

UNIVERSITY OF KERALA
SYLLABUS OF COMPLEMENTARY CHEMISTRY
FOR STUDENTS OF BOTANY MAJORS
2020 Admission onwards

SEMESTER	I
COURSE	2
COURSE TITLE	ANALYTICAL AND ENVIRONMENTAL CHEMISTRY
COURSE CODE	CH1131.3
CREDIT	2
L-T-P	2-0-2
TOTAL HOURS	36

CO No.	COURSE OUTCOME	Cognitive Level
	<i>Upon completion of this course, the students ,</i>	
1	Discuss Bohr atom model and represent electronic configuration of elements	U
2	Predict structure of simple molecules based on the concept of hybridisation	A
3	Identify hydrogen bonding in relation to physical and chemical properties	U
4	List the various chemical bonds	R

5	Apply the VSEPR theory to explain the geometry of molecules	A
6	Discuss the theory of volumetric analysis	U
7	Become aware of threat of chemical pollutants air ,water and soil	A

*R-Remember, U-Understand, A-Apply, E- Evaluate

MODULE I –ATOMIC STRUCTURE

(9 Hrs)

Atomic spectrum of Hydrogen – different series, Rydberg equation

Bohr theory – postulates – statement of Bohr energy equation – derivation of spectral frequency from Bohr equation.

Schrodinger wave equation (no derivation, mention only) - concept of orbitals, the four quantum numbers and their significances.

Orbital wise electron configuration, energy sequence rule – Pauli’s Principle, Hund’s rule, stability of filled and half filled orbitals

MODULE II - CHEMICAL BONDING

(9 Hrs)

Energetics of bond formation –Born Haber cycle

Hybridisation and structure of molecules – sp^2 , sp^3 , sp^2 , sp^3 , sp^2 , sp^3d , and sp^3d^2

hybridisation with examples- Explanation of bond angle in water and ammonia

VSEPR theory with regular and irregular geometry

Hydrogen bond – inter and intra molecular – its consequences on boiling point –volatility and solubility

Partial covalent character of the ionic bond- Fajan’s rules-

A brief review of molecular orbital approach-

LCAO method – bond order, bond distance and stability of O_2 , O_2^{2+} , O_2^{2-} , NO , NO^+

MODULE III: ANALYTICAL PRINCIPLES

(9 Hrs)

Principles of volumetric analysis- primary standard - standard solutions- normality and molarity - theory of acid - base titrations, permanganometric and dichrometric titrations, iodometric and complexometric titrations-

Theory of acid – base and redox indicators-

Beer- Lambert law- Principles of colorimetry – Estimation of Iron and phosphate

MODULE IV – ENVIRONMENTAL CHEMISTRY

(9 Hrs)

Nature of environmental threats and role of chemistry-

Green house effect, ozone layer and its depletion-

Water pollution: Various factors affecting purity of water, sewage water, industrial waste, agricultural pollution such as pesticides, fertilizers, detergents, treatment of industrial waste water using activated charcoal, synthetic resins, reverse osmosis, electro dialysis

Dissolved oxygen-BOD, COD

Text Books / References

1. Atomic structure and chemical bonding with introduction to molecular spectroscopy – Manas Chanda
2. Concise Inorganic Chemistry – J.D. Lee
3. Environmental Chemistry A. K. De
4. Modern Inorganic Chemistry A.D. Madan
5. A. I. Vogel, “Text book of Qualitative Analysis”
6. A. I. Vogel, “Text book of Quantitative Inorganic Analysis”.
7. S. K. Banerji, “Environmental Chemistry”.
8. A. K. De “Environmental Chemistry - An introduction”
9. B. K. Sharma “Air Pollution”.
10. V. K. Ahluwalia “Environmental Chemistry”
11. G.W. van Loon and S. J. Duffy “Environmental Chemistry: A global perspective”

UNIVERSITY OF KERALA
First semester B.Sc Degree Examination Model question paper
Complementary course for Botany Majors
Course Code CH1131.3 Credit 2
(2020 admission onwards)

