



Acharya Panth Shree Grindh Muni Naam Saheb Govt. P.G. College Kawardha  
Dist. Kabirdham (C.G.)

Affiliated to: Hemchand Yadav University, Durg (C.G.)

Email ID: [govtpgcollege.kawardha@gmail.com](mailto:govtpgcollege.kawardha@gmail.com), Website: [pgcollegekawardha.edu.in](http://pgcollegekawardha.edu.in)

### Programme Outcomes: M. Sc. Chemistry

At the completion of the two-year M.Sc. Chemistry program, the students of our Department will be able to:

PO1	To understand basic facts and concepts in Chemistry while retaining the exciting aspects of Chemistry so as to develop interest in the study of chemistry as a discipline.
PO2	To appreciate the achievements in Chemistry and to know the role of Chemistry in nature and in society.
PO3	Helps in understanding the causes of environmental pollution and can open up new methods for environmental pollution control.
PO4	Learns about the potential uses of analytical industrial chemistry, medicinal chemistry and green chemistry.
PO5	To develop skills in the proper handling of apparatus and chemicals
PO6	Work in the interdisciplinary and multidisciplinary areas of chemical sciences and its applications.
PO7	Carry out experiments in the area of organic analysis, estimation, separation, derivative process, inorganic semi micro analysis, preparation, conductometric and potentiometric analysis
PO8	To be familiarized with the emerging areas of Chemistry and their applications in various spheres of Chemical sciences and to apprise the students of its relevance in future studies.

### Programme Specific Outcomes: M. Sc. Chemistry

PSO1	Understand good laboratory practices and safety.
PSO2	Make aware and handle the sophisticated instruments/equipments.
PSO3	Learn the Familiar name reactions and their reaction mechanisms.
PSO4	Understand the various type of aliphatic, aromatic, nucleophilic substitution reaction.
PSO5	Use modern chemical tools, Models, Chem-draw, Charts and Equipments
PSO6	Develop research oriented skills



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## COURSE OUTCOME: M. Sc. Chemistry

<b>SEMESTER I</b>	
<b>CHP-1</b> GROUP THEORY AND CHEMISTRY OF METAL COMPLEXES	CO-1. Learn concept of symmetry elements in molecules. CO-2. Find out the point group of inorganic molecules. CO-3. Learn about geometry and shape of the molecule. CO-4. Known the preparation and properties of transition metal carbonyls CO-5. To study the isopoly and heteropoly acids CO-6. Learn molecular orbital and its orientation. CO-7. Learn metal clusters
<b>CHP-2</b> CONCEPTS IN ORGANIC CHEMISTRY	CO-1. Learn concept of Organic chemistry and aromaticity. CO-2. Study the stereochemistry and conformational analysis. CO-3. Learn elimination reaction and Reaction intermediates. CO-4. Learn Pericyclic reaction: Electro cyclic, Cycloaddition, and Ene Reaction, analysis by correlation diagram, FMO approach and ATS concept.
<b>CHP-3</b> QUANTUM CHEMISTRY, THERMODYNAMICS AND CHEMICAL DYNAMICS – I	CO-1. Realize the terms ionic strength, activity coefficient, DHO equation. CO-2. Vector quantities and Basic rules of differentiation and Integration Applications CO-3. Understand the schrodinger wave equation. CO-4. Learn electrochemistry. CO-5. Understand the chemical dynamics.
<b>CHP-4</b> THEORY AND APPLICATIONS OF SPECTROSCOPY- I	CO-1. Study the basic and molecular spectroscopy. CO-2. Learn Microwave spectroscopy. CO-3. Learn Electron Diffraction spectroscopy. CO-4. Discuss the instrumentation of turbidimetry, nephelometry and fluorometry, Fluorescence and phosphorescence. CO-5. Understand the raman spectroscopy.
<b>CHI-5</b> Inorganic Chemistry Practical's	CO-1. Qualitative analysis of inorganic mixtures. CO-2. study the gravimetric and volumetric analysis of ores and alloy. CO-3. Prepare a various inorganic complexes and determine its % purity. CO-4. Estimation of inorganic compound.
<b>CHP-6</b>	CO-1. Determination of surface tension.



