## ABOUT THE DEPARTMENT

Started as a supportive subject to P.U.C in 1967 and as allied to UG Mathematics course in 1972, the Department has been elevated to offer **B.Sc., (Chemistry)** major Programme during 1979 with Mathematics / Botany and Physics as Ancillary subjects. The Department has been producing exemplary results right from its inception. The Department is constantly concentrating on the overall development of students. So far 42 batches of students have successfully finished their graduation. Many of them have pursued their higher education in various prestigious institutions like MIT, IISc, IIT, Central University and the others have been well placed as production executives and marketing executives in Chemical and Pharma industries.

## VISION

To train the students of Chemistry as scientifically literate professionals with a sense of social responsibility.

## MISSION

- To encourage the advancement of Chemistry in all of its branches through education, research and service opportunities.
- To provide students with community need based research and outreach opportunities.
- To strive for an ideal balance between creation and knowledge dissemination in the chemical sciences.
- To train our students to succeed in competitive examinations

## GRADUATE ATTRIBUTES

1. **(KB) A knowledge base for Chemistry**: Demonstrated competence in university level mathematics, natural sciences, knowledge appropriate to the program.

2. **(PA) Problem analysis**: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex problems in order to reach substantiated conclusions

3. **(Inv.) Investigation**: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data and synthesis of information in order to reach valid conclusions.

4. **(Des.) Design:** An ability to design solutions for complex, open–ended problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.

5. **(Tools) Use of tools**: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern tools to a range of activities, from simple to complex, with an understanding of the associated limitations.

6. **(Team) Individual and teamwork**: An ability to work effectively as a member and leader in teams, preferably in a multi–disciplinary setting.

7. **(Comm.) Communication skills**: An ability to communicate complex scientific concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.

8. **(Prof.) Professionalism**: An understanding of the roles and responsibilities of the graduates in society, especially the primary role of protection of the public and the public interest.

9. **(Impacts) Impact of Chemistry on society and the environment**: An ability to analyze social and environmental aspects of science activities. Such ability includes an understanding of the interactions that Chemistry with the economic, social, health, safety, legal, and cultural aspects of society, the uncertainties in the prediction of such interactions; and the concepts of sustainable design and development and environmental stewardship.

10. **(Ethics) Ethics and equity**: An ability to apply professional ethics, accountability, and equity.

11. **(Econ.) Economics and project management**: An ability to appropriately incorporate economics and business practices including project, risk, and change management into the practice of science and to understand their limitations.

12. **(LL) Life–long learning**: An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge

## PROGRAMME EDUCATIONAL OBJECTIVES(PEOs)

**The B.Sc., Chemistry Graduates of the Sourashtra College will:**

| | |
|---|---|
| **PEO 1** | be well prepared for successful careers in the profession at an industry and/or in government in one or more of discipline of chemistry. |
| **PEO 2** | be academically prepared to become licensed professional chemists in due course and will contribute effectively in serving the society. |
| **PEO 3** | be engaged in professional activities to enhance their own achievement and simultaneously contribute in service of mankind. |
| **PEO 4** | be successful in higher education in Chemistry. |
| **PEO 5** | have leadership quality to work in all kind of circumstances, diverse environment such as interdisciplinary and multidisciplinary learning systems. |
| **PEO 6** | have proper laboratory and safety techniques with effective scientific communication skills. |

## UNDERGRADUATE (UG) PROGRAMME OUTCOMES (POs)

Undergraduate (B.A., **B.Sc.,** B.Com., B.C.A., B.B.A., etc.,) is a 3 – year degree Programme with 6 semesters consisting the following Programme Outcomes (POs) under various criteria including critical thinking, problem solving, effective communication, societal/ citizenship/ ethical credibility, sustainable growth and employable abilities.

| | |
|---|---|
| **PO 1** | **Critical Thinking**: Intellectual exploration of knowledge towards actions in clear and rational manner by understanding the logical connections between ideas and decisions. |
| **PO 2** | **Problem Solving**: Understanding the task/ problem followed by planning and narrow execution strategy that effectively provides the solution. |
| **PO 3** | **Effective Communication**: Knowledge dissemination by oral and verbal mechanisms to the various components of our society. |
| **PO 4** | **Societal/ Citizenship/ Ethical Credibility**: Realization of various value systems/ moral dimensions and demonstrate the empathetic social concern as well as equity in all the decisions, executions and actions. |
| **PO 5** | **Environmental Concern and Sustainable Growth**: Understanding the emerging environmental challenges and provide the possible contribution in sustainable development that integrates environment, economy and employment. |
| **PO 6** | **Skill Development and Employable Abilities**: Adequate training in relevant skill sector and creating employable abilities among the under graduates. |

## PROGRAMME SPECIFIC OUTCOMES(PSOs)

On completion of **B.Sc. Chemistry** Programme, the students are expected /will be able to

| | |
|---|---|
| **PSO 1** | get a firm foundation in the fundamentals and applications of chemical and scientific theories including environmental and biological aspects in chemistry. |
| **PSO 2** | make use of experiments by demonstration with the help of analytical instruments and analyze the outcomes. |
| **PSO 3** | develop skills in problem solving, critical thinking and analytical reasoning as applied to chemistry related problems. |
| **PSO 4** | find the solution for the ethical, historic, philosophical, economical and environmental dimensions of problems and issues facing chemists. |
| **PSO 5** | pursue post graduate program in higher educational institutions and also to get suitable employment opportunities in industries and academic institutions. |
| **PSO 6** | exhibit leadership qualities to work individually and within a team in organizing curricular, co–curricular and extracurricular activities. |

## DISTRIBUTION OF CREDITS (UG PROGRAMME)

| Part | Semester | Courses | No. of Courses | Hrs. | Credits | Total Credits |
|---|---|---|---|---|---|---|
| **I** | **I–IV** | Language | **4** | **6** | **3** | **12** |
| **II** | **I–IV** | English | **4** | **6** | **3** | **12** |
| **III** | **I–VI** | Core | **16** | **3–6** | **2–5** | **60** |
| | **I–IV** | Elective/Allied | **4** | **6** | **5** | **20** |
| | **V–VI** | Elective | **4** | **4–5** | **3–4** | **15** |
| **IV** | **I–II** | SEC (Non Major Elective) | **2** | **2** | **2** | **4** |
| | **I** | Foundation Course FC | **1** | **2** | **2** | **2** |
| | **I–IV** | SEC (Discipline Specific/ Generic) | **5** | **1–2** | **1–2** | **9** |
| | **IV** | EVS(Environmental Studies) | **1** | **2** | **2** | **2** |
| | **V** | Value Education | **1** | **2** | **2** | **2** |
| | **V** | Internship | **1** | **–** | **1** | **1** |
| **V** | **IV** | Extension Activity | **–** | **–** | **1** | **1** |
| | **V** | Soft Skills (Self–Study) | **1** | **0** | **1** | **1** |
| | **VI** | General Knowledge(online) (Self – Study) | **1** | **0** | **1** | **1** |
| **Additional credit will be given to any Online Course taken in SWAYAM Portal** | | | | | | |
| | | **Total** | | | | **142** |

# SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

## B.Sc. CHEMISTRY– SYLLABUS

**(Under CBCS based on OBE)**

**(For the students admitted from the academic year 2025 – 2026 onwards)**



## B.Sc. CHEMISTRY
## COURSE STRUCTURE – I SEMESTER

| S. No. | Course Code | Part | Course Title | Hrs. / Week | Exam (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 25UACT11 | I | **Tamil** – பொதுத் தமிழ் – I | 6 | 3 | 25 | 75 | 100 | 3 |
| | 25UACH11 | | **Hindi** – General Hindi – I | | | | | | |
| | 25UACS11 | | **Sanskrit** – Poetry, Grammar and History of Sanskrit Literature | | | | | | |
| 2. | 25UACE11 | II | **English** – General English – I | 6 | 3 | 25 | 75 | 100 | 3 |
| 3. | 25UCYC11 | III | **Core – 1:** General Chemistry–I | 5 | 3 | 25 | 75 | 100 | 5 |
| 4. | 25UCYCP1 | | **Core – 2: Practical –** Quantitative Inorganic estimation (titrimetry) and Inorganic Preparations | 3 | 6 | 40 | 60 | 100 | 2 |
| 5. | 25UMSA11 | | **Elective/Allied – 1:** Mathematics –I | 6 | 3 | 25 | 75 | 100 | 5 |
| | 25UBYA11 | | Botany –I | 4/2 | 3 | 25 | 75 | 100 | 3 |
| | 25UBYAP1 | | Botany Practical | | | 40 | 60 | 100 | 2 |
| 6. | 25UMSN11/ 25UBYN11 | IV | **SEC – 1: NME** Mathematics/ Botany | 2 | 3 | 25 | 75 | 100 | 2 |
| 7. | 25UCYFC1 | | **Foundation Course:** Role of Chemistry in Daily life | 2 | 3 | 25 | 75 | 100 | 2 |
| | | **Total** | | **30** | | | | **700/800** | **22/22** |

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## COURSE STRUCTURE – II SEMESTER

| S. No. | Course Code | Part | Course Title | Hrs. / Week | Exam (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 25UACT21 | I | **Tamil** – பொதுத் தமிழ் – II | 6 | 3 | 25 | 75 | 100 | 3 |
| | 25UACH21 | | **Hindi** – General Hindi – II | | | | | | |
| | 25UACS21 | | **Sanskrit**– Prose, Grammar and History of Sanskrit Literature | | | | | | |
| 2. | 25UACE21 | II | **English** – General English – II | 6 | 3 | 25 | 75 | 100 | 3 |
| 3. | 25UCYC21 | III | **Core – 3:** General Chemistry–II | 5 | 3 | 25 | 75 | 100 | 5 |
| 4. | 25UCYCP2 | | **Core – 4: Practical**– Qualitative Organic Analysis and preparation of Organic Compounds | 3 | 6 | 40 | 60 | 100 | 2 |
| 5. | 25UMSA21 | | **Elective/ Allied – 2:** Mathematics –II | 6 | 3 | 25 | 75 | 100 | 5 |
| | 25UBYA21 | | Botany – II | 4/2 | 3 | 25 | 75 | 100 | 3 |
| | 25UBYAP2 | | Botany Practical | 2 | 3 | 40 | 60 | 100 | 2 |
| 6. | 25UMSN21/ 25UBYN21 | IV | **SEC – 2: NME:** Mathematics/ Botany | 2 | 3 | 25 | 75 | 100 | 2 |
| 7. | 25UCYS21 | | **SEC – 3: DS:** Cosmetics and Personal Grooming | 2 | 3 | 25 | 75 | 100 | 2 |
| | | **Total** | | **30** | | | | **700/800** | **22/22** |

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**(For the students admitted from the academic year 2025 – 2026 onwards)**



## B.Sc. CHEMISTRY
## COURSE STRUCTURE – I SEMESTER

| S. No. | Course Code | Part | Course Title | Hrs. / Week | Exam (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 25UACT11 | I | **Tamil** – பொதுத் தமிழ் – I | 6 | 3 | 25 | 75 | 100 | 3 |
| | 25UACH11 | | **Hindi** – General Hindi – I | | | | | | |
| | 25UACS11 | | **Sanskrit** – Poetry, Grammar and History of Sanskrit Literature | | | | | | |
| 2. | 25UACE11 | II | **English** – General English – I | 6 | 3 | 25 | 75 | 100 | 3 |
| 3. | 25UCYC11 | III | **Core – 1:** General Chemistry–I | 5 | 3 | 25 | 75 | 100 | 5 |
| 4. | 25UCYCP1 | | **Core – 2: Practical** – Quantitative Inorganic estimation (titrimetry) and Inorganic Preparations | 3 | 6 | 40 | 60 | 100 | 2 |
| 5. | 25UMSA11 | | **Elective/Allied – 1:** Mathematics –I | 6 | 3 | 25 | 75 | 100 | 5 |
| | 25UBYA11 | | Botany –I | 4/2 | 3 | 25 | 75 | 100 | 3 |
| | 25UBYAP1 | | Botany Practical | | | 40 | 60 | 100 | 2 |
| 6. | 25UMSN11/ 25UBYN11 | IV | **SEC – 1: NME** Mathematics/ Botany | 2 | 3 | 25 | 75 | 100 | 2 |
| 7. | 25UCYFC1 | | **Foundation Course:** Role of Chemistry in Daily life | 2 | 3 | 25 | 75 | 100 | 2 |
| | | **Total** | | **30** | | | | **700/800** | **22/22** |

**CA – Class Assessment (Internal)**

**SE – Summative Examination**

**SEC – Skill Enhancement Course**

**NME – Non –Major Elective**

**T – Theory**

**P – Practical**

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**(Under CBCS based on OBE)**

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| COURSE CODE | COURSE TITLE | CATEGORY | T | P | CREDITS |
|---|---|---|---|---|---|
| 25UCYC11 | GENERAL CHEMISTRY – I | CORE – 1 | 5 | – | 5 |

| YEAR | SEMESTER | INTERNAL | EXTERNAL | TOTAL |
|---|---|---|---|---|
| I | I | 25 | 75 | 100 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Curriculum Design and Development** | Employability | | | Skill Oriented | | ✓ | Entrepreneurship | | | | | |
| | National | | Local | | Regional | | Global | | | | ✓ | |
| **Curriculum Enrichment** | Professional Ethics | | Gender | | Environment and Sustainability | | Human Values | | Other Values | ✓ | | |

**COURSE DESCRIPTION:**

This course deals with the basics of chemistry required for UG programme

**COURSE OBJECTIVES:**

The course aims at giving an overall view of the following

- quantum mechanics
- chemical bonding
- basic organic chemistry

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| No. | Course Outcomes | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | explain the atom on the basis of classical mechanics and atomic properties | Upto K3 |
| CO 2 | illustrate the quantum mechanics. | Upto K3 |
| CO 3 | identify the bonding in molecules | Upto K3 |
| CO 4 | predict the geometry of molecules with the help VB theory and VSEPR theory | Upto K3 |
| CO 5 | understand the basic concepts in organic chemistry | Upto K3 |

**K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING**

## GENERAL CHEMISTRY – I

**UNIT – I: ATOMIC STRUCTURE AND PERIODIC TRENDS**

Constituents of atom – Planck's Quantum theory: Black body radiation – Photoelectric effect – Compton effect – Bohr model of the atom– postulates of Bohr's theory (no radius and energy calculation) hydrogen spectrum – Zeeman effect – de Broglie's equation – the wave nature of the electron – Heisenberg's uncertainty principle – Quantum numbers – Pauli's exclusion principle – Aufbau principle– Hund's rule.