ANALYTICAL AND ENVIRONMENTAL CHEMISTRY

Time: Three Hours

Maximum Marks: 80

SECTION A

*(Answer **all** questions. Each question carries 1 mark)*

1. Give the electronic configuration of Copper (atomic number 29)
2. The quantum numbers $n = 2$ and $l = 1$ corresponds to which orbital?
3. What are the shapes of molecules with sp and sp^3 hybridization?
4. Calculate the bond order of H_2 molecule.
5. Give the structure of XeO_3 .
6. What is Lattice Energy?
7. What is meant by primary standards?
8. Define Molality.
9. What is the optimum value of DO for good water quality?
10. What is meant by BOD?

SECTION B

*(Answer any **eight** questions. Each question carries 2 marks)*

11. What is Bohr Bury's rule?
12. Write down the Schrodinger Equation and explain the terms involved.
13. Explain the failures of Bohr's theory?
14. What are the limitations of VSEPR Theory?
15. What are polar and non polar covalent bonds?
16. Mention the rules for adding electrons to molecular orbitals?
17. What are dichrometric titrations?
18. How would you prepare 100ml of 0.05M Mohr's salt solution?
19. Why is methyl orange not a suitable indicator for the titration of weak acid with strong base?
20. Which are the green house gases? Mention their sources.
21. What is reverse osmosis? How it is useful in the purification of waste water?
22. What are chief factors responsible for water pollution?

SECTION C

*(Answer any **six** questions. Each question carries 4 marks)*

23. If the energy difference between two electronic states of hydrogen atom is $214.68 \text{ KJmol}^{-1}$. What will be the frequency of light emitted when the electrons jump from the higher to the lower level?
24. Explain the stability of half filled and completely filled orbitals.
25. Give an account of permanganometric titrations.
26. Discuss the theory of Acid – Base indicators.
27. Explain the energetic of ionic bond formation.
28. Define hybridization. Mention the types of hybridization involved in SF_6 , PCl_5 , BF_3 .

29. Explain Born-Haber Cycle considering the formation of NaCl as an example.
30. Write a note on agricultural pollution.
31. Explain briefly the different methods for the treatment of industrial waste water.

SECTION D

(Answer any two questions. Each question carries 15 marks)

32. (a) Discuss Bohr Theory, highlighting its merits and demerits.

(b) What are quantum numbers? Give its significance.

(c) Explain various rules regarding electronic configuration.
33. (a) Discuss the titration curves for the titration of strong acid with strong base and weak acid with strong base.

(b) Explain the theory of redox indicators.

(c) Explain Beer's Law, Lambert's Law and Beer – Lambert Law.
34. (a) Write a note on Hydrogen bonding and its consequences.

(b) How electronic configuration of molecules related to molecular behavior? Explain.

(c) Explain Fajan's Rule.
35. (a) Discuss the formation and importance of ozone layer.

(b) What is meant by pollution and pollutants? Explain the classification of air pollutants.

(c) What are the sources of important air pollutants?

UNIVERSITY OF KERALA
Complementary Chemistry for Botany Majors
2020 Admission onwards

SEMESTER	II
COURSE	2
COURSE NAME	INORGANIC & BIOINORGANIC CHEMISTRY
COURSE CODE	CH1231.3
CREDIT	2
L-T-P	2-0-2
TOTAL HOURS	36

CO No.	COURSE OUTCOME <i>Upon completion of this course, the students,</i>	Cognitive Level
1	Understand the biological and environmental aspects of organic compounds	U
2	Comprehend the meaning of stability of nucleus	R
3	Summarise the applications of radioactivity	U
4	Predict the properties of transition metal complexes	A
5	Apply complexation reactions in qualitative and quantitative analysis	U

6	Appreciate biological processes like photosynthesis, respiration etc	E
7	Realise the use of trace elements in biochemical processes	A

R-Remember, U-Understand, A-Apply, E-Evaluate

MODULE I :ORGANOMETALLICS

(9 Hrs)

