

S.V.ARTS COLLEGE, TIRUPATI
Department of Chemistry
Learning outcomes of the course

Paper-1 : Inorganic & Organic Chemistry 3-1-106

INORGANIC CHEMISTRY Unit I : P- Block elements-I (Group- 13, 14, 15)

Unit II: 1. P- Block elements-II (Group- 16, 17) 2. Organometallic Chemistry

ORGANIC CHEMISTRY

Unit III: Structural theory in organic chemistry

Unit IV: 1. Acyclic hydrocarbons 2. Alicyclic hydrocarbons

Unit V: Benzene and its reactivity

Learning Outcomes of Course

1. After learning 'P- block elements', students are expected to recall the various definitions, concepts related to them and apply these concepts as and when required. Realize the industrial significance of these elements and their compounds. Also, their applications in our daily.
2. After the completion of 'Organometallic chemistry', students should be able to realize the potential applications of these compounds in the synthesis of various chemicals and polymers of day today use both at laboratory level in micro scale and industrially in macro scale.
3. After learning 'Structural theory in organic chemistry', students are expected to be well versed with all the fundamental concepts of organic chemistry such as bond fission, inductive effect, mesomeric effect, hyper conjugation etc. Also, explanation for acidity and basicity based on these concepts.
4. After going through 'Acyclic hydrocarbons' and 'Alicyclic hydrocarbons', students are expected to know the differences between them, methods of synthesis, chemical properties, various types of strains involved in the cyclic hydrocarbons and their effect on their geometry and chemical properties, theories of strain such as Bayer's theory.
5. After going through 'Benzene and its reactivity', students are to be in a position to apply the concept of resonance in explaining different phenomena such as acidity, basicity of acids, phenols and amines. Also, they are expected to be in a position to explain the preference of electrophilic and nucleophilic substitutions for ortho, para or meta positions.
6. The students must have developed personality traits such as Punctuality, faithfulness, honest recording of scientific data and self- confidence.
7. Working through this course, students are expected to apply their knowledge to problem-solve, deduce structures, and synthesize simple organic molecules using the studied reactions. Relationships between organic chemistry and other disciplines are noted.

PHYSICAL CHEMISTRY

Unit I : Solid state

Unit II: 1. Gaseous state 2.Liquid state

Unit III: Solutions

GENERAL CHEMISTRY

Unit IV: 1. Surface chemistry 2. Chemical Bonding

Unit V: Stereochemistry of carbon compounds

Learning Outcomes of Course

1. After going through the topic 'Solid state', students will be in a position to apply the concepts of the topic in various scientific situations, say, conductivity of crystals due to crystal defects etc.
2. Learning 'Gaseous state' by students empower them with the ability to differentiate between real and ideal gases. Also, they will be in a position to explain why only real gases show JouleThomson effect and why only real gases can be liquified.
3. Learning 'Liquid state' makes them aware of classification of liquid crystals and will be in a position to explain the functioning of LCD.
4. Learning 'Solutions' will not only make the students aware of all the fundamental concepts of it, but also bring the familiarity of its applications such as isotonic solutions, azeotropic mixtures etc
5. After learning 'Surface chemistry' students will have clear idea of all the concepts and will be in a position to apply the concepts in explaining water purification methods, colloidal medicines etc.
6. the bonding fundamentals for both ionic and covalent compounds, including electro negativities, bond distances and bond energies using MO diagrams and thermodynamic data.
7. Apply the fundamental principles of measurement, matter, atomic theory, chemical periodicity, chemical bonding, general chemical reactivity and solution chemistry to subsequent courses in science.
8. Understanding 'Stereochemistry' will make the students to appreciate how the three dimensional structure of molecules effect their chemical and physical properties. Also, they are in a position to explain the importance of stereochemistry in medicine.
9. Recognize and draw constitutional isomers, stereoisomers, including enantiomers and diastereomers, racemic mixture and meso compounds .