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Physical Chemistry Practical's	<p>CO-2. Construct of phase diagram.</p> <p>CO-3. Study the energy of activation and first and second order reaction.</p> <p>CO-4. Study the stability of complex ion and stranded free energy change and equilibrium constant by potentiometry.</p> <p>CO-5. Find out the acidity, Basicity and PKa Value on pH meter.</p>
<b>SEMESTER II</b>	
<b>CHP-7</b> TRANSITION METAL COMPLEXES	<p>CO-1. Study the crystal field theories.</p> <p>CO-2. Understand the transition metal complex.</p> <p>CO-3. Learn spectroscopic ground state, Selection rule and calculations of various parameters.</p> <p>CO-4. Study the transition metal complex with unsaturated organic molecule.</p> <p>CO-5. Understand the organocopper, alkylidene, allyl and dienyl complex.</p>
<b>CHP-8</b> REACTION MECHANISMS	<p>CO-1. Learn SN1, SN2 and SNi Mechanism and stereochemistry.</p> <p>CO-2. Learn aromatic nucleophilic substitution reaction.</p> <p>CO-3. Learn SE1, SE2 and aromatic electrophilic substitution reaction.</p> <p>CO-4. Study the addition of carbon-carbon multiple bond.</p> <p>CO-5. Study the addition of carbon-hetero multiple bond.</p> <p>CO-6. Understand the mechanism of condensation reaction.</p>
<b>CHP-9</b> QUANTUM CHEMISTRY, THERMODYNAMICS AND CHEMICAL DYNAMICS - II	<p>CO-1. Know the Eigen function, Eigen value, Vector, operator and postulates of quantum mechanics.</p> <p>CO-2. Study the probability, partition function and thermodynamic functions.</p> <p>CO-3. Understand the electrochemistry: Semiconductor, electrocatalysis.</p> <p>CO-4. Study the flash photolysis, RRK and RRKM.</p>
<b>CHP-10</b> THEORY AND APPLICATIONS OF SPECTROSCOPY -II	<p>CO-1. Understand the factors affecting UV-absorption spectra, Interpret IR- spectra on basic values of IR-frequencies.</p> <p>CO-2. Understand the factors affecting UV-absorption spectra, Interpret IR- spectra on basic values of IR-frequencies.</p> <p>CO-4. Discuss the problem of UV, IR and NMR.</p> <p>CO-5. Learn instrumentation of mass spectrometry, fragmentation, structure determination.</p> <p>CO-6. Study <sup>1</sup>H NMR Spectroscopy: Chemical Shift, deshielding, correlation for protons bonded to carbon and other nuclei.</p>



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	CO-7. Study of $^{13}\text{C}$ NMR spectroscopy: FT- NMR, type of $^{13}\text{C}$ NMR.
<b>CHO-11</b> Organic chemistry practical's	CO-1. Perform the Binary mixtures. CO-2. Preparation of organic compounds and their purifications. CO-3. Determination of physical constant: Melting point, Boiling point. CO-4. Different separation techniques.
<b>CHA-12</b> Analytical Chemistry Practical's	CO-1. Error analysis and statistical data analysis. CO-2. Nephelometric determination. CO-3. Verification of Lambert-beer Law. CO-4. Determination of pKa.
<b>SEMESTER III</b>	
<b>CHP-13</b> RESONANCE SPECTROSCOPY, PHOTOCHEMISTRY AND ORGANOCATALYSIS	CO-1. Discuss electron spin resonance spectroscopy. CO-2. Study Quadrupole nuclei, quadrupole moments, electric field gradient, coupling constant, splittings, applications. CO-3. Understand the Basic principal of atoms and molecules, Koopman's theorem, Auger electron spectroscopy. CO-4. Study the Basic principle of Photo acoustic Spectroscopy (PAS) and its applications. CO-5. Study of photochemistry: Carbonyl compounds, alkenes, dienes, polyenes and aromatic compounds. CO-6. Study photo rearrangement Barton reaction, application of photochemical reaction. CO-7. Discuss organocatalysis and heterogenous catalysis.
<b>CHP-14</b> CHEMISTRY OF BIOMOLECULES	CO-1. Discuss the Hydrolysis of ATP, synthesis of ATP from ADP. CO-2. Study the Structure and function of metalloproteins in electron transport processes—cytochromes and Ion-sulphur proteins. CO-3. Discuss the haemoglobin and myoglobin. CO-4. Understand Zinc enzyme and cytochrome P-450. CO-5. Study the host-guest chemistry and Cyclodextrin-based enzyme models, calixarenes. CO-6. Discuss introduction of enzyme, $\text{NAD}^+$ , $\text{NADP}^+$ , FMN, FAD, lipoic acid, vitamin B12. CO-7. Study the immobilization enzymes in medicine and industry, Enzymes and Recombinant DNA Technology. CO-8. Understand the biopolymer interaction and cell membrane and transport of ion.



