MRR GOVERNMENT ARTS & SCIENCE DEGREE COLLEGE
UDAYAGIRI, SPSR NELLORE.
Affiliated to Vikrama Simhapuri University
Estd. 1983
Website: www.mrrgdc.ac.in

DEPARTMENT OF CHEMISTRY

PROGRAMME SPECIFIC OUTCOMES

ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

B.SC. CHEMISTRY SYLLABUS UNDER CBCS

W.E.F. 2015-16 (REVISED IN APRIL 2016)

B.Sc Botany, Zoology and Chemistry (BZC)

PROGRAMME OUTCOMES

- Develop observation and critical thinking
- Understand scientific methods
- Scientific reasoning and analytical problem solving with a molecular perspective

PROGRAMME SPECIFIC OUTCOMES

On successful completion of this programme, the students will be able to:

- Develops knowledge about all the branches of Chemistry such as organic, inorganic, physical and medicinal chemistry
- Gain the practical knowledge about elements and their reactivity
- Handling of chemicals
- Get exposure of experimental techniques and instruments
- Inspires to pursue higher education in Chemistry and its interdisciplinary courses
- Inspires to become a good researcher/chemist/scientist
- Learn skills required to get a job in pharmaceutical, bioprocessing and petroleum industries

- **PSO 1**: Understand the basic and applied concepts of Botany, Zoology and Chemistry.
- **PSO 2** : Perform procedures as per laboratory standards in the areas of Microbiology, Plant Anatomy, Taxonomy, Physiology, Cell Biology, Molecular Biology, Economic Zoology and Ecology.
- **PSO 3** : Demonstrate laboratory skills necessary for research in basic science.
- **PSO 4** : Integrate the different disciplines and understand the interdisciplinary approach to carry out research.

- **PSO 5** : Interpreting the significance of resulting data, reporting results and writing technical reports.
- **PSO 6** : Understand the role of Biology and Chemistry in daily life.
- **PSO 7** : Know employment opportunities through basic science.
- **PSO 8** : Understand the applications of biological sciences and Chemistry in Aquaculture, Agriculture, Horticulture and Medicine and to grow as entrepreneur in Apiculture, Sericulture, Aquaculture, Horticulture, Mushroom cultivation, and Poultry & Pest Control Services.
- **PSO 9** : Apply scientific methods and processes by formulating questions, designing investigations and synthesizing data to draw conclusions and make scientifically-based decisions.
- **PSO 10** : Apply one's knowledge and understanding of Biology and Chemistry to new/unfamiliar contexts and to identify problems and solutions in daily life

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DEPARTMENT OF CHEMISTRY

COURSE OUTCOMES

ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION

B.SC. CHEMISTRY SYLLABUS UNDER CBCS

W.E.F. 2015-16 (REVISED IN APRIL 2016)

COURSE OUTCOMES

SEMESTER I

COURSE 1: INORGANIC & ORGANIC CHEMISTRY (1304CHE15)

Theory:

At the end of the course, the students will be able to:

- Gets knowledge about p-block elements
- Acquires knowledge about basic concepts of organic chemistry
- Understands the concept of Aromaticity, Huckel's rule

Laboratory:

1304CHE15: Practical-I Simple Salt Anaiysis

On successful completion of this course, the students shall be able to:

- Develop skills required for the qualitative analysis of simple salt containing one anion and cation

SEMESTER II

COURSE II : PHYSICAL & GENERAL CHEMISTRY (2304CHE15)

Theory:

At the end of the course, the students will be able to:

- Understands the basic terminology of stereochemistry and molecular representations
- Gets knowledge about the states of matter in depth and properties of solutions
- Acquires knowledge about hybridization, valence bond theory and molecular orbital theory
- Learn about the properties of colloids, sols, emulsions and gels

Laboratory:

2304CHE15: Practical-II Analysis of Mixture Salt

On successful completion of this course, the students shall be able to:

- Use glassware , equipment and chemicals and follow experimental procedures in the laboratory
- Develop skills required for the qualitative analysis of mixture salt containing two anions and two cations