**MODERN PERIODIC TABLE**

Cause of periodicity; Features of the periodic table; classification of elements Periodic trends for atomic size – Atomic radii, Ionic radii and Covalent radii – ionization energy, electron affinity– electronegativity–electronegativity scales, applications of electronegativity.

**UNIT – II: INTRODUCTION TO QUANTUM MECHANICS**

Classical mechanics, Wave mechanical model of atom, distinction between a Bohr orbit and orbital; Postulates of quantum mechanics; probability interpretation of wavefunctions, Formulation of Schrodinger wave equation – Probability and electron density–visualizing the orbitals –Probability density and significance of $\Psi$ and $\Psi^2$.

**UNIT – III: STRUCTURE AND BONDING – I**

Cause of chemical bonding – Octet rule – Types of bonds – Ionic bond: definition – ionic compounds – factors favoring the formation of ionic compounds including Lattice energy and properties – Metallic bond: definition and conditions for the formation of metallic bond–significance–Hydrogen bond: definition and types – consequence and significance – vanderWaal's forces: definition and types – applications

**UNIT– IV: STRUCTURE AND BONDING – II**

Covalent bond : definition – covalent compounds : factors favouring the formation and properties – Valence Bond theory–Postulates–applications to $H_2$ and HF molecules – Molecular Orbital approaches – explanation and applications to various molecules including homonuclear ($H_2$,$He_2$,$F_2$,$O_2$) and heteronuclear (HF, CO) molecules.

Hybridization: definition and types: *sp*, $sp^2$, $sp^3$, $sp^3d$ and $sp^3d^2$ ($BeF_2$ , $BCl_3$ , $CH_4$ , $PCl_5$ , $SF_6$ )– VSEPR theory : Postulates –applications to $H_2O$, $NH_3$ , $ClF_3$ and $ClO_4$ molecules – Ionic character in covalency : Fajan's rule – Coordinate Bond : definition and conditions for formation of a coordinate bond.

**UNIT– V: BASIC CONCEPTS IN ORGANIC CHEMISTRY**

Characteristics of organic compounds – catenation – classification of organic compounds – homologous series – functional groups – nomenclature – IUPAC system – Empirical formula – molecular formula – problems.

Tetrahedral valency of carbon – homolytic and heterolytic fissions of C–C bond – formation and stability of carbonium ions, carbanions and free radicals –electrophilic and nucleophilic reagents.

Electronic effects: inductive effect – mesomeric effect – resonance effect – hyperconjugation effect.

Types of organic reactions – substitution – addition – elimination – rearrangement – examples (mechanism not required).

**TEXT BOOKS:**

1. Madan R D, Sathya Prakash, (2014), ***Modern Inorganic Chemistry***, (2019) S.Chand and Company, New Delhi.
2. Sathya Prakash, Tuli G D,Basu S K and Madan R D, (2020), ***Advanced Inorganic Chemistry Vol 2***, 19th edition, S.Chand and Company, New Delhi.
3. Bahl B S, Arul Bhal, (2017), ***Advanced Organic Chemistry***, 23rd edition, S.Chand and Company, New Delhi.
4. Tewari K S, Mehrothra S N and Vishnoi N K, (2017), ***Text book of Organic Chemistry***, 4th edition, Vikas Publishing House, New Delhi.
5. Puri B R, Sharma L R, (2020), ***Principles of Physical Chemistry***, 49th edition, Vishal Publishing Company, Jalandhar.

**REFERENCE BOOKS:**

1. Maron S H and Prutton C P, (2017), ***Principles of Physical Chemistry***, 4th edition, The Macmillan Company, Newyork.
2. Barrow G M, (1996), ***Physical Chemistry***, 6th edition, Tata McGraw Hill, New Delhi.
3. Lee J D, (2023), ***Concise Inorganic Chemistry***, 5th edition, ELBS William Heinemann, London.
4. Huheey J E,(2006),***Inorganic Chemistry: Principles of Structure and Reactivity***, 4th edition, Addison Wesley Publishing Company, India.
5. Gurudeep Raj, (2022 Reprint), ***Advanced Inorganic Chemistry Vol – I***, 26th edition, Goel Publishing House, Meerut.
6. Agarwal O P, (2023), ***Reactions and Reagents in Organic Chemistry***, 56th edition, Goel Publishing House, Meerut.

**DIGITAL TOOLS:**

- https://onlinecourses.nptel.ac.in
- http://www.mikeblaber.org/oldwine/chm1045/notes_m.htm
- http://www.ias.ac.in/initiat/sci_ed/resources/chemistry/Inorganic.html
- https://swayam.gov.in/course/64–atomic–structure–and–chemical–bonding
- https://www.chemtube3d.com/

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 |

**3. Advanced Application 2. Intermediate Development 1. Introductory Level**

# SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

## B.Sc. CHEMISTRY– SYLLABUS

**(Under CBCS based on OBE)**

**(For the students admitted from the academic year 2025 – 2026 onwards)**



| COURSE CODE | COURSE TITLE | CATEGORY | T | P | CREDITS |
|---|---|---|---|---|---|
| 25UCYCP1 | QUANTITATIVE INORGANIC ESTIMATION (TITRIMETRY) AND INORGANIC PREPARATIONS | CORE –2 | – | 3 | 2 |

| YEAR | SEMESTER | INTERNAL | EXTERNAL | TOTAL |
|---|---|---|---|---|
| I | I | 40 | 60 | 100 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Curriculum Design and Development** | Employability | | ✓ | Skill Oriented | | ✓ | Entrepreneurship | | | | |
| | National | | Local | | Regional | | Global | | | | ✓ |
| **Curriculum Enrichment** | Professional Ethics | | Gender | | Environment and Sustainability | | Human Values | | Other Values | | ✓ |

**COURSE DESCRIPTION:**

This course gives the practical knowledge in volumetric analysis.

**COURSE OBJECTIVES:**

This course aims at providing knowledge on

- laboratory safety
- handling glasswares
- quantitative estimation
- preparation of inorganic compounds

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| CO | Course Outcomes | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO1 | provide the knowledge in laboratory safety and develop the skill in handling glasswares and various apparatus used in volumetric estimation. | Upto K3 |
| CO2 | explain the basic principles involved in titrimetric analysis. | Upto K3 |
| CO3 | calculate the concentrations of unknown solutions in different ways and develop the skill to estimate the amount of a substance present in a given solution. | Upto K3 |
| CO4 | assess the yield of different inorganic preparations. | Upto K3 |

**K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING**

## QUANTITATIVE INORGANIC ESTIMATION (TITRIMETRY) AND INORGANIC PREPARATIONS

### UNIT– I: CHEMICAL LABORATORY SAFETY IN ACADEMIC INSTITUTIONS

Introduction – importance of safety education for students, common laboratory hazards, assessment and minimization of the risk of the hazards, prepare for emergencies from uncontrolled hazards; concept of MSDS; importance and care of PPE; proper use and operation of chemical hoods and ventilation system; fire extinguishers–types and uses of fire extinguishers, demonstration of operation; chemical waste and safe disposal.

