SMRJ Government College, Siwani (Bhiwani)

(Affiliated to Chaudhary Bansi Lal University, Bhiwani)

Session: 2025-26

Lesson Plan

(Department of Chemistry)

Teacher: Dr. Mukesh Rani

Chemistry)

Class: B.Sc. (Med. & Non-Medical)

Semester: III

Maximum Marks: 50

End Term Exam Marks: 40

Course Type & Title: Chemistry-III (S & P-Block Elements, Electrochemistry & Organic

Course Code: 24UN-CHE-301

Credits: 04

Internal Assessment Marks: 10

Practical Marks: 50

Course Outcomes: After completing this course, the learner will be able to:

1. To learn about the structure of S and P-block elements, their properties and discuss their use in daily life as well as industrial applications.
2. To understand about various laws and theories related to Electrochemistry-I and know about their thermodynamic properties.
3. To understand about variation of conductance studies with concentration and explain with many phenomena.
4. The fundamental properties, structures and reactivity of organic compounds such alkene, alkyne arenes, alkyl and aryl halide etc

Sr. No.	Week/Month, 2025	Unit/ Topic/ Chapter to be covered	Assignment/ Test/ Remarks, if any
1	02.09.2025 – 06.09.2025	Salient features of hydrides, oxides, halides, hydroxides of s-block elements (methods of preparation excluded).	
2	08.09.2025 – 13.09.2025	Structure, preparation and properties of Diborane and Borazine. Structure of oxides of Nitrogen and Phosphorous; Oxyacids of Nitrogen, Phosphorus, Sulphur, Chlorine.	
3	15.09.2025 – 20.09.2025	Comparison of acidic strength of oxyacids. Alkynes: Nomenclature, structure, methods of formation – calcium carbide, dehydrohalogenation, Kolbe's electrolysis.	
4	22.09.2025 – 27.09.2025	Reactions of alkynes: Mechanism of electrophilic and nucleophilic addition, formation of metal acetylides. Addition of bromine, KMnO4, ozonolysis; acidity of alkynes.	

5	29.09.2025 – 04.10.2025	R and S configuration, E & Z system, conformational analysis of ethane and n-butane. Conformations of cyclohexane, Newman and Sawhorse projections. Benzene and derivatives: Nomenclature, aromatic nucleus, Huckel's rule of aromaticity.	
6	06.10.2025 – 11.10.2025	Orientation and activating/deactivating substituents. Energy profile diagrams. Alkyl halides: Nomenclature, methods of formation from alkenes and alcohols; SN1 and SN2 mechanisms.	**Assignment**
7	13.10.2025 – 18.10.2025	Aryl halides: Methods of formation, Sandmeyer reaction, addition–elimination mechanisms. Comparison of reactivity of alkyl, allyl, vinyl, and aryl halides; noble gas chemistry and structures of Xe compounds.	
8	27.10.2025 – 01.11.2025	Electrochemistry-I: Electrolytic conduction, factors affecting, specific, molar and equivalent conductance.	
9	03.11.2025 – 08.11.2025	Variation of conductance with concentration, concept of pH, pKa, buffer solution, Henderson–Hasselbalch equation.	**Mid Term Test**
10	10.11.2025 – 15.11.2025	Electrochemistry-II: Reversible and irreversible cells, thermodynamic quantities (ΔG, ΔH, K).	
11	17.11.2025 – 22.11.2025	Types of reversible electrodes – metal-metal ion, gas, redox electrodes; Nernst equation, SHE, calomel electrode.	
12	24.11.2025 – 29.11.2025	Revision of syllabus	

1. **Recommended Books/ E resources/ LMS:**
2. 1. J.D. Lee – Concise Inorganic Chemistry, Oxford University Press.
3. 2. P.L. Soni & H.M. Chawla – Textbook of Organic Chemistry.
4. 3. P.W. Atkins & J. de Paula – Physical Chemistry, Oxford University Press.
5. 4. R.T. Morrison & R.N. Boyd – Organic Chemistry.
6. 5. Bahl & Tuli – Essentials of Physical Chemistry.
7. 6. e-Resources: NPTEL lectures on S- and P-block elements, Electrochemistry, Organic Reaction Mechanisms.
8. 7. LMS: Departmental Moodle / Google Classroom – topic-wise PPTs, videos, quizzes.