SEMESTER III

COURSE III : INORGANIC CHEMISTRY & ORGANIC CHEMISTRY (3304CHE15)

Theory:

At the end of the course, the students will be able to:

- Develops insight into Chemistry of d-block and f-block elements
- Develops in-depth knowledge about metal carbonyls and EAN (Effective atomic number)
- Learn about various name reactions and their mechanisms

Laboratory:

3304CHE15: Practical-III Titrimetric analysis and Organic Functional Group Reactions

On successful completion of this course, the students shall be able to:

- How to use glassware equipments and chemicals and follow experimental procedures in the laboratory
- Identifies the nature of functional group present in a given organic compound
- Determine the amount of Fe(II)/Cu(II) through titrimetric analysis
- How to depose of chemicals in a safe and responsible manner
- How to perform common laboratory techniques including reflects distillation re crystallisation vacuum filtration
- How to create and carryout work up and separation procedures
- How to critically evaluate data collected to determine te identify purity and percent yield of products and to summaries findings in writing in clear and concise manner

SEMESTER IV

COURSE IV :

SPECTROSCOPY & PHYSICAL CHEMISTRY (4304CHE15)

Theory:

At the end of the course, the students will be able to:

- To learn about the loss of a observation of light energy by molecules and the subsequent photo chemical reactions
- To understand the concepts of quantum efficiency and mechanisms of photochemical reactions.
- Get awareness about spectroscopic techniques like Electronic, Infra red and Proton magnetic resonance spectroscopy and their uses in structural elucidation of an organic compound
- Develops in-depth knowledge about Phase equilibrium and its applications
- Gain the knowledge about conductometric and potentiometric titrations

Laboratory:

4304CHE15: Practical-IV Physical Chemistry and IR Spectral Analysis

On successful completion of this course, the students shall be able to:

- Measure the concentration of acids through conductometric titrations
- Measure the CST (Critical Solution Temperature) of Phenol-Water system

SEMESTER V

COURSE V : INORGANIC, ORGANIC & PHYSICAL CHEMISTRY (5314CHE15)

Theory:

- Learn about various concepts of Coordination chemistry and stereochemistry of coordination compounds
- Understands the stability of metal complexes
- The terminology in Thermodynamics and laws of Thermodynamics

Laboratory:

5314CHE15: Practical-V Organic Chemistry

- Develop skills required for the systematic qualitative analysis of organic compounds and determination of physical constants

COURSE VI : INORGANIC, ORGANIC & PHYSICAL CHEMISTRY (5324CHE15)

Theory:

At the end of the course, the students will be able to:

- Knows about kinetics of a chemical reaction and the concept of activation energy
- Understands the various photophysical and photochemical processes
- Learn the physical and chemical properties of Amino acids

Laboratory:

5324CHE15: Practical-VI Physical Chemistry

On successful completion of this course, the students shall be able to:

- Capable to determine the surface tension and viscosity of a liquid
- Knows the determination of rate constant for acid catalysed ester hydrolysis

SEMESTER VI

63CHE: ELECTIVE-VII-A: ANALYTICAL METHODS IN CHEMISTRY

Theory:

At the end of the course, the students will be able to:

- Identify the importance of solvent extraction and ion exchange method.
- Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis.
- Demonstrate the usage of common laboratory apparatus used in quantitative analysis.
- Understand the theories of different types of titrations.
- Gain knowledge on different types of errors and their minimization methods.
- Get awareness about separation techniques in chemical analysis and various types of chromatographic techniques, which are essential to become a good researcher
- Understand the principles of volumetric and gravimetric analysis

Laboratory:

63CHE: Practical-VII-A

On successful completion of this practical course, student shall be able to:

- Estimate Iron(II) using standard Potassium dichromate solution
- Learn the procedure for the estimation of total hardness of water
- Demonstrate the determination of chloride using Mohr's method
- Acquire skills in the operation and calibration of pH meter
- Perform the strong acid vs strong base titration using pH meter
- Expertise in Paper chromatography technique, which is a notable purification technique
- EDTA titrations

