Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Digital Helpline No.- 0261 2388888
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૪–૨૫ થી અમલમાં આવનાર S.Y.B.Sc.Chemistry Sem.- 4 Major,Minor અને SECનો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ રસાયણશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૯/૦૭/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંક : ૦૨ અન્વયે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૦૧/૦૩/૨૦૨૪ની સભાના ઠરાવ ક્રમાંકઃ૧૦૪ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત ઈ.ચા.માનનીય કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે.જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./સાયન્સ/પરિપત્ર/૧૮૧૨૧/૨૦૨૪
તા.૨૦–૦૮–૨૦૨૪

કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ.
..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકો તથા વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારૂ.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી,પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

Veer Narmad South Gujarat University,

Surat

Syllabus of B.Sc. SEM-IV-Chemistry
As per NEP 2020

(Effective from June, 2024)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B. Sc. Chemistry

As per NEP 2020

B.Sc. Chemistry is an undergraduate degree program that focuses on the study of various aspects of chemistry, including its principles, theories, and practical applications. It is a comprehensive program that equips students with a solid foundation in the field of chemistry and prepares them for a wide range of career opportunities.

Upon completion of the program, graduates are expected to possess the following general outcomes:

- **Knowledge and Understanding**: Graduates will have a strong theoretical and practical knowledge of the fundamental concepts and theories in chemistry, including organic, inorganic, physical, and analytical chemistry.
- **Laboratory Skills:** Graduates will be proficient in laboratory techniques, including the handling of chemicals, operation of laboratory equipment, and conducting experiments safely and accurately.
- **Critical Thinking and Problem Solving**: Graduates will develop criticalthinking skills and the ability to analyse and solve complex problems in the field of chemistry. They will be adept at designing experiments, interpreting data, and drawing logical conclusions.
- **Communication Skills:** Graduates will be able to effectively communicate scientific ideas and findings through written reports, presentations, and scientific discussions. They will also possess strong teamwork skills, enabling them to collaborate with peers and professionals in the field.
- **Ethical and Professional Conduct:** Graduates will understand the importance of ethical conduct in scientific research and demonstrate professionalism in their interactions with colleagues, clients, and the broader community.

In addition to these general outcomes, B.Sc. Chemistry programs may also have specific outcomes tailored to meet the needs of the particular institution or program.

The specific outcomes:

- **Specialized Knowledge:** Graduates will have in-depth knowledge in specificsub-disciplines of chemistry, such as environmental chemistry, medicinal chemistry, dyes, or materials chemistry.
- **Research Skills:** Graduates will possess research skills and the ability to design and carry out independent research projects in chemistry.

M. B. Mahida

- **Industrial Applications:** Graduates will be familiar with the applications of chemistry in various industries, such as pharmaceuticals, dyes, petrochemicals, materials science, and environmental science.
- **Advanced Instrumentation Skills:** Graduates will have hands-on experience with advanced analytical instruments used in chemical analysis, such as spectroscopy, chromatography, pH Metry and conductometry.
- **Advanced Computational Skills:** Graduates will be proficient in using computational tools and software for modelling chemical structures, predicting properties, and simulating chemical reactions.

Overall, the B. Sc. Chemistry program aims to provide students with a solid foundation in chemistry, preparing them for various careers in the chemical industry, research institutions, academia, and other related fields. It equips students with the necessary theoretical knowledge, practical skills, and critical thinking abilities to excel in the diverse and ever evolving field of chemistry.

==========

M. B. Mahida.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B. Sc. Chemistry

Teaching & Evaluation

Scheme

S. Y. B. Sc. Semester-IV

Course Coding for Three/Four Years UG Degree (Honours) Semester –IV

Semester	Major (MJ)		Minor (ME)		Multi disciplinary (MDC)	AEC	SEC	VAC	Internship	Total Credits
	Th	Pra	Th	Pra	(T+P)	T	(P)	T	----	
IV	2+2+4	2+2	2	2	--	2	2	2	---	22

[AEC: Ability Enhancement Course; SEC: Skill Enhancement Course; VAC: Value Added Course]

