

Mahatma Gandhi Vidyamandir's
Smt. Pushpatai Hiray Mahila Mahavidyalya, Malegaon, Dist. Nashik.

Department of Chemistry

B. Sc Chemistry

Theory papers in each semester deal with the further detailed studies of the various branches of chemistry as well as some specialized topics like industrial and environmental chemistry. Such as designing of course structure enables the student to understand fundamental as well as applied components that are pertinent to chemistry. Also practical course are framed towards development of synthetic as well as analytical skills that are essential for academic and professional life.

CO1: The systematic and planned curricula from first year to the third year shall motivate and encourage the students for pursuing higher studies in various disciplines of chemistry such as physical, inorganic, organic, analytical, drug and biochemistry. This curriculum also enable student to shoulder the responsibility as chemist in chemical industry.

CO2: Since chemistry is an experimental subject practical courses is interned to achieve the basic skills required for understanding the concepts and authenticating the basic laws and principles of chemistry.

CO3: For the development of vertical growth in the subject advanced level topics are introduced so as to make the student mature enough to pursue the career in chemistry.

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Programme Outcomes: FY B.Sc Chemistry

The syllabus of Chemistry for First year has been redesigned for Choice based Credit System (CBCS) to be implemented from 2019-2020.

Course Outcome

CH- 101: Physical Chemistry

After completing the course learner will be acquired with knowledge of chemical energetics, Chemical equilibrium and ionic equilibria.

CH- 102: Organic Chemistry

Students will learn Fundamentals of organic chemistry, stereochemistry (Conformations, configurations and nomenclatures) and functional group approach for aliphatic hydrocarbons.

CH- 201: Inorganic Chemistry

Students will learn quantum mechanical approach to atomic structure, Periodicity of elements, various theories for chemical bonding.

CH-202: Analytical Chemistry

Students will know about basics of analytical chemistry, some techniques of analysis and able to do calculations essential for analysis.

Lab Course CH 103 and CH-203

1. The practical course is in relevance to the theory courses to improve the Understanding of the concepts.
2. It would help in development of practical skills of the students.
3. Use of microscale techniques wherever required.

Course Name	Learning outcome
<p style="text-align: center;">CH-101 : Physical Chemistry</p>	<p>Chemical Energetics</p> <ol style="list-style-type: none"> 1. Students will be able to apply thermodynamic principles to physical and chemical process 2. Calculations of enthalpy , Bond energy, Bond dissociation energy , resonance energy 3. Variation of enthalpy with temperature –Kirchoff’s equation 4. Third law of thermodynamic and its applications <p>2. Chemical Equilibrium</p> <p>Knowledge of Chemical equilibrium will make students to understand</p> <ol style="list-style-type: none"> 1. Relation between Free energy and equilibrium and factors affecting on equilibrium constant. 2. Exergonic and endergonic reaction 3. Gas equilibrium, equilibrium constant and molecular interpretation of equilibrium constant 4. Van’t Haff equation and its application <p>3. Ionic equilibria</p> <p>Ionic equilibria chapter will lead students to understand</p> <ol style="list-style-type: none"> 1. Concept to ionization process occurred in acids, bases and pH scale 2. Related concepts such as Common ion effect hydrolysis constant, ionic product, solubility product 3. Degree of hydrolysis and pH for different salts , buffer solutions
<p style="text-align: center;">CH-201 :Inorganic Chemistry</p>	<p>1. Atomic Structure</p> <ol style="list-style-type: none"> 1. Various theories and principles applied to reveal atomic structure 2. Origin of quantum mechanics and its need to understand structure of hydrogen atom 3. Schrodinger equation for hydrogen atom 4. Radial and angular part of hydrogenic wave functions 5. Significance of quantum numbers

6. Shapes of orbitals

2. Periodicity of Elements

1. Explain rules for filling electrons in various orbitals- Aufbau's principle, Pauli exclusion principle, Hund's rule of maximum multiplicity