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Department of Chemistry

PROGRAMME OUTCOMES & COURSE OUTCOMES

Vikrama Simhapuri University :: Nellore

Common Framework of CBCS for Colleges in Andhra Pradesh

(Andhra Pradesh State Council of Higher Education)

with effect from the Academic Year 2020-21

SEMESTER I

COURSE 1: INORGANIC & PHYSICAL CHEMISTRY

Theory:

At the end of the course, the students will be able to:

- Understand the basic concepts of p-block Elements
- Explain the difference between solids, liquids and gases interms of intermolecular interactions.
- Apply the concepts of gas equations.
- Apply the concepts of pH and Electrolytes studying other chemistry courses

Laboratory:

On successful completion of this course, the students shall be able to:

- Understand the basic concepts of qualitative analysis of Inorganic mixture
- Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- Apply the concepts of common ion effect,solubility product and concepts of related to qualitative analysis

SEMESTER II

COURSE II : ORGANIC & GENERAL CHEMISTRY

Theory:

At the end of the course, the students will be able to:

- Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt.
- Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.
- Learn and identify many organic reaction mechanism including free radical substitution electrophilic addition and electrophylic aromatic substitution.
- Correlate and describe the stereo chemical properties of organic compound and reactions

Laboratory:

On successful completion of this course, the students shall be able to:

- Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
- Understand and explain the volumetric analysis bsed on fundamental concepts learn in inorganic equilibrium
- Learning and identify the concepts of a standard solutions primary and secondary standards.
- Felicitate the learner to make solutions of various molar concentrations. This may include the concept of the mole converting moles to grams converting grams to moles defining concentration dilution of solutions making different molar concentrations

SEMESTER III

COURSE III : ORGANIC CHEMISTRY & SPECTROSCOPY

Theory:

At the end of the course, the students will be able to:

- Understand PREPARATION properties and reaction of alkalines, haloarenes and oxygen containing functional groups.
- Use the synthetic chemistry learn in this course to do functional group transformations.
- To propose plausible and mechanisms for any relevant reaction

Laboratory:

On successful completion of this course, the students shall be able to:

- How to use glassware equipments and chemicals and follow experimental procedures in the laboratory
- How to calculate liming reagent theoretical yield and percent yield
- How to engage in safe laboratory practices by handling laboratory glassware equipment and chemical reagents appropriately
- How to depose of chemicals in a safe and responsible manner
- How to perform common laboratory techniques including reflects distillation re crystallization vacuum filtration
- How to create and carryout work up and separation procedures
- How to critically evaluate data collected to determine te identify purity and percent yield of products and to summaries findings in writing in clear and concise manner

SEMESTER IV

COURSE IV : INORGANIC , ORGANIC & PHYSICAL CHEMISTRY

Theory:

At the end of the course, the students will be able to:

- To learn about the loss of a observation of light energy by molecules and the subsequent photo chemical reactions
- To understand the concepts of quantum efficiency and mechanisms of photochemical reactions.

Laboratory:

On successful completion of this course, the students shall be able to:

- Used glassware equipment and chemicals and follow experimental procedures in the laboratory
- Determine melting and boiling points of organic compounds
- Understand the application of concepts of different organic reactions studied in theory part of organic chemistry

COURSE V : INORGANIC & PHYSICAL CHEMISTRY

Theory:

At the end of the course, the students will be able to:

- Understand of boundary conditions and quantization probability distribution ost probable values uncertainty and expectation values
- Application of quantization to spectroscopy
- Various types of spectra and there use instructed determination .

Laboratory:

On successful completion of this course, the students shall be able to:

- Used glassware equipment and chemicals and follow experimental procedures in the laboratory
- Apply concepts of electrochemistry in experiments
- Be familiar with electro analytical methods and technique use in Analytical chemistry which study an Analytic by measuring the potential and current in electrochemical cell containing the analyte

SEMESTER V

COURSE 6B : ANALYTICAL METHODS IN CHEMISTRY-1

Theory: At the end of the course, the students will be able to

- . Identify the importance of solvent extraction and ion exchange method.
- 2). Acquire knowledge on the basic principles of volumetric analysis and gravimetric analysis.
- 3). Demonstrate the usage of common laboratory apparatus used in quantitative analysis.
- 4). Understand the theories of different types of titrations.
- 5). Gain knowledge on different types of errors and their minimization methods.