MAJOR (MJ) COURSE							
Course Code	Course Title	Course credit	Teaching schedule Hrs./week	Internal marks	External marks	Total Marks	Duration of external exam Hrs
CH-MJ-401	Chemistry- III [Inorganic Chemistry]	2	2	25	25	50	1
CH-MJ-402	Chemistry Paper-IV [Organic Chemistry]	2	2	25	25	50	1
CH-MJ-403	Chemistry Paper-V [Physical & Industrial Chemistry]	4	4	50	50	100	2
CHP-MJ-401	Chemistry Practicals Paper III	2	4	25	25	50	4
CHP-MJ-402	Chemistry Practicals Paper IV	2	4	25	25	50	4
Total		12	16	150	150	300	

M. B. Makwana

MINOR COURSE (ME)							
Course Code	**Course Title**	**Course credit**	**Teaching schedule Hrs./week**	**Internal marks**	**External marks**	**Total Marks**	**Duration of external exam Hrs**
CH-ME-401	Selected topics in Chemistry	2	2	25	25	50	1
CHP-ME-401	Chemistry Practicals	2	4	25	25	50	04
Total		4	6	50	50	100	
SKILL ENHANCEMENT COURSE (SEC) (Only Practical)							
Course Code	**Course Title**	**Course credit**	**Teaching schedule Hrs./week**	**Internal marks**	**External marks**	**Total Marks**	**Duration of external exam Hrs**
CHP-SEC-401	Organic Preparations	2	4	25	25	50	04
Total		2	4	25	25	50	

M.B. Mahider.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2024
For
S. Y. B. Sc. Semester- IV

Major Course
Chemistry Paper-III [Inorganic Chemistry]
Total credit: 02 (Theory-2)

Total Hrs: Theory-30

CH-MJ-401 (Theory)

Course Code	**CH-MJ-401**	Title of the Course	**Chemistry Paper-III [Inorganic Chemistry]**
Total Credits of the Course	**2**	Hours per Week	2 hrs.

Course Outcome: Having Completed this course, the learner will be able to	
1.	Gain a comprehensive understanding of the chemistry of lanthanide and actinide elements, including their electronic configurations, extraction methods, and industrial applications
2.	Develop a solid grasp of hydrogen bonding theories, classifications, and effects, with the ability to differentiate between hydrogen bonding and sigma bonds, and appreciate the role of hydrogen bonding in various chemical and physical processes.
3.	Acquire skills in the synthesis, characterization, and application of ion-exchange resins for separation processes, and understand the properties and classifications of non-aqueous solvents, including their uses in advanced chemical processes and reactions.

UNIT-I

[A] Chemistry of Lanthanide and Actinide Elements: **[9 Hrs.]**

Lanthanide and Actinide Elements, Electronic configuration of Lanthanide and Actinide Elements, Extraction by solvent and ion exchange, Lanthanide contraction, Use of Lanthanide compounds, Industrial use Uranium and Plutonium, Misch metal.

[B] Hydrogen Bonding : **[6 Hrs.]**

Theory of hydrogen bonding, Definition, classification, importance of hydrogen bonding in ice, Effect of hydrogen bonding in various fields, Differentiate sigma and H-bond, Anion solvation.

UNIT-II

[A] Ion-exchange chromatography: **[9 Hrs.]**

Synthesis and Characterization of ion exchanger, Basic requirements of ion exchange resin. Types of ion-exchange resin. Technique of ion exchange, Application of ion exchange for Separation.

m. B. Mahida.

[B] Non aqueous solvents: **[6 Hrs.]**

Introduction, classification of solvents, Properties characterizing of solvents, protonic non aqueous solvents (liquid ammonia, anhydrous sulphuric acid), aprotic solvents (liquid SO_2).

Reference Books:

