysis of ethane and n-butane, conformations of cyclohexane, axial and equatorial bonds. Newman and Sawhorse projection formulae.
20th October	**SUNDAY**
21st–26th October	**Benzene and its derivatives:** Nomenclature, Aromatic nucleus and side chain, Huckels' rule of aromaticity. Aromatic electrophilic substitution, mechanism of nitration, halogenation, sulphonation, and Friedel-Crafts reaction.
27th October	**SUNDAY**
27th Oct. to 03rd Nov.	**Dipawali Holiday**
4th –9th November	Energy profile diagrams. Activating, deactivating substituents and orientation. **Alkyl halides:** Nomenclature, methods of formation: from alkenes and alcohol, nucleophilic substitution reactions of alkyl halides
10th November	**SUNDAY**
11th-16th November	SN2 and SN1 reactions with energy profile diagrams. Aryl halides: Methods of formation: halogenation, Sandmeyer reaction. The addition-elimination, and the elimination- addition mechanisms of nucleophilic aromatic substitution reactions.
17th November	**SUNDAY**
18th Nov.-22th Nov.	Relative reactivities of alkyl halides vs allyl, vinyl, and aryl halides. Revision and Test

Summary of Lesson Plan of College Faculty

Name of College: S.M.S.L. Government College, Julana

AcademicSession:2024-25

Name of Asst. Prof: Mr. Sahil Class: B.Sc. 3rd Semester: Odd

Name of Subject: Inorganic Chemistry

22nd–27thJuly	Pollution and their types: Plastic and polyethene pollution,
28thJuly	SUNDAY
29th-03rdAugust	pollution sources, Recycling of plastic,
04thAugust	SUNDAY
5th-10thAugust	greenhouse effect, ozone depletion
11thAugust	SUNDAY
12th-17thAugust	Revision and Test
18thAugust	SUNDAY
19th-24thAugust	Energy: Energy sources, renewable and non-renewable sources,
25thAugust	SUNDAY
26th–31stAugust	cells and batteries, fuel cell,
1st September	SUNDAY
2nd -7th September	solar cell, polymer cell
08th September	SUNDAY
9th-14th September	Revision and Test
15th September	SUNDAY
16th-21st September	Water: Sources of drinking water and uses, water conservation,
22nd September	SUNDAY
23th-28th September	Permissible TDS, Techniques of purification of water,
29th September	SUNDAY
30th Sep -05th October	R.O. water purification process (Osmosis and Reverse Osmosis),
06th October	SUNDAY
07th-12th October	Waste water management
13th October	SUNDAY
14th-19th October	Revision and Test
20th October	SUNDAY
21st–26th October	Pesticides and Herbicides: General introduction and definition,
27th October	SUNDAY
27th Oct. to 03rd Nov.	Dipawali Holiday
4th –9th November	biological control and chemical control: natural and synthetic pesticides,
10th November	SUNDAY
11th-16th November	benefits and adverse effects of DDT, BHC, malathion.
17th November	SUNDAY
18th Nov.-22th Nov.	Revision and Test