**Common Apparatus Used in Quantitative Estimation (Volumetric)**

Description and use of burette, pipette, standard flask, measuring cylinder, conical flask, beaker, funnel, dropper, clamp, stand, wash bottle, watch glass, wire gauge and tripod stand.

### UNIT– II: PRINCIPLE OF QUANTITATIVE ESTIMATION (VOLUMETRIC)

Equivalent weight of an acid, base, salt, reducing agent, oxidizing agent; concept of mole, molality, molarity, normality; primary and secondary standards, preparation of standard solutions; theories of acid–base, redox, complexometric, iodimetric and iodometric titrations; indicators – types, theory of acid–base, redox, metal ion and adsorption indicators, choice of indicators.

### UNIT– III:

**Quantitative Estimation (Volumetric)**

Preparation of standard solution, dilution from stock solution

**Acidimetry and Alkalimetry**

Estimation of Sodium carbonate
Estimation of Oxalic acid

**Permanganometry**

Estimation of Ferrous sulphate using standard Ferrous ammonium sulphate
Estimation of sodium oxalate using standard ferrous ammonium sulphate

**Dichrometry**

Estimation of ferric alum using standard dichromate (external indicator)
Estimation of ferric alum using standard dichromate (internal indicator)

**Iodometry**

Estimation of copper in copper sulphate using standard dichromate

**Argentimetry**

Estimation of chloride in barium chloride using standard sodium chloride/
Estimation of chloride in sodium chloride (Volhard's method)

**Complexometry**

Estimation of hardness of water using EDTA

### UNIT– IV:

**Preparation of Inorganic compounds**

Potassium trioxalatoaluminate(III)
Tetraammine copper (II) sulphate
Potassium trioxalatochromate(III)
Mohr's Salt

**TEXT BOOKS:**

1. Venkateswaran, V., Veeraswamy, R.; Kulandaivelu, A.R. ***Basic Principles of Practical Chemistry***, 2nd edition, Sultan Chand: New Delhi, 2015.
2. Gurtu, J.N; Kapoor, R. ***Advanced Experimental Chemistry (Organic),*** Sultan Chand: New Delhi, 1987.
3. Furniss, B. S.; Hannaford, A. J.; Smith, P. W. G., Tatchell, A.R. ***Vogel's Textbook of Practical Organic Chemistry,*** 5th edition, Pearson: India, 1989.

**REFERENCE BOOK:**

G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, ***Vogel's Text book of Quantitative Chemical Analysis***, 6th edition, Pearson Education, 2006.

**DIGITAL TOOLS:**

- http://www.federica.unina.it/agraria/analytical–chemistry/volumetricanalysis
- https://chemdictionary.org/titration–indicator/

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 |

**3. Advanced Application 2. Intermediate Development 1. Introductory Level**

# SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

## B.Sc. CHEMISTRY– SYLLABUS

**(Under CBCS based on OBE)**

**(For the students admitted from the academic year 2025 – 2026 onwards)**



| COURSE CODE | COURSE TITLE | CATEGORY | T | P | CREDITS |
|---|---|---|---|---|---|
| 25UCYFC1 | ROLE OF CHEMISTRY IN DAILY LIFE | FOUNDATION COURSE | 2 | - | 2 |

| YEAR | SEMESTER | INTERNAL | EXTERNAL | TOTAL |
|---|---|---|---|---|
| I | I | 25 | 75 | 100 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Curriculum Design and Development** | Employability | | | Skill Oriented | ✓ | Entrepreneurship | | | | | |
| | National | | Local | | Regional | | Global | | | ✓ | |
| **Curriculum Enrichment** | Professional Ethics | | Gender | | Environment and Sustainability | | Human Values | | Other Values | ✓ | |

**COURSE DESCRIPTION:**

This course deals about the chemistry of daily life products.

**COURSE OBJECTIVES:**

This course aims at providing knowledge on

- importance of Chemistry in everyday life
- chemistry of building materials and food
- chemistry of Drugs and pharmaceuticals

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| CO | Course Outcomes | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO1 | learn about the chemicals used in everyday life as well as air pollution and water pollution. | Upto K3 |
| CO2 | get knowledge on building materials cement, ceramics, glass and plastics, polythene, PVC bakelite, polyesters, | Upto K3 |
| CO3 | acquire information about Food and Nutrition. Carbohydrates, Proteins, Fats Also have an awareness about Cosmetics Tooth pastes, face powder, soaps and detergents. | Upto K3 |
| CO4 | discuss about the fertilizers like urea, NPK fertilizers and super phosphate. Fuel classification solid, liquid and gaseous; nuclear fuel – examples and uses | Upto K3 |
| CO5 | have an idea about the pharmaceutical drugs analgesics and antipyretics like paracetamol and aspirin and also about pigments and dyes and its applications. | Upto K3 |

**K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING**

## ROLE OF CHEMISTRY IN DAILY LIFE

**UNIT– I:**

General survey of chemicals used in everyday life. Air – components and their importance; photosynthetic reaction, air pollution, green – house effect and the impact on our life style. Water – Sources of water, qualities of potable water, soft and hard water, methods of removal of hardness–water pollution

**UNIT– II:**

Building materials – cement, ceramics, glass and refractories – definition, composition and application only. Plastics – polythene, PVC, bakelite, polyesters, melamine–formaldehyde resins –preparation and uses only.

**UNIT– III:**

Food and Nutrition – Carbohydrates, Proteins, Fats – definition and their importance as food constituents – balanced diet – Calories minerals and vitamins (sources and their physiological importance). Cosmetics – tooth paste, face powder, soaps and detergents, shampoos, nail polish, perfumes – general formulation and preparations – possible hazards of cosmetic use.

**UNIT– IV:**

Chemicals in food production – fertilizers – need, natural sources; urea, NPK fertilizers and super phosphate. Fuel – classification – solid, liquid and gaseous; nuclear fuel examples and uses.

**UNIT– V:**

Pharmaceutical drugs – analgesics and antipyretics – paracetamol and aspirin. Colour chemicals – pigments and dyes – examples and applications. Explosives – classification and examples.

**TEXT BOOKS:**


1. H. K. Chopra, P. S. Panesar, ***Food Chemistry,*** Narosa publishing house, 2010.
2. Jayashree Ghosh, ***A Textbook of Pharmaceutical Chemistry***, S Chand publishing, 2012.
3. S. Vaithyanathan, ***Text book of Ancillary Chemistry***; Priya Publications, Karur, 2006.
4. B.K. Sharma, ***Industrial Chemistry***; GOEL publishing house, Meerut,16th edition, 2014.
5. Jayashree Ghosh, ***Fundamental Concepts of Applied Chemistry***, S. Chand & Co. Publishers, 2nd edition, 2006.


**REFERENCE BOOKS:**


1. Randolph. Norris Shreve, ***Chemical Process Industries***, McGraw–Hill, Texas, 4th edition, 1977.
2. W.A. Poucher, Joseph A. Brink, Jr. ***Perfumes, Cosmetics and Soaps***, Springer, 2000.
3. A.K. De, ***Environmental Chemistry***, New Age International Public Co., 1990.


