Government College, Nalwa (Hisar)

LESSON PLAN (w.e.f. 01-04-2022)

Name: Dr. Sudesh **Class: B.Sc. I (2nd sem)**

Subject: Chemistry [CCL-204] **Session: 2021-22**

Paper: Physical Chemistry [Chemical energetics and Equilibria]

	Contents
Week 1	**Unit-1:Chemical Energetics** Review of thermodynamics and the Laws of Thermodynamics. Important principles and definitions of thermochemistry.
Week 2	Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution.
Week 3	Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data.
Week 4	Variation of enthalpy of a reaction with temperature – Kirchhoff's equation. Statement of Third Law of thermodynamics and calculation of absolute entropies of substances. **Assignment-1**
Week 5	**Unit-2: Chemical Equilibrium** Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium.
Week 6	Distinction between ΔG and ΔG^o, Le Chatelier's principle.
Week 7	Relationships between Kp, Kc and Kx for reactions involving ideal gases. **Assignment-2**
Week 8	**Unit-3: Ionic Equilibria-I** Strong, moderate and weak electrolytes, degree of ionization,
Week 9	Factors affecting degree of ionization, ionization constant and ionic product of water.
Week 10	Ionization of weak acids and bases, pH scale, common ion effect. **Unit Test**
Week 11	**Unit-4: Ionic Equilibria-II** Salt hydrolysis-calculation of hydrolysis constant,
Week 12	Degree of hydrolysis and pH for different salts. Buffer solutions.
Week 13	Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.
Week 14	Revision

H.O.D.

Department of Chemistry

Government College, Nalwa (Hisar)

LESSON PLAN (w.e.f. 01-04-2022)

Dr. Rajni Mohil
Assistant Professor
Subject: Chemistry
Class: BSc-I 2nd Semester
Paper: CCL 205, Core Course-IV, Organic Chemistry-II

SR. NO.	MONTH /WEEK	TOPICS TO BE COVERED	REMARKS IF ANY
1	**April**	**UNIT-I: Aromatic hydrocarbons**	
	Week 1	Introduction	
	Week 2	Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid.	
	Week 3	Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation.	
	Week 4	Reactions: (Case benzene): Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene).	**ASSIGNMENT 1**
	Week 5	**UNIT-II: Alkyl and Aryl Halides** **Alkyl Halides** (Upto 5 Carbons) Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions. Preparation: from alkenes and alcohols. Reactions: hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamson's ether synthesis: Elimination vs substitution.	
2	**May**	**UNIT-II: Alkyl and Aryl Halides contd.**	
	Week 1	**Aryl Halides Preparation:** (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions. Reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by – OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.	**ASSIGNMENT 2**
	Week 2	**UNIT-III:Alcohols, Phenols and Ethers (Upto 5 Carbons)** **Alcohols:** Preparation: Preparation of 1º , 2º and 3º alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters.	
	Week 3	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. Phenols: (Phenol case) Preparation: Cumene hydroperoxide method, from diazonium salts.	
	Week 4	Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Houben– Hoesch Condensation, Schotten – Baumann Reaction. Ethers (aliphatic and aromatic): Cleavage of ethers with HI.	
	Week 5	---------	

3	**June**	**UNIT-IV: Aldehydes and ketones (aliphatic and aromatic)**	**TEST**
	Week 1	(Formaldehye, acetaldehyde, acetone and benzaldehyde) Preparation: from acid chlorides and from nitriles.	
	Week 2	Reactions – Reaction with HCN, ROH, $NaHSO_3$, NH_2-G derivatives. Iodoform test..	
	Week 3	Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation	
	Week 4	Clemensen reduction and Wolff Kishner reduction. Meerwein Pondorff Verley reduction	
	Week 5	**REVISION**	
	Examination		

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LESSON PLAN (w.e.f. 01-04-2022)

Name: Dr. Sudesh **Class: B.Sc. II (4th sem)**
Subject: Chemistry [CCL-405] **Session: 2021-22**
Paper: Physical Chemistry [States of Matter and Chemical Kinetics]

Dates	Contents
Week 1	**Unit-1: Kinetic Theory of Gases** Postulates of Kinetic Theory of Gases and derivation of the kinetic gas equation. Deviation of real gases from ideal behaviour, compressibility factor, causes of deviation.
Week 2	Van der Waals equation of state for real gases. Boyle temperature (derivation not required). Critical phenomena, critical constants and their calculation from van der Waals equation. Andrews isotherms of CO_2.
Week 3	Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance. Temperature dependence of these distributions.
Week 4	Most probable, average and root mean square velocities (no derivation). Collision cross section, collision number, collision frequency, collision diameter and mean free path of molecules. **Assignment-1**
Week 5	**Unit-2: Liquids** Surface tension and its determination using stalagmometer.
Week 6	Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer.
Week 7	Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only). **Assignment-2**
Week 8	**Unit-3: Solids** Forms of solids. Symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes
Week 9	Laws of Crystallography - Law of constancy of interfacial angles, Law of rational indices. Miller indices. X–Ray diffraction by crystals, Bragg's law.
Week 10	Structures of NaCl, KCl and CsCl (qualitative treatment only). Defects in crystals. **Unit Test**
Week 11	**Unit-4: Chemical Kinetics** The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction.
Week 12	Derivation of integrated rate equations for zero, first and second order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction. Concept of activation energy and its calculation from Arrhenius equation.
Week 13	Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).
Week 14	Revision

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LESSON PLAN (w.e.f. 01-04-2022)