1. Introductory Quantum Chemistry by A. K. Chandra, Tata Mc. Graw Hill Delhi.
2. Atomic Structure and Chemical Bond by Manos Chandra, Tata Mc. Graw Hill Pub. Co. Ltd.
3. Theoretical Inorganic Chemistry by M. C. Day & J. Selbin Affiliated, East West Pub. Pvt. Ltd.
4. Coordination Compounds (Studies in Modern Chemistry) S. F. A. Kettle, Nelson.
5. Inorganic Chemistry by (Principles of Structure and Reactivity) James E. Huhely, Harper International (NY).
6. Inorganic Chemistry by R. B. Heslop and P. L. Robinson Elsevier Pub. Co. NY.
7. Physical Methods Inorganic Chemistry by R. S. Drago, W.B.S. Saunders Co. London, Reinhold Pub. Co. NY.
8. Basic Concepts of Analytical Chemistry by S. M. Khopkar, Wiely Estern Ltd. New Delhi.
9. Quantitative Analysis Day & Underwood Prentice Hall of India, Pvt. Ltd.
10. Instrumental Method of Analysis B. K. Sharma, Krishna Pub. House, Merrut.
11. Principles of Inorganic Chemistry (Puri, Sharma, Kalia).
12. Enviornmental Chemistry, By S. K. Banerji. Prentice Hall India Pvt. Ltd.
13. Progressive Inorganic Chemistry, Suratkar, Thatte, Pandit, Ideal Book Service, Poona.
14. Advanced Inorganic Chemistry Vol. I & II by Gurudeep Raj, Goel Pub. House, Meerut.
15. Quantum Chemistry Ir. N. Levine, Prentice Hall.
16. Advanced Inorganic Chemistry by Cotton & Wilkinson John Wihn Wiely.
17. Introduction to Chromatography Theory and Practice by V. K. Srivastava and K. K. Srivastava - S. Chand Pub.
18. Environmental Chemistry by. A. K. De.
19. Industrial Chemistry by B. K. Sharma
20. Inorganic chemistry by Gray L. Miessler, Donald A. Tarr, 3rd addition, Pearson publication.
21. General and Inorganic chemistry (part-I & II) by R. Sarkar, Books and Allied (P) ltd.

M.B. Mahida

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2024
For
S. Y. B. Sc. Semester- IV

Major Course
Chemistry Paper-IV [Organic Chemistry]
Total credit: 02 (Theory-2)

Total Hrs: Theory-30

CH-MJ-402 (Theory)

Course Code	**CH-MJ-402**	Title of the Course	**Chemistry Paper-IV [Organic Chemistry]**
Total Credits of the Course	**2**	Hours per Week	2 hrs.

Course Outcome: Having Completed this course, the learner will be able to	
1.	Understand and explain the mechanisms and applications of key organic reactions & Analyze reaction pathways and predict products for various name reactions. Describe the mechanisms of β-elimination, including E1 and E2 pathways & differentiate between elimination and substitution reactions and predict reaction outcomes.
2.	Explain the structures and properties of disaccharides & elucidate methods for methylating sugars and understand their significance. Describe the preparation and synthetic applications of malonic ester and acetoacetic ester

Unit-I

[A] NAME REACTIONS: **[9 Hrs.]**

General nature, Reaction mechanism and applications of the following reactions:

(1) Fridle Craft reaction
(2) Aldol condensation
(3) Dickmann reaction
(4) Michael reaction
(5) Wolf-Kishner reduction
(6) Mannich Reaction
(7) Reimer Tiemann reaction
(8) Wittig reaction

[B] Elimination reaction: **[6 Hrs.]**

Introduction, β -elimination, E1-mechanism, E2-mechanism, Stereo chemistry of elimination reactions, Elimination v/s substitution,

α -elimination, Generation of carbenes and Ketenes.

M.B. Mahider

Unit-II

[A] Carbohydrates: **[6 Hrs.]**

(a) General introduction:
(b) Disaccharides: Structure elucidation of maltose, lactose and sucrose
(c) Methods of methylating sugar.

[B] Compounds containing reactive methylene group: **[9 Hrs.]**

(a) Malonic ester: Preparation from acetic acid and its synthetic applications (n-butyric acid, n-caproic acid, succinic acid, adipic acid, cinnamic acid and barbituric acid)

(b) Acetoacetic ester (Ethyacetoacetate): Preparation and synthetic applications (butanone, 1,3 and 1,4-diketone, alicyclic compound.)

(c) Keto-enol tautomerism: Factors affecting keto-enol tautomerism and its mechanism.

Reference books:

(1) Organic Chemistry by R.T.Morison and R.N. Boyd, Prentice Hall India.
(2) Organic Chemistry vol-I & II by I.L.Finar.
(3) Organic Chemistry vol-I & II by B.K.Sharma, Goel pub. House, Merrut
(4) Reaction and reagents In Organic synthesis by O.P.Agrawal Goel pub. House, Merrut.
(5) Organic Chemistry by S.H.Pine.
(6) Reaction Mechanism In Organic chemistry by S.M. Mukharji & S.P. Singh.
(7) Organic Chemistry by L.G. Wade Jr. Pretice Hall.