Definition and classification, Organo metallic compounds of Mg, Sn, Li, Hg, Fe and their synthesis, applications

Biological and environmental aspects of organic compounds – Organometallic compounds in medicines – organomercury, organoboron, organosilicon and organo arsenic compounds – outline of preparation and uses

Antitumour drugs, silylated derivatives of bioactive organic compounds in agriculture and horticulture

Environmental aspects of Organometallic compounds

MODULE II NUCLEAR CHEMISTRY

(9 Hrs)

Natural radioactivity, modes of decay, Geiger–Nuttal rule-

Artificial transmutation and artificial radioactivity-

Nuclear stability, n/p ratio, mass defect and binding energy, nuclear fission and nuclear fusion-

Applications of radioactivity- ¹⁴C dating, rock dating, neutron activation analysis and isotope as tracers

MODULE III - COORDINATION CHEMISTRY

(9 Hrs)

Nomenclature, Coordination number and geometry - chelates – isomerism – structural and stereo isomerism

Valence bond theory of bonding in octahedral and tetrahedral complexes – drawbacks of valence bond theory – high and low spin complexes – colour and magnetic properties of transition metal complexes

Application of metal complexes in qualitative and quantitative analysis

MODULE IV – BIO INORGANIC COMPOUNDS

(9 Hrs)

Metalloporphyrins – cytochromes –

Chlorophyll - photosynthesis and respiration –

Haemoglobin and myoglobin, mechanism of O₂ – CO₂ transportation

Nitrogen fixation, carbon fixation and carbon cycle

Biochemistry of iron toxicity and nutrition, essential and trace elements in biological systems

TEXT BOOKS /REFERENCES

1. Bosolo and Johns, Co-ordination Chemistry
2. Rochoco, Chemistry of Organometallics
3. J.D. Lee, Concise Inorganic Chemistry
4. Puri, Sharma and Kalia, “Inorganic Chemistry”
5. A.D. Madan, Modern Inorganic Chemistry

II Semester B.Sc Degree Examination Model question paper
Complementary Course for Botany Majors

Course Code CH1231.3 Credit 2

INORGANIC AND BIOINORGANIC CHEMISTRY
(2020 admission onwards)

Time: Three Hours

Maximum Marks: 80

SECTION A

(Answer all questions. Each question carries 1 mark)

1. Give the structure of Zeisel's salt.
2. Write any one of the preparation methods of organolithium compounds.
3. What is ferrocene? How is it synthesized?
4. What are alpha particles?
5. Define the term radioactivity.
6. Write the IUPAC name of $K_3[Co(NO_2)_4Cl_2]$
7. What are low spin complexes?
8. What do you mean by chelate?
9. What are metalloporphyrins?
10. Give an example of anaerobic respiration.

SECTION B

(Answer any eight questions. Each question carries 2 marks)

11. What is reformatsky reaction?
12. What is cisplatin? Give its significance.
13. How are organomercurials prepared?

14. Explain Geiger Nuttal Rule.
15. What are half life period and average life period?
16. Define mass defect and binding energy.
17. Write the postulates of Werner's Coordination Theory.
18. What are poly dentate ligands? Give an example.
19. Explain the colours of transition metal complexes.
20. Differentiate respiration and photosynthesis.
21. What are trace elements?
22. What is the role of chlorophyll in photosynthesis?

SECTION C

*(Answer any **six** questions. Each question carries 4 marks)*

23. Write a note on organotin compounds.
24. Write a brief note on the applications of organometallic compounds in agriculture and horticulture.
25. One microgram of phosphorus- 32 was injected into a living system for biological tracer studies. The half life period of P-32 is 14.3 days. How long will it take for the radioactivity to fall to 10% of the initial value?
26. Explain the relation between nuclear stability and n/p ratio.
27. Write the biological effects of radiation.
28. Suggest the structure of $[\text{NiCl}_4]$ on the basis of Valence Bond Theory.
29. Explain the magnetic properties of octahedral complexes with suitable examples.
30. Discuss briefly the biochemistry of iron toxicity and nutrition.
31. Metal ions play a variety of roles in biological systems. Explain.