**DIGITAL TOOLS:**

**https://www.britannica.com/technology/wastewater–treatment**
**https://onlinecourses.swayam2.ac.in/cec19_ag04/preview**
**https://byjus.com/chemistry/agricultural–chemistry/**
**https://nptel.ac.in/courses/104/105/104105039/**

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 |

**3. Advanced Application 2. Intermediate Development 1. Introductory Level**

| COURSE CODE | COURSE TITLE | CATEGORY | T | P | CREDITS |
|---|---|---|---|---|---|
| 25UCYN11 | FOOD CHEMISTRY | SEC – 1 NME | 2 | - | 2 |

| YEAR | SEMESTER | INTERNAL | EXTERNAL | TOTAL |
|---|---|---|---|---|
| I | I | 25 | 75 | 100 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Curriculum Design and Development** | Employability | | ✓ | Skill Oriented | | ✓ | Entrepreneurship | | | | |
| | National | | Local | | Regional | | Global | | | | ✓ |
| **Curriculum Enrichment** | Professional Ethics | | Gender | | Environment and Sustainability | | Human Values | | Other Values | | ✓ |

**COURSE DESCRIPTION:**

This course imparts detailed knowledge about the food chemistry.

**COURSE OBJECTIVES:**

This course aims at giving an overall view of the

- Types of food
- Food adulteration and poisons
- Food additives and preservation

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| No. | Course Outcomes | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | learn about food adulteration – contamination of wheat, Rice, Milk, Butter. | Upto K3 |
| CO 2 | get an awareness about food poisons like natural poisons (alkaloids – nephrotoxin) pesticides, DDT, BHC, Malathion | Upto K3 |
| CO 3 | get an exposure on food additives, artificial sweeteners, Saccharin, Cyclomate and Aspartate in the food industries. | Upto K3 |
| CO 4 | acquire knowledge on beverages, soft drinks, soda, fruit juices and alcoholic beverages examples | Upto K3 |
| CO 5 | study about fats and oils – Sources of oils – production of refined vegetable oils – preservation. Saturated and unsaturated fats –MUFA and PUFA | Upto K3 |

**K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING**

## FOOD CHEMISTRY

**UNIT– I: FOOD ADULTERATION**

Sources of food, types, advantages and disadvantages – food adulteration – contamination of wheat, rice, milk, butter etc. with clay stones, water and toxic chemicals –common adulterants– detection of adulterated foods by simple analytical techniques.

**UNIT– II: FOOD POISON**

Food poisons – natural poisons – Chemical poisons – pesticides, (DDT, BHC) –First aid for poison consumed victims.

**UNIT– III: FOOD ADDITIVES**

Food additives –artificial sweeteners – saccharin – cyclomate and aspartate – food flavours –esters, aldehydes and heterocyclic compounds – food colours – emulsifying agents – preservatives – baking powder – yeast – taste makers – MSG – vinegar.

**UNIT– IV: BEVERAGES**

Beverages–soft drinks–soda–fruit juices–alcoholic beverages–examples – Carbonation– addiction to alcohol– diseases of liver and social problems.

**UNIT– V: EDIBLE OILS**

Fats and oils – sources of oils – refined vegetable oils – preservation– saturated and unsaturated fats – iodine value – role of MUFA and PUFA in preventing heart diseases– RM value, saponification values (definition and their significance)

**TEXT BOOKS:**


1. H. K. Chopra, P. S. Panesar, ***Food Chemistry***, Narosa publishing house, 2010.
2. Jayashree Ghosh, ***Fundamental Concepts of Applied Chemistry*** S Chand publishing, 2006.
3. Dr. L. Rakesh Sharma, ***Food Chemistry,*** Evincepub publishing, 2022.
4. G. Subbulakshmi, Shobha A Udipi, Pdmini S Ghugre, ***Food processing and preservation,*** New age international publishers, 2nd edition, 2021.


**REFERENCE BOOKS:**


1. H.–D. Belitz, Werner Grosch, ***Food Chemistry*** Springer Science & Business Media, 4th Edition, 2009.
2. M.Swaminathan, ***Food Science and Experimental Foods***, Ganesh and Company,1979.
3. Hasenhuettl, Gerard. L. Hartel, Richard. W. ***Food Emulsifiers and their applications*** Springer New York 2nd ed. 2008.
4. H.–D. Belitz, W. Grosch, P. Schieberle, ***Food Chemistry,*** Springer, 4th revised and extended edition, 2009.
5. John M. deMan, John W. Finley, W. Jefferey Hurst, Chang Yong Lee, ***Principles of food chemistry,*** Springer, 4th edition, 2018.


**DIGITAL TOOL:**

https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/127

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 |

**3. Advanced Application 2. Intermediate Development 1. Introductory Level**

# SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

## B.Sc. CHEMISTRY– SYLLABUS

**(Under CBCS based on OBE)**

**(For the students admitted from the academic year 2025 – 2026 onwards)**



## COURSE STRUCTURE – II SEMESTER

| S. No. | Course Code | Part | Course Title | Hrs. / Week | Exam (Hrs.) | CA | SE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|---|
| 1. | 25UACT21 | I | **Tamil** – பொதுத் தமிழ் – II | 6 | 3 | 25 | 75 | 100 | 3 |
| | 25UACH21 | | **Hindi** – General Hindi – II | | | | | | |
| | 25UACS21 | | **Sanskrit**– Prose, Grammar and History of Sanskrit Literature | | | | | | |
| 2. | 25UACE21 | II | **English** – General English – II | 6 | 3 | 25 | 75 | 100 | 3 |
| 3. | 25UCYC21 | III | **Core – 3:** General Chemistry–II | 5 | 3 | 25 | 75 | 100 | 5 |
| 4. | 25UCYCP2 | | **Core – 4: Practical–** Qualitative Organic Analysis and preparation of Organic Compounds | 3 | 6 | 40 | 60 | 100 | 2 |
| 5. | 25UMSA21 | | **Elective/ Allied – 2:** Mathematics –II | 6 | 3 | 25 | 75 | 100 | 5 |
| | 25UBYA21 | | Botany – II | 4/2 | 3 | 25 | 75 | 100 | 3 |
| | 25UBYAP2 | | Botany Practical | 2 | 3 | 40 | 60 | 100 | 2 |
| 6. | 25UMSN21/ 25UBYN21 | IV | **SEC – 2: NME:** Mathematics/ Botany | 2 | 3 | 25 | 75 | 100 | 2 |
| 7. | 25UCYS21 | | **SEC – 3: DS:** Cosmetics and Personal Grooming | 2 | 3 | 25 | 75 | 100 | 2 |
| | | **Total** | | **30** | | | | **700/800** | **22/22** |

**CA – Class Assessment (Internal)**

**SE – Summative Examination**

**SEC – Skill Enhancement Course**

**DS – Discipline Specific**

**NME – Non –Major Elective**

**T – Theory**

**P – Practical**

**Passed in the BoS Meeting held on 27/02/2025** **Signature of the Chairman**

# SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

## B.Sc. CHEMISTRY– SYLLABUS

**(Under CBCS based on OBE)**

**(For the students admitted from the academic year 2025 – 2026 onwards)**



| COURSE CODE | COURSE TITLE | CATEGORY | T | P | CREDITS |
|---|---|---|---|---|---|
| 25UCYC21 | GENERAL CHEMISTRY – II | CORE–3 | 5 | – | 5 |

| YEAR | SEMESTER | INTERNAL | EXTERNAL | TOTAL |
|---|---|---|---|---|
| I | II | 25 | 75 | 100 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Curriculum Design and Development** | Employability | | | Skill Oriented | ✓ | Entrepreneurship | | | | | | |
| | National | | Local | | Regional | | Global | | | | ✓ | |
| **Curriculum Enrichment** | Professional Ethics | | Gender | | Environment and Sustainability | | Human Values | | Other Values | ✓ | | |

**COURSE DESCRIPTION:**

This course deals with the basics of chemistry required for UG programme

**COURSE OBJECTIVES:**

To comprehend the fundamental properties of atoms, molecules, and the various states of matter and to understand the periodic table and their trends in physical and chemical properties. It also deals with study to acquire the knowledge of characteristics and application of acids, bases and ionic equilibria. This course helps the students to acquire a thorough knowledge of the basics of organic chemistry related to reaction mechanism, aliphatic hydrocarbons and chemistry of aromatic hydrocarbons.