M.B. Mahida

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2024

For

S. Y. B. Sc. Semester- IV

Major Course

Chemistry Paper-V [Physical & Industrial Chemistry]

Total credit: 04 (Theory-4)

Total Hrs: Theory-60

CH-MJ-403 (Theory)

Course Code	**CH-MJ-403**	Title of the Course	**(Physical & Industrial Chemistry) Chemistry-V**
Total Credits of the Course	**4**	Hours per Week	4 hrs.

Course Outcome: Having Completed this course, the learner will be able to	
1.	Explain Nernst distribution law and conditions for its validity & analyze complications arising from solute association and dissociation in phases. Understand Gibbs and Helmholtz free energies and derive related equations & relate free energy changes to equilibrium constants and apply Clapeyron-Clausius equation.
2.	Describe principles and types of conductometric titrations for different acid-base combinations & Compare advantages of conductometric titrations over indicator methods. Explain theories of acid-base indicators and their selection criteria.
3.	Describe properties and industrial preparation of key inorganic chemicals such as PCl5, phosphoric acid, and boric acid and the contact process for H2SO4 production. Understand applications of these inorganic chemicals in various industries.
4.	Understand & explain industrial preparation methods and uses of chemicals. Define and classify various types of fertilizers, including natural and synthetic options. Explain industrial preparation methods of fertilizers.

UNIT-I

[A] PARTITION CO-EFFICINT [6 Hrs.]

Explanation of Nernst distribution law and its conditions for the validity.

Complications arising in distribution law:

(a) Association of solute in one of the phases.
(b) Dissociation of solute in one the phases.
(c) Dissociation of solute in both the phases. Derivation of distribution law from kinetic consideration explanation of solvent extraction process. Numerical Problems

[B] THEMODYNAMICS [9 Hrs.]

Free energy or work function [Gibbs free energy (G) and Helmholtz free energy (A). Derivation Gibbs Hemholtz equation. Derivation of $G=G^0+RTlnp$. Hemholtz equation, Relation of ΔG and equilibrium constant Kp (Vant Hoff isotherm and isochore, Derivation of Clapeyron and Clapeyron-Clausius equation.

M-B-Mahider

Application of Clapeyron-Clausius equation in the derivation of Molal elevation constant & Molal depression constant. Numerical problem

UNIT-II

[A] CONDUCTOMETRIC TITRATIONS: **[8 Hrs.]**

Principle, Types of conductometric titrations:

(a) Strong acid v/s strong base
(b) Strong acid v/s weak base
(c) Weak acid v/s strong base
(d) Weak acid v/s weak base
(e) Mixture of Strong acid and weak acid v/s strong base
(f) Precipitation titration of
(i) $BaCl_2$ v/s K_2CrO_4 (ii) NaCl v/s $AgNO_3$

Advantages of conductometric titrations over indicator method

[B] IONIC EQUILIBRIA **[7 Hrs.]**

Relation between degree of hydrolysis, Hydrolysis constant and pH of solutions of:

(a) Salts of weak acid v/s strong base
(b) Salts of strong acid v/s weal base
(c) Salts of weak acid v/s weak base

Theories of acid-base indicators. Oswald and Quinonoid theories,

Choice of indicators, Indicator exponent and useful range of pH of an indicator.

Numerical Problems

Unit-III

[A] Inorganic Chemicals **[8 Hrs.]**

(1) Red Phosphorus (2) Sodium hexametaphosphate

(3) PCl_5 (4) Phosphoric acid (5) Boric acid (6) H_2SO_4 (Contact process)

[B] Industrial Preparation and uses of **[7 Hrs]**

(1) Potassium permanganate (2) Bleaching powder by Bachmann's method (3) $K_2Cr_2O_7$

(4) Titanium Dioxide

Unit-IV

[A] Fertilizers **[6 Hrs]**

Definition and classification of fertilizers, Direct and indirect fertilizers, Natural and synthetic fertilizer, Symptoms of deficiency of some elements like N, K, and P.

[B] Industrial Preparation of **[9 Hrs.]**

Ammonium sulphate, Urea, Super Phosphate of Lime, DAP. Hazadous effect of used of fertilizers and its preventive measures, Mixed fertilizers, Complex fertilizers, Fertilizers grades, Fertilizers ratio, Fertilizers condition, Fertilizers filter.

