

GCW, Hisar Dept. of Chemistry Session : 2025-26 Odd Sem
NAME OF TEACHER: Dr. Satyender Kumar

CLASS: B.Sc. III (Vth SEM)

PAPER-CCL 503(ii): CHEMISTRY OF MAIN GROUP ELEMENTS, THEORIES OF ACIDS AND BASES-I

PAPER-CCS 505(ii): FUEL CHEMISTRY

Week 1	PAPER I
	Acids and Bases: Bronsted-Lowry concept, conjugate acids and bases.
Week 2	
	Relative strengths of acids and bases, effects of substituent and solvent, differentiating and levelling solvents.
Week 3	
	Lewis acid-base concept, classification of Lewis acids and bases, Lux-Flood concept and solvent system concept.
Week 4	
	Hard and soft acids and bases (HSAB concept), applications of HSAB process.
Week 5	General Principles of Metallurgy
	General Principles of Metallurgy: Chief modes of occurrence of metals based on standard electrode potentials Assignment
Week 6	
	Ellingham diagrams for reduction of metal oxides using carbon and carbon monoxide as reducing agents.
Week 7	
	Hydrometallurgy with reference to cyanide process for gold and silver. Methods of purification of metals (Al, Pb, Ti, Fe, Cu, Ni, Zn, Au)
Week 8	
	Electrolytic refining, zone refining, van Arkel-de Boer process, Parting Process, Mond's process and Kroll Process.
	Class Test
Week 9	
	s- and p-Block Elements Periodicity in s- and p-block elements with respect to electronic configuration, atomic and ionic size, ionization enthalpy, electron gain enthalpy, electronegativity (Pauling scale).

Satyender Kumar

Week 10	
	General characteristics of s-block metals like density, melting and boiling points, flame colour and reducing nature. Oxidation states of s- and p-block elements,
Week 11	
	Inert-pair effect, diagonal relationships and anomalous behaviour of first member of each group. Allotropy in C, P and S
Week 12	
	Complex forming tendency of s block elements and a preliminary idea of crown ethers and cryptates, structures of basic beryllium acetate, salicylaldehyde/ acetylacetonato complexes of Group 1 metals.
Week 13	(SEC) FUEL CHEMISTRY
	Review of energy sources (renewable and non-renewable). Classification of fuels and their calorific value. Coal: Uses of coal (fuel and nonfuel) in various industries, its composition, carbonization of coal. Coal gas, producer gas.
	Assignment
Week 14	
	water gas—composition and uses. Fractionation of coal tar, uses of coal tar bases chemicals, requisites of a good metallurgical coke, Coal gasification (Hydro gasification and Catalytic gasification), Coal liquefaction and Solvent Refining. Petroleum and Petrochemical Industry: Composition of crude petroleum, Refining and different types of petroleum products and their applications.
Week 15	
	Fractional Distillation (Principle and process), Cracking (Thermal and catalytic cracking), Reforming Petroleum and non-petroleum fuels (LPG, CNG, LNG, bio-gas, fuels derived from biomass), fuel from waste, synthetic fuels (gaseous and liquids), clean fuels.
	CLASS TEST
Week 16	
	Petrochemicals: Vinyl acetate, Propylene oxide, Isoprene, Butadiene, Toluene and its derivatives Xylene. Lubricants: Classification of lubricants, lubricating oils (conducting and nonconducting) Solid and semisolid lubricants, synthetic lubricants. Properties of lubricants (viscosity index, cloud point, pore point) and their determination.
	ASSINGMENT
Week 17	
	Revision

[Handwritten signature]

GCW, Hisar Dept. of Chemistry Session : 2025-26 Odd Sem
NAME OF TEACHER: Dr. Satyender Kumar

CLASS: B.Sc. II (3rd SEM)

PAPER-C24SEC328T:

