



Vitthalbhai Patel & Rajratna P. T. Patel Science College  
(Autonomous)

(Reaccredited with 'A' Grade by NAAC (CGPA 3.13))

Affiliated to SARDAR PATEL UNIVERSITY

Vallabh Vidyanagar, Gujarat

Syllabus effective from the Academic Year 2024-2025



(Bachelor of Science) (Undergraduate) (NEP-2020)

B. Sc. (UG) Semester-I

Course Code	<b>US01MACHE01</b>	Title of the Course	<b>GENERAL CHEMISTRY- I</b>
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	To make students familiar with: 1. Chemistry as a subject. 2. Historic development and scope of chemistry 3. Basic concepts related to Organic, Inorganic, physical and analytical chemistry.
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Course Content		
Unit	Description	Weightage* (%)
1.	<b>ALKANE, ALKENE AND ALKYNE</b> <b>Hydrocarbons</b> : Physical properties of alkanes, alkene and alkynes, Common and IUPAC nomenclature of alkanes, alkenes and alkynes. <b>Alkanes</b> : Preparation from alkene by hydrogenation, reduction of alkyl halide, The Grignard reagent, Corey-House reaction, Wurtz reaction, Wurtz-Fittig reaction, Mechanism of halogenations, Orientation of halogenations : n-propane, n-butane, iso-butane, 2,3-dimethylbutane, n-pentane and isopentane, Ease of formation and stability of free radical. <b>Alkenes</b> : Geometrical isomerism (Cis-Trans and E-Z isomerism), Preparation of alkene from dehydrohalogenation of alkyl halide with Mechanism, dehydration of alcohol. The E <sup>2</sup> mechanism, Evidence : Absence of hydrogen exchange, element effect, Heat of hydrogenation and stability of alkene, The E <sup>1</sup> mechanism, Evidence accompanied by rearrangement, Electrophilic addition Mechanism, Electrophilic addition rearrangement, Mechanism of addition of halogen, Halohydrin formation, Free-radical addition, Hydroxylation, addition of alkene and alkane to alkene, Oxymercuration-Demercuration and Hydroboration-oxidation, Ozonolysis.	25



	<p><b>Alkynes:</b> Preparation from dehydrohalogenation of alkyl halide, Reaction of metal acetylide with primary alkyl halides, Hydration of alkynes, Acidity of alkynes, Analysis of alkynes.</p>	
2.	<p><b>PERIODIC PROPERTIES</b>  <b>Periodic Table:</b> Definition of periodic table, Periodic Law, Modern periodic table (Long form of periodic table), Merits of long form of periodic table, Brief introduction and types of elements, Atomic, ionic and covalent radii and its related numericals, Shielding effect and effective nuclear charge, Factor affecting the magnitude of <math>\sigma</math> and <math>Z_{\text{eff}}</math> and their variation in the periodic table, Slater's rule for calculation <math>\sigma</math> and <math>Z_{\text{eff}}</math>.  <b>Ionization Energy:</b> Successive ionization energy, Factor affecting magnitude of Ionization Energy, Variation of IE values in main group element, Variation of IE values in different element groups, Ionization energies of isoelectronic species, Find out the order of second IE values of the element of second period, Difference between Ionization potential and Electrode potential of a metal.  <b>Electron Affinity:</b> Relation between EA of X(g) atom and IE of X-(g) ion, EA<sub>2</sub> represents energy required, Factor affecting the magnitude of electron affinity, Variation of electron affinity in main group elements of the periodic table, Variation of electron affinity values of different groups.  <b>Electronegativity:</b> Different methods used for calculating electronegativity (like Pauling, Mulliken, Allred-Rachow), Factor affecting the magnitude of electronegativity, Role of electronegativity in chemical behaviour, Variation of electronegativity of the elements of different group, Variation of electronegativity in a period of s and p Block elements, Application of electronegativity. Numerical based on above topics.</p>	25
3.	<p><b>IONIC EQUILIBRIA IN AQUEOUS SOLUTIONS</b>                      Sparingly Soluble Salts, Selective Precipitation, Acids &amp; Bases; Arrhenius theory of Acids and Bases, The Lowry – Bronsted Concept, Strength of Acids and Bases, The Lewis concept, Numerical problems; Self Ionization of water, Weak acids and bases, Hydrolysis, Buffer Solutions; Indicator, Numerical based on above topics.</p>	25
4.	<p><b>ANALYTICAL CHEMISTRY</b>                      Introduction, Qualitative and Quantitative analysis, Instrumental and</p>	