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| No. | Course Outcomes | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| **CO 1** | explain the concept of acids, bases and ionic equilibria | **Upto K3** |
| **CO 2** | discuss the periodic properties of *s* and *p*–block elements | **Upto K3** |
| **CO 3** | examine the properties *p*–block elements and characteristics of group16,17 & 18 elements | **Upto K3** |
| **CO 4** | preparation and properties of aliphatic hydrocarbons | **Upto K3** |
| **CO 5** | study the reaction mechanisms of aromatic hydrocarbons | **Upto K3** |

**K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING**

## GENERAL CHEMISTRY–II

**UNIT– I: ACIDS, BASES AND IONIC EQUILIBRIA**

Concepts of Acids and Bases – Arrhenius concept, Bronsted–Lowry concept, Lewis concept – relative strengths of acids and bases – ionic product of water – pH scale – pH of solutions – degree of dissociation, factors affecting degree of dissociation, common ion effect– acid base indicators, theory of acid base indicators – action of phenolphthalein and methyl orange, titration curves – use of acid base indicators; Buffer solutions – types, mechanism of buffer action in acid and basic buffer, Henderson–Hasselbalch equation; Salt hydrolysis – salts of weak acids and strong bases, weak bases and strong acids, weak acids and weak bases – hydrolysis constant, degree of hydrolysis and relation between hydrolysis constant and degree of hydrolysis; Solubility product – determination and applications.

**UNIT– II: CHEMISTRY OF *s* and *p*– BLOCK ELEMENTS**

**Hydrogen:** Position of hydrogen in the periodic table. **Alkali metals**: Electronic configuration, metallic character, flame colouration, oxidation state and reducing property – Anomalous properties of Lithium –Diagonal relationship and resemblance of Li & Mg – Preparation, properties and uses of NaOH, $Na_2CO_3$, KBr, $KClO_3$. **Alkaline earth metals**. Anomalous behaviour of Be – diagonal relationship and resemblance of Be & Al.

**Chemistry of *p*– Block Elements** (Group 13 & 14) preparation and structure of diborane, borazine& borax – comparison of carbon with silicon– Carbon–di–sulphide – preparation, properties, structure and uses – preparation & properties of percarbonates, per monocarbonates and per dicarbonates.

**UNIT– III: CHEMISTRY OF *p*– BLOCK ELEMENTS (GROUP 15–18)**

G**eneral characteristics of elements of group 15:** Electronic configuration, metallic and non–metallic character and oxidation states –preparation and properties of $NH_2$–$NH_2$,$PCl_5$ and $H_3PO_4$.

G**eneral characteristics of elements of group 16:** Electronic configuration, metallic and non–metallic character, atomicity and oxidation states –preparation and properties of Caro's acid and Marshall's acid.

G**eneral characteristics of elements of group 17:** Electronic configuration, electro–negativity, electron affinity, oxidation states and oxidizing power. Peculiarities of fluorine. Preparation and properties of HF, HI & $HClO_4$. Inter–halogen compounds: Preparation and properties of $ClF_3$ and $IF_7$– pseudo halogens: Comparison between $(CN)_2$ and $(SCN)_2$– basic nature of Iodine.

**Elements of group 18 (Noble gases):** Preparation, properties and structure of $XeF_4$, $XeOF_4$ and $KrF_2$– clathrate compounds.

**UNIT– IV: HYDROCARBON CHEMISTRY–I**

**Alkanes:** Preparation by Sabatier–Senderen, Wurtz, Corey–House, Kolbe, Duma and reduction methods – properties of halogenation, nitration, sulphonation, pyrolysis, aromatization and oxidation.

**Alkenes:** General methods of preparation – properties: electrophilic addition reactions – addition of hydrogen halides– Markovinikov rule and Kharasch effect – addition of halogens – hydration by oxy mercuration and demercuration – hydroboration oxidation – ozonolysis – reduction – substitution reactions –polymerization.

**Alkadienes:** Classification –preparation and properties of 1,3–butadiene and isoprene.

**Alkynes:** preparation, properties and acidic character of acetylene.

**Cycloalkanes:** Preparation by Freund, Perkin, Wislicenus, Dieckmann, Thorpe–Zeigler and Diel's–Alder methods – properties – Baeyer's strain theory – its modification– conformational analysis of cyclohexane.

**UNIT– V: HYDROCARBON CHEMISTRY – II**

**Benzene:**

Source, structure of benzene: Molecular orbital model– aromaticity– Huckel's (4n+2) rule and its applications. Electrophilic substitution reactions – General mechanism of aromatic electrophilic substitution – nitration, sulphonation, halogenation, Friedel–Craft's alkylation and acylation. – Effect of substituents on orientation and reactivity – directive influence of substituents.

**Polynuclear Aromatic hydrocarbons:**

Synthesis and properties of naphthalene and anthracene – preparation and uses of derivatives of naphthalene viz., naphthols, naphthylamines and naphthaquinones

**TEXT BOOKS:**

1. Madan R D, Sathya Prakash, (2014), ***Modern Inorganic Chemistry***, (2019) S.Chand and Company, New Delhi.
2. Sathya Prakash, Tuli G D,Basu S K and Madan R D, (2020), ***Advanced Inorganic Chemistry Vol 2***, 19th edition, S.Chand and Company, New Delhi.
3. Bahl B S, Arul Bhal, (2017), ***Advanced Organic Chemistry***, 23rd edition, S.Chand and Company, New Delhi.
4. Tewari K S, Mehrothra S N and Vishnoi N K, (2017), ***Text book of Organic Chemistry***, 4th edition, Vikas Publishing House, New Delhi.
5. Puri B R, Sharma L R, (2020), ***Principles of Physical Chemistry***, 49th edition, Vishal Publishing Company, Jalandhar.

**REFERENCE BOOKS:**

1. Maron S H and Prutton C P, (2017), ***Principles of Physical Chemistry***, 4th edition, The Macmillan Company, Newyork.
2. Barrow G M, (1996), ***Physical Chemistry***, 6th edition, Tata McGraw Hill, New Delhi.
3. Lee J D, (2023), ***Concise Inorganic Chemistry***, 5th edition, ELBS William Heinemann, London.
4. Huheey J E,(2006),***Inorganic Chemistry: Principles of Structure and Reactivity***, 4th edition, Addison Wesley Publishing Company, India.
5. Gurudeep Raj, (2022 Reprint), ***Advanced Inorganic Chemistry Vol – I***, 26th edition, Goel Publishing House, Meerut.
6. Agarwal O P, (2023), ***Reactions and Reagents in Organic Chemistry***, 56th edition, Goel Publishing House, Meerut.