M. B. Mahida

References:

1. Physical chemistry by Gurdeep Raj.
2. Physical chemistry by K.L.Kapoor vol.-I to IV [Pub. Macmilan]
3. Advanced Physical chemistry by D.N.Bajpai.
4. Text book of Physical chemistry by S.C. Khetepal & Yogeshwar Sharma. [Pub. R.Chand]
5. Physical chemistry by Puri & Sharma[S.Nagin & Co.]
6. A text book of Physical chemistry by A.S.Negi & Anand [New age International]
7. Physical chemistry by P.L.Soni & O.P.Dharmraj.
8. Physical chemistry by B.K.Sharma.
9. Essential of Physical chemistry by Bahl Tuli &Bahl.
10. Elemental Physical chemistry byGlasston & Lewis.
11. Physical chemistry by K.K.Sharma, L.K.Sharma [Vikas Publication House, New Delhi.]
12. Indusrtial Chemistry BY B.K.Sharma (Goysl Publication)
13. Indristrial Chemistry by Shreve.

M.B. Mahida.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2024
For
S. Y. B. Sc. Semester- IV

Major Course
Chemistry Practicals Paper III

Total credit: 02

Total Hrs: Practical: 60

CHP-MJ-401

Course Code	CHP-MJ-401	Title of the Course	**Chemistry Practicals Paper III**
Total Credits of the Course	2	Hours per Week	4 hrs.

Course Outcome: Having Completed this course, the learner will be able to	
1.	Interpret the solubility and reactivity of inorganic compounds in various solvents. Apply knowledge of chemical reactions to determine the presence of specific ions in mixtures, ensuring accurate qualitative analysis.
2.	Synthesize organic compounds such as anthraquinone, m-dinitrobenzene, p-bromoacetanilide, and naphthalene picrate etc. using standard laboratory procedures.

[A] INORGANIC QUALITATIVE ANALYSIS: [Minimum 10 should be done]

LIST OF INORGANIC CHEMICALS USED FOR INORGANIC QUALITATIVE ANALYSIS:

CHLORIDES: Cu^{+2}, Cd^{+2}, Fe^{+3}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Na^{+}, K^{+}, NH_4^{+}

BROMIDES: Sr^{+2}, Na^{+}, K^{+}, NH_4^{+}

IODIDES: K^{+}

NITRITES: Na^{+}, K^{+}

NITRATES: Pb^{+2}, Co^{+2}, Ni^{+2}, Ba^{+2}, Sr^{+2}, Na^{+}, K^{+}, NH_4^{+}

SULPHITES: Na^{+}

SULPHIDE: Zn^{+2}, Sb^{+3}

SULPHATES: Cu^{+2}, Cd^{+2}, Fe^{+2}, Al^{+3}, Mn^{+2}, Co^{+2}, Ni^{+2}, Zn^{+2}, Mg^{+2}, Na^{+}, K^{+}, NH_4^{+}

CARBONATES: Cu^{+2}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Mg^{+2}, Na^{+}, K^{+}, NH_4^{+}

M. B. Mahale

PHOSPHATES: , Cu^{+2}, Al^{+3}, Fe^{+3}, Zn^{+2}, Mn^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2},

Mg^{+2}, Na^{+}, K^{+}, NH_4^{+}

(NOTE: Inorganic qualitative analysis of mixture containing four radicals. The mixture may be soluble in water or dilute hydrochloric acid or concentrated hydrochloric acid excluding Arsenite, Arsenate, Chromates and Borate.)

[B] ORGANIC PREPARATION: (MINIMUM 3 SHOULD BE DONE)

1. Anthraquinone from Anthracene
2. m-Dinitrobenzene from Benzene
3. p-Bromoacetanilide from Acetanilide
4. Naphthalene picrate from Naphthalene.

N.B. Preparation should be submitted with sample and justification (M.P. & C.T.)

M. B. Mahida.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2024
For
S. Y. B. Sc. Semester- IV

Major Course
Chemistry Practicals Paper IV

Total credit: 02

Total Hrs: Practical: 60

CHP-MJ-402

Course Code	CHP-MJ-402	Title of the Course	**Chemistry Practicals Paper IV**
Total Credits of the Course	2	Hours per Week	4 hrs.