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<b>CHP-15</b> CATALYSIS, SOLID STATE AND SURFACE CHEMISTRY	<p>CO-1. Study the Hard and soft acids and bases, Nucleophilicity scales, Nucleofugacity.</p> <p>CO-2. Discuss enzyme catalysis.</p> <p>CO-3. Discuss Micelle, thermodynamics of micellization, laplace equation and kelvin equation.</p> <p>CO-4. Study the Crystal defects and Non-stoichiometry.</p> <p>CO-5. Understand the Electronic properties and Band theory of semiconductors.</p> <p>CO-6. Discuss the macromolecules, kinetics of polymerization, mechanism of polymerization.</p> <p>CO-7. Determination of molecular mass of macromolecules.</p>
<b>CHP-16</b> ANALYTICAL TECHNIQUES AND DATA ANALYSIS	<p>CO-1. Sample preparation, digestion and statistical analysis.</p> <p>CO-2. Discuss Method of Extraction, applications.</p> <p>CO-3. Study the principal, Technique and applications of paper chromatography, Thin-layer chromatography, HPLC, Column chromatography. Gas Chromatography.</p> <p>CO-4. Study Principle, Instrumentation, Application of TGA, DTA and DSC methods.</p> <p>CO-5. Discuss Principle, instrumentation and application of flow injection analysis.</p> <p>CO-6. Principles and instrumentation of pH potentiometry, coulometry and conductometry.</p> <p>CO-7. Learn Differential pulse polarography and Squarewave polarography</p>
<b>CHP-17</b> Physical Chemistry Practicals	<p>CO-1. Determination of surface tension.</p> <p>CO-2. Study the energy of activation and first and second order reaction.</p> <p>CO-3. Study the stability of complex ion and stranded free energy change and equilibrium constant by potentiometry.</p> <p>CO-4. Find out the acidity, Basicity and PKa Value on pH meter.</p>
<b>CHA-18</b> Analytical Chemistry Practical's	<p>CO-1. Spectral analysis best on instrumental techniques</p> <p>CO-2. Preparation of organic compounds, their purifications and run TLC.</p> <p>CO-3. Determination of physical constant: Melting point, Boiling point.</p> <p>CO-4. Different separation techniques.</p>
<b>SEMESTER IV</b>	
<b>CHP-19</b> INSTRUMEN TAL METHODS	<p>CO-1. Study the ion chromatography, Size exclusion chromatography and Supercritical fluid chromatography.</p> <p>CO-2. Discuss Capillary Electrophoresis and capillary electrochromatography.</p>



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OF ANALYSIS	<p>CO-3. Understand X-Ray fluorescent method and Theory, instrumentation and application of Proton Induced X-Ray Spectroscopy.</p> <p>CO-4. Study Theory, instrumentation and application of flame photometry, AES, ICP-AES and AFS.</p> <p>CO-5. Study the atomic absorption spectroscopy.</p> <p>CO-6. Discuss Theory, instrumentation and application of hyphenated techniques i.e. GC/HPLC/MS-GC/IC/HPLC- ICP-MS</p>
<b>CHP-20</b> NATURAL PRODUCTS AND MEDICINAL CHEMISTRY	<p>CO-1. Discuss the Terpenoids and Carotenoid.</p> <p>CO-2. Study the synthesis Ephedrine, (+) - Conine, Nicotine, Atropine, Quinine and Morphine.</p> <p>CO-3. Learn biogenesis terpenoides, alkaloids and shikimic pathway.</p> <p>CO-4. Study the steroids and plant pigments.</p> <p>CO-5. Learn medicinal chemistry, Drug design, the action and discovery.</p> <p>CO-6. Study the structure activity and drug targets.</p> <p>CO-7. Study synthesis of antimicrobial drugs, antibacterial, antifungal, antiviral, antimalarial etc.</p>
<b>CHP-21</b> MATERIAL AND NUCLEAR CHEMISTRY	<p>CO-1. Discuss forces and fluxes, Onsager's theory for biological systems.</p> <p>CO-2. Study the nanoparticles and its applications, ceramics, physical and chemical methods.</p> <p>CO-3. Learn Supramolecular reactivity and catalysis.</p> <p>CO-4. Understand the nuclear and radiochemistry.</p> <p>CO-5. Study the Nuclear fission and nuclear energy.</p>
<b>CHP-22</b> ENVIRONMENTAL & APPLIED CHEMICAL ANALYSIS	<p>CO-1. Study air pollution and its. Control device.</p> <p>CO-2. Discuss photochemical smog, greenhouse effect, global warming and ozone hole.</p> <p>CO-3. Study the soil and water pollution.</p> <p>CO-4. Discuss the food adulteration.</p> <p>CO-5. Analysis of food.</p> <p>CO-6. Study cosmetic, clinical and drug analysis.</p>



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<b>CHO-23</b> Organic Chemistry Practical's	CO-1. Multistep synthesis of organic compounds. CO-2. Quantitative organic analysis. CO-3. Extraction of organic compounds from natural sources.
<b>CH-24</b> Practical's	CO-1. Spectrophotometric determination. CO-2. Titrimetric/gravimetric determinations. CO-3. Separation of organic compounds by paper chromatography.