SECTION D

(Answer any two questions. Each question carries 15 marks)

- 32.(a) Explain the synthesis and applications of Grignard reagent. (5 marks)
- (b) What are Frankland reagents? Give its significance. (5 marks)
- (c) Explain about organosilicon compounds in medicine. (5 marks)
- 33.(a) Explain carbon dating and rock dating. (5 marks)
- (b) Give the principle of neutron activation analysis. (5 marks)
- (c) Explain the terms nuclear fission and fusion with suitable examples. (5 marks)
- 34.(a) Write a note on Crystal Field Theory. (5 marks)
- (b) Explain the applications of complexes in qualitative analysis. (5 marks)
- (c) Write a brief note on isomerism in coordination complexes. (5 marks)
- 35.(a) Give brief outline of carbon cycle. (5 marks)
- (b) Explain nitrogen Fixation. (5 marks)
- (c) Write a short note on hemoglobin. (5 marks)

UNIVERSITY OF KERALA

COMPLEMENTARY CHEMISTRY FOR BOTANY MAJORS

2020 Admission onwards

SEMESTER	III
COURSE	4
COURSE TITLE	PHYSICAL CHEMISTRY
COURSE CODE	CH1331.3

CREDIT	3
L-T-P	3-0-2
TOTAL HOURS	54

CO No.	COURSE OUTCOME	Cognitive Level
	<i>Upon completion of this course, the students,</i>	
1	Classify reactions on the basis of order and molecularity	A
2	Understand the effect of temperature on reaction rates	U
3	Understand the theories of catalysis	U
4	Categorize compounds into acids and bases	U
5	Discuss the principle and application of UV and NMR spectroscopy.	U & A
6	Understand the properties of colloids and their application	U

*R-Remember, U-Understand, A-Apply, E- Evaluate

MODULE I - CHEMICAL KINETICS

9 Hrs

Rates of reactions, various factors influencing rates of reactions

order and molecularity - Zero, first, second and third order reactions

Derivation of integrated rate equation, fractional life time, units of rate constants Influence of temperature on reaction rates – Arrhenius equation, calculation of Arrhenius parameters – Collision theory

Catalysis- Different types of catalysis- intermediate compound formation theory and adsorption theory

MODULE II-IONIC EQUILIBRIUM

9 Hrs

Concepts of Acids and Bases- ionization of weak electrolytes- Influence of solvent on acid strength – leveling effect –

pH and its determination - potentiometric method-

Buffer solutions and calculations of the pH- Henderson equation -

Hydrolysis of salt – degree of hydrolysis and hydrolytic constant, derivation of relation between K_w and K_h for salts of strong acid – weak base, weak acid - strong base and weak acid – weak base

MODULE II-SOLUTIONS

9 Hrs

Completely miscible liquid pairs, vapour pressure - composition curve, boiling point-composition curve- ideal and non ideal solutions, fractional distillations, azeotropes

Partially miscible liquids - CST, phenol- water, nicotine-water system- Effect of impurities on miscibility and CST,

Immiscible liquid pairs, steam distillation- Distribution law and its limitations, applications of solvent extractions.

MODULE IV - UV AND NMR SPECTROSCOPY

9 Hrs

UV-Visible Spectroscopy- absorption, types of electronic transitions, effect of conjugation-

Concept of chromophore, auxochrome, bathochrome, hypochromic shifts, hyperchromic and hypochromic effects.