FUEL CHEMISTRY

Week 1	Renewable and non-renewable energy sources
Week 2	Classification of fuels and their calorific values
Week 3	Uses of coal as fuel and non-fuel in industries
Week 4	Carbonisation of coal, coal gas, producer gas, water gas- composition and uses
Week 5	Coal gasification- hydro gasification, catalytic gasification
Week 6	Composition of crude petroleum ASSIGNMENT
Week 7	Refining, different types of petroleum products and their applications
Week 8	Fractional distillation- principle and process CLASS TEST
Week 9	Thermal & catalytic cracking
Week 10	Reforming, petroleum and non-petroleum fuels
Week 11	LPG, CNG, LNG, Biogas, Syn Gas, Synthetic Natural Gas
Week 12	Classification of petrochemicals
Week 13	Classification and functions of lubricants
Week 14	Lubricating oils- conducting and non-conducting
Week 15	Solid and semi solid lubricants, synthetic lubricants
Week 16	Properties of lubricants, viscosity index, cloud point and pour point

Satyender

GOVERNMENT COLLEGE FOR WOMEN, HISAR

Department of Chemistry
Lesson Plan (Odd Semester)
SESSION 2025-26

Name of Assistant Professor: Dr. Rakesh Kumar

Class:- B.Sc-Ist (Semester- Ist)

Subject: - Discipline Specific Course (DSC) Chemistry – I [C24CHE101T]

Date	Syllabus to be Covered
14-07-2025 to 19-07-2025	Atomic Structure Dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg's uncertainty principle, Quantum mechanics. Time independent Schrodinger equation (Derivation Excluded).
21-07-2025 to 26-07-2025	Significance of Ψ and Ψ^2 , Normal and orthogonal wave functions, Concept of atomic orbitals, Significance of quantum numbers,
28-07-2025 to 02-08-2025	shapes of <i>s</i> , <i>p</i> and <i>d</i> orbitals, Rules for filling electrons in various orbitals, Electronic configurations of the atoms, Stability of half-filled and completely filled orbitals.
04-08-2025 to 09-08-2025	Structure and Bonding Localized and delocalized chemical bond, Van der Waals interactions, Concept of resonance and its applications, Hyperconjugation, Inductive effect, Electromeric effect and their comparison.
11-08-2025 to 16-08-2025	Mechanism of Organic Reactions Curved arrow notation, homolytic and heterolytic bond fission, Types of reagents: electrophiles and nucleophiles.
18-08-2025 to 23-08-2025	Types of organic reactions: Substitution, Addition, Condensation, Elimination, Rearrangement, Isomerization.
25-08-2025 to 30-08-2025	Reactive intermediates: Carbocations, Carbanions, Free radicals and Carbenes (structure & stability). Class Test
01-09-2025 to 06-09-2025	Stereochemistry Type of Stereoisomers, Conformations with respect to ethane, butane and cyclohexane. Optical isomerism,
08-09-2025 to 13-09-2025	Elements of symmetry, Concept of chirality (upto two carbon atoms). Enantiomerism, Diastereomerism
15-09-2025 to 20-09-2025	Threo and erythro diastereomers and Meso compounds; Configuration: (relative and absolute)

P. Kumar

22-09-2025 to 27-09-2025	Sequence rules D and L; R and S (for upto 2 chiral carbon atoms) system of nomenclature; Geometrical isomerism; <i>cis</i> - <i>trans</i> nomenclature; and <i>E/Z</i> Nomenclature (for up to two C=C systems). Assignment
29-09-2025 to 04-10-2025	Gaseous State Kinetic theory of gases and derivation of the kinetic gas equation.
06-10-2025 to 11-10-2025	Maxwell's distribution of velocities and energies (Graphic representation - derivation excluded), Temperature dependence of these distributions
13-10-2025 to 18-10-2025	Most probable velocity, Average velocity and Root Mean Square Velocity (Derivations excluded), Relationship among three types of velocities
27-10-2025 to 31-10-2025	Collision diameter, Collision number, Collision frequency and Mean free path (with Derivations), Deviation of real gases from ideal behaviour, Compressibility factor, Causes of deviation
03-11-2025 to 08-11-2025	Derivation of Van der Waal's Equation of State, its application in the calculation of Boyle's temperature.
10-11-2025 to 20-11-2025	Important topics, Class Test and Revision