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	<p>Chemical Methods of analysis, Applications of Chemical Analytical Chemistry, Sampling of Solid, Liquid and Gas, Stages of Analysis, Selection of Methods, Classification of quantitative analysis on the basis of : Quantitative execution of chemical reaction, Electrical measurements, Spectroscopic properties and Movement of substance in a medium under controlled condition, limitations of Analytical Methods, Classification of Errors, Accuracy and Precision, Absolute and Relative Error, Minimization of Error, Significant Figure, Rounding off, Mean, Median, Standard Deviation, , Distribution of Random Error, Reliability of Results (Q-test), Comparison of Results: Student's t-test and F-test, confidence limit (interval), Numericals based on above topics.</p>	<p><b>25</b></p>
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<p>Teaching-Learning Methodology</p>	<p>Conventional method (classroom blackboard teaching), ICT. Courses for B. Sc. Chemistry programme are delivered through classroom, laboratory work in a challenging, engaging, and inclusive manner that accommodates a variety of learning styles and tools (PowerPoint presentations, audio visual resources, e-resources, seminars, workshops, models).</p>
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage (%)
1.	<p>Continuous and compression evaluation : Class test/Internal written test 15 Marks (30%), Quiz 15 Marks (30%), Active learning 05 Marks (10%), Home Assignments 05 Marks (10%), Class Assignments 05 Marks (10%), Attendance 05 Marks (10%), (As per SPU Letter No. E-3/2748 dated 02/02/2024) [Total 50 Marks (100%)].</p>	50
2.	<p>Semester End Examination [Total 50 Marks (100%)].</p>	50

Course Outcomes: Having completed this course, the learner will be able to	
1.	<p>Gain the knowledge of Chemistry using various fundamental aspects of all four major branches of chemical sciences.</p>



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2.	Explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the several chemical reactions.
3.	To have knowledge of basic aspects of inorganic chemistry comprising of various aspects of periodic table.
4.	Gain knowledge about various acid-base theory and their applications.
5.	Know about use of various theoretical analytical methods and their applications.

Suggested References:

Sr. No.	References
1.	Morrison, R. T. & Boyd, R. N., <i>Organic chemistry</i> (6 <sup>th</sup> edition). (unit- 1)
2.	Clayden, J., Greeves, N., Warren, S., <i>Organic Chemistry</i> 2 <sup>nd</sup> Edition, Oxford University Press. (unit- 1)
3.	Prakash S., Tuli, G. D., Basu, S. K., Madan R. D., <i>Advance inorganic chemistry</i> (Vol. - I). (unit- 2)
4.	Lee J. D., <i>Concise Inorganic Chemistry</i> (4 <sup>th</sup> Edition). (unit- 2)
5.	Cotton, F.A. & Wilkinson, G. <i>Basic Inorganic Chemistry</i> , Wiley. (unit- 2)
6.	Mahan, B.H. <i>University Chemistry</i> , 3 <sup>rd</sup> Edition Narosa. (unit- 3)
7.	Day, R. A. and Underwood A. L., <i>Quantitative Analysis</i> 6 <sup>th</sup> Edition. (unit- 4)
8.	Vogel, A. I., <i>Textbook Quantitative Chemical Analysis</i> , Prentice-Hall, 5 <sup>th</sup> Ed. (unit- 4)

On-line resources to be used if available as reference material

On-line Resources : Google books, INFLIBNET, Google Web

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