

**LESSON PLAN (From 1 April 2022 to 15 June 2022)**

NAME: Dr. Kuldeep Mahiya (Assist. Prof. Chemistry)

CLASS: B.Sc. II (Inorganic Chemistry-II)

SECTION: Med + Non Med

Dates	Contents
01-4-2022 to 30-4-2022	<b>Transition Elements (3d series)</b> General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states (Latimer diagrams) for Mn, Fe and Cu.
01-5-2022 to 31-5-2022	<b>Lanthanoids and actinoids</b> Electronic configurations, oxidation states, colour, magnetic properties, lanthanide contraction, separation of lanthanides (ion exchange method only).
01-6-2022 to 15-6-2022	<b>Crystal Field Theory</b> Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry. Factors affecting the magnitude of d-orbital splittings. Spectrochemical series. Comparison of CFSE for <i>Oh</i> and <i>Td</i> complexes, Tetragonal distortion of octahedral geometry. Jahn-Teller distortion, Square planar coordination.

CLASS: B.Sc. III ORGANOMETALLICS AND BIOINORGANIC CHEMISTRY

[CCL-603(i)]

SECTION: Med + Non Med

Dates	Contents
01-4-2022 to 30-4-2022	<b>Chemistry of 3d metals</b> Oxidation states displayed by Cr, Fe, Co, Ni and Cu. A study of the following compounds (including preparation and important properties); Peroxo compounds of Cr, $K_2Cr_2O_7$ , $KMnO_4$ , $K_4[Fe(CN)_6]$ , sodium nitroprusside, $[Co(NH_3)_6]Cl_3$ , $Na_3[Co(NO_2)_6]$ .
01-5-2022 to 31-5-2022	<b>Organometallic Compounds</b> Definition and Classification with appropriate examples based on nature of metalcarbon bond (ionic, s, p and multicentre bonds). Structures of methyl lithium, Zeiss salt and ferrocene. EAN rule as applied to carbonyls. Preparation, structure, bonding and properties of mononuclear and polynuclear carbonyls of 3d metals. p-acceptor behaviour of carbon monoxide. Synergic effects (VB approach)-(MO diagram of CO can be referred to for synergic effect to IR frequencies).
01-6-2022 to 15-6-2022	<b>Bio-Inorganic Chemistry</b> A brief introduction to bio-inorganic chemistry. Role of metal ions present in biological systems with special reference to $Na^+$ , $K^+$ and $Mg^{2+}$ ions: Na/K pump; Role of $Mg^{2+}$ ions in energy production and chlorophyll. Role of $Ca^{2+}$ in blood clotting, stabilization of protein structures and structural role (bones).

*Kuldeep*  
19/5/2022

LESSON PLAN (From 1 April 2022 to 15 June 2022)

NAME: Ms. Sonia Saroya (Assist. Prof. Chemistry)

CLASS: B.Sc. III POLYNUCLEAR HYDROCARBONS AND UV, IR

SPECTROSCOPY, CCL-604(i)

SECTION: Med + Non Med

Dates	Contents
01-4-2022 to 30-4-2022	<b>Active methylene compounds:</b> <i>Preparation:</i> Claisen ester condensation. Keto-enol tautomerism. <i>Reactions:</i> Synthetic uses of ethyl acetoacetate (preparation of non-hetero molecules having upto 6 carbon).
01-5-2022 to 31-5-2022	<b>Application of Spectroscopy to Simple Organic Molecules</b> Application of visible, ultraviolet and infrared spectroscopy in organic molecules. Electromagnetic radiations, electronic transitions, $\lambda_{\text{max}}$ & $\epsilon_{\text{max}}$ , chromophore, auxochrome, bathochromic and hypsochromic shifts. Application of electronic spectroscopy and Woodward rules for calculating $\lambda_{\text{max}}$ of conjugated dienes and $\alpha, \beta$ -unsaturated compounds.
01-6-2022 to 15-6-2022	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 $>\text{C}=\text{O}$ stretching absorptions).

*Sonia Saroya*  
19/05/2022

LESSON PLAN (From 1 April 2022 to 15 June 2022)

NAME: Mr. Shyam Lal (Asst. Prof. Chemistry)

CLASS: B.Sc. I (Organic Chemistry-II, CCL-205)

SECTION: Med + Non Med

Dates	Contents
01-4-2022 to 30-4-2022	<p><b>Aromatic hydrocarbons</b> <i>Preparation</i> (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. <i>Reactions</i>: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene). <b>Alkyl Halides</b> (Upto 5 Carbons) Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions. <i>Preparation</i>: from alkenes and alcohols. <i>Reactions</i>: hydrolysis, nitrite &amp; nitro formation, nitrile &amp; isonitrile formation. Williamson's ether synthesis: Elimination vs substitution.</p>
01-5-2022 to 31-5-2022	<p><b>Aryl Halides</b> <i>Preparation</i>: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer &amp; Gattermann reactions. <i>Reactions</i> (Chlorobenzene): Aromatic nucleophilic substitution (replacement by – OH group) and effect of nitro substituent. Benzyne Mechanism: KNH<sub>2</sub>/NH<sub>3</sub> (or NaNH<sub>2</sub>/NH<sub>3</sub>). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides. <b>Alcohols</b>: <i>Preparation</i>: Preparation of 1o, 2o and 3o alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters. <i>Reactions</i>: With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. KMnO<sub>4</sub>, acidic dichromate, conc. HNO<sub>3</sub>). Oppeneauer oxidation <i>Diols</i>: (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement. <b>Phenols</b>: (Phenol case) <i>Preparation</i>: Cumene hydroperoxide method, from diazonium salts. <i>Reactions</i>: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Houben-Hoesch Condensation, Schotten-Baumann Reaction. <b>Ethers (aliphatic and aromatic)</b>: Cleavage of ethers with HI.</p>
01-6-2022 to 15-6-2022	<p><b>Aldehydes and ketones (aliphatic and aromatic) (7 Hours)</b> (Formaldehyde, acetaldehyde, acetone and benzaldehyde) <i>Preparation</i>: from acid chlorides and from nitriles. <i>Reactions</i> – Reaction with HCN, ROH, NaHSO<sub>3</sub>, NH<sub>2</sub>-G derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. Meerwein-Ponndorf Verley reduction.</p>

