

**Y.S. Palpara Mahavidyalaya**  
**Programme Specific Outcome**  
**BACHELOR OF SCIENCE with CHEMISTRY**  
**(Multidisciplinary Studies)**  
**3 Year Undergraduate Programme**  
**CCFUP 2023 & NEP 2020**

Upon successful completion of this course,

1. **Fundamental Knowledge:** Students should have a strong foundation in the fundamental concepts of chemistry, including principles of inorganic, organic, and physical chemistry.
2. **Laboratory Skills:** Students should be proficient in laboratory techniques and safety procedures, including the ability to design and conduct experiments, analyze data, and draw conclusions.
3. **Problem-Solving Skills:** Graduates should be able to apply chemical principles to solve complex problems in various contexts, such as environmental, industrial, and medicinal chemistry.
4. **Critical Thinking:** Students should develop critical thinking skills, including the ability to evaluate scientific literature, assess the validity of experimental results, and make informed decisions based on evidence.
5. **Communication Skills:** Graduates should be able to effectively communicate scientific concepts and research findings through written reports and oral presentations.
6. **Ethical and Professional Conduct:** Students should understand and adhere to ethical standards in scientific research and demonstrate professionalism in their interactions with peers and colleagues.
7. **Interdisciplinary Knowledge:** Graduates should recognize the interdisciplinary nature of chemistry and its connections to other fields of science and technology.
8. **Research Skills:** For those pursuing research-oriented careers, the program may include the development of research skills, including experimental design, data analysis, and publication of research findings.
9. **Environmental and Social Responsibility:** Students may be expected to understand the environmental and societal implications of chemical processes and products and contribute to sustainable practices.

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**Course outcome**  
**CCFUP 2023 & NEP 2020**

**CHEMISTRY Major (Disc-A1)**  
**(Multidisciplinary Studies)**  
**3 Year Undergraduate Programme**

**Semester-I**

**MJA1: Atomic Structure, Redox Reaction and precipitation ,general organic chemistry & aliphatic hydrocarbons.**

**Theory (MJA1T):**

**Section A: Inorganic Chemistry-1**

**a. Atomic Structure**

To know about fundamentals of Bohr's theory, de Broglie's relation, Heisenberg Uncertainty principle, hydrogen atom spectra, time independent Schrodinger equation and the concept of atomic orbitals.

**b. Redox Reaction and precipitation:**

To know about Ion electron Balancing, Standard Redox Potential, Nernst equation, precipitation and change of pH on redox potentials; formal potential, Redox potential diagram (Latimer and Frost diagrams), Disproportionation and comproportionation reactions.

To know about Solubility product principle, common ion effect and their applications to the precipitation and separation of common metallic ions.

**Section B: Organic Chemistry-1**

**a. Fundamentals of Organic Chemistry**

To know about inductive Effect, electromeric effect, resonance, hyperconjugation and the fundamentals of nucleophiles and electrophiles and aromaticity.

**b. Stereochemistry**

To know about conformation, interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations, concept of chirality, geometrical and optical isomers, CIP Rules, R/ S and E / Z nomenclature

**c. Aliphatic Hydrocarbons**

To know about Functional group approach for common alkanes, alkenes and alkynes. Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. Reactions, Free radical Substitution, Halogenation, Elimination reactions Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule), cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions, cis-addition (alk.  $\text{KMnO}_4$ ) and trans-addition (bromine), Addition of HX (Markownikoff's and anti Markownikoff's addition), Hydration, Ozonolysis, oxymecuration - demercuration, Hydroboration-oxidation.

## **MJ A1P: Atomic structure, Bonding, general organic chemistry & aliphatic hydrocarbons (Practical)**

### **Section A: Inorganic Chemistry - Volumetric Analysis**

1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture
2. Estimation of oxalic acid by titrating it with  $\text{KMnO}_4$ .
3. Estimation of water of crystallization in Mohr's salt by titrating with  $\text{KMnO}_4$
4. Estimation of  $\text{Fe(II)}$  ions by titrating with  $\text{K}_2\text{Cr}_2\text{O}_7$  using redox indicator..
5. Estimation of  $\text{Cu(II)}$  ions iodometrically using  $\text{Na}_2\text{S}_2\text{O}_3$ .

