

**Govt. College for Women, Gharaunda**  
**Lesson Plan**  
**Sept 2022 to Dec 2022 (Odd Semester)**

**B.Sc. Chemistry 1st Semester**

**Mr. Sukh Raj & Mrs. Rachna**

**Subject : Chemistry**

<b>Week 1</b>	01/09/2022 to 03/09/2022
	Introduction to Structure and Bonding Atomic structure introduction, idea of de-broglie matter waves. Heisenberg uncertainty principle, atomic orbitals. Introduction to Gaseous state- Kinetic theory and Maxwell distribution
<b>Week 2</b>	04/09/2022 to 10/09/2022
bonding	Localized and delocalized bonding and Vanderwaals interaction Quantum numbers.Radial & angular wave functions. Problems session related to structure and Collission number, frequency and diameter, mean free path
<b>Week 3</b>	12/09/2022 to 17/09/2022
	Types of effects Probability distribution curves, Shapes of s,p,d orbitals. Aufbau&pauli exclusive principles. Hund's multiplicity rule. Electronic configuration of elements Deviation of Real gases from ideal behavior, vanderwaals equation
<b>Week 4</b>	19/09/2022 to 24/09/2022
	Applications and comparison of different effects Effective nuclear charge, slaters rule. Problem session of Atomic structure, Classification of periodic table Boyle's temperature and critical properties
<b>Week 5</b>	26/09/2022 to 01/10/2022
	Introduction of Stereochemistry and Isomerism Atomic & ionic radii, ionistaion energy, electron affinity. Electronegativity, methods of determination, trends in periodic table. PV isotherm, Continuity of state, relationship between critical constants and vanderwaal constant
<b>Week 6</b>	03/10/2022 to 08/10/2022
	Optical activity, Resolution, Inversion Pauling, mulliken,allred rachow & mullikanjaffe's scale. Sanderson's density ratio. Problem session of Periodic Properties. Valence bond theory & its limitation. Characteristics of covalent bond. Various types of hybridisation. Critical compressibility factor and Law of corresponding states
<b>Week 7</b>	10/10/2022 to 15/10/2022

	<p>Configuration and sequence rule  Shapes of molecules &amp; ions ( <math>\text{BeF}_2</math>, <math>\text{BF}_3</math>, <math>\text{CH}_4</math>, <math>\text{PF}_5</math>, <math>\text{SF}_6</math>)( <math>\text{IF}_7</math>, <math>\text{SO}_4^{2-}</math>, <math>\text{ClO}_4^-</math>, <math>\text{NO}_3^-</math> ), VSEPR theory to various molecules. Molecular orbital theory for homonuclear molecules.  Molecular orbital theory for heteronuclear molecules.  Introduction to liquid states- Structure, surface tension</p>
<b>Week 8</b>	17/10/2022 to 21/10/2022
	<p>Geometrical Isomerism and E &amp; Z nomenclature  Bond energy, bond angle, bond length &amp; dipole moments. Percentage ionic character, dipole moment &amp; electronegativity difference. Problem session of Covalent bond  Refractive index, viscosity, vapour pressure</p>
<b>Week 9</b>	27/10/2022 to 29/10/2022
	<p>Conformation isomerism and Projections  <b>Ionic solids</b>- ionic structures( <math>\text{NaCl}</math>, <math>\text{CsCl}</math>, <math>\text{ZnS}</math>, <math>\text{CaF}_2</math>), Radius ratio effect &amp; coordination number, limitation of radius ratio rule.  Optical rotation and introduction to solid state</p>
<b>Week 10</b>	31/10/2022 to 05/11/2022
	<p>Introduction of Mechanism of Organic reactions- Types of bond and reagent  Lattice defects, semiconductors. Assignment on covalent bond.  Laws of interfacial angles and rational indices</p>
<b>Week 11</b>	07/11/2022 to 12/11/2022
	<p>Types of organic reactions  Problems session  Symmetry elements</p>
<b>Week 12</b>	14/11/2022 to 19/11/2022
	<p>Reactive intermediates and formation structure and stability  Discussion on last year papers.  Seven crystal systems</p>
<b>Week 13</b>	21/11/2022 to 26/11/2022

## Introduction to Alkanes – Isomerism in Alkanes

Discussion on last year papers.  
Bravais lattices

<b>Week 14</b>	28/11/2022 to 03/12/2022
	Methods of formation of alkanes, chemical and physical properties Discussion on last year papers. X-ray diffraction
<b>Week 15</b>	05/12/2022 to 10/12/2022
	Free radical halogenations and introduction to cycloalkanes Discussion on last year papers. Bragg's law, Laue's method
<b>Week 16</b>	12/12/2022 to 17/12/2022
	Methods of formation and chemical reactions of cyclo alkanes Discussion on last year papers. Rotating Crystal method
<b>Week 17</b>	19/12/2022 to 24/12/2022
	Baeyer Strian Theory, Theory of Strainless rings Discussion on last year papers. Powder pattern method