UV-Visible spectra of enes - Calculation of λ_{max}

Applications of UV spectroscopy - conjugation, functional group and geometrical isomerism

Principle of NMR, nuclear spin, chemical shift, spin-spin coupling, τ and δ , PMR of simple organic molecules $\text{CHBr}_2\text{CH}_2\text{Br}$, $\text{CH}_3\text{CH}_2\text{Br}$ and $\text{CH}_3\text{CH}_2\text{OH}$

Principle of MRI

MODULE V DILUTE SOLUTIONS

9 Hrs

Molarity, molality and mole fraction

Colligative property – relative lowering of vapour pressure – elevation in boiling point – depression in freezing point – osmotic pressure – experimental determination of osmotic pressure – Isotonic solution – reverse osmosis - abnormal molecular mass - van't Hoff factor.

(Numerical Problems to be worked out)

MODULE VI COLLOIDS-

9 Hrs

Colloidal state- Types of colloids

Preparation of colloids-Purification of colloids – ultra filtration and electro dialysis, Kinetic, optical and electrical properties of colloids

Ultra microscope, Electrical double layer and zeta potential

Coagulation of colloids, Hardy-Schulz rule

Micelles and critical micelle concentration, sedimentation

Application of colloids – Cottrell precipitator, purification of water and delta formation

REFERENCES

1. Chatwal, Gurdeep.R Organic Chemistry of Natural Products, , Himalaya Publications
2. Puri Shrama Pathania Principles of Physical chemistry, , Vishal
3. P.S. Kalsi, Chemistry of natural products, New Age International Private Ltd
4. Y.R Sharma, Elementary organic spectroscopy, S chand & Company
5. B.R.Puri, R.L.Sharma & Pathania Principles of Physical Chemistry, Vishal Publishing
6. B.S. Bahl., G.D. Tuli & Arun Bahl ,Essentials of Physical Chemistry, , S.Chand & Co., N Delhi.
7. R.L. Madan, G.D. Tuli Simplified Course in Physical Chemistry, , S.Chand & Co.
8. B.K .Sharma ,Chromatography, GOEL Publishing house, Meerut

UNIVERSITY OF KERALA

III Semester B.Sc Degree Examination Model question paper

Complementary course for Botany Majors

Course Code CH1331.3 Credit 3

PHYSICAL CHEMISTRY

(2020 admission onwards)

Time: Three Hours

Maximum Marks: 80

SECTION A

(Answer *all* questions. Each question carries 1 mark)

1. What are the units of rate constants for first and second order reactions?
2. Give one example of a reaction in which order and molecularity have different values.
3. Define pH.
4. State Hardy-Schulze rule.
5. Distinguish between lyophobic colloids and lyophilic colloids.
6. Define chemical shift.
7. Explain chromophore with an example.
8. What is meant by a buffer solution? Give one example each for acid buffer and basic buffer solution.
9. What is meant by the term ideal solution?
10. Define Van't Hoff factor.

SECTION B

(Answer any *eight* questions. Each question carries 2 marks)

11. What are the factors which affect the rate of a chemical reaction?
12. Write down the expression that gives the dependence of the rate constant of a chemical reaction on the absolute temperature and explain the terms involved.
13. Explain briefly Lewis concept of acids and bases with two examples
14. What is zeta potential? How does it arise?

15. What is critical micelle concentration? Discuss the structure of micelles in polar and non polar media
16. Tetra Methyl Silane (TMS) is chosen as a reference compound in NMR studies. Give reasons
17. What are the different types of electronic transitions?
18. Differentiate between molarity and molality.
19. A solution containing 7g of a non volatile solute in 250g of water boils at 373.26 K. Find the molecular mass of the solute. (K_b for water is 0.52K/m)
20. Explain the terms: Degree of hydrolysis and hydrolysis constant.
21. Explain reverse osmosis.
22. Calculate the mole fraction of alcohol, C_2H_5OH and water in a solution made by dissolving 9.2g of alcohol in 18g of water.