Dr. Rakesh Kumar
Assistant Professor (Chemistry)



Principal
Govt. College for Women,
Hisar

GOVERNMENT COLLEGE FOR WOMEN, HISAR

**Department of Chemistry
Lesson Plan (Odd Semester)**

SESSION 2025-26

Name of Assistant Professor: Dr. Rakesh Kumar

Class:- B.Sc-2nd (Semester- 3rd)

Subject: - Discipline Specific Course (DSC) Chemistry – III [C24CHE301T]

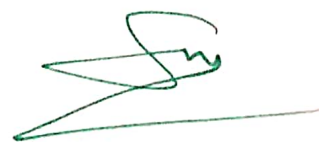
Date	Syllabus to be Covered
01-08-2025 to 02-08-2025 & 04-08-2025 to 09-08-2025	Transition Elements (3d series) General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states (Latimer diagrams) for Fe and Cu.
11-08-2025 to 16-08-2025	Lanthanoids and Actinoids Electronic configurations, oxidation states, colour, magnetic properties, lanthanide contraction, separation of lanthanides (ion exchange method only).
18-08-2025 to 23-08-2025	Alkyl and aryl halides Alkyl Halides Preparation: From Alkenes and Alcohols, Reactions: Nitrite and Nitro formation, Nitrile and isonitrile formation. Williamson's ether synthesis. Types of Nucleophilic Substitution (SN1, SN2 and SNi) reactions.
25-08-2025 to 30-08-2025	Aryl Halides Preparation (Chloro, bromo and iodo-benzene case): From phenol, Sandmeyer & Gattermann reactions. Chemical reactions (Chlorobenzene): Aromatic nucleophilic substitution (replacement by – OH group) and effect of nitro substituent. Benzyne
01-09-2025 to 06-09-2025	Mechanism: KNH ₂ /NH ₃ (or NaNH ₂ /NH ₃). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, vinyl and aryl halides. Class Test
08-09-2025 to 13-09-2025	Alcohols and Phenols Alcohols Preparation: Preparation of 1o, 2o and 3o alcohols using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones and esters.

(P) Kumar

15-09-2025 to 20-09-2025	Acidic nature reactions: With sodium, HX (Lucas test), Esterification, Oxidation (with PCC and acidic dichromate). Phenols Preparation: From Cumene, diazonium salts and
22-09-2025 to 27-09-2025	Grignard reagent. Acidic nature, Chemical reactions: Electrophilic substitution: Nitration, halogenation and sulphonation.
29-09-2025 to 04-10-2025	Reimer-Tiemann Reaction, Claisen rearrangement, Fries rearrangement and Schotten-Baumann Reaction, Kolbe's reaction (with mechanism) Assignment
06-10-2025 to 11-10-2025	Conductance and Conductivity Introduction, Equivalent and Molar conductivity and their variation with dilution for weak and strong electrolytes,
13-10-2025 to 18-10-2025	Kohlrausch's law of independent migration of ions, Transport number, Ionic mobility, Applications of conductance measurements:
27-10-2025 to 31-10-2025	Determination of degree of ionization of weak electrolyte, Solubility and Solubility products of sparingly soluble salts, Ionic product of water.
03-11-2025 to 08-11-2025	Conductometric titrations (only acid-base): Concept of pH and pKa, buffer solution, buffer action, Henderson-Hasselbalch equation.
10-11-2025 to 20-11-2025	Important topics, Class Test and Revision



Dr. Rakesh Kumar
Assistant Professor (Chemistry)



Principal
Govt. College for Women,
Hisar

GOVERNMENT COLLEGE FOR WOMEN, HISAR

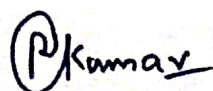
Department of Chemistry Lesson Plan (Odd Semester) SESSION 2025-26

Name of Assistant Professor: Dr. Rakesh Kumar

Class:- B.Sc-1st (Semester- 1st)

