

POST GRADUATE & RESEARCH DEPARTMENT OF CHEMISTRY
ST. JOSEPH'S COLLEGE, MOOLAMATTOM

Add on Course (Course Code-SJCMCH01)

Title: INNOVATIVE ASPECTS IN CHEMISTRY

(Duration- 30hrs)

Unit 1: Basics of Chemistry (12hr)

Importance of Chemistry, classification of matter, states of matter, SI base units, atomic mass, molecular mass, mole concept, molarity and molality, stoichiometry, sub atomic particles, modern periodic table, covalent, ionic and coordinate bonds, valence, oxidation number, isotopes and allotropes, classification of hydrocarbons, nomenclature and isomerism, fundamental concepts in organic reaction mechanism.

Unit conversions - Practice problems, Preparation of solutions, VSEPR theory through ball and stick model, Shape of orbitals, Facts on Elements in Periodic table – Creating a workbook

References

1. C. N.R. Rao, University General Chemistry, MacMillan India (Ltd.)
2. Mc Quarrie, J. D. Simon, Physical Chemistry – A molecular Approach, Viva Books
3. I. N. Levine, Physical Chemistry, Tata McGraw Hill,
4. J. D. Lee, Concise Inorganic Chemistry, 5th edn, Blackwell Science, London.
5. Morrison, R.T., Boyd, R.N. & Bhattacharjee, S.K. Organic Chemistry, 7th ed., Dorling Kindersley (India) Pvt. Ltd (Pearson Education), 2011.
6. D A Skoog, D. M. West, F. J. Holler and S R Crouch, Fundamentals of Analytical Chemistry, 8th edition, Brooks/Cole, Thomson Learning, Inc. USA, 2004.
7. Practical Chemistry by A.O. Thomas, Scientific Book Centre, Cannanore, 2003
8. Inorganic Chemistry (5th Edition) by Gary L. Miessler, Paul J. Fischer, Donald A. Tarr

Unit2: Chemistry in Everyday life (12hr)

Plastics and Polymers-Introduction, classification, biodegradable plastics, symbols used in plastics. Drugs – Analgesics, Anipyretics, Antihistamines, Antacids, Antibiotics and antifertility drugs. Detergents –Types of detergents, anionic, cationic, non-ionic and amphoteric.

Paper- manufacture, types of paper, applications and environmental impact of papers. Dyes- Classification and applications. Soaps- History, introduction, types, TFM and grades of soaps.

References

1. V. R. Gowariker; N.V. Viswanathan and J Sreedhar; polymer science, 2nd Edition, New Age, New Delhi, 2015
2. Singh, K., Chemistry in Daily life; Prentice Hall of India, New Delhi 2008.
3. B. K. Sharma; Industrial Chemistry, Goel Publishing house, Meerut 2003.
4. C.N.R Rao; Understanding Chemistry. University Press.

Unit 3: Green Techniques in chemistry (6 hr)

Green Chemistry–Definition–Principles of Green Chemistry, Fermentation and Bio transformations, green nano-synthesis, green polymer chemistry, Biomass conversion, green solvents, green catalysts; Synthesis routes including microwave and ultrasonic assisted synthesis, An introduction to micro scale and green experiments.

1. New Trends In Green Chemistry, V. K Ahluwalia-2004
2. Green Chemistry: An Introductory Text, Mike Lancaster, third edn-2016
3. Introduction to Green Chemistry, Albert S. Matlack, Second Edition V. Kumar, “An Introduction to Green Chemistry” Vishal publishing Co. Reprint Edition 2010
4. Rashmi Sanghi, M.M Srivastava “Green Chemistry” Fourth Reprint - 2009
5. Anastas & Warner, Green Chemistry: Theory & Practice, Oxford Univ. Press, New York, 1998

POST GRADUATE & RESEARCH DEPARTMENT OF CHEMISTRY
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Add on Course (SJCMCH02)

Title: NEW TRENDS IN CHEMISTRY [Credit 4]

(Duration- 30hrs)

Unit 1: Green Protocols in chemistry (6 hr)

Green protocols in Chemistry–Concept familiarization–Theories of Green Chemistry, Oxidation reagents and catalysts; Biomimetic, multifunctional reagents; green polymer chemistry, Biomass conversion, green solvents, green catalysts; Synthesis routes including microwave and ultrasonic assisted synthesis,

1. Green Chemistry An Introductory Text, Mike Lancaster, third edn-2016
2. Introduction to Green Chemistry, Albert S. Matlack, Second Edition V. Kumar, “An Introduction to Green Chemistry” Vishal publishing Co. Reprint Edition 2010
3. Rashmi Sanghi, M.M Srivastava “Green Chemistry” Fourth Reprint - 2009
4. Lancaster, M. Green Chemistry: An Introductory Text RSC Publishing, 2nd Edition, 2010.

