

Sri Venkateswara University, Tirupati

**Syllabus for Chemistry (Minor) in consonance with Curriculum frame work
(W.E.F. AY-2026-27)**

COURSE STRUCTURE (for Semesters III)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
II	III	1	General Chemistry	3	3
			Qualitative Analysis of Simple Salt	2	1


(BOS chairman)
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SEMESTER-III
COURSE 1: GENERAL CHEMISTRY

Theory	Credits: 3	3 hrs/week	Total: 45 hrs
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I. LEARNING OBJECTIVES:

1. To understand the structure of the atom and its relation to periodic properties.
2. To explain different types of chemical bonding-ionic, covalent, metallic, hydrogen bonding.
3. To apply bonding theories to predict molecular structure and bonding nature.
4. To correlate periodic trends with physical and chemical properties of elements.
5. To evaluate acid-base behaviour using various theories and apply the HSAB principle.

II. COURSE OUTCOMES:

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

1. Describe the electronic configuration of elements and periodic trends.
2. Analyze the formation and properties of ionic and covalent compounds.
3. Apply VSEPR, hybridization, and MOT to predict molecular geometry and bonding.
4. Explain metallic bonding, hydrogen bonding, and intermolecular forces and relate them to physical properties.
5. Compare and evaluate acid-base theories and explain HSAB applications in predicting chemical reactivity.

III. SYLLABUS:

UNIT-1: ATOMIC STRUCTURE AND PERIODIC TABLE (9h)

Electronic configuration- Aufbau principle, Hund's rule and Pauli's exclusion principle. Periodic law and arrangement of elements in the periodic table, horizontal, vertical, and diagonal relationships in the periodic table. Definition and periodic trends of atomic radii, ionic radii, covalent radii, ionization potential, electron affinity, and electronegativity, Pauling scale, variable valency, inert-pair effect.

UNIT-2: IONIC BOND (9h)

Definition and Properties of ionic compounds, factors favouring the formation of ionic compounds, Lattice energy: definition, factors affecting lattice energy, Born-Haber cycle - enthalpy of formation of ionic compound and stability, Covalent character in ionic compounds - polarization and Fajan's rules, effects of polarization.

UNIT-3: COVALENT BOND (9 h)

Valence Bond theory: Hybridization of atomic orbitals and geometry of molecules- BeCl_2 , BF_3 , CH_4 , PCl_5 , and SF_6

VSEPR model: Effect of bonding and non-bonding electrons on the structure of molecules- NH_3 , H_2O , SF_4 , and XeF_4

Molecular orbital theory: Postulates, LCAO method, construction of M.O. diagrams for homo nuclear and heteronuclear diatomic molecules (N_2 , O_2 , CO and NO), bond order, magnetic nature

UNIT -4: METALLIC AND HYDROGEN BONDS (9 h)

Metallic bond: Definition, Metallic properties, free electron theory, band theory of metals. Explanation of conductors, semiconductors and insulators.

Hydrogen bonding: Definition, intra and inter molecular hydrogen bonding, influence on the physical properties of molecules, Vanderwaals forces, dipole-dipole interactions.

UNIT -5: ACIDS, BASES AND HSAB PRINCIPLE (9h)

Definition of Acid and base- Arrhenius, Bronsted-Lowry, Lewis theories, the solvent system, Classification of solvents, pH, Types of salts, Salt hydrolysis.

Pearson's concept, HSAB principle and its application.

IV. REFERENCES:

1. J.D.Lee, Concise Inorganic Chemistry, 5th ed., Blackwell Science, London, 1996.
2. B.R.Puri, L.R.Sharma, K.C.Kalia, Principles of Inorganic Chemistry, Shoban Lal Nagin Chand and Co., 1996.
3. D.F.Shriver and P.W.Atkins, Inorganic Chemistry, 3rd ed., W.H.Freeman and Co, London,
4. James E. Huheey, Inorganic Chemistry: Principles of Structure and Reactivity, 4th ed., 2017.
5. W.U. Malik, G.D Tuli, R.D Madan, Selected Topics in Inorganic Chemistry, S. Chand Publishing, 1998.

V. PROPOSED ACTIVITIES:

1. Chart on periodic trends like radii, ionization energy, electronegativity across groups/periods.
2. Work sheet solving- MOT diagrams, hybridization problems, salt hydrolysis calculations.
3. Case study- Analyze real-life use of acids and bases,
4. Model Building-Build 3D structures using kits/software for CH_4 , PCl_5 , XeF_4 etc.

VI. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS

1. Continuous Internal Evaluation (CIA): Monitoring the progress of student's learning.
2. Class Tests, Worksheets, Quizzes, Industrial/Field visits, Student seminars, Poster and PPT presentations, Peer learning, Project-based learning, Assignments, Debates, Group Discussions: Enhances critical thinking skills.
3. Semester End Examination (SEE): Critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

SEMESTER-III
COURSE 1: QUALITATIVE ANALYSIS OF SIMPLE SALT

Practical

Credits: 1

2 hrs/week

I. LEARNING OBJECTIVES:

1. To understand the theoretical principles behind classical qualitative analysis of cations and anions.
2. To develop the ability to identify common cations and anions in inorganic salts.
3. To practice laboratory safety and correct handling of reagents.
4. To record and interpret observations accurately in systematic salt analysis.

II. COURSE OUTCOMES:

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

1. Proper use of glassware, equipment and chemicals in the laboratory
2. Apply systematic procedures to identify one cation and one anion in a given inorganic salt.
3. Analyze reactions based on solubility, color changes, and precipitate formation.
4. Interpret results to draw conclusions and confirm the identity of ions.

III. SYLLABUS:

Analysis of simple salt containing **one anion and one cation** from the following:

Anions: Carbonate, sulphate, chloride, bromide, acetate, nitrate, borate.

Cations: Lead, copper, iron, aluminium, zinc, nickel, manganese, calcium, barium, ammonium.

IV. REFERENCES

1. G. Svehla, Vogel's Textbook of Qualitative Inorganic Analysis, Pearson Education, 2008.
2. K. Nagaraj, S. Kamalesu, S. Lokhandwala, N.M. Parekh, Textbook of Semi-micro Inorganic Qualitative Analysis, Notion Press, 2023.
3. G. Pass, H. Sutcliffe, Practical Inorganic Chemistry. 2nd edition, John-Wiley & Sons, 2020.

V. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS

1. Internal Practical Assessment
2. Lab Record Evaluation
3. Final Practical Examination
4. Oral/Viva Voce

4- Year UG Honours MINOR

Syllabus

(2026-27)

Semester-III

Model Question Paper

Time : 3hrs

Marks:75

Part-A

Answer any Five Questions. Each Question carries 3 Marks.

5x3=15

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Answer the following questions. Each question carries 12 Marks

5x12=60

11. a) Unit-I
(Or)
b) Unit-I

12. a) Unit-II
(Or)
b) Unit-II

13. a) Unit-III
(Or)
b) Unit-III

14. a) Unit-IV
(Or)
b) Unit-IV

15. a) Unit-V
(Or)
b) Unit-V