Subject: - Minor Course (MIC) Basic Chemistry – I [C24MIC131T]

Date	Syllabus to be Covered
14-07-2025 to 19-07-2025	Covalent Bond Valence bond theory approach, Various type of hybridisation and shapes of simple inorganic molecules and ions
21-07-2025 to 26-07-2025	Hybridisation and shapes of simple inorganic molecules and ions with suitable examples of linear, trigonal planar
28-07-2025 to 02-08-2025	Hybridisation and shapes of square planar, tetrahedral, trigonal bipyramidal
04-08-2025 to 09-08-2025	Hybridisation and shapes of octahedral arrangements (BeF_2 , BF_3 , CH_4 , PF_5 , SF_6 , IF_7 ,
11-08-2025 to 16-08-2025	Covalent Bond Hybridisation and shapes of (BeF_2 , BF_3 , CH_4 , PF_5 , SF_6 .)
18-08-2025 to 23-08-2025	Hybridisation and shapes of IF_7 , SO_4^{2-} , ClO_4^- , NO_3^-),
25-08-2025 to 30-08-2025	Valence Shell Electron Pair Repulsion (VSEPR) theory to NH_3 , H_3O^+ , SF_4 ,
01-09-2025 to 06-09-2025	Valence Shell Electron Pair Repulsion (VSEPR) theory to ClF_3 , H_2O ,
08-09-2025 to 13-09-2025	Valence Shell Electron Repulsion (VSEPR) theory to SnCl_2 , ClO_3^- and ICl_2^-). Class Test
15-09-2025 to 20-09-2025	Alkanes Nomenclature, Classification of carbon atoms in
22-09-2025 to 27-09-2025	alkanes and its structure.
29-09-2025 to 04-10-2025	Isomerism in alkanes. Methods of formation: Wurtz reaction
06-10-2025 to 11-10-2025	Corey-House reaction Assignment
13-10-2025 to 18-10-2025	Alkanes Kolbe electrolytic reaction, and decarboxylation of
27-10-2025 to 31-10-2025	carboxylic acids. Mechanism of free radical
03-11-2025 to 08-11-2025	halogenation of alkanes: reactivity and selectivity
10-11-2025 to 20-11-2025	Important topics, Class Test and Revision



(Dr. Rakesh Kumar)



Principal
Govt. College for Women,
Hisar

GOVERNMENT COLLEGE FOR WOMEN, HISAR
LESSON PLAN ODD SEMESTER,
SESSION 2025-26
Department of Chemistry

NAME EXTENSION LECTURER: Dr. PRIYANKA

Class:- B.Sc-III (Sem-5th)

DAYS: 3,4 *Paper - CCL - 504 (ii) Chemistry of Main Group Elements (II)*

Month , Week	
July, Week 3	UNIT-I Structure, bonding and properties (acidic/ basic nature, oxidizing/ reducing nature and hydrolysis of the following compounds
July, Week 4	their applications in industrial and environmental chemistry wherever applicable
August, Week 1	Diborane and concept of multicentre bonding, hydrides of Groups 13 (EH ₃), 14, 15, 16 and 17.
August, Week 2	Oxides of N and P, Oxoacids of P, S and Cl
August, Week 3	UNIT-II Halides and oxohalides of P and S (PCl ₃ , PCl ₅ , SOCl ₂ and SO ₂ Cl ₂)
August, Week 4	Interhalogen compounds. A brief idea of pseudohalides (8 Hours) (7 Hours) ASSIGNMENT
September, Week 1	UNIT-III Noble gases: Rationalization of inertness of noble gases, clathrates
September, Week 2	preparation and properties of XeF ₂ , XeF ₄ and XeF ₆
September, Week 3	bonding in these compounds using VBT
September Week 4	shapes of noble gas compounds using VSEPR Theory TEST
October, Week 1	UNIT-IV Inorganic Polymers: Types of inorganic polymers
October, Week 2	comparison with organic polymers, structural features,
October , Week 3	classification and important applications of silicates.
October , Week 4	Synthesis, structural features and applications of silicones.
November, week 1	Borazines and cyclophosphazenes – preparation, properties and reactions.
November, Week 2	Bonding in (NPCl ₂) ₃ . REVISION