### **Section B: Organic Chemistry**

1 Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing upto two extra elements)

2 Separation of mixtures by Chromatography: Measure the  $R_f$  value in each case (combination of two compounds to be given) (a) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography (b) Identify and separate the sugars present in the given mixture by paper chromatography.

## **SEC 1: Chemistry of Cosmetics & Perfumes**

### **SEC1P: Chemistry of Cosmetics & Perfumes**

#### **Course Outline:**

#### **Part-A:**

- i) Preparation of talcum powder.
- ii) Preparation of shampoo.
- iii) Preparation of enamels.
- iv) Preparation of hair remover.
- v) Preparation of face cream.
- vi) Preparation of nail polish and nail polish remover.
- vii) Preparation of Lipstick.

#### **Part-B: Field visit and submission of the Report**

- **Monor (MI) MI-1/C1: Same as Minor 1 of Chemistry (Hons) Programme**

**Y.S. Palpara Mahavidyalaya**  
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**CCFUP 2023 & NEP 2020**

**CHEMISTRY Major (Disc-B1)**  
**(Multidisciplinary Studies)**  
**3 Year Undergraduate Programme**

**Semester-II**

**MJB1: Atomic Structure, Redox Reaction and precipitation, general organic chemistry & aliphatic hydrocarbons.**

**Theory (MJB1T):**

**Section A: Inorganic Chemistry-1**

**c. Atomic Structure**

To know about fundamentals of Bohr's theory, de Broglie's relation, Heisenberg Uncertainty principle, hydrogen atom spectra, time independent Schrodinger equation and the concept of atomic orbitals.

**d. Redox Reaction and precipitation:**

To know about Ion electron Balancing, Standard Redox Potential, Nernst equation, precipitation and change of pH on redox potentials; formal potential, Redox potential diagram (Latimer and Frost diagrams), Disproportionation and comproportionation reactions.

To know about Solubility product principle, common ion effect and their applications to the precipitation and separation of common metallic ions.

**Section B: Organic Chemistry-1**

**b. Fundamentals of Organic Chemistry**

To know about inductive Effect, electromeric effect, resonance, hyperconjugation and the fundamentals of nucleophiles and electrophiles and aromaticity.

**b. Stereochemistry**

To know about conformation, interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations, concept of chirality, geometrical and optical isomers, CIP Rules, R/ S and E / Z nomenclature

**C. Aliphatic Hydrocarbons**

To know about Functional group approach for common alkanes, alkenes and alkynes. Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. Reactions, Free radical Substitution, Halogenation, Elimination reactions Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule), cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions, cis-addition (alk.  $\text{KMnO}_4$ ) and trans-addition (bromine), Addition of HX (Markownikoff's and anti Markownikoff's addition), Hydration, Ozonolysis, oxymecuration demercuration, Hydroboration-oxidation.

## **MJ B1: Atomic structure, Bonding, general organic chemistry & aliphatic hydrocarbons (Practical)**

### **Section A: Inorganic Chemistry - Volumetric Analysis**

6. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture
7. Estimation of oxalic acid by titrating it with  $\text{KMnO}_4$ .
8. Estimation of water of crystallization in Mohr's salt by titrating with  $\text{KMnO}_4$
9. Estimation of  $\text{Fe(II)}$  ions by titrating with  $\text{K}_2\text{Cr}_2\text{O}_7$  using redox indicator..
10. Estimation of  $\text{Cu(II)}$  ions iodometrically using  $\text{Na}_2\text{S}_2\text{O}_3$ .

### **Section B: Organic Chemistry**

- 1 Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing upto two extra elements)
- 2 Separation of mixtures by Chromatography: Measure the  $R_f$  value in each case (combination of two compounds to be given) (a) Identify and separate the components of a given mixture of 2 amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography (b) Identify and separate the sugars present in the given mixture by paper chromatography.

## **SEC 2: Medicinal & Pharmaceutical Chemistry**

### **SEC 2P: Medicinal and Pharmaceutical Chemistry**

**The students will learn the following practicals.**

#### **Part-A: Extraction**

- i) Extraction of eucalyptus leaf ingredient
- ii) Extraction of eugenol from clove
- iii) Extraction of nicotine from tobacco.
- iv) Curumine from turmeric
- v) Extraction of caffeine from tea/coffee

**Part-B: A project:** Collection and brief introduction of at least 10 herbal plants

- **Monor (MI) MI-2/C2: Same as Minor 2 of Chemistry (Hons) Programme**