	Dr. Rajni Mohil **Assistant Professor** **Subject: Chemistry** **Class: BSc-II 4TH Semester** **Paper: CCL-404, CORE COURSE-VII, INORGANIC CHEMISTRY-II** **TRANSITION METALS & COORDINATION CHEMISTRY**			
SR. NO.		WEEK	TOPICS TO BE COVERED	REMARKS IF ANY
1.	**April**	**Week 1**	---------	**ASSIGNMENT 1**
		Week 2	UNIT-I:Transition Elements (3d series) General group trends with special reference to electronic configuration	
		Week 3	Variable valency, colour, magnetic and catalytic properties, ability to form complexes and.	
		Week 4	Stability of various oxidation states (Latimer diagrams) for Mn, Fe and Cu	
		Week 5	UNIT-III Coordination Chemistry Valence Bond Theory (VBT): Drawbacks of VBT.	
2.	**May**	**Week 1**	Inner and outer orbital complexes of Cr, Fe, Co, Ni and Cu (coordination numbers 4 and 6).	
		Week 2	Structural and stereoisomerism in complexes with coordination numbers 4 and 6.	
		Week 3	. IUPAC system of nomenclature.	
		Week 4	UNIT-II Lanthanoids and actinoids Electronic configurations, oxidation states, colour, magnetic properties, lanthanide contraction	
		Week 5	Separation of lanthanides (ion exchange method only).	
3.	**June**	**Week 1**	UNIT-IV Crystal Field Theory Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields.	
		Week 2	Tetrahedral symmetry.Factors affecting the magnitude of dorbital splittings.Spectrochemical series.	
		Week 3	Comparison of CFSE for Oh and Td complexes,	
		Week 4	Tetragonal distortion of octahedral geometry.Jahn-Teller distortion, Square planar coordination.	
		Week 5	**REVISION** Examination	

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LESSON PLAN (w.e.f. 01-04-2022)

Name: Dr. Sudesh **Class: B.Sc. III (6th sem)**
Subject: Chemistry [CCL-604(i)] **Session: 2021-22**
Paper: POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

Dates	Contents
Week 1	**UNIT-I: Polynuclear and heteronuclear aromatic compounds:** Properties of the following compounds with reference to electrophilic and nucleophilic substitution: Naphthalene, Anthracene,.
Week 2	Furan, Pyrrole,
Week 3	Thiophene, and Pyridine
Week 4	Revision. **Assignment-1**
Week 5	**UNIT-II: Active methylene compounds:** *Preparation:* Claisen ester condensation. Keto-enol tautomerism.
Week 6	*Reactions:* Synthetic uses of ethyl acetoacetate (preparation of non-hetero molecules having upto 6 carbon).
Week 7	Revision. **Assignment-2**
Week 8	**UNIT-III: Application of Spectroscopy to Simple Organic Molecules** Application of visible, ultraviolet and infrared spectroscopy in organic molecules.
Week 9	Electromagnetic radiations, electronic transitions, λ_{max} & ε_{max}, chromophore, auxochrome, bathochromic and hypsochromic shifts.
Week 10	Application of electronic spectroscopy and Woodward rules for calculating λmax of conjugated dienes and α,β-unsaturated compounds. **Unit Test**
Week 11	**UNIT-IV** Infrared radiation and types of molecular vibrations, functional group and fingerprint region.
Week 12	IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding),
Week 13	aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretching absorptions).
Week 14	Revision

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Department of Chemistry

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LESSON PLAN (w.e.f. 01-04-2022)

	Dr. Rajni Mohil **Assistant Professor** **Subject: Chemistry** **Class: BSc-III 6TH Semester** **Paper: CCL-603(i) Discipline Specific Course-III(i)** **ORGANOMETALLICS AND BIOINORGANIC CHEMISTRY**			
SR. NO.		**WEEK**	**TOPICS TO BE COVERED**	**REMARKS IF ANY**
1.	**April**	**Week 1**	----------	**ASSIGNMENT 1**
		Week 2	UNIT-I Chemistry of 3d metals Oxidation states displayed by Cr, Fe, Co, Ni and Co	
		Week 3	A study of the following compounds (including preparation and important properties); Peroxo compounds of Cr, K2Cr2O7, KMnO4.	
		Week 4	A study of the following compounds (including preparation and important properties: K4[Fe(CN)6], sodium nitroprusside, [Co(NH3)6]Cl3, Na3[Co(NO2)6].	
		Week 5	UNIT-II Organometallic Compounds: Introduction	
				ASSIGNMENT 2
2.	**May**	**Week 1**	Organometallic Compounds Definition and Classification with appropriate examples based on nature of metalcarbon bond (ionic, s, p and multicentre bonds).	
		Week 2	Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls.	
		Week 3	. UNIT-III Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals	
		Week 4	p-Acceptor behaviour of carbon monoxide.	
		Week 5	Synergic effects (VB approach)-(MO diagram of CO can be referred to for synergic effect to IR frequencies).	
3.		**Week 1**	UNIT-IV Bio-Inorganic Chemistry A brief introduction to bio-inorganic chemistry.	

	June	**Week 2**	Role of metal ions present in biological systems with special reference to Na+ , K+ and Mg2+ ions: Na/K pump;	**TEST**
		Week 3	Role of Mg2+ ions in energy production and chlorophyll.	
		Week 4	Role of Ca2+ in blood clotting, stabilization of protein structures and structural role (bones)	
		Week 5	**REVISION**	
		Examination		