**DIGITAL TOOLS:**

https://onlinecourses.nptel.ac.inhttp://cactus.dixie.edu/smblack/chem1010/lecture_notes/4B.html
http://www.auburn.edu/~deruija/pdareson.pdfhttps://swayam.gov.in/course/64–atomic–structure–and–chemical–bonding

**MOOC components**

http://nptel.ac.in/courses/104101090/

Lecture1: Classification of elements and periodic properties http://nptel.ac.in/courses/104101090/

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| **CO1** | **3** | **3** | **3** | **3** | 3 | **3** |
| **CO2** | **3** | **3** | **3** | **3** | 3 | **3** |
| **CO3** | **3** | **3** | **3** | **3** | 3 | **3** |
| **CO4** | **3** | **3** | **3** | **3** | 3 | **3** |
| **CO5** | **3** | **3** | **3** | **3** | 3 | **3** |

**3. Advanced Application 2. Intermediate Development 1. Introductory Level**

| COURSE CODE | COURSE TITLE | CATEGORY | T | P | CREDITS |
|---|---|---|---|---|---|
| 25UCYCP2 | QUALITATIVE ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS | CORE–4 PRACTICAL | – | 3 | 2 |

| YEAR | SEMESTER | INTERNAL | EXTERNAL | TOTAL |
|---|---|---|---|---|
| I | II | 40 | 60 | 100 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Curriculum Design and Development** | Employability | | ✓ | Skill Oriented | | ✓ | Entrepreneurship | | | | | |
| | National | | Local | | Regional | | Global | | | | ✓ | |
| **Curriculum Enrichment** | Professional Ethics | | Gender | | Environment and Sustainability | | Human Values | | Other Values | ✓ | | |

**COURSE DESCRIPTION:**

This course gives lab experience on organic qualitative analysis.

**COURSE OBJECTIVES:**

This course gives lab experience on organic qualitative analysis by simple chemical reactions.

The analysis involving the detection of following characteristics of the given organic compound.

- Whether given organic compound is aliphatic or aromatic
- Whether given organic compound is saturated or unsaturated
- Detection of Elements: Nitrogen, Sulphur and Halogens
- Any one of the following functional groups
- Carbohydrate, Aldehyde, Ketone, Phenol, Amides, Carboxylic Acids, Amines and Nitro compounds
- Preparation of derivatives for the above functional groups.

Preparation of organic compounds

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| No. | Course Outcomes | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | able to handling the glasswares, chemicals and learn the knowledge about the laboratory safety | Upto K3 |
| CO 2 | detect the elements in organic substances and analyze the various functional groups and preparation of their derivatives. | Upto K3 |
| CO 3 | prepare the organic compounds. | Upto K3 |

**K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING**

## QUALITATIVE ORGANIC ANALYSIS AND PREPARATION OF ORGANIC COMPOUNDS

**UNIT– I:**

Safety rules, symbols and first–aid in chemistry laboratory– basic ideas about Bunsen burner, its operation and parts of the flame – chemistry laboratory glassware – basis information and uses

**UNIT– II:**

**Qualitative Organic Analysis**

Preliminary examination, detection of special elements – nitrogen, sulphur and halogens Aromatic and aliphatic nature, Test for saturation and unsaturation, identification of functional groups using solubility tests

Confirmation of functional groups

- monocarboxylic acid, dicarboxylic acid
- monohydric phenol, dihydric phenol
- aldehyde, ketone, ester
- carbohydrate (reducing and non–reducing sugars)
- primary, secondary, tertiary amine
- monoamide, diamide
- anilide, nitro compound
- preparation of derivatives for functional groups

**UNIT– III:**

**Preparation of Organic Compounds**

i. Nitration – picric acid from phenol
ii. Halogenation – p–bromo acetanilide from acetanilide
iii. Oxidation – benzoic acid from benzaldehyde
iv. Methyl benzoate to benzoic acid
v. Salicylic acid from methyl salicylate
vi. Hydrolysis of benzamide to benzoic acid
vii. Preparation of glucosazone from glucose.

**Separation and Purification Techniques (Not for Examination)**

1. Purification of organic compounds by crystallization (from water / alcohol) and distillation
2. Determination of melting and boiling points of organic compounds.
3. **Steam distillation** – Extraction of essential oil from citrus fruits/eucalyptus leaves.
4. **Chromatography(any one) (Group experiment)**
   i. Separation of amino acids by Paper Chromatography
   ii. Thin Layer Chromatography – mixture of sugars / plant pigments /permanganate dichromate.
   iii. Column Chromatography – extraction of carotene, chlorophyll and xanthophyll from leaves / separation of anthracene – anthracene picrate.
5. **Electrophoresis** – Separation of amino acids and proteins. (Demonstration)
6. Isolation of casein from milk/Determination of saponification value of oil or fat/Estimation of acetic acid from commercial vinegar. (Any one Group experiment) (4,5& 6–not for ESE) (Demonstration)

**TEXT BOOK:**

***Vogel's Textbook of Practical Organic Chemistry***, (2006), 6th edition, Pearson publication, India.

**REFERENCE BOOKS:**

1. Venkateswaran, V.; Veeraswamy, R.; Kulandaivelu, A.R. ***Basic Principles of Practical Chemistry***, 2nd edition, Sultan Chand: New Delhi, 2017.
2. Gurtu, J.N; Kapoor, R. ***Advanced Experimental Chemistry (Organic),*** Sultan Chand: New Delhi, 1987.
3. Furniss,B. S.; Hannaford, A. J.; Smith, P. W. G.; Tatchell, A.R. ***Vogel's Textbook of Practical Organic Chemistry,*** 5th edition, Pearson: India,1989.

**DIGITAL TOOLS:**

https://www.vlab.co.in/broad–area–chemical–sciences

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 3 |

**3. Advanced Application 2. Intermediate Development 1. Introductory Level**

# SOURASHTRA COLLEGE, MADURAI – 625004

(An Autonomous Institution Re-accredited with 'A' grade by NAAC)

## B.Sc. CHEMISTRY– SYLLABUS

**(Under CBCS based on OBE)**

**(For the students admitted from the academic year 2025 – 2026 onwards)**



| COURSE CODE | COURSE TITLE | CATEGORY | T | P | CREDITS |
|---|---|---|---|---|---|
| 25UCYN21 | DAIRY CHEMISTRY | SEC – 2<br>NME | 2 | - | 2 |

| YEAR | SEMESTER | INTERNAL | EXTERNAL | TOTAL |
|---|---|---|---|---|
| I | II | 25 | 75 | 100 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Curriculum Design and Development** | Employability | | ✓ | Skill Oriented | | ✓ | Entrepreneurship | | | | ✓ | |
| | National | | Local | | Regional | | Global | | | | ✓ | |
| **Curriculum Enrichment** | Professional Ethics | | Gender | | Environment and Sustainability | | Human Values | | Other Values | ✓ | | |

**COURSE DESCRIPTION:**

To know the chemistry of milk with their milk products.

**COURSE OBJECTIVES:**

This course aims at giving an overall view of

- chemistry of milk and milk products
- processing of milk
- preservation and formation of milk products.