Course Outcome: Having Completed this course, the learner will be able to	
1.	Apply quantitative analytical techniques to evaluate the content of organic substances in given samples.
2.	Investigate adsorption properties and relative strengths of acids, enhancing understanding of physical chemistry principles and laboratory techniques.

ORGANIC ESTIMATIONS (Minimum 5 should be performed)

1. To determine the amount of acetamide in the given solution hydrolysis by NaOH.
2. To determine the amount of phenol in the given solution by bromination.
3. To determine Aniline in the given solution by bromination.
4. To determine the number of -COOH group of given carboxylic acid.
5. Percentage purity of l-ascorbic acid (Vitamin-c)
6. Percentage purity of Glycine.

PHYSICAL PRACTICALS (Minimum 6 should be performed)

1. pH metry: To determine the normality of given mix acid in $H\overline{A}c$ + HCl pH-metrically using strong base.

2 Conductometric Titration:

(i) To determine the normality of given mixture ($H\overline{A}c$ +HCl) solution by

M. B. Mahida

Condutometric titration with the given 0.1N NaOH solution.

3 Heat of solution;

To determine the heat of solution of organic acid (benzoic acid, phthalic acid) by finding the solubility of the acid at two different temperature

4 Surface Tension:

To determine the parachor of $-CH_2$ group of liquid: (Benzene, Toluene, Xylene)

5. Adsorption:
To study the adsorption of given organic acid (Acetic acid/ oxalic acid) on animal charcoal.

6. Relative strength:

To study the relative strength of two acids H_2SO_4 and HCl.

7. pH metry: Determination of Ka of weak acid

To determination of ionisation constant of weak acid

M.B. Mahida

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2024
For
S. Y. B. Sc. Semester- IV
Minor Course (ME)
Selected topics in Chemistry
Total credit: 02 (Theory-2)
Total Hrs: Theory-30
CH-ME-401 (Theory)

Course Code	CH-ME-401	Title of the Course	**Selected topics in Chemistry**
Total Credits of the Course	**2**	Hours per Week	2 hrs.

Course Outcome: Having Completed this course, the learner will be able to	
1.	Describe methods for the formation and chemical reactions of monocarboxylic acid derivatives. Understand and apply nomenclature rules for metal complexes, including common ligands. Explain Werner's coordination theory and crystal field stabilization energy (CFSE).
2.	Define and classify hydrogen bonding and differentiate it from sigma bonds. Explain the preparation and uses of common polymers like polyethylene, polystyrene, and PVC. Understand the properties and applications of biodegradable polymers such as PHBV and Nylon-2-Nylon-6.

UNIT-I

[A] Carboxylic acid and its derivatives: **[6Hrs.]**

Structure and nomenclature of acid chloride, ester, amides of monocarboxylic acid; Method of formation of monocarboxylic acid derivatives and chemical reactions.

[B] Metal Complexes: **[9Hrs.]**

Introduction, Werner's coordination theory, CFSE, Factors affecting on CFSE, Application of CFT (Magnetic properties, Spectral properties) Nomenclature of complexes (Nomenclature rules, Examples of Common monodentate and multidentate ligands).

UNIT - II

[A] Hydrogen Bonding: **[6 Hrs.]**

M. B. Mahida

Theory of hydrogen bonding, Definition, classification, importance of hydrogen bonding in ice, Effect of hydrogen bonding in various fields, Differentiate sigma and H-bond, Anion solvation.

[B] Polymers : **[9 Hrs.]**

Definition of Polymers. Types of Polymerization Reactions.

Preparation and uses of Polyethylene, Polystyrene, PVC, Polybutadiene, Nylon-6, Nylon-6,6, Novalac, Melamine-Formaldehyde.

Biodegradable Polymers: Preparation, Properties and uses of PHBV & Nylon-2-Nylon-6.

Reference books:

(1) Organic Chemistry vol-I & II by I.L.Finar.
(2) Organic Chemistry vol-I & II by B.K.Sharma, Goel pub. House, Merrut
(3) Reaction and reagents In Organic synthesis by O.P.Agrawal Goel pub. House, Merrut.

M. B. Mahida

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2024
For
S. Y. B. Sc. Semester- IV

Minor Course (ME)
Chemistry Practicals
Total credit: 02

Total Hrs: Practical: 60

CHP-ME-401

Course Code	**CHP-ME-401**	Title of the Course	**Chemistry Practicals**
Total Credits of the Course	**2**	Hours per Week	4 hrs.