S.V.ARTS COLLEGE, TIRUPATI
Department of Chemistry
Objectives & learning outcomes
II B.Sc - Chemistry

1. Chemistry of d-block elements
2. Theories of bonding in metals
3. Metal carbonyls
4. Chemistry of f-block elements
5. Halogen compounds
6. Hydroxy compounds
7. Carbonyl compounds
8. Carboxylic acids and derivatives
9. Active methylene compounds

Learning Outcomes of the course

- The students will be able to know the electronic configuration of d-block elements and its effect on colour and magnetic properties. Catalytic properties of d-block elements and its industrial applications.
- The students will be able to know the conductors and semiconductors.
- Calculation of EAN and its relation with stability of metal carbonyls.
- Recognizes the difference between d-block elements and f-block elements, Lanthanide contraction and its consequences, Colour properties, Lanthanides separation.
- Acquires knowledge on halogen derivatives of organic compounds, Types of organic reactions, Importance of stereochemistry in the organic reactions especially in substitution reactions.
- Able to differentiate alcohols and phenols, able to write preparative methods for alcohols and phenols.
- Distinguish between different carbonyl compounds, able to write preparation methods of carbonyl compounds, synthetic importance of base catalysed reactions.
- Naming the carboxylic acids according to IUPAC, describes acidity.
- Able to describe the importance of carbanion in organic synthesis, synthetic applications of malonic ester and acetoacetic ester.

Paper-IV

3-4-106 SPECTROSCOPY & PHYSICAL CHEMISTRY

UNIT-I : Spectrophotometry and electronic spectroscopy

Unit-II: Infra red spectroscopy

Unit-III: Proton magnetic resonance spectroscopy ($^1\text{H-NMR}$)

PHYSICAL CHEMISTRY

Unit-I: Dilute solutions

Unit-II: Electrochemistry-I

Unit-III: Electrochemistry-II

Unit-IV: Phase rule

Learning Outcomes of the course

- Students will be able to apply Beer-Lambert's law for quantitative determinations.
- Able to identify the type of conjugation in organic molecules and effect of conjugation on colour of the compounds.
- Able to know the modes of vibrations in organic molecules.
- Able to identify type of functional group present in the organic molecules.
- Able to learn the magnetic behaviour of ^1H and elucidation of structures of organic compounds by using $^1\text{H-NMR}$ data.
- Students will be able to determine the molecular weight by using experimental determination of Colligative properties.
- Student will be able differentiate strong electrolytes and weak electrolytes.
- Able to understand effect of dilution on conductance for strong electrolytes and weak electrolytes.
- Able to determine the transport numbers.
- Student will be able to calculate the EMF of the given cell.
- Differentiate the reversible and irreversible cells.
- Students will be able to learn the applications of phase rule in metallurgy, desilverisation of lead.

S.V.ARTS COLLEGE, TIRUPATI
Department of Chemistry
Objectives & learning outcomes
III B.Sc - Chemistry

3-5-107 Chemistry Paper V : (INORGANIC, ORGANIC & PHYSICAL CHEMISTRY)

- 1 .Coordination Chemistry
- 2. Spectral and magnetic properties of metal complexes**
3. Stability of metal complexes
4. Nitro hydrocarbons
5. Nitrogen compounds
6. Thermodynamics

Learning outcomes of the course

- Students able to learn the bonding in the coordinate compounds, stability, colour and magnetic properties, Learn the CFSE calculations, Isomerism in complex compounds. Able to know the colour phenomenon and calculation of magnetic moment.
- Able to know the stability and reactivity of the complexes, labile and inert complexes, Methods for determination of composition of the complexes.
- the bonding fundamentals for both ionic and covalent compounds, including electronegativities, bond distances and bond energies using MO diagrams and thermodynamic data.
- Able to understand the nomenclature of nitro hydrocarbons, tautomerism in nitro hydrocarbons.
- Students understand the nomenclature of amines, Basicity of amines, comparison of basicity, separation of amines. Chemical properties of amines.
- Able to learn the different types of thermodynamic systems, reaction energies, feasibility of the chemical reactions, entropy and its significance.