2. Discuss electronic configuration of an atom and anomalous electronic configurations.

3. Describe stability of half-filled and completely filled orbitals.

4. Discuss concept of exchange energy and relative energies of atomic orbitals

5. Design Skeleton of long form of periodic table.

6. Describe Block, group, modern periodic law and periodicity.

7. Classification of elements as main group, transition and inner transition elements

8. Write name, symbol, electronic configuration, trends and properties.

9. Explain periodicity in the following properties in details: a.

Effective nuclear charge, shielding or screening effect; some numerical problems. b. Atomic and ionic size. c. Crystal and

covalent radii d. Ionization energies e. Electronegativity- definition,

trend, Pauling electronegativity scale. f. Oxidation state of elements

3. Chemical Bonding

1. Attainment of stable electronic configurations.

2. Define various types of chemical bonds- Ionic, covalent, coordinate and metallic bond

3. Explain characteristics of ionic bond, types of ions, energy consideration in ionic bonding, lattice and solvation energy and their importance in the context of stability and solubility of ionic compounds

4. Summarize Born-Landé equation and Born-Haber cycle,

5. Define Fajan's rule, bond moment, dipole moment and percent

	<p>ionic character.</p> <p>6. Describe VB approach, Hybridization with example of linear, trigonal, square planer, tetrahedral, TBP, and octahedral.</p> <p>7. Discuss assumption and need of VSEPR theory.</p> <p>8. Interpret concept of different types of valence shell electron pairs and their contribution in bonding.</p> <p>9. Application of non-bonded lone pairs in shape of molecule</p> <p>10. Basic understanding of geometry and effect of lone pairs with examples such as ClF_3, Cl_2O, BrF_5, XeO_3 and XeOF_4.</p>
CH-102 : Organic Chemistry	<p>1. The students are expected to understand the fundamentals, principles, and recent developments in the subject area.</p> <p>2. It is expected to inspire and boost interest of the students towards chemistry as the main subject.</p> <p>3. To familiarize with current and recent developments in Chemistry.</p> <p>4. To create foundation for research and development in Chemistry.</p>
CH-202 : Analytical Chemistry	<p>1. Introduction to Analytical Chemistry</p> <p>i. Analytical Chemistry –branch of chemistry</p> <p>ii. Perspectives of analytical Chemistry</p> <p>iii. analytical problems</p> <p>2. Calculations used in Analytical Chemistry</p> <p>i. Calculations of mole, molar concentrations and various units of concentrations which will be helpful for preparation of solution</p> <p>ii. Relation between molecular formula and empirical formula</p> <p>iii. Stoichiometric calculation</p> <p>iv. Define term mole, millimole, molar concentration, molar equilibrium concentration and Percent Concentration.</p> <p>v. SI units, distinction between mass and weight</p> <p>vi. Units such as parts per million, parts per billion, parts per thousand, solution-dilatant volume ratio, function density and specific gravity of solutions.</p>

	<p>3 Qualitative Analysis of Organic Compounds Basics of type determination, characteristic tests and classifications, reactions of different functional groups.</p> <p>i. Separation of binary mixtures and analysis</p> <p>ii. Elemental analysis -Detection of nitrogen, sulfur, halogen and phosphorous by Lassaigne's test.</p> <p>iii. Purification techniques for organic compounds.</p> <p>4. Chromatographic Techniques – Paper and Thin layer Chromatography</p> <p>i. Basics of chromatography and types of chromatography</p> <p>ii. Theoretical background for Paper and Thin Layer Chromatography</p> <p>5. pH metry</p> <p>i. pH meter and electrodes for pH measurement</p> <p>ii. Measurement of pH</p> <p>iii. Working of pH meter iv. Applications of pH meter</p>
<p>CH-103 : Chemistry Practical-I</p>	<p>1. Importance of chemical safety and Lab safety while performing experiments in laboratory</p> <p>2. Determination of thermochemical parameters and related concepts</p> <p>3. Techniques of pH measurements</p> <p>4. Preparation of buffer solutions</p> <p>5. Elemental analysis of organic compounds (non instrumental)</p> <p>6. Chromatographic Techniques for separation of constituents of mixtures</p>
<p>CH-203 : Chemistry Practical-II</p>	<p>1. Inorganic Estimations using volumetric analysis</p> <p>2. Synthesis of Inorganic compounds</p> <p>3. Analysis of commercial products</p> <p>4. Purification of organic compounds</p> <p>5. Preparations and mechanism of reactions involved</p>