Govt. College for Women, Gharaunda  
Lesson Plan  
Sept 2022 to Dec 2022 (Odd Semester)

B.Sc. Chemistry 3rd Semester

Mr. Sukh Raj & Mrs. Rachna

Subject : Chemistry

Week 1	01/09/2022 to 03/09/2022
	General introduction of syllabus and exam pattern. Alcohols- monohydric alcohols, nomenclature, methods of formation by reduction of aldehydes. From ketones, carboxylic acids & esters. Introduction of coordination compounds- werner's theory, Chelating compounds Definition of thermodynamic terms : system, surrounding etc. Type systems, intensive and extensive properties. State and path functions and their differentials, Thermodynamic process
Week 2	04/09/2022 to 10/09/2022
	Hydrogen bonding, Acidic nature, reaction of alcohols. Dihydric alcohols- nomenclature. EAN rule, Nomenclature of coordination compounds Thermodynamic equilibrium, Concept of heat and work. First law of thermodynamics: statement, concepts of internal energy and enthalpy. Heat capacity, heat capacities at constant volume and pressure and their relationship
Week 3	12/09/2022 to 17/09/2022
	Methods of formation, chemical reaction of vicinal glycols. Oxidative cleavage & pinacol-pinacolone rearrangement Optical Isomerism in coordination compounds Joule-Thomson coefficient for ideal gas and real gases and inversion temperature, Calculation of $w, q, dU$ & $dH$ for the expansion of ideal gases under isothermal conditions for reversible processes
Week 4	19/09/2022 to 24/09/2022
	Phenols-Introduction and nomenclature Valence bond theory and examples Comparison of adiabatic and isothermal processes.
Week 5	26/09/2022 to 01/10/2022
	Structure & bonding. Preparation of phenols, physical properties & acidic character. Introduction of d-block elements- General properties Introduction to Chemical equilibrium
Week 6	03/10/2022 to 08/10/2022
	Comparative acidic strengths of alcohols & phenols, resonance stabilization of phenoxide ion. <b>Reactions of phenols- electrophilic aromatic substitution</b> , mechanism of Fries rearrangement Properties of 4d and 5d elements, Comparison of properties of 3d, 4d and 5d series Equilibrium constant and free energy
Week 7	10/10/2022 to 15/10/2022

	<p>Claisen rearrangement, Reimer – tiemann reaction, Kolbe's reaction. Schotten &amp; Baumann reactions. Epoxides synthesis.</p> <p>Stability of various oxidation states and e.m.f (Latimer and Frost diagrams), Structure and properties of some compounds of transition elements- <math>TiO_2</math>, <math>VOCl_2</math></p> <p>Concept of chemical potential</p>
<b>Week 8</b>	17/10/2022 to 21/10/2022
	<p>Acid &amp; base catalyzed ring opening of epoxides., orientation of epoxide ring opening. Reaction of grignard &amp; organolithium reagents with epoxides. Assignment on alcohols &amp; phenols.</p> <p>Structure and properties of some compounds of transition elements- <math>FeCl_3</math>, <math>CuCl_2</math> and <math>Ni(CO)_4</math></p> <p>Law of chemical equilibrium</p>
<b>Week 9</b>	27/10/2022 to 29/10/2022
	<p>Nomenclature of carboxylic acids, structure &amp; bonding.</p> <p>Physical properties, Acidity of carboxylic acids, Effect of substituents on acid strength</p> <p>Physical properties of solvents, Types of solvents and their general characteristics</p> <p>Temperature dependence of equilibrium constant</p>
<b>Week 10</b>	31/10/2022 to 05/11/2022
	<p><b>Preparation of carboxylic acids.</b> Reactions of carboxylic acids. Hell- volhard – zelinsky reactions. Reduction of carboxylic acids.</p> <p>General reactions in non aqueous solvents</p> <p>Clausius- Clapeyron equation and applications</p>
<b>Week 11</b>	07/11/2022 to 12/11/2022
	<p>Mechanism of decarboxylation. Relative stability of acyl derivatives.</p> <p>Physical properties. Interconversion of acid derivatives by nucleophilic acyl substitution</p> <p>Reactions in ammonia</p> <p>Introduction to distribution law</p>
<b>Week 12</b>	14/11/2022 to 19/11/2022
	<p>Mechanism of esterification &amp; hydrolysis</p> <p>Reactions in <math>SO_2</math></p> <p>Applications of distribution law</p>
<b>Week 13</b>	21/11/2022 to 26/11/2022

Class test on phenols, doubts from carboxylic acids

Discussion on last year papers.