*Shyam*  
19/05/2022



**LESSON PLAN (From 1 April 2022 to 15 June 2022)**

NAME: Mr. Shyam Lal (Assist. Prof. Chemistry)

SECTION: **Med + Non Med**

CLASS: **B.Sc. II (Inorganic Chemistry-II)**

Dates	Contents
01-4-2022 to 30-4-2022	<b>UNIT-III Coordination Chemistry</b> IUPAC system of nomenclature and introduction of Valence Bond Theory (VBT)
01-5-2022 to 31-5-2022	<b>UNIT-III Coordination Chemistry</b> Inner and outer orbital complexes of Cr, Fe, Co, Ni and Cu (coordination numbers 4 and 6).
01-6-2022 to 15-6-2022	<b>UNIT-III Coordination Chemistry</b> Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Drawbacks of VBT.

CLASS: **B.Sc. II (Physical Chemistry-III, CCL-405)**

SECTION: **Med + Non Med**

Dates	Contents
01-4-2022 to 30-4-2022	<b>Chemical Kinetics:</b> The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction.
01-5-2022 to 31-5-2022	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.
01-6-2022 to 15-6-2022	Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

## Lesson Plan 2021-22

FGM Government College, Adampur

Month wise Lesson Plan for Even (4<sup>th</sup>) Semester 1 April -15 June 2021-2022

Department: Chemistry


Teacher: Jitender Kumar

Subject: Physical Chemistry-III: CCL 405

Class: B. Sc.-II

Section: 2021-2022

Sr. No.	Description of Chapters/Topics	Expected Duration	Assignment/Test
1	<ul style="list-style-type: none"><li>Solids: Forms of solids. Symmetry elements, unit cells, crystal systems, Bravais lattice types and identification of lattice planes. Laws of Crystallography - Law of constancy of interfacial angles, Law of rational indices. Miller indices. X-Ray diffraction by crystals, Bragg's law. Structures of NaCl, KCl and CsCl (qualitative treatment only). Defects in crystals.</li><li>Liquids: Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).</li></ul>	April	
2	<ul style="list-style-type: none"><li>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. 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<sub>2</sub></li></ul>	May	Minor test in the 2 <sup>nd</sup> week of Month  Assignment in 3 <sup>rd</sup> week of month
3	<ul style="list-style-type: none"><li>Maxwell Boltzmann distribution laws of molecular velocities and molecular energies (graphic representation – derivation not required) and their importance. Temperature dependence of these distributions. 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.</li></ul>	June	

  
Mr. Jitender Kumar  
Asst. Prof Chemistry



# Lesson Plan 2021-22

FGM Government College, Adampur

Month wise Lesson Plan for Even(2<sup>nd</sup>) Semester 1 April -15 June 2021-2022

Department: Chemistry

Teacher: Dr. Prince Kumar  
Subject: Physical Chemistry-I (CCL-204)

Class: B.Sc.-I  
Section: 2021-2022

Sr. No.	Description of Chapters/Topics	Expected Duration	Assignment/Test
1	<p>1 Chemical Energetics (8 Hours)</p> <ul style="list-style-type: none"> <li>Review of thermodynamics and the Laws of Thermodynamics.</li> <li>Important principles and definitions of thermochemistry. Concept of standard state</li> <li>and standard enthalpies of formations, integral and differential enthalpies of</li> <li>solution and dilution. Calculation of bond energy, bond dissociation energy and</li> <li>resonance energy from thermochemical data. Variation of enthalpy of a reaction</li> <li>with temperature – Kirchhoff's equation.</li> <li>Statement of Third Law of thermodynamics and calculation of absolute entropies</li> <li>of substances. Liquids: Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only).</li> </ul>	April	
2	<p>2 Chemical Equilibrium (8 Hours)</p> <p>Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between <math>\Delta G</math> and <math>\Delta G^\circ</math>, Le Chatelier's principle.</p> <p>Relationships between <math>K_p</math>, <math>K_c</math> and <math>K_x</math> for reactions involving ideal gases.</p>	May	<p>Minor test in the 2<sup>nd</sup> week of Month</p> <p>Assignment in 3<sup>rd</sup> week of month</p>
3.	<p>3. Ionic Equilibria-I (7 Hours)</p> <p>Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of</p> <ul style="list-style-type: none"> <li>weak acids and bases, pH scale, common ion effect.</li> </ul>	June	

Prince Kumar  
Dept of Chemistry

4	<p>4. Ionic Equilibria-II (7 Hours)</p> <p>Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle.</p>		

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Dept of Chemistry