SECTION C

(Answer any six questions. Each question carries 4 marks)

23. What is energy of activation? What happens to the energy of activation in presence of a catalyst?
24. Explain Half life period of a reaction. A first order reaction has a specific reaction rate of $2.31 \times 10^{-3} \text{ s}^{-1}$. Calculate the half life period of the reaction.
25. Calculate the pH of a buffer solution containing 0.2 mole of NH_4Cl and 0.1mole of NH_4OH per litre. K_b for $NH_4OH = 1.85 \times 10^{-5}$.
26. Derive the relation between K_h , K_w and K_a .
27. Give an account of applications of colloids
28. Explain ultra filtration and electro-dialysis techniques used for the purification of colloids
29. Which of the following will show spin- spin coupling in their NMR spectra? If coupling is observed, give the spin multiplicity : (a) $ClCH_2CH_2Cl$ (b) CH_3COCH_3 (c) CH_3CHO (d) $ClCH_2CH_2I$
30. What is osmotic pressure? How will you determine the molecular mass of a substance with this method?
31. Explain the principle of Fractional Distillation

SECTION D

(Answer any two questions. Each question carries 15 marks)

32. (a) Differentiate between Molarity and order of a reaction with examples (5 marks)
- (b) Discuss the Kinetic, optical and electrical properties of colloids (5 marks)
- (c) Explain the protective action of colloids (5 marks)

33. (a) Which of the following has the highest osmotic pressure: 0.1M sucrose, 0.1M acetic acid, 0.1M KCl and 0.1M Na₂SO₄ all in water? Why?
- (b) Why do you get abnormal molecular masses of the substances by using colligative properties of the solution.
- (c) Discuss in detail about the determination of molecular mass of a non volatile compound from elevation in boiling point and depression in freezing point
34. (a) Discuss the factors responsible for deviation from Raoult's law by taking suitable examples.
- (b) Define critical solution temperature. Explain systems having upper and lower CST using examples
- (c) Explain the applications of UV spectroscopy
35. (a) Discuss the advantages of Bronsted-Lowery concept over Arrhenius concept and also the limitations of the Bronsted-Lowery concept.
- (b) The salt of strong acid and strong base does not undergo hydrolysis. Explain.
- (c) Explain the underlying principle in an NMR spectrum and interpret the low resolution NMR spectrum of ethanol molecule.

UNIVERSITY OF KERALA
Complementary Chemistry for Botany Majors

SEMESTER	IV
COURSE TITLE	ORGANIC CHEMISTRY
COURSE CODE	CH1431.3
CREDIT	3
L-T-P	3-0-2
TOTAL HOURS	54

CO No.	COURSE OUTCOME <i>Upon completion of this course, the students,</i>	Cognitive Level
1	Discuss the principle and applications of chromatography and electrophoresis	U
2	Classify amino acids, proteins, carbohydrates and vitamins. Identify and distinguish the structure of amino acids, peptides, proteins and nucleic acids.	U
3	Summarise the concept of optical isomerism.	U and A
4.	Categorise crude drugs and explain the method of evaluating crude drugs.	U
5.	Draw the structure of aminoacids, carbohydrates, simple optical isomers	R
6.	Explain the preparation and reactions of amino acids and carbohydrates	U
7.	Discuss the extraction process and general properties of natural products -oils, fats, terpenes and alkaloids.	U

*R-Remember, U-Understand, A-Apply

MODULE I - CHROMATOGRAPHY

9 Hrs

Outline study of adsorption and partition chromatography-

Principle and applications of paper, thin layer, ion exchange and gas chromatography

Principle, instrumentation and applications of HPLC

R_f and R_t value of various chromatographic techniques

Electrophoresis – Principle and application of Zone and Capillary electrophoresis

MODULE II - STEROCHEMISTRY

9 Hrs

Optical Isomerism : Chirality and elements of symmetry; DL notation and Enantiomers

Optical isomerism in glyceraldehydes, lactic acid and tartaric acid

Diastereoisomers and mesocompounds

Cahn-Ingold-Prelog rules – R-S notations for optical isomers with one and two asymmetric carbon atoms

