Lesson Plan

Name of Assistant Professor: Mr. SANDEEP KUMAR

Class: B.Sc 3rd Semester:6th

Subject: ORGANOMETALLICS AND BIOINORGANIC CHEMISTRY& POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

Lesson Plan: From January 1, 2024 to April 30, 2024.

Week 1 1.01.2024-06.01.2024	Chemistry of 3d metals Oxidation states displayed by Cr, Fe, Co, Ni and Co
Week 2 8.01.2024-13.01.2024	. A study of the following compounds (including preparation and important properties); Peroxo compounds of Cr, K2Cr2O7,
Week 3 15.01.2024-20.01.2024	KMnO4, K4[Fe(CN)6], sodium nitroprusside, [Co(NH3)6]Cl3, Na3[Co(NO2)6].
Week 22.01.2024-27.01.2024	Definition and Classification with appropriate examples based on nature of metalcarbon bond (ionic, s, p and multicentre bonds).
Week 5 29.01.2024-03.02.2024	Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls.
Week 6 5.02.2024-10.02.2024	Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals.
Week 7 12.02.2024-17.02.2024	p-acceptor behaviour of carbon monoxide. Synergic effects (VB approach)-(MO diagram of CO can be referred to for synergic effect to IR frequencies).
Week 8 19.02.2024-24.02.2024	TEST& ASSIGNMENT A brief introduction to bio-inorganic chemistry.
Week926.02.2024-02.03.2024	Role of metal ions present in biological systems with special reference to Na+ , K+ and Mg2+ ions: Na/K pump;
Week 10 04.03.2024-09.03.2024	Role of Mg2+ ions in energy production and chlorophyll. Role of Ca2+ in blood clotting, stabilization of protein structures and structural role (bones).
Week 11 11.03.2024-16.03.2024	Polynuclear and heteronuclear aromatic compounds: Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Naphthalene, Anthracene, Furan, Pyrrole, Thiophene, and Pyridine. TEST& ASSIGNMENT
Week 12 18.03.2024-22.03.2024	Polynuclear and heteronuclear aromatic compounds: Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Pyrrole, Thiophene, and Pyridine

Week 13 25.03.2024-30.03.2024	Holi Vacations
Week 14 1.04.2024-06.04.2024	Active methylene compounds: Preparation: Claisen ester condensation. Keto-enoltautomerism Reactions: Synthetic uses of ethyl acetoacetate (preparation of non-hetero molecules having upto 6 carbon).
Week 15 8.04.2024-13.04.2024	Application of Spectroscopy to Simple Organic Molecules Application of visible, ultraviolet and infrared spectroscopy in organic molecules. Electromagnetic radiations, electronic transitions, λmax&εmax,.
Week 16 15.04.2024-20.04.2024	chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating λmax of conjugated dienes and α,β-unsaturated compounds
22.04.2024-30.04.2024	Infrared radiation and types of molecular vibrations, functional group and fingerprint region. IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).

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Lesson Plan

Name of Assistant Professor: Mr. SANDEEP KUMAR
Class: B.Sc 2ND YEAR Semester:4TH Subject: INORGANIC CHEMISTRY
Lesson Plan: From January 01, 2024 to April 30, 2024.

Week 1 1.01.2024-06.01.2024	Transition Elements (3d series) General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties,
Week 2 8.01.2024-13.01.2024	Transition Elements (3d series) General group trends with special reference to magnetic and catalytic properties,
Week 3 15.01.2024-20.01.2024	ability to form complexes and stability of various oxidation states (Latimer diagrams) for Mn, Fe and Cu.
Week 22.01.2024-27.01.2024	ability to form complexes and stability of various oxidation states (Latimer diagrams) for Cu. TEST& ASSIGNMENT
Week 5 29.01.2024-03.02.2024	Lanthanoids and actinoids Electronic configurations,
Week 6 5.02.2024-10.02.2024	oxidation states, colour, magnetic properties, lanthanide contraction
Week 7 12.02.2024-17.02.2024	separation of lanthanides (ion exchange method only)
Week 8 19.02.2024-24.02.2024	Coordination Chemistry Valence Bond Theory (VBT): Inner and outer orbital complexes of Cr, Fe
Week 26.02.2024-02.03.2024	AND Co, Ni and Cu (coordination numbers 4 and 6)..
Week 10 04.03.2024-09.03.2024	Structural and stereoisomerism in complexes with coordination numbers 4 and 6
Week 11 11.03.2024-16.03.2024	Drawbacks of VBT.IUPAC system of nomenclature
Week 12 18.03.2024-22.03.2024	Crystal Field Theory Crystal field effect, octahedral symmetry.. TEST& ASSIGNMENT
Week 13 25.03.2024-30.03.2024	Holi vacations
Week 14 1.04.2024-06.04.2024	Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields.
Week 15 8.04.2024-13.04.2024	Tetrahedral symmetry.Factors affecting the magnitude of dorbital splittings.Spectrochemical series.

Week 16 15.04.2024-20.04.2024	Comparison of CFSE for Oh and Td complexes, Tetragonal distortion of octahedral geometry.Jahn-Teller distortion, Square planar coordination
22.04.2024-30.04.2024	REVISION & TEST

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Incharge

Lesson Plan

Name of Assistant Professor: Mr. SANDEEP KUMAR
Class: B.Sc 1st YEAR Semester:2nd Subject: ORGANIC CHEMISTRY
Lesson Plan: From January 01, 2024 to April 30, 2024.

Week 1 1.01.2024-06.01.2024	Aromatic hydrocarbons Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid.
Week 2 8.01.2024-13.01.2024	Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation
Week 3 15.01.2024-20.01.2024	. Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene).
Week 22.01.2024-27.01.2024	Alkyl and Aryl Halides (8 Hours) Alkyl Halides (Upto 5 Carbons) Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions. Preparation: from alkenes and alcohols.
Week 5 29.01.2024-03.02.2024	Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation..
Week 6 5.02.2024-10.02.2024	Williamson's ether synthesis: Elimination vs substitution. Aryl Halides Preparation: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions
Week 7 12.02.2024-17.02.2024	Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH2/NH3 (or NaNH2/NH3).
Week 8 19.02.2024-24.02.2024	Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides
Week 26.02.2024-02.03.2024	Alcohols, Phenols and Ethers (Upto 5 Carbons) (Alcohols: Preparation: Preparation of 1o, 2o and 3o alcohols: using Grignard reagent
Week 10 04.03.2024-09.03.2024	Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters. Reactions: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO4, acidic dichromate, conc. HNO3).
Week 11 11.03.2024-16.03.2024	Oppeneauer oxidation Diols: (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement. Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts. Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation.
Week 12 18.03.2024-22.03.2024	Reimer Tiemann Reaction, Gattermann-Koch Reaction, Houben– Hoesch Condensation, Schotten – Baumann Reaction. Ethers (aliphatic and aromatic):

	Cleavage of ethers with HI.
Week 13 25.03.2024-30.03.2024	Holi Vacations
Week 14 1.04.2024-06.04.2024	Aldehydes and ketones (aliphatic and aromatic) (Formaldehye, acetaldehyde, acetone and benzaldehyde
Week 15 8.04.2024-13.04.2024	Preparation: from acid chlorides and from nitriles.Reactions – Reaction with HCN, ROH, $NaHSO_3$, NH_2-G derivatives.
Week 16 15.04.2024-20.04.2024	Iodoform test. Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. Meerwein-Pondorff Verley reduction.
22.04.2024-30.04.2024	REVISION & TEST

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