

Lesson Plan-1

Name of the Faculty : **Mr. SUNIL KUMAR**
Class : **B.SC- III**

Semester : **Semester-V**

Subject : **INORGANIC CHEMISTRY**

Lesson Plan duration: **From 22Sept -31Dec2023**

Unit 1(1Aug-30Aug)

Organometallic Compounds-I: Definition and classification of organometallic compounds on the basis of bond type. Concept of hapticity of organic ligands. Metal carbonyls: 18 electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d series. General methods of preparation (direct combination, reductive carbonylation, thermal and photochemical decomposition) of mono and binuclear carbonyls of 3d series, Structures of mononuclear and binuclear carbonyls of Cr, Mn, Fe, Co and Ni using VBT. π -acceptor behaviour of CO (MO diagram of CO to be discussed), synergic effect and use of IR data to explain extent of back bonding.

Unit2 (1Sept-30 Sept)

Organometallic Compounds-II: Zeise's salt: Preparation and structure, evidences of synergic effect and comparison of synergic effect with that in carbonyls. Metal Alkyls. important structural features of methyl lithium (tetramer) and trialkyl aluminium (dimer), concept of multicentre bonding in these compounds. Ferrocene: Preparation and reactions (acetylation, alkylation, metallation, Mannich Condensation). Structure and aromaticity. Comparison of aromaticity and reactivity with that of benzene.

UNIT-III((1Oct-30oct)

Catalysis by Organometallic: Compounds Study of the following industrial processes and their mechanism: 1. Alkene hydrogenation (Wilkinson's Catalyst)

3. Polymerisation of ethene using Ziegler-Natta catalyst

UNIT-IV(1nov -30nov)

Bioinorganic Chemistry: Metal ions present in biological systems, classification of elements according to their action in biological system. Geochemical effect on the distribution of metals. Sodium/K-pump, carbonic anhydrase and carboxypeptidase. Excess and deficiency of some trace metals. Toxicity of metal ions (Hg, Pb, Cd and As), reasons for toxicity, Use of chelating ingents in medicine, Cisplatin as an anti-cancer drag. Iron and its application in bio-systems, Haemoglobin, Myoglobin; Storage and transfer of iron.

Subject: Chemistry

Teacher's Name: Sunil Kumar

Class: BSc 6th Semester

Paper: Inorganic Chemistry

Semester (Odd/Even): 6th sem(2023)

Month	Week	Topics	Practical	Test/Assignment/Project/Seminar/Field Trip
April	1	Definition, nomenclature and classification of organometallic compound		
	2	Preparation, properties and bonding of alkyl of Li,Al,Hg and Sn		
		A brief account of Metal-ethylenic complexes and homogeneous hydrogenation		
	3	Mononuclear carbonyls and the nature of bonding in metal carbonyls		
		Arrhenius, Bronsted – Lowry, the Lux – Flood, Solvent system and Lewis concepts of acids & bases		Assignment 1
	4	relative strength of acids & bases		
May 23	1	Concept of Hard and Soft Acids & Bases. Symbiosis		
		electronegativity and hardness and softness		Class Test
		Essential and trace elements in biological processes		
	2	metallophorphyrin with Special reference to haemoglobin and myoglobin		
		Biological role of alkali and alkaline earth metal ions with special reference to Ca ²⁺		
		Nitrogen fixation		
	3	Silicones and their preparation, properties, structure and uses		Assignment 2
	4	Phosphazenes and their preparation, properties, structure and uses		
May 23	1	Problem discussion from last year question papers		
	2	Revision Syllabus		

Lesson Plan-1

Name of the Faculty : Mr. Sunil Kumar **Class** : B.SC-I(M&NM)
Semester : 1st

Subject : ATOMIC STRUCTURE & BONDING AND GENERAL ORGANIC CHEMISTRY-I

Session: 2022-2023

Code: 20UCHE101

7Sept-15Sept

Atomic Structure: Review of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de Broglie's relation, Heisenberg Uncertainty principle, Hydrogen atom Spectra
What is Quantum mechanics?

Time independent Schrodinger equation and meaning of various terms in it. Significance of w and w^2 , Schrödinger equation for hydrogen atom. Radial and angular parts of the hydrogenic wavefunctions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and 3d orbitals (Only graphical representation).

16Sept-30Sept

Radial and angular nodes and the significance. Radial distribution functions and the concept of the most probable distance with special reference to 1s and 2s atomic orbitals.

Significance of quantum numbers, orbital angular momentum and quantum numbers m_l and m_s . Shapes of s, p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (m_s).
Chemical Bonding: Review of Ionic Bonding: General characteristics and Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds.

1Oct-15Oct

Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.

16Oct-30Oct

Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for s-s, s-p and p-p combinations of atomic orbitals nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules of 1 and 2nd periods (including idea of s-p mixing) heteronuclear diatomic molecules such as CO, NO and NO'. Comparison of VB and MO approaches.

1Nov-15Nov

Fundamentals of Organic Chemistry: Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles. Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength

of organic acids and bases: Comparative study with emphasis on factors affecting pK values.

16Nov-30Nov

Aromaticity: Benzenoids and Hückel's rule. Stereochemistry: Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism

1Dec-15Dec

Meso compounds). Threo and erythro; D and L; cis trans nomenclature; CIP Rules: R/S (for upto 2 chiral carbon atoms) and E/Z Nomenclature (for upto two C-C systems)