Unit 2: Fundamentals of Chemistry (12hr)

Scientific Method- Observations and experimentation, Hypothesis formulation and testing, Theory.

Matter and energy - States of matter, Chemical and physical properties of matter, Classification of matter, Chemical and physical changes of matter and interaction of matter and energy. Scientific data-Quantitative values, Scientific notation, measurement and error, significant figures, English versus metric and SI systems Dimensional analysis.

Formula writing -Quantitative aspects of chemical formulae, Percent composition , Empirical and molecular formulae, Chemical calculations, Mole calculations , Avogadro's number, molar mass ,Stoichiometry, Molarity , Solution preparation calculations ,Solute mass , Dilution principles.

References

1. C. N.R. Rao, University General Chemistry, MacMillan India (Ltd.)

2. Mc Quarrie, J. D. Simon, Physical Chemistry – A molecular Approach, Viva Books
3. I. N. Levine, Physical Chemistry, Tata McGraw Hill,
4. J. D. Lee, Concise Inorganic Chemistry, 5th edn, Blackwell Science, London.
5. Morrison, R.T., Boyd, R.N. & Bhattacharjee, S.K. Organic Chemistry, 7th ed., Dorling Kindersley (India) Pvt. Ltd (Pearson Education), 2011.
6. D A Skoog, D. M. West, F. J. Holler and S R Crouch, Fundamentals of Analytical Chemistry, 8th edition, Brooks/Cole, Thomson Learning, Inc. USA, 2004.
7. Practical Chemistry by A.O. Thomas, Scientific Book Centre, Cannanore, 2003
8. Inorganic Chemistry (5th Edition) by Gary L. Miessler, Paul J. Fischer, Donald A. Tarr

Unit 3: Chemistry in Cosmetics and Plastics (12hr)

Cosmetics -Basic concepts-composition and classification of creams-sunscreen and suntan lotions, deodorants, talcum powder- dentifiers, lipsticks, oils, face creams, toilet powder, skin products, dental cosmetics, hair dyes, shaving cream, shampoo.

Plastics and Polymers - Introduction to polymers, types of polymers, Plastic in daily use HDPE, LDPE, PVC, PET, PP. Environmental Hazards of plastics, recycling of plastics International universal recycling codes and symbols for identification, biodegradable plastics

References

1. V. R. Gowariker; N.V. Viswanathan and J Sreedhar; polymer science, 2nd Edition, New Age, New Delhi, 2015
2. Singh, K., Chemistry in Daily life; Prentice Hall of India, New Delhi 2008.
3. B. K. Sharma; Industrial Chemistry, Goel Publishing house, Meerut 2003.
4. C.N.R Rao; Understanding Chemistry. University Press.

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Add on Course (Course Code-SJCMCH03)

Title: Chemistry in Service of Society

(Duration- 30hrs)

Unit 1: Chemistry of Life (8 hr)

Introduction-Importance of chemistry, chemical basis of life, periodic table, elements in the human body, essential, non-essential elements, criteria of essentiality.

Food Chemistry -Food processing-coloring and flavoring agents, Food preservation-viscosity builders-bulking agents and artificial sweeteners, Food additives and Food colors –permitted and non-permitted.

References

1. C. N.R. Rao, University General Chemistry, MacMillan India (Ltd.)
2. Mc Quarrie, J. D. Simon, Physical Chemistry – A molecular Approach, Viva Books
3. J. D. Lee, Concise Inorganic Chemistry, 5th edn, Blackwell Science, London.
4. Childs, P. E. (1986). What is everyday chemistry? In P. E. Childs (ed.), Everyday chemistry. Limerick: Thomond College. Hosteller, J. D. (1983).
5. Introduction to the 'real-world' examples symposium. Journal of Chemical Education 60 1031
6. ASE (1985). Education through science. Hatfield: ASE

Unit 2: Applications and Impact of Chemistry (14 hr)

Plastics and Polymers- Introduction to polymers, types of polymers., Plastic in daily use: HDPE, LDPE, PVC, PET, PP. Environmental hazards of plastics, recycling of plastics, International universal recycling codes and symbols for identification, biodegradable plastics, Alternatives: Paper news print, writing paper, paper boards, cardboards and Natural materials: Wood, cotton, jute, coir.

Cosmetics - Basic concepts, composition and classification of creams-sunscreen and suntan lotions, deodorants, talcum powder- dentifiers, lipsticks, oils, face creams, toilet powder, skin products, dental cosmetics, hair dyes, shaving cream, shampoo.

Soaps and detergents – Soaps, Basic chemical compositions of soaps, Surface active agents, builders, additives, fillers and fragrance, toilet soap, bathing bars, washing soaps, biodegradability, Detergents– Introduction, detergent action, significance of acidity and alkalinity, common detergent chemicals and environmental hazards.