Laboratory:

- On successful completion of this practical course, student shall be able to:
- Estimate Iron(II) using standard Potassium dichromate solution
- Learn the procedure for the estimation of total hardness of water
- Demonstrate the determination of chloride using Mohr's method
- Acquire skills in the operation and calibration of pH meter
- Perform the strong acid vs strong base titration using pH meter

SEMESTER V

COURSE 7B : ANALYTICAL METHODS IN CHEMISTRY-2

Theory:

Students after successful completion of the course will be able to:

- Identify the importance of chromatography in the separation and identification of compounds in a mixture
- Acquire a critical knowledge on various chromatographic techniques.
- Demonstrate skills related to analysis of water using different techniques.
- Understand the principles of spectro chemistry in the determination of metal ions.
- Comprehend the applications of atomic spectroscopy.

Laboratory:

On successful completion of this practical course, student shall be able to:

- Perform the separation of a given dye mixture using TLC
- Learn the preparation of TLC plates
- Demonstrate the separation of mixture of amino acids using paper chromatography
- Acquire skills in using column chromatography for the separation of dye mixture

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Department of Chemistry

PROGRAMME OUTCOMES & COURSE OUTCOMES

(Andhra Pradesh State Council of Higher Education)

Revised syllabus of B.Sc Chemistry under CBCS Framework w.e.f AY 2023-24

PROGRAMME: FOUR-YEAR UG HONOURS PROGRAMME IN SINGLE MAJOR CHEMISTRY

COURSE OUTCOMES

SEMESTER I

COURSE 1: ESSENTIALS AND APLLICATIONS OF CHEMICAL SCIENECES

Theory:

At the end of the course the student will be able to

- Understand the basic principles and concepts underlying a broad range of fundamental areas of chemistry and to Connect their knowledge of chemistry to daily life.
- Understand the interplay and connections between mathematics, physics, and chemistry in various applications. Recognize how mathematical models and physical and chemical
- Understand various substances and chemical reactions, such as mixing acids and bases or observing a combustion reaction
- Understand the chemical changes that occur, including changes in color, temperature, or the formation of new substances.
- Understand Chemistry in Daily Life Presentation
- Understand group a specific biomolecule category, such as carbohydrates, proteins, fats, or vitamins.

COURSE 2 : ADVANCES IN CHEMICAL SCIENCES

Theory:

At the end of the course the student will be able to

- Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
- Understand different number systems, such as binary, octal, decimal, and hexadecimal.
- Understand experiments to study enzyme- substrate interactions or molecular interactions in biological systems.

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DEPARTMENT OF CHEMISTRY

PROGRAMME OUTCOMES & COURSE OUTCOMES

Andhra Pradesh State Council of Higher Education

Multidisciplinary Courses Offered for B.A./B.Com./BBA/BCA Majors

With effect from Academic Year

2023-24

SEMESTER-I

PRINCIPLES OF CHEMICAL SCIENCES

Course Outcomes

Theory:

At the end of the course the student will be able to

- Understand the structure of atom.
- Identify the isotopes and isobars.
- Define acids and bases and predict the nature of salts.
- Explain ionic and covalent bonding.
- Describe the importance of Chemistry in daily life.
- Understand Classification of elements based on electronic configuration
- Understand distinguish between metals, non-metals and metalloids
- Understand periodic properties atomic radii, ionization enthalpy, electronegativity, Octet rule.
- Understand ionic bond properties of Ionic compounds-covalent bond, properties of covalent molecule.
- Understand Definition, types and properties of Acids, Bases, Salts, strength of acids and bases

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DEPARTMENT OF CHEMISTRY

COURSE OUTCOMES

REVISED SYLLABUS OF B.Sc. (Chemistry)

UNDER CBCS FRAMEWORK WITH EFFECT FROM 2023 -24

PROGRAMME: FOUR-YEAR UG HONOURS PROGRAMME IN SINGLE MAJOR CHEMISTRY

(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities & Model Q.P.)