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| CO | Course Outcomes | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO1 | understand about general composition of milk – constituents and its physical properties | Upto K3 |
| CO2 | acquire knowledge about pasteurization of Milk and various types of pasteurization –Bottle, Batch and HTST Ultra High Temperature Pasteurization. | Upto K3 |
| CO3 | learn about Cream and Butter their composition and how to estimate fat in cream and Ghee | Upto K3 |
| CO4 | explain about Homogenized milk, flavoured milk, vitaminised milk and toned milk. | Upto K3 |
| CO5 | have an idea about how to make milk powder and its drying process – types of drying process | Upto K3 |

**K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING**

## DAIRY CHEMISTRY

**UNIT– I:**

Milk–definition–general composition of milk –factors affecting the composition of milk – physical properties of milk – colour, odour & acidity.

**UNIT– II:**

Processing of Milk – destruction of microorganisms in milk – pasteurization – types of pasteurization –Bottle, Batch and HTST (High Temperature Short Time) – Vacuum pasteurization – Ultra High Temperature Pasteurization

**UNIT– III:**

Milk Products : Cream – definition – composition. Butter – definition –composition – desi butter – salted butter. Ghee – major constituents – common adulterants added to ghee and their detection – rancidity – definition – prevention.

**UNIT– IV:**

Special milk – homogenized milk – flavoured milk – vitaminised milk – toned milk – vegetable toned milk – condensed milk – humanized milk – low lactose milk.

**UNIT– V:**

**Fermented and other milk products**

Fermented milk products: fermentation of milk – yoghurt – cultured milk –acidophilous milk and uses of fermented milk products.

Ice cream –percentage composition – manufacture of ice–cream – sweeteners, stabilizers, emulsifiers and their role. Milk powder – manufacture of milk powder .

**TEXT BOOKS:**


1. K. Bagavathi Sundari, ***Applied Chemistry***, MJP Publishers, 1st edition, 2006.
2. K. S. Rangappa and K.T. Acharya, ***Indian Dairy Products***, Asia Publishing House New Delhi, 1974.
3. M.P. Mathur, D. Datta Roy, P. Dinakar, ***Text book of dairy chemistry***, Indian Council of Agricultural Research, 1st edition, 2008.
4. Saurav Singh, ***A Text book of dairy chemistry***, Daya Publishing house, 1st edition, 2013.
5. P. L. Choudhary, ***Text book of dairy chemistry,*** Bio–Green book publishers, 2021.


**REFERENCE BOOKS:**


1. Robert Jenness and S. Patom, ***Principles of Dairy Chemistry,*** S.Wiley, New York, 2005.
2. F.P.Wond, ***Fundamentals of Dairy Chemistry***, Springer, Singapore, 2006.
3. Sukumar De, ***Outlines of Dairy Technology,*** Oxford University Press, New Delhi, 2001.
4. P.F.Fox and P.L.H. Mcsweeney, ***Dairy Chemistry and Biochemistry,*** Springer, 2nd edition, 2016.
5. P. F. Fox, T. Uniacke–Lowe, P.L.H. McSweeney, J.A. O Mahony, ***Dairy Chemistry and Biochemistry,*** Springer, 2nd edition, 2015.


**DIGITAL TOOLS:**

https://onlinecourses.nptel.ac.in/noc19_ag05/preview
https://elearning.icar.gov.in/DisplayPG_ECoursesContent.aspx?CourseCode=S2mF!

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 |

**3. Advanced Application 2. Intermediate Development 1. Introductory Level**

| COURSE CODE | COURSE TITLE | CATEGORY | T | P | CREDITS |
|---|---|---|---|---|---|
| 25UCYS21 | COSMETICS AND PERSONAL GROOMING | SEC –3 DS | 2 | – | 2 |

| YEAR | SEMESTER | INTERNAL | EXTERNAL | TOTAL |
|---|---|---|---|---|
| I | II | 25 | 75 | 100 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Curriculum Design and Development** | Employability | | ✓ | Skill Oriented | | ✓ | Entrepreneurship | | | | |
| | National | | Local | | Regional | | Global | | | | ✓ |
| **Curriculum Enrichment** | Professional Ethics | | Gender | | Environment and Sustainability | | Human Values | | Other Values | | ✓ |

**COURSE DESCRIPTION:**

This course is designed for the students to become self–employed by training them in the preparation and applications of Cosmetics and Dental care products.

**COURSE OBJECTIVES**

This paper is specially designed for the chemistry students to give an exposure on topics such as skin care, hair care, dental care, perfumes & cosmetics and to understand the basic principles behind them. With an aim to make each student an entrepreneur, we give basic knowledge to the students on the ingredients for the cosmetic and dental care items such aslipstick, eyeliner, mascara, eyeshadow, concealers, rouge, shampoo, face powder, cream, gel, tooth pastes, mouth wash and perfumes.

**COURSE OUTCOMES (COs):**

**After the completion of the course, the students will be able to**

| No. | Course Outcomes | Knowledge Level (According to Bloom's Taxonomy) |
|---|---|---|
| CO 1 | understand the chemical aspects and applications of skincare products. | Upto K3 |
| CO 2 | understand the chemical aspects and applications of hair care and dental care products. | Upto K3 |
| CO 3 | know about the composition of various cosmetic products | Upto K3 |
| CO 4 | understand the chemical aspects and applications of perfumes | Upto K3 |
| CO 5 | know the methods of beauty treatments their advantages and disadvantages | Upto K3 |

**K1– KNOWLEDGE (REMEMBERING), K2–UNDERSTANDING, K3–APPLYING**

## COSMETICS AND PERSONAL GROOMING

**UNIT– I:**

Skin care Nutrition of the skin, skin care and cleansing of the skin; face powder – ingredients; creams and lotions – cleansing, moisturizing all purpose, shaving and sunscreen (formulation only); Gels – formulation and advantages; astringent and skin tonics – key ingredients, skin lightness, depilatories

**UNIT– II:**

**Hair care**

Shampoos – types – powder, cream, liquid, gel – ingredients; conditioner – types – ingredients

**Dental care** Tooth pastes – ingredients – mouth wash

**UNIT– III:**

Make up Base – foundation – types – ingredients; lipstick, eyeliner, mascara, eye shadow, concealers, rouge

**UNIT– IV:**

**Perfumes**

Classification – Natural – plant origin – parts of the plant used, chief constituents; animal origin – amber gries from whale, civetone from civet cat, musk from musk deer; synthetic – classification emphasizing characteristics – esters – alcohols – aldehydes – ketones

**UNIT– V:**

**Beauty treatments**

Facials – types – advantages – disadvantages; face masks – types; bleach – types – advantages– disadvantages; shaping the brows; eyelash tinting; perming – types; hair colouring and dyeing ; permanent waving – hair straightening; wax – types – waxing; pedicure, manicure – advantages – disadvantages

**TEXT BOOK:**

Thankamma Jacob, (1997) ***Foods, drugs and cosmetics – A consumer guide***, Macmillan publication, London

**REFERENCE BOOKS:**


1. Wilkinson J B E and Moore R J, (1997) ***Harry's Cosmetology***, 7th edition, Chemical Publishers, London.
2. George Howard, (1987) ***Principles and Practice of Perfumes and Cosmetics***, Stanley Therones, Chettenham


**DIGITAL TOOL:**

http://www.khake.com/page75.html

**Mapping of CO with PSO**

| | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | 3 |

**3. Advanced Application 2. Intermediate Development 1. Introductory Level**