Paper- manufacture, types of paper, applications and environmental impact of papers. Dyes- Classification and applications. Soaps- History, introduction, types, TFM and grades of soaps.

References

1. V. R. Gowariker; N.V. Viswanathan and J Sreedhar; polymer science, 2nd Edition, New Age, New Delhi, 2015
2. Singh, K., Chemistry in Daily life; Prentice Hall of India, New Delhi 2008.
3. B. K. Sharma; Industrial Chemistry, Goel Publishing house, Meerut 2003.
4. C.N.R Rao; Understanding Chemistry. University Press.
5. Handbook on Fertilizer Technology by Swaminathan and Goswamy, 6th ed. 2001, FAI.
8. Organic Chemistry by I. L. Finar, Vol. 1 & 2.
6. Polymer Science and Technology, J. R. Fried (Prentice Hall).

Unit 3: Chemistry behind drugs and cosmetics (8hr)

Pharmaceuticals - Introduction, Contribution of chemistry to human health and historical developments in medicine, Classification of drugs and some common drugs used in our daily life.

Drugs – Analgesics, Antipyretics, Antihistamines, Antacids, Antibiotics and antifertility drugs.

Detergents –Types of detergents, anionic, cationic, non-ionic and amphoteric.

1. B. K. Sharma: introduction to Industrial Chemistry, Goel Publishing, Meerut (1998)
2. Medicinal Chemistry by Ashtoush Kar.
3. Drugs and Pharmaceutical Sciences Series, Marcel Dekker, Vol. II, INC, New York.
4. Analysis of Foods – H.E. Cox: 13. Chemical Analysis of Foods – H.E.Cox and Pearson.
5. Foods: Facts and Principles. N. Shakuntala Many and S. Swamy, 4th ed. New Age International (1998)

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ADD ON COURSE

SJCMCH04 - SCIENTIFIC RESEARCH METHODOLOGY

Credit - 4

Duration- 30hrs

Objectives:

1. To introduce the importance of research for future development and sustenance.
2. To learn the ways of carrying out literature search for current awareness and for retrospective survey.
3. To understand the relevance of plagiarism
4. To know the methodology of writing thesis and journal articles.

Unit 1: Meaning of Research (6 hr)

- 1.1 The search for knowledge, purpose of research, scientific method, role of theory, characteristics of research.
- 1.2 Types of research: fundamental or pure research, applied research, action research, historical research, experimental research.

Unit 2: Chemical Literature (8 hr)

- 2.1 Sources of chemical information: primary, secondary and tertiary sources.
- 2.2 Indexes and abstracts in science and technology: applied science and technology index, biological abstracts, chemical abstracts, chemical titles, current chemical reactions, current contents, engineering index, index chemicus, index medicus, physics abstracts, science citation index.
- 2.3 Classical and comprehensive reference works in chemistry. Beilstein, compilations of data, synthetic methods and techniques, treatises, reviews.

Unit 3: Scientific Writing (6 hr)

- 3.1 Scientific writings: research reports, theses, journal articles, and books.
- 3.2 Requirement of technical communications: eliminating wordiness and jargon-tautology, redundancy, imprecise words, superfluous phrases.
- 3.3 Steps to publishing a scientific article in a journal: types of publications and communications, articles, reviews; when to publish, where to publish, specific format required for submission, organization of the material.

3.4 Documenting: abstracts-indicative or descriptive abstract, informative abstract, footnotes, end notes, referencing styles, bibliography-journal abbreviations (CASSI), abbreviations used in scientific writing.

UNIT - 4: Plagiarism (6 hr)

4.1 Introduction to Plagiarisms, Plagiarism: understanding and management.

4.2 Local plagiarism.

4.3 Plagiarism in student research: The responsibility of supervisors and suggestions.

4.4 The problem of plagiarism.

4.5 Helping students avoid plagiarism.

UNIT - 5: Computer Searches of Literature (4 hr)

5.1 ASAP Alerts, CA Alerts, SciFinder, ChemPort, ScienceDirect, STN International.

5.2 Journal home pages.

REFERENCE BOOKS

1. R. L. Dominoswki, Research Methods, Prentice Hall, 1981.

2. J. W. Best, Research in Education, 4th ed. Prentice Hall of India, New Delhi, 1981.

3. H. F. Ebel, C. Bliefert and W. E. Russey, The Art of Scientific Writing, VCH, Weinheim, 1988.

4. B. E. Cain, The Basis of Technical Communicating, ACS., Washington, D.C., 1988.

5. H. M. Kanare, Writing the Laboratory Notebook; American Chemical Society: Washington, DC, 1985.

6. J. S. Dodd, Ed., The ACS Style Guide: A Manual for Authors and Editors; American Chemical Society: Washington, DC, 1985.