Racemic mixture, resolution and methods of resolution

MODULE III - AMINO ACIDS AND PROTEINS

9 Hrs

Amino acids: - Classification, structure and stereochemistry of amino acids

Essential and non essential amino acids, zwitter ion, isoelectric point

General methods of preparation and reactions of amino acids

Peptides: structure and synthesis-Carbobenzoxy and Sheehan method

Proteins: - Structure of proteins, denaturation and colour reactions

Nucleic acids: - Classification and structure of DNA and RNA- Replication of DNA, Genetic Codes-Translation- Transcription

MODULE IV - OILS, FATS, ALKALOIDS, VITAMINS AND TERPENES 9 Hrs

Oils and Fats: Occurrence and extraction-Analysis of oils and fats-saponification value, iodine value and acid value

Alkaloids: - Extraction and structural elucidation of conine and importance of quinine, morphine and codeine

Terpenes: Classification- Isoprene and special isoprene rule-Isolation of essential oils-citral and geraniol (No structural elucidation)

Vitamins: - Classification and structure, functions and deficiency diseases (structures of vitamin A, B1 and C but no structural elucidation).

MODULE V - CARBOHYDRATES

9 Hrs

Classification- Configuration of glyceraldehyde, erythrose, threose, ribose, 2-deoxy ribose, arabinose, glucose, fructose and mannose

Preparation and properties of glucose and fructose (oxidation, reduction and reaction with phenylhydrazine only)

Pyranoside structures of glucose and fructose, furanoside structure of fructose (structure elucidation not expected)

Mutarotation and epimerization- Conversion of glucose into fructose and viceversa

Structure of starch and cellulose (structure elucidation not expected)

MODULE VI - PHYTOCHEMICALS AND CRUDE DRUGS

9 Hrs

Pharmacognacy – Scope and importance, scheme for pharmacognotic studies of crude drugs

Phytochemicals. Crude drugs: Morphological, pharmacological and chemical classification

Collection and processing of crude drugs – collection and harvesting, drying, garbling, packing

Processing of drugs: Method of preparation – decoction, maceration and infusion

Methods of drug evaluation: Moisture content, volatile content, solubility, optical rotation, ash values and extracting, spectroscopic analysis, chromatographic method and foreign organic matter (Mention only)

Phytoconstituents of therapeutic values: Carbohydrates, glycosides (saponin glycosides and cardiac glycosides), alkaloids (quinoline, isoquinoline, indole alkaloids and steroidal alkaloids) volatiles oils and phenols (Mention its sources, important compounds in each class and therapeutic importance)

Text Books / References

1. Organic Chemistry of Natural Products, Chatwal, Gurdeep.R, Himalaya Publications
2. Chemistry of natural products, P.S. Kalsi, New Age International Private Ltd

3. Chromatography, .B.K .Sharma, GOEL Publishing house, Meerut
4. Pharmacognosy, A.Roseline, MJP publishers, 2011.
5. A textbook of Organic Chemistry, K.S.Tewari, N.K.Vishnoi and S.N.Mehrotra, Vikas Publishing House (Pvt) Ltd., New Delhi.
6. Modern Organic Chemistry, S.C.Sharma and M.K.Jain, Vishal Publishing Company, New Delhi.
7. Stereochemistry of Organic Compounds: Principles and Applications, D.Nasipuri, New Age International Publishers, New Delhi.

IV Semester B.Sc Degree Examination Model question paper

Complementary course for Botany Majors

Course Code CH1431.3 Credit 3

ORGANIC CHEMISTRY

(2020 admission onwards)

Time: Three Hours

Maximum Marks: 80

SECTION A

(Answer all questions. Each question carries 1 mark)

1. What is meant by Rf value?
2. Define Racemic mixture.
3. Represent the configurations of D and L glyceraldehyde.
4. Give two examples of essential amino acids.
5. Describe a colour test for proteins.
6. Define Iodine value.
7. Name a phytochemical.
8. State Special isoprene rule?
9. Write an example for volatile oil .
10. Give the deficiency disease of Vitamin C.