Courses of 1, 2, 3 & 4 Semesters)

(To be Implemented from 2023-24 Academic Year)

SEMESTER-II

COURSE -I[MAJOR AND MINOR]

GENERAL AND INORGANIC CHEMISTRY

COURSE OUTCOMES:

THEORY:

At the end of the course the student will be able to

1. Understand the structure of atom and the arrangement of elements in the periodic table.

2. Understand the nature and properties of ionic compounds.

3. Identify the structure of a given inorganic compound.

4. Explain the existence of special types of compounds through weak chemical forces.

5. Define acids and bases and predict the nature of salts.

LABORATORY COURSE -I

PRACTICAL- I

QUALITATIVE ANALYSIS OF SIMPLE SALT QUALITATIVE INORGANIC ANALYSIS (MINIMUM OF SIX SIMPLE SALTS SHOULD BE ANALYSED)

COURSE OUTCOMES:

At the end of the course, the student will be able to;

1. Understand the basic concepts of qualitative analysis of inorganic simple salt.

2. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory

3. Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis

Inorganic Chemistry

Theory:

COURSE OUTCOMES:

At the end of the course, the student will be able to:

1.Understand the basic concepts of p-block elements.

2.Explain the concepts of d-block elements

3. Distinguish lanthanides and actinides.

4. Describe the importance of radioactivity.

Laboratory Course–II

Practical-II Inorganic Preparations

COURSE OUTCOMES:

At the end of the course, the student will be able to:

1. Understand the basic concepts of inorganic preparations.

2. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory

3. Apply the properties of various elements for the preparation of inorganic compounds.

SEMESTER-III
COURSE -III [Major and Minor]
FUNDAMENTALS IN ORGANIC CHEMISTRY.

COURSE OUTCOMES:

Theory:

At the end of semester the student will be able to

1. Understand and explain the differential behavior of organic compounds based on fundamental concepts learnt.

2. Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved.

3. Learn and identify many organic reaction mechanisms .

4. Correlate and describe the stereo-chemical properties of organic compounds and reactions.

Laboratory Course -III

Organic Qualitative analysis

Course outcomes:

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory

2. Determine melting and boiling points of organic compounds

3. Understand the application of concepts of different organic reactions studied in theory part of organic chemistry

SEMESTER-III

COURSE -IV [MAJOR]

ORGANIC CHEMISTRY (Halogen and Oxygen containing organic compounds).

Course outcomes

Theory:

At the end of the course, the student will be able to:

1. Understand the concept of SN1andSN2and SNimechanisms.

2. Describe the reactivity of alcohols and phenols.

3. Achieve the skills required to propose various mechanisms

4. Apply the concepts for synthesising various oxygen containing organic compounds

5. Interconvert the monosaccharides.

LABORATORY COURSE – IV

Organic preparations

COURSE OUTCOMES:

On the completion of the course, the student will beable to do the following:

1. How to use glassware, equipment and chemicals and follow experimental procedures in the laboratory.

2. How to calculate limiting reagent, theoretical yield, and percent yield.

3. How to perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.

4. How to critically evaluate data collected to determine the identity, purity and percent yield of products and to summarize findings in writing in a clear and concise manner.