7. Gibaldi, J. Achtert, W. S. Handbook for writers of Research Papers; 2nd ed.; Wiley Eastern, 1987.

**POST GRADUATE & RESEARCH DEPARTMENT OF
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ADD ON COURSE

SJCMCH05-COMPUTER APPLICATIONS IN CHEMISTRY

Duration- 30hrs

Objectives

1. To introduce the importance of computer in Chemistry.
2. To understand the basics of office presentations tools.
3. To acquire knowledge of data base management systems.

Unit 1 Introduction to Microsoft PowerPoints (6 hrs)

Introduction to Microsoft PowerPoints- Overview of PowerPoint interface, Understanding the Ribbon and Tabs, Basic formatting (font, alignment, cell styles), Screen Layout- Creating, Inserting Slides- Adding Sounds and Videos-Formatting Slides -Slide Layout Views in, Colour Scheme- Background Action Buttons- Slide Transition- Custom Animation Creating Master Slides- Managing Slide Shows - Using Pen Setting Slide Intervals. Inserting and formatting images and shapes

Unit 2 Basic Microsoft Excel (6 hrs)

Advanced Features of Excel: All Functions in Excel- Using Logical Functions-Statistical Functions Mathematical Functions - Linking Data between Worksheet- Elements of Excel Charts-Categories

Unit 3 Advanced Microsoft Excel (6 hrs)

Create a Chart- Choosing Chart Type- Edit Chart Axis - Titles, Labels, Data Series and Legend- Adding a Text Box- Rotate Text in a Chart- Converting a Chart on a Web Page- Saving a Chart- Designing of Templates in Excel.

Unit 4 Microsoft Word (6 hrs)

Word Processing Package: MS-Word 2013- Introduction-Features- Word User Interface Elements Creating New Documents- Basic Editing- Saving a Document- Printing a Document- Print Preview- Page Orientation- Viewing Documents- Setting Tabs-Page Margins- Indents- Ruler- Formatting Techniques Font Formatting- Paragraph Formatting- Page Setup- Headers &Footers-Bullets and

Numbered List Borders and Shading- Find and Replace-Page Break Page Numbers-Mail Merging- Spelling and Grammar Checking.

Unit 5 Google for Education (6 hrs)

Google forms- How to create a google form; Google docs- Creating a new document using google docs, Familiarising the tool bar; Google scholar- Using google scholar to find scholarly articles; Google translate- Translating from one language to another; Google drive- Uploading, sharing & accessing files in google drive; Google Class room- Creating a classroom, posting notes or assignments or exams, uploading completed assignments or exams in google classroom; Google alerts- Setting alert in google alerts.

References

1. Patrick Blattner, Louie Utrich. Ken Cook & Timothy Dyck, Special Edition Ms Excel 2013, Prentice Hall India Pvt. Ltd.
2. Atman Rebecca & Atman Rich, Mastering PageMaker, BPB Publications
3. Gini, Courter & Annette Marquis, Ms-Office 2013, BPB Publications

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ADD ON COURSE

SJCMCH06- CHEMISTRY OF SOAPS AND DETERGENTS

Duration- 30hrs

Objectives

1. To introduce the importance of chemistry in industry.
2. To understand the basics of soaps, detergents, handwash and dishwash.
3. To acquire practical skill in the manufacture of soaps and detergents.

Unit 1 Soaps (8 hrs)

Introduction to soaps. Composition of soaps. Preparation of soaps. Types of soaps. TFM and grades of soaps. Cleansing action of soaps. WHO standards. Impact on environment and health.

Unit 2 Detergents (4 hrs)

Introduction to detergents. Composition of detergents. Preparation of detergents. Types of detergents - anionic, cationic, non-ionic and amphoteric detergents. Advantages and disadvantages of detergents.

Unit 3 Hand wash (4 hrs)

Introduction to hand wash. Composition of hand wash. Qualities of a good hand wash.

Unit 4 Dish wash (4 hrs)

Introduction to dishwash. Composition of dishwash. Qualities of a good dishwash.

Unit 5 Practicals (8 hrs)

Laboratory scale preparation of soaps and detergents.

References

1. A.K. De; Environmental Chemistry, New Age International Ltd., New Delhi, 2006.
2. B.K. Sharma; Industrial Chemistry. Goel Publishing House, Meerut, 2003.
3. S.S. Dara; A Textbook of Environmental Chemistry and Pollution Control, S. Chand & Company Ltd.
4. J.W. Hill; T.W. McCreary and D.K. Kolb; Chemistry for Changing Times, Prentice Hall, 12th edn., 2010.
5. V. R. Gowariker; N. V. Viswanathan and J. Sreedhar; Polymer Science, 2nd edn., New Age, New Delhi, 2015.