SECTION B

*(Answer any **eight** questions. Each question carries 2 marks)*

11. Give the principle of adsorption chromatography.
12. What is meant by denaturation of proteins.
13. Discuss the importance of Morphine.
14. Which of the following are optically active ? Why?
(i) 2-chloropropane (ii) 2-chlorobutane (iii) 3-chloropentane
15. Give four differences between enantiomers and diastereoisomers.
16. Write a note on the different types of RNA and its functions.
17. How are alkaloids extracted from natural sources?
18. Give the classification of Vitamins.
19. What happens when glucose is treated with Br₂ water?
20. Define moisture content and extraction value.
21. Name four anticancer compounds from plants.
22. Explain saponification.

SECTION C

*(Answer any **six** questions. Each question carries 4 marks)*

23. Discuss the optical isomerism of tartaric acid.
24. Write a note on DNA replication.
25. Give the synthesis of Tryptophan.
26. Comment on zwitter ion and isoelectric point.
27. Determine the R & S notations of meso tartaric acid and L- glyceraldehyde.
28. Give a brief account on Thin Layer Chromatography.
29. Write a note on the methods of isolation of terpenoids.
30. Describe the structure of starch and cellulose.
31. Mention the source and therapeutic value of the alkaloid phytoconstituent.

SECTION D

*(Answer any **two** questions. Each question carries 15 marks)*

32. (a) Explain Ion exchange Chromatography.
- (b) Elucidate the structure of Coniine.

- (c) Describe the structure of DNA.
33. (a) Discuss briefly the structure of Protein.
 (b) Explain Sheehan's method of peptide synthesis.
 (c) What are crude drugs? Discuss its classification
34. (a) What is resolution? Explain any three methods of resolution.
 (b) What are meso compounds? Are they optically active? Explain with a suitable example.
 (c) Discuss the isolation, structure and uses of geraniol.
35. (a) Differentiate mutarotation and epimerization
 (b) Define Oils and fats and discuss the different methods of extraction.
 (c) Discuss on the pyranoside structure of glucose and furanoside structure of fructose.

**UNIVERSITY OF KERALA
 SYLLABUS OF LAB COURSE IN CHEMISTRY
 FOR STUDENTS OF BOTANY MAJORS**

2020 Admission onwards

SEMESTER	I,II,III & IV
COURSE NAME	COURSE V : LAB COURSE FOR BOTANY
COURSE CODE	CH 1432.3
CREDIT	2
L-T-P	0-0-2
TOTAL HOURS	36

CO No.	COURSE OUTCOME <i>Upon completion of this course, the students</i>	Cognitive Level
1	Obey Lab safety instructions, develop qualities of punctuality, regularity and scientific attitude, out look and scientific temper (GOOD LAB PRACTICES)	R,U,A
2	Develop skill in safe handling of chemicals, take precaution against accidents and follow safety measures	U,A
3	Develop skill in observation, prediction and interpretation of reactions	U,A
4	Prepare organic compounds, Purify and recrystallise	U,A
5	Develop skill in weight calculation for preparing standard solutions	E,A
6	Perform volumetric titrations under acidimetry-alkalimetry, permanganometry, dichrometry, iodimetry-iodometry, cerimetry, argentometry and complexometry	A
7	Conduct chromatographic separation of mixtures	A

SYLLABUS FOR LABORATORY COURSE

FOR COMPLEMENTARY CHEMISTRY FOR BOTANY MAJORS

Course Code CH1432 .3 Credit 2

I.QUALITATIVE ANALYSIS

Systematic analysis with a view to identify the organic compound (aromatic – aliphatic, saturated – unsaturated, detection of elements and detection of functional groups) – glucose, alcohols, phenols, halogen compounds, nitro compounds, amino compounds, aldehydes, ketones, carboxylic acids, amides, urea, thiourea and esters. Only monofunctional compounds are to be given. A student has to analyse at least twelve organic compounds.

II.ORGANIC PREPARATIONS

1. Acetanilide from aniline
2. Metadinitrobenzene from nitro benzene
3. Benzoic acid from benzyl chloride