

Sri Venkateswara University, Tirupati

**Syllabus for Chemistry (Major) in consonance with Curriculum frame work
w.e.f. AY 2025-26**

COURSE STRUCTURE (for Semesters I to VI)

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	General Chemistry	3	3
			Qualitative Analysis of Simple Salt	2	1
		2	Inorganic Chemistry	3	3
			Inorganic Preparations	2	1
	II	3	Organic Chemistry – I (Structural Theory & Hydrocarbons)	3	3
			Organic Preparations	2	1
		4	Physical Chemistry – I (States of Matter, Phase rule & Surface Chemistry)	3	3
			Physical Chemistry – I Practical	2	1
II	III	5	Organic Chemistry – II (Halogenated Hydrocarbons and Oxygen Containing Functional Groups)	3	3
			Organic Qualitative Analysis	2	1
		6	Physical Chemistry – II (Solutions and Electrochemistry)	3	3
			Physical Chemistry – II Practical	2	1
		7	Coordination Chemistry	3	3
			Preparation of Coordination Compounds	2	1
	IV	8	Organic Chemistry-III (Nitrogen Containing Organic Compounds & Biomolecules)	3	3
			Organic Chemistry-III Practical	2	1
		9	Physical Chemistry – III (Ionic equilibrium and Thermodynamics)	3	3

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
			Qualitative Analysis of Inorganic Mixture	2	1

III		10	Applied and Physical Chemistry	3	3
			Applied and Physical Chemistry Practical	2	1
	V	11	Organic Spectroscopy	3	3
			Organic Spectral Problems	2	1
		12 A	Analytical Methods in Chemistry	3	3
			Analytical Methods in Chemistry Practical	2	1
		13 A	Separation techniques and Chromatography	3	3
			Separation techniques and Chromatographic Techniques	2	1
	VI	14 A	Green Chemistry and Nanotechnology	3	3
			Green Chemistry and Nanotechnology - Practical	2	1
		15 A	Environment and Industrial Chemicals	3	3
			Environment and Industrial Chemicals Practical	2	1

Note: In the III Year (during the V and VI Semesters), students are required to select a pair of electives from one of the **Two** specified domains. **For example: if set 'A' is chosen, courses 12 to 15 to be chosen as 12 A, 13 A, 14 A and 15 A.** To ensure in-depth understanding and skill development in the chosen domain, students must continue with the same domain electives in both the V and VI Semesters.


(BOS chairman)
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SEMESTER: I
COURSE 2: INORGANIC CHEMISTRY

Theory

Credits: 03

3 hrs/w

(Total: 45 hrs)

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I. LEARNING OBJECTIVES:

1. To explain preparation and uses of selected p-block compounds.
2. To understand the structural and chemical properties of selected p-block compounds.
3. To classify and analyze the characteristics of d- and f-block elements.
4. To compare the properties of lanthanides and actinides.
5. To understand the processes involved in the extraction of metals from their ores.

II. COURSE OUTCOMES:

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

1. Explain the structures and preparation of key p-block compounds.
2. Classify d- and f-block elements and discuss their properties and oxidation states.
3. Analyze magnetic, catalytic, and color properties of transition metals.
4. Compare and contrast lanthanides and actinides based on electronic configuration.
5. Explain and differentiate various metallurgical processes used in the extraction of metals.

III. SYLLABUS:

UNIT-1: CHEMISTRY OF p-BLOCK ELEMENTS – I **(9 h)**

Group 13: Preparation and structure of Diborane, Borazine and (BN)_x.

Group 14: Preparation, classification and uses of silicones.

Group 15: Preparation and structure of Phosphonitrilic Chloride P₃N₃Cl₆.

UNIT-2: CHEMISTRY OF p-BLOCK ELEMENTS – II **(9 h)**

Group 16: Classification of oxides, structures of oxides and oxoacids of sulphur.

Group 17: Preparation and structures of Interhalogen compounds, Pseudohalogens.

UNIT-3: CHEMISTRY OF d-BLOCK ELEMENTS **(9 h)**

Definition, Characteristics of d-block elements with special reference to electronic configuration, variable valency, colour, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states of 3d-series.

UNIT-4: CHEMISTRY OF f-BLOCK ELEMENTS **(9 h)**

Chemistry of Lanthanides: Definition, electronic configuration, oxidation states, colour, magnetic properties, lanthanide contraction, consequences of lanthanide contraction.

Chemistry of Actinides: Definition, electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

UNIT-5: GENERAL PRINCIPLES OF METALLURGY **(9 h)**

Definition, Occurrence of metals, minerals and ores, Concentration of ores- levigation, magnetic separation, froth floatation, leaching; Conversion of concentrated ores to oxide- calcination and

roasting, reduction of oxide to the metal, Refining of crude metal-distillation, liquation, poling, electrolysis, zone refining and vapour phase refining, Corrosion and its prevention, Alloys.

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, P.W. Atkins, Inorganic Chemistry, W. H. Freeman and Co, London, 1999.
4. J.E. Huheey, **Inorganic Chemistry: Principles of Structure and Reactivity**, 4th ed., 2017.
5. A.K. Das, Fundamentals of Metallurgy. Tata McGraw Hill Education, 2011.

V. PROPOSED ACTIVITIES:

1. Group discussion: Trends in d-block and f-block properties across periods and groups.
2. Comparative worksheet: Lanthanide vs Actinide behaviour.
3. Seminar: Uses of metals in daily life.

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-I

COURSE 2: INORGANIC PREPARATIONS

Practical

Credits: 1

2 hrs/week

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I. LEARNING OBJECTIVES:

1. To understand and apply stoichiometry and principles of inorganic salt preparation.
2. To learn techniques such as crystallization, filtration, and drying.
3. To calculate percentage yields.
4. To handle reagents and lab apparatus safely and precisely

II. COURSE OUTCOMES:

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

1. Demonstrate safe use of laboratory equipment and chemical handling.
2. Describe the theoretical background for the preparation of inorganic salts.
3. Perform synthesis of potash alum, ferrous salts, and cuprous chloride following proper procedures.
4. Analyze colour changes, crystal formation, and yields to evaluate reaction completion.

III. SYLLABUS:

1. Preparation of Potash alum.
2. Preparation of Ferrous oxalate
3. Preparation of Ferrous ammonium sulphate.
4. Preparation of Cuprous chloride.
5. Preparation of Chrome alum.

IV. REFERENCES:

1. G. Svehla, Vogel's Textbook of Qualitative Inorganic Analysis, Pearson Education, 2008.
2. G.H. Jeffery, J. Bassett, J. Mendham, R.C. Denney, Vogel's Textbook of Quantitative Chemical Analysis, John Wiley and Sons, 1989.

V. CO-CURRICULAR ACTIVITIES AND ASSESSMENT METHODS:

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

Model question paper- Semester: I
Subject: Chemistry Major
Single major program wef: 2025- 26

COURSE 2: INORGANIC CHEMISTRY

Max. time: 3 hrs

Max. marks: 75

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Section: A

Answer any 5 of the following 10 questions. Each question carries 3 marks (2 questions should be given from each unit)

5 QX 3 M = 15 M

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

Section: B

Answer 5 of the following 10 questions following internal choice. Each question carries 12 marks (2 questions should be given from each unit)

5 QX 12 M = 60 M

11. Questions 11 & 12 from unit 1. One should be answered.
- 12.
13. Question 13 & 14 from unit 2. One should be answered
- 14.
15. Question 15 & 16 from unit 3. One should be answered
- 16.
17. Question 17 & 18 from unit 4. One should be answered
- 18.
19. Question 19 & 20 from unit 5. One should be answered
- 20.