SEMESTER-V Paper - VI
INORGANIC, ORGANIC & PHYSICAL CHEMISTRY

INORGANIC CHEMISTRY

UNIT-I 1. Reactivity of metal complexes:

. UNIT-I2. Bioinorganic chemistry:

UNIT-I ; PHYSICAL CHEMISTRY

UNIT-II ; Chemical kinetics

ORGANIC CHEMISTRY

UNIT- III Heterocyclic Compounds

UNIT-IV Carbohydrates

UNIT- V Amino acids and proteins

Learning outcomes of the course

- Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Analytical, Inorganic, Organic and Physical Chemistries..
- Students will be able to function as a member of an interdisciplinary problem solving team.
- the application of mathematical tools to calculate thermodynamic and kinetic properties
- the derivation of rate equations from mechanistic data
- the use of simple models for predictive understanding of physical phenomena associated to chemical thermodynamics and kinetics
- the limitations and uses of models for the solution of applied problems involving chemical thermodynamic and kinetics
- In order to study carbohydrates will develop the skills to recognize and draw particular carbohydrate structures.
- To know general structural elements of cyclic monosaccharide and disaccharides and their implications for structure and function.
- The students will be able to introduce about basic chemistry of the heterocyclic.
- The students will get familiar with particular properties and reactions for the most important heterocyclic as well as different systems of nomenclature.
- The students will develop fundamental theoretical understanding of heterocyclic chemistry
- .The students will be able to fully comprehend the chemistry of many heterocyclic products, carbohydrate, amino acids, peptides, proteins and lipids in use such as drugs and food

Open elective

3-6-105 Elective Paper – VII-(A)- Analytical Methods In Chemistry

UNIT-I-Quantitative analysis

Unit-II- Treatment of analytical data

Unit-III- Separation Techniques In Chemical Analysis-

A) Solvent Extraction

B) Ion Exchange

Unit-IV- Chromatography Principle

Unit-V- TLC, Column chromatography, HPLC

Learning outcomes of the course

- Student will be able to learn and acquired skill on different titrations for quantitative determinations.
- Acquire skill on choice of indicators in titrations.
- Learn Chemical calculations in gravimetric and volumetric analysis.

- Students will be able to process the analytical data.

- Students will be learn how to minimise errors in chemical experiments.

- Students will be aware on the Batch extraction, continuous extraction and counter current extraction and their applications.

- Student could able to learn the cation exchanger and anion exchanger and uses industrial applications.

- Student could able to know the basics of chromatographic techniques and their applications.

- Student could able acquire some basic knowledge of Chromatographic techniques and its applications.

3-6-105-A (Cluster-1)

Title of the course –Polymer chemistry

Unit I : Introduction to polymers

Unit II: Techniques of polymers-molecular weight of polymers

Unit III: Polymer characteristics

Unit IV: Polymer additives

Unit V: Polymers and their applications

Learning outcomes of the course

- Students are expected to acquire the knowledge of understanding preparation and properties of polymers. Explain degree of polarization, classification of polymers, Natural & synthetic polymers, organic& inorganic polymers, Thermoplastic & thermosetting polymers, Plastics & elastomers, fibers & resins, linear, branched & cross linked polymers, addition polymers & condensation polymers, mechanism of polymerization, free radical, ionic & Ziegler-Natta polymerization
- Students learn about the techniques of polymerization-Bulk polymerization-solution, Polymerization, suspension & emulsion polymerization.
- This course can explain molecular weight of polymers-number average and weight average molecular weights. Determination of molecular weight of polymers by viscosity and osmometry and light scattering methods.
- Students able to know about The students to acquire knowledge in the analysis of preparation and properties of Polymer characteristics: kinetics of free radical polymerization, glass transition temperature and factors affecting its determination, free volume theory, WLF equation.
- Students analyze the factors after learning this unit polymer additives: plastic additives-fillers, plasticizers and softners, lubricants, flow promoters, anti aging additives, flame retardants, colourants, blowing agents, cross linking agents, photo stabilizers, nucleating agents.
- Students be able to predict factors and know about Polymers and their applications: preparation of ad industrial applications of polyethylene, polyvinylchloride, teflon, terelene, polyacrylonitrile, nylon 6,6 and silicones.