Degree of hydrolysis and numerical

<b>Week 14</b>	28/11/2022 to 03/12/2022
	Concept of chromophore & auxochrome. Different types of shifts in detail. UV spectra of conjugated enes & enones Discussion on last year papers. Equilibrium constant of $K_i$ and numerical
<b>Week 15</b>	05/12/2022 to 10/12/2022
	Absorption laws, molar absorptivity, presentation & analysis of UV spectra. Applications of UV spectroscopy in structure elucidation of organic compounds Discussion on last year papers. Process of extraction and numerical
<b>Week 16</b>	12/12/2022 to 17/12/2022
	Revision /Unit test Revision /Unit test Revision /Unit test
<b>Week 17</b>	19/12/2022 to 24/12/2022
	Discussion on last year papers. Revision /Unit test Revision /Unit test

Govt. College for Women, Gharaunda  
Lesson Plan  
Sept 2022 to Dec 2022 (Odd Semester)

B.Sc. Chemistry 5th Semester

Mr. Sukh Raj & Mrs. Rachna

Subject : Chemistry

Week 1	01/09/2022 to 03/09/2022
	Introduction to NMR- Principle Introduction of coordination compounds, Limitations of valence bond theory, Black-body radiation, Plank's radiation law, photoelectric effect
Week 2	04/09/2022 to 10/09/2022
	Number of Signals, Peaks Crystal field theory , Crystal field splitting of octahedral compounds, tetrahedral and square planer compounds, factors affecting the crystal field parameters postulates of quantum mechanics, quantum mechanical operators, commutation relations, Hamiltonian operator, Hermitian operator
Week 3	12/09/2022 to 17/09/2022
	Types of peaks with numerical Crystal field splitting of tetrahedral and square planer compounds, factors affecting the crystal field parameters average value of square of Hermitian as a positive quantity, Role of operators in quantum mechanics, To show quantum mechanically that position and momentum cannot be predicated simultaneously
Week 4	19/09/2022 to 24/09/2022
	Chemical shift, Shielding and deshielding A brief outline of thermodynamic stability of metal complexes, factors affecting the stability, Determination of wave function & energy of a particle in one dimensional box, Optical activity, polarization, Clausius – Mossotti equation
Week 5	26/09/2022 to 01/10/2022
	Splitting of signals and coupling constants Irving William Series and kinetic stability Orientation of dipoles in an electric field, dipole moment, induced dipole moment, measurement of dipole moment -temperature method and refractivity method
Week 6	03/10/2022 to 08/10/2022
	Magnetic equivalence of Protons, PMR spectra of ethyl bromide Trans effect , Theories of trans effect Dipole moment and structure of molecules, Magnetic permeability, magnetic susceptibility and its determination
Week 7	10/10/2022 to 15/10/2022

PMR spectra of different molecules  
Substitution reactions of square planar complexes,  
Applications of magnetic susceptibility, magnetic properties – paramagnetism,  
diamagnetism and ferromagnetism

**Week 8** | 17/10/2022 to 21/10/2022

Carbohydrates- introduction and mechanism of osazone formation  
Class test  
Spectroscopy- introduction, Basic features, Born-oppenheimer approximation

**Week 9** | 27/10/2022 to 29/10/2022

Glucose Fructose inter conversion, chain lengthening and shortening  
Type of magnetic materials, Magnetic susceptibility  
Degree of freedom, rotational spectrum of diatomic molecule

**Week 10** | 31/10/2022 to 05/11/2022

Configuration, Conversions  
Class test  
Rigid rotator, Selection rule

**Week 11** | 07/11/2022 to 12/11/2022

Formation of glycosides, determination of Ring Size  
LS coupling, and magnetic moment, Orbital contribution, Revision of Chapter-Magnetic  
properties of coordination complexes  
Spectral intensity distribution, bond length

**Week 12** | 14/11/2022 to 19/11/2022

Structure of Glucose and fructose, mutarotation  
Applications of magnetic moment data , Revision of Chapter-Magnetic properties of  
coordination complexes  
Non-rigid rotor, isotopic effect

**Week 13** | 21/11/2022 to 26/11/2022



Introduction to disaccharide and polysaccharide  
Selection rules for d-d transitions, Spectroscopic ground states  
Vibrational spectrum - introduction, SHM, Selection rule

Week 14 28/11/2022 to 03/12/2022

Organometallic introduction, Organomagnesium compounds  
Orgel energy level diagrams, Discussion of energy spectrum of  $[Ti(H_2O)_6]^{+3}$  complex ion  
Intensity, Force constant, bond energy, Anharmonic motion

Week 15 05/12/2022 to 10/12/2022

Organozinc compounds  
Discussion on last year papers.  
Vibration frequency of functional groups, raman spectrum introduction

Week 16 12/12/2022 to 17/12/2022

Organolithium compounds  
Revision /Unit test  
Rotational and vibrational raman spectra, selection rules

Week 17 19/12/2022 to 24/12/2022

Discussion on last year papers.  
Revision /Unit test  
Quantum theory of raman spectra, Revision /Unit test

Subhraj