Course Outcome: Having Completed this course, the learner will be able to	
1.	Identify and classify organic compounds such as acids, phenols, bases, aldehydes, ketones, esters, alcohols, hydrocarbons, nitro hydrocarbons, halogenated hydrocarbons, amides, and anilides through systematic spotting techniques.
2.	Quantitatively determine the concentration of acetamide, phenol, aniline, and carboxylic acids in given solutions using appropriate chemical reactions.

[A] ORGANIC SPOTTING [Minimum 08 should be performed]

ACID: Salicylic acid, Cinnamic acid, Phenyl acetic acid, Sulphanilic acid.

PHENOL: α -Naphthol, β -Naphthol, o-Nitrophenol

BASE: o-Nitroaniline, m-Nitroaniline, p-Nitroaniline, p-Toludine, p-Chloroaniline,

Diphenyl amine, Dimethylaniline, Diethylaniline

NEUTRAL:

ALDEHYDE: Glucose, Benzaldehyde

KETONE: Methylethylketone, Acetophenone

ESTER: Ethylacetate, Butylacetate

ALCOHOL: Ethanol, Butanol

HYDROCARBON: Anthracene, Naphthalene, Diphenyl

NITRO HYDROCARBON: m-Dinitrobenzene, Nitrobenzene

M. B. Mahida

HALOGENATED HYDROCARBON: Chlorobenzene, Bromobenzene, p-Dichlorobenzene

AMIDE: Benzamide, Thiourea

ANILIDE: Acetanilide

[B] ORGANIC ESTIMATIONS (Minimum 4 should be performed)

1. To determine the amount of acetamide in the given solution hydrolysis by NaOH.
2. To determine the amount of phenol in the given solution by bromination.
3. To determine Aniline in the given solution by bromination.
4. To determine the number of -COOH group of given carboxylic acid.
5. Percentage purity of l-ascorbic acid (Vitamin-c)
6. Percentage purity of Glycine.

M. B. Mahida.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus effective from June, 2024
For
S. Y. B. Sc. Semester- IV

Skill Enhancement Course (SEC): Organic Preparations (Only Practical)
Total credit: 02

Total Hrs: Practical: 60

CHP-SEC-401

Course Code	**CHP-SEC-401**	Title of the Course	**Organic Preparations**
Total Credits of the Course	2	Hours per Week	4 hrs.

Course Outcome: Having Complete this Course, the learner will be able to understand	
1	Demonstrate Proficiency in Performing Organic Preparation

Organic Preparation: (Minimum 10)

1. To prepare Picrate derivative of Naphthalene.
2. To prepare Aspirin from Salicylic Acid.
3. To prepare Acetanilide from Aniline.
4. To prepare p-Nitroacetanilide from acetanilide
5. To prepare Phthalic anhydride from Phthalic acid.
6. To prepare Salicylic acid by Nitration (Green route).
7. To prepare Iodoform from Acetone.
8. To perform based catalyzed Aldol condensation using LiOH H_2O as catalyst.
9. To prepare m-Nitroaniline from m-dinitrobenzene.
10. To prepare (1,2,3,4,6-penta-)-acetyl-α-D-Glucose from α-D-Glucose.
11. To prepare Aniline from Nitrobenzene.
12. To prepare m-Nitroaniline from m-dinitrobenzene.
13. To prepare benzoic acid from benzamide.
14. To prepare oxalate derivative from dimethyl aniline.
15. To prepare Acetanilide from Aniline and Acetic acid using Zn dust. (Green route)

Reference Book

1. Vogel's Practical Organic Chemistry by A. I. Vogel
2. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, V. K. Ahluwalia, R. Aggarwal
3. Practical Organic Chemistry: A Student Handbook of Techniques by J. R. Mohrig, D. F. Heathcock, and D. G. Mackean
4. Organic Chemistry Laboratory Notebook by Hayden-McNeil

M. B. Mahida

5. Experimental Organic Chemistry: A Miniscale and Microscale Approach by John C. Gilbert and Stephen F. Martin
6. Advanced Practical Organic Chemistry by Dorothy M. Conlon and Kevin O. Smi.

M. B. Mahida.