3-6-105B Title of the course – Instrumental Methods Of Analysis

UNIT – I Introduction to spectroscopic methods of analysis

UNIT – II Molecular spectroscopy: Infrared spectroscopy

UNIT – III UV-Visible/ Near IR

UNIT – IV Separation techniques- (1)Chromatography (2)Mass spectroscopy

UNIT – V (1) Elemental analysis: Mass spectrometry (electrical discharges) (2) NMR spectroscopy (3) Electro analytical Methods: Potentiometry & Voltammetry (4) Radiochemical Methods:X-ray analysis and electron spectroscopy (surface analysis)

Learning outcomes of the course

- After learning spectroscopic methods students must have developed all concepts related to it, have sound knowledge on the type of molecular structural information that can be elicited and their industrial significance.
- After going through Infrared and UV/Visible spectroscopic methods, students are expected to understand the fundamental concepts related to them and apply them in problem solving. They must be aware of their industrial and research applications.
- After going through Chromatography and Mass spectroscopy, students are expected to apply these concepts in problem solving. Students must be in a position to handle chromatographic instruments in the separation of dye mixtures etc.
- After learning NMR spectroscopy, Potentiometry, Voltammetry, X-ray analysis etc., students must be in a position to appreciate their industrial importance and applications. They must have clear idea of type of structural information obtained from these techniques.
- Students must have developed the skills related to practicals such as safe handling of chemicals and the apparatus, recording the observations, drawing diagrams and graphs. Students must have developed inquisitive spirit, scientific temper, rational thinking, logical interpretation of data obtained and systematic approach to solve problems.
- The students must have developed personality traits such as punctuality, faithfulness, honest recording of scientific data and self-confidence.

3-6-105-C

Title of the course – Drugs & Dairy products analysis

Unit I : Analysis of Aspirin,

Paracetamol, Chloroquine, Amoxicillin, Chloramphenicol, metronidazole, Pencillin, Tetracycline, Cefalexin & Isoniazid

Unit II: Analysis and preparations of Allegra, Zyrtec, Alprazolam, trazodone, lorazepam, Ambien & Diazepam

Unit III: Analysis of Phenobarbital, Phenacemide, Atenolol, Norvasc, Lipitor, Furosemide, Triamterene & Lansoprazole

Unit IV: Analysis of milk and milk products, Analysis of food materials & Flavoring agents

Unit V: Clinical analysis of blood, estimation of blood cholesterol, Glucose, Enzymes, RBC & WBC.

Learning outcomes of the course

- Students are expected to acquire the knowledge of understanding reparation and properties of drugs like Aspirin, Paracetamol, Chloroquine, Amoxicillin, Chloramphenicol, metronidazole, Pencillin, Tetracycline, Cefalexin & Isoniazid.
- Students learn about the various drugs analysis and preparations of Allegra, Zyrtec, Alprazolam, trazodone, lorazepam, Ambien & Diazepam
- Students able to know about analysis of Preparation & properties of Phenobarbital, Phenacemide, Atenolol, Norvasc, Lipitor, Furosemide, Triamterene & Lansoprazole
- Students analyze the factors after learning this unit analysis of milk and milk products, analysis of food materials & flavoring agents .
- Students able to predict factors and know about Clinical analysis of blood, estimation of blood cholesterol, Glucose, Enzymes, RBC & WBC.
- Students must have developed the skills related to practicals such as safe handling of chemicals, instruments, glassware and apparatus, recording the observations, drawing, tables diagrams and graphs.
- Students must have developed inquisitive spirit, scientific temper, rational thinking, logical interpretation of data obtained and systematic approach to solve their problems.