SEMESTER-III

COURSE -V [MAJOR ONLY]

PHYSICAL CHEMISTRY (Solutions & Electro Chemistry)

COURSE OUTCOMES:

Theory:

At the end of the semester the student will be able to

1. Understand the ideal and non ideal behaviour of solutions.

2. Determine the molecular mass of non-volatile solutes.

3. Discuss the basic concepts of Photochemistry.

4. Apply the principles of electrical conductivity.

5. Explain the importance of emf and its applications.

Laboratory Course –V

Course-V -PHYSICAL CHEMISTRY

Course outcomes:

At the end of the course, the student will be able to:

1. Use of glassware, equipment and chemicals and follow experimental procedures in the laboratory.

2. Understand and apply the concepts of solutions practically.

3. Apply concepts of electrochemistry in experiments.

SEMESTER-III

COURSE -VI[MAJOR ONLY]

Inorganic and Physical Chemistry

Course outcomes:

Theory:

At the end of the semester the student will be able to:

1) Apply IUPAC nomenclature for Coordination compounds

2) Understand the various theories, structure and stereo chemistry of coordination compounds.

3) Explain the reaction mechanism in complexes.

4) Apply the 18 electron rule.

5) Discuss the basic concepts of thermodynamics.

LABORATORY COURSE –VI

Qualitative inorganic analysis (Minimum of Six mixtures should be analyzed) IV.

Course outcomes:

At the end of the course, the student will be able to:

1) Understand the basic concepts of qualitative analysis of inorganic mixture.

2) Use glassware, equipment and chemicals and follow experimental procedures in the laboratory.

3) Apply the concepts of common ion effect, solubility product and concepts related to qualitative analysis

SEMESTER-IV

COURSE -VII [MAJOR AND MINOR]

PHYSICAL CHEMISTRY (States of Matter, Phase Rule & Surface Chemistry)

Course outcomes:

At the end of the semester the student will be able to:

1. Explain the difference between solids liquids and gases in terms of intermolecular interactions.
2. Differentiate ideal and real gases.
3. Discuss the basic concepts of two component systems
4. Apply the concepts of adsorption.
5. Understand the basic concepts of crystallography.

LABORATORY

CourseVII - Organic preparations

Course outcomes:

At the end of the course, the student will be able to:

1) Use glassware, equipment and chemicals and follow experimental procedures in the laboratory

2) Apply concepts of surface chemistry in experiments.

3) Be familiar with the concepts & practical applications of Surface tension and viscosity of liquids.

SEMESTER-IV

COURSE -VIII [MAJOR AND MINOR]

GENERAL AND PHYSICAL CHEMISTRY

Course outcomes:

At the end of the semester the student will be able to:

1. Correlate and describe the stereochemical properties of organic compounds.
2. Explain the biological significance of various elements present in the human body.
3. Apply the concepts of ionic equilibrium for the qualitative and quantitative analysis.
4. Determine the order of a chemical reaction.
5. Describe the basic concepts of enzyme catalysis.

LABORATORY

COURSE –VIII Physical Chemistry - Volumetric Analysis

Course outcomes:

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in the laboratory
2. Understand and explain the volumetric analysis based on fundamental concepts learnt in ionic equilibria
3. Learn and identify the concepts of a standard solutions, primary and secondary standards
4. Facilitate the learner to make solutions of various molar concentrations.

SEMESTER-IV

COURSE –IX [MAJOR]

Nitrogen containing Organic Compounds &Spectroscopy

Course outcomes:

At the end of the semester the student will be able to:

1. Distinguish primary secondary and teritiary amines and their properties.

2. Describe the preparation and properties of amino acids.

3. Explain the reactivity of nitro hydrocarbons.

4. Discuss heterocyclic compounds with N, O and S.

5. Apply the concepts of UV and IR to ascertain the functional group in an organic compound.

Laboratory Course –IX

Organic preparations and IR Spectral Analysis

Course outcomes:

On completion of the course, the student will be able to:

1) Use glassware, equipment and chemicals and follow experimental procedures in the laboratory

2) Calculate limiting reagent, theoretical yield, and percent yield

3) Engage in safe laboratory practices by handling laboratory glassware, equipment, and chemical reagents appropriately

4) Dispose of chemicals in a safe and responsible manner

5) Perform common laboratory techniques including reflux, distillation, recrystallization, vacuum filtration.

6) Create and carry out work up and separation procedures.

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DEPARTMENT OF CHEMISTRY

PROGRAMME OUTCOMES

AND

COURSE OUTCOMES -

COMMUNICATION RECORD