Signature of the teacher concerned

Head of the Department

SMRJ Government College, Siwani (Bhiwani)

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Session: 2025-26

Lesson Plan

(Department of Chemistry)

Teacher: Dr. Mukesh Rani
Class: B.Sc. (Med. & Non-Medical)
Semester: 1st
Maximum Marks: 50
End Term Exam Marks: 40

Course Type & Title: Chemistry-I
Course Code: 24UN-CHE-101
Credits: 04
Internal Assessment Marks: 10
Practical Marks: 50

Course Outcomes:

1. Enable to understand the basis of quantum mechanics and structural idea and relevance in describing shapes of s, p and d orbitals.

2. To learn about role of temperature and pressure to establish the state of gases and describe the concept of critical constants of real gases.

3. Get knowledge about the electrophile/nucleophile and its role in mechanism of preparation of organic compounds.

4. To know the physical properties, morphology and crystalline study of liquid and different type of solids.

5. Hand on practice in preparation of solutions, compounds, estimation and determination of physical properties of some of some compounds.

Sr. No.	Week/Month, 2025	Unit/ Topic/ Chapter to be covered	Assignment/ Test/ Remarks, if any
1.	02.09.2025 – 06.09.2025	Dual behavior of matter and radiation; de Broglie's relation; Heisenberg's uncertainty principle. Concept of atomic orbitals; significance of quantum numbers; radial and angular wave functions.	
2.	08.09.2025 – 13.09.2025	Normal and orthogonal wave functions; significance of ψ and ψ^2; shapes of s, p, d, f orbitals. Rules for filling electrons in orbitals (Aufbau, Pauli, Hund); effective nuclear charge; Slater's rules.	
3.	15.09.2025 – 20.09.2025	Classification of periodic table; atomic and ionic radii; ionization energy, electron affinity. Electronegativity: trends in s and p-block elements; Pauling, Mulliken, Allred–Rochow and Mulliken–Jaffe scales.	
4.	22.09.2025 – 27.09.2025	Sanderson's electron density ratio; periodic trends and their applications. Kinetic theory of gases; Maxwell's distribution of velocities and energies. Root mean square, average, and most probable velocity; collision diameter, number, frequency, mean free path.	

5.	29.09.2025 – 04.10.2025	Deviation of real gases from ideal behaviour; Derivation of van der Waal's equation. Application of van der Waal's equation: Boyle's temperature, compression factor. Critical phenomenon: critical temperature, pressure, volume; relation between critical constants and van der Waal's constants.	**Assignment**
6.	06.10.2025 – 11.10.2025	Structure and bonding: localized and delocalized bonds; Van der Waals interactions; concept of resonance. Hyperconjugation, inductive and electromeric effects; their comparison and applications.	
7.	13.10.2025 – 18.10.2025	Mechanism of organic reactions: curved arrow notation; homolytic and heterolytic fission; electrophiles and nucleophiles.	
8.	27.10.2025 – 01.11.2025	Types of organic reactions – Substitution, Addition, Condensation, Elimination, Rearrangement, Isomerization, Pericyclic reactions.	
9.	03.11.2025 – 08.11.2025	Reactive intermediates: Carbonations, carbanions, free radicals, carbenes – structure and stability.	**Mid TermTest**
10.	10.11.2025 – 15.11.2025	Liquid state: structure of liquids; properties – surface tension, refractive index, viscosity, vapour pressure, optical rotation.	
11.	17.11.2025 – 22.11.2025	Solid state: classification of solids; laws of interfacial angles, rational indices, Miller indices. Symmetry elements.	
12.	24.11.2025 – 29.11.2025	seven crystal systems and fourteen Bravais lattices; X-ray diffraction and Bragg's law, Laue method, rotating crystal and powder pattern methods; revision and discussion.	

Recommended Books/ E resources/ LMS:

1. Lee, J.D.; (2010), Concise Inorganic Chemistry, Wiley India.

2. Kapoor, K.L. (2015), A Textbook of Physical Chemistry, Vol 1, 6th Edition, McGraw Hill Education.

3. Clayden, J.; Greeves, N.; Warren, S. (2012), Organic Chemistry, Oxford.

4. Morrison, R. N.; Boyd, R. N. Organic Chemistry, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).

5. Khosla, B.D.; Garg, V.C.; Gulati, A. (2015), Senior Practical Physical Chemistry, R. Chand &Co, New Delhi.

6. Jeffery, G.H.; Bassett, J.; Mendham, J.; Denney, R.C. (1989), Vogel's Textbook of Quantitative Chemical Analysis, John Wiley and Sons.