Dr. Priyanka

Principal
Govt. College for Women
HISAR

NAME EXTENSION LECTURER: Dr. PRIYANKA

Class:- B.Sc (Sem-4th) Minor

DAYS= 3-5

Subject: Chemistry Minor Course (MIC) Basic Chemistry – III (Semester-III) Paper
Code: C24MIC331T

Month , Week	
August, Week 1	UNIT-1 Periodic table and Properties
August, Week 2	Classification of periodic table: s, p, d and f blocks,
August, Week 3	Periodic properties: atomic and ionic radii, ionization energy
August, Week 4	electron affinity and electronegativity-
September, Week 1	trend in periodic properties (in s and p-block elements
September, Week 2	Assignment I
September, Week 3	UNIT-III Ionic Equilibria Strong, moderate and weak electrolytes.
September Week 4	degree of ionization, factors affecting degree of ionization, TEST
October, Week 1	ionization constant and ionic product of water.
October, Week 2	Ionization of weak acids and bases, pH scale, common ion effect. ASSIGNMENT
October ,Week 3	UNIT-IV Van der Waals forces and Hydrogen Bonding
October ,Week 4	Brief discussion of various types of Van der Waals forces. Hydrogen Bonding
November, week 1	Definition, types, effects of hydrogen bonding on properties of substances, Applications. ASSIGNMENT
November, Week 2	REVISION


(Dr. Priyanka)


Principal
Govt. College for Women
HISAR

NAME EXTENSION LECTURER: Dr. PRIYANKA

Class:- B.A & B.COM-I (Sem-Ist)

DAYS= 1,2

Subject: - Chemistry Multidisciplinary Course (MDC) Chemistry of Oils and Dyes
(Semester-I) Paper Code: C24MDC104T

Month , Week	
August, Week 1	UNIT-I Chemistry of Oils Introduction to oils and fats.
August, Week 2	classification, common fatty acids present in oils and fats.
August, Week 3	difference between fats and oils,
August, Week 4	Saponification value, acid value and iodine value (Only definitions).
September, Week 1	Applications and uses of different oils and fats
September, Week 2	Assignment, Test
September, Week 3	UNIT-II Chemistry of Dyes Definition; Colour and constitution;
September Week 4	Classification on the basis of origin & application methods, applications and uses of the following dyes:
October, Week 1	Methyl orange (azo dye); Malachite green (triphenylmethane dye), ASSIGNMENT
October, Week 2	Phenolphthalein (Phthalein dye),
October ,Week 3	Alizarin (anthraquinone dye),
October ,Week 4	Indigo dye. REVISION ASSIGNMENT II
November, week 1	
November, Week 2	REVISION

(Dr. Priyanka)

Principal
Govt. College for Women
JALAP

NAME EXTENSION LECTURER: Dr. PRIYANKA

Class:- B.A- & B.COM (Sem-III)

Subject: Chemistry Multidisciplinary Course (MDC)

Energy Resources and Water Treatment (Semester-III)

Paper Code: C24MDC304T

DAYS: 5,6

August, Week 1	UNIT-I Energy Resources Energy resources:
August, Week 2	Renewable and Non-Renewable resources, Cells
August, Week 3	Batteries, Fuel cell, Solar cell.
August, Week 4	UNIT-II Water Sources of drinking Test1
September, Week 1	water and uses, water conservation
September, Week 2	Permissible TDS, Water pollution, Assignment 2
September, Week 3	Techniques of purification of water, R.O.
September, Week 4	water purification process TEST
October, Week 1	(Osmosis and Reverse Osmosis),
October, Week 2	wastewater management Energy Resources
October, Week 3	Water Treatment
October, Week 5	Assignment 2
November, Week 1	Revision
November, Week 2	Revision


(Dr. Priyanka)



Dr. Priyanka
T. J. Somaiya Institute of
Engineering & Technology