SRI VENKATESWARA UNIVERSITY - TIRUPATI
B.S.c., (Honours) in **CHEMISTRY (MAJOR)**
FIRST YEAR – II SEMESTER
(W.E.F. Academic Year 2023 - 24)

Course Code 3:GENERAL AND INORGANIC CHEMISTRY

Credits:03

Course Out comes : 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 acid sand base sand predict the nature of salts.

Syllabus:

Unit I: Atomic Structure and Periodic table

(9h)

Electronic configuration: Bohr theory, duel nature of electrons, Heisenberg uncertainty principle, the Schrodinger equation, significance of wave functions, normalization of wave function, radial and angular wave functions, Pauli's exclusion principle, Hund's rule, sequence of energy levels (Aufbau principle).

Periodicity: periodic law and arrangement of elements in the periodic table, IUPAC nomenclature and group number, horizontal, vertical, and diagonal relationships in the periodic table. General properties of atoms: size of atoms and ions-atomic radii, ionic radii, covalent radii; trend in ionic radii, ionization potential, electron affinity; electro negativity - oxidation states and variable valency; isoelectronic relationship; inert-pair effect;

UNIT2: Ionic bond

(9h)

Properties of ionic compounds, factors favouring the formation of ionic compounds Lattice energy: definition, factors affecting lattice energy, Born-

Haber cycleenthalpy of formation Of ionic compound and stability. Solubility and thermal stability of ionic compounds. Covalent character in ionic compounds-polarization and Fajan's rules; effects of polarization-solubility, melting points, and thermal stability of typical ionic compounds.

UNIT3: The Covalent Bond

(9 h)

Valance Bond theory-arrangement of electrons in molecules, hybridization of atomic orbitals and geometry of molecules-$BeCl_2$, BF_3, CH_4, PCl_5, SF_6– VSEPR model- effect of bonding and nonbonding electrons on the structure of molecules, effect of electro negativity, iso electronic principle, illustration of structures by VESPR model-NH_3,H_2O,SF_4, XeF_4, XeF_6

Molecular orbital theory -LCAO method, construction of M.O. diagrams for homo- nuclear and hetero-nuclear diatomic molecules (N_2, O_2, CO and NO)

UNIT4:MetallicandWeakBonds

(9 h)

The Metallic bond: metallic properties, free electron theory, Valence Bond Theory, band theory of metals. Explanation of conductors, semiconductors and insulators.

Weak bonds: hydrogen bonding-intra- and intermolecular hydrogen bonding, influence on the physical properties of molecules, and properties of hydrogen bonded N, O and F compounds; ion dipole-dipole interactions.

UNIT5:AcidsandBases

(9h)

Theoriesofacidsandbases:Arrheniustheory,Bronsted-Lowrytheory,Lewistheory, the solvent system, Non aqueous solvents: classification-protonic and aproticsolvents, liquid ammonia as solvent-solutions of alkali and alkaline earth metals in ammonia.

Types of chemical reactions: acid-base, oxidation-reduction, calculation of oxidation number. Definition of pH, pK_a, pK_b. Types of salts, Salt hydrolysis. Pearson's concept, HSAB principle & its importance, bonding in Hard-Hard andSoft-Soft combinations.

List of Reference Books:

1. J.D.Lee, Concise InorganicChemistry,5th ed.,BlackwellScience,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.ShriverandP.W.Atkins,InorganicChemistry,3rd ed.,W.H.Freeman and Co, London,

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Course Code 3:GENERAL AND INORGANICCHEMISTRY

Credits:01

Practical-I Qualitative Analysis of SIMPLE SALT

Qualitative in organic analysis(Minimum of Six simple salts should be analysed) 50 M

I. 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. Useglassware,equipmentandchemicalsandfollowexperimentalproc edures in the laboratory
3. Applytheconceptsofcommonioneffect,solubilityproductandconcept srelated to qualitative analysis

II. Laboratory course

Syllabus: Analysis of Simple Salt **50M**

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

Anions: Carbonate, Sulphate, Chloride, Bromide, Acetate,
Nitrate, Borate,
Phosphate.Cations:Lead,Copper,Iron,Aluminium,Zinc,Nickel,Ma
nganese, Calcium, Strontium, Barium, Magnesium and
Ammonium.

Co-curricular activities and Assessment Methods

1. Continuous Evaluation: Monitoring the progress of student's learning.
2. Class Tests, Worksheets and Quizzes
3. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
4. SEMESTER-End Examination: critical indicator of student's learning and teaching methods adopted by teachers through out the SEMESTER

Reference books:

1.Vogel'sQuanlitative Inorganic Analysis, Seventh edition, Pearson.

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COURSE CODE 4: INORGANICCHEMISTRY-I

Credits:03

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.

Syllabus:

UNIT–I Chemistry of p-block elements – I **9 h**

Group 13: Preparation & structure of Diborane, Borazine and$(BN)_x$ Group14: Preparation, classification and uses of siliconesand Silanes. Group 15: Preparation & structure of Phosphonitrilic Chloride $P_3N_3Cl_6$

Unit II Chemistry ofp-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-III Chemistry of d-block elements: **9 h**

Characteristicsofd-blockelementswithspecialreferencetoelectronicconfiguration, variable valence, colour, magnetic properties, catalytic properties and ability to form complexes. Stability of various oxidation states of 3d series-Latimer diagrams.

UNIT-IV Chemistry off-block elements: **9h**

Chemistry of lanthanides - electronic configuration, oxidation states, lanthanide contraction,consequencesoflanthanidecontraction,colour,magneticproperties.Separation of lathanides by ion exchange method. Chemistry of actinides - electronic configuration, oxidation states, actinide contraction, comparison of lanthanides and actinides.

Unit–V Radioactivity **9 h**

Definition, Isotopes, n/p ratio, binding energy, types of radioactivity, Soddy-Fajan's displacement law, Law of Radio activity, Radio active ecayseries, Nuclear Reactions-fission and fusion, Applications of radioactivity.

List of Reference books:

1. Basic Inorganic Chemistry by Cotton and Wilkinson
2. Advance Inorganic chemistry vol-Iby Satya Prakash
3. In organic chemistry by Puri and Sharma
4. Concise Inorganic Chemistry by J D Lee
5. NuclearChemistrybyMaheshwarSharon,2009

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COURSECODE4: INORGANICCHEMISTRY-I

Credits:01

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.

Syllabus: Preparation of Inorganic compounds:

4. Crystallization of compounds and determination of melting point.
5. Preparation of Cuprous chloride.
6. Preparation of Potash Alum.
7. Preparation of Chrome Alum.
8. Preparation of Ferrous oxalate
9. Preparation of Ferrous ammonium sulphate.

Co-curricular activities and Assessment Methods

10. Continuous Evaluation: Monitoring the progress of student's learning
11. Class Tests, Work sheets and Quizzes
12. Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality
13. SEMESTER-End Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the SEMESTER .
14. **REFERENCE BOOKS**:

1. Vogel's Quanlitative Inorganic Analysis, Seventh edition, Pearson.