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Session: 2025-26

Lesson Plan

(Department of Chemistry)

Teacher: Dr. Mukesh Rani

Class: B.Sc. (Med. & Non-Medical)
Semester: Vth
Maximum Marks: 50
End Term Exam Marks: 40

Course Type & Title: Organometallics & Bioinorganic Chemistry (Theory
Course Code: 20UCHE501
Credits: 04
Internal Assessment Marks: 10
Practical Marks: 50(40+10)

Sr. No.	Week/Month, 2025	Unit/ Topic/ Chapter to be covered	Assignment/ Test/ Remarks, if any
1	02.09.2025 – 06.09.2025	Introduction and history of polymeric materials: Different schemes of classification of polymers, polymer nomenclature,	
2	08.09.2025 – 13.09.2025	molecular forces and chemical bonding in polymers, texture of polymers, functionality and its importance: criteria for synthetic polymer formation	
3	15.09.2025 – 20.09.2025	classification of polymerization processes, relationships between functionality, extent of reaction and degree of polymerization.	
4	22.09.2025 – 27.09.2025	Kinetics of polymerization: Mechanism and kinetics of step growth, radical chain growth, ionic chain (both cationic and anionic) and coordination polymerizations, Mechanism and kinetics of copolymerization, polymerization techniques.	
5	29.09.2025 – 04.10.2025	Conducting polymers: structure, properties and application of the following polymers: polyacetylene, polyaniline, poly(p-phenylene sulphide), polypyrrole, polythiophene.	
6	06.10.2025 – 11.10.2025	Polymers of commercial importance: Brief introduction to preparation, structure, properties and application of the following polymers: polyolefins, polystyrene, poly(vinyl chloride), poly(vinyl acetate),	**Assignment**
7	13.10.2025 – 18.10.2025	Polymers of commercial importance: Brief introduction to preparation, structure, properties and application of the following polymers acrylic polymers, fluoro polymers, polyamides, phenol formaldehyde resins (Bakelite, Novalac), polyurethanes, silicone polymers.	

8	27.10.2025 – 01.11.2025	Metal carbonyls: 18-electron rule; Electron count of mononuclear and polynuclear carbonyls of 3d series.Preparation of metal carbonyls: Direct combination, reductive carbonylation, thermal & photochemical decomposition	
9	03.11.2025 – 08.11.2025	Structures of mono- and binuclear carbonyls of Cr, Mn, Fe, Co, Ni (using VBT); π-acceptor behaviour of CO; MO diagram of CO.Synergic effect and use of IR data to explain extent of back bonding Zeise's salt: Preparation, structure, evidences of synergic effect; Comparison with carbonyls.	**Minor Test**
10	10.11.2025 – 15.11.2025	Metal alkyls: Structure and bonding in methyl lithium and trialkyl aluminium; Concept of multicentre bonding.Ferrocene: Preparation, reactions (acetylation, alkylation, metallation, Mannich condensation); structure and aromaticity.	
11	17.11.2025 – 22.11.2025	Comparison of aromaticity and reactivity of ferrocene with benzene.	
12	24.11.2025 – 29.11.2025	Fischer–Tropsch process and polymerization of ethene using Ziegler–Natta catalyst. (Completion of Unit III)Bioinorganic Chemistry: Metal ions in biological systems, classification of elements, geochemical distribution; Na^+/K^+ pump.	

Recommended Books/ E resources/ LMS:

9. J.E. Huheey, E.A. Keiter, R.L. Keiter & O.K. Medhi – Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Education.
10. B.D. Gupta & A.J. Elias – Basic Organometallic Chemistry, Universities Press.
11. R. D. Shriver, P.W. Atkins, C.H. Langford – Inorganic Chemistry, Oxford University Press.
12. F.A. Cotton & G. Wilkinson – Advanced Inorganic Chemistry, Wiley.
13. D.F. Shriver & M.A. Drezdzon – The Manipulation of Air Sensitive Compounds, Wiley-Interscience.
14. e-Resources: NPTEL lectures on Organometallic Chemistry (IIT Madras, IIT Bombay).
15. LMS: Departmental Moodle / Google Classroom (uploaded PPTs, videos, and quizzes).
16. Seymour, R.B. & Carraher, C.E. Polymer Chemistry: An Introduction, Marcel Dekker, Inc. New York, 1981.
17. Odian, G. Principles of Polymerization, 4th Ed. Wiley, 2004.
18. Billmeyer, F.W. Textbook of Polymer Science, 2nd Ed. Wiley Interscience, 1971.
19. Ghosh, P. Polymer Science & Technology, Tata McGraw-Hill Education, 1991.

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Head of the Department