CHEMISTRY

Semester I

CHEMISTRY-C I: INORGANIC CHEMISTRY-I
UNIT I:
Atomic Structure:

Objectives:

- Describe the structure of an atom according to Bohr's theory.
- Describe how the atomic model has changed over time and why those changes were necessitated by experimental evidences
- Understand the experimental design and conclusions used in the development of modern atomic theory.
- Development of modern atomic theory.
- Development of quantum-mechanical model of the atom.
- Development of wave-mechanical model of the atom(Schrodinger's wave equation).
- Introduction of mathematical concept of wave-particle duality into the behaviour of electron.
- Explanation of spectral feature of single electronic system
- Quantum Numbers.
- Electronic configuration and orbital diagram of atom
- Term, symbol of polyelectronic system.

Outcomes:

Enables one student to

- Describe the structure of atom.
- State the location, relative charges and atomic mass of the subatomic particles.
- Draw the Bohr's structure of atom.
- Know Heisenberg's Uncertainity Principle and De Broglie's Hypothesis.
- Understand Quantum mechanical model of atomic structure.
- know the need of wave mechanical model of atomic structure.
- Understand the mathematical concept of Schrodinger.
- Be familiar with the shapes of different orbitals
- Write the electronic configuration of atom.
- Describe the sequence of energy levels of single electronic system.
- Describe the orbital diagram of atom
- Explain the spectral feature of single as well as polyelectronic system.
- Enables to new areas of research.

UNIT IV:
Objectives:

Students will be able to know

- Electronic concept of oxidation and reduction.
- Basic principles of Redox reaction.
- Mechanism of electron transfer involve in redox reactions.
- Construct the cell reaction of redox reactions.
- Understand the key mechanism of Volumetric estimation of metal ions.
- Electrochemistry of redox reaction as a tool of future knowledge.

Outcomes:

Enables one student to

- Gather knowledge about electronic concept of oxidation and reduction.
- Understand the mechanism of Redox reactions.
- Write down the half Cell Reaction.
- Construct Cell reaction
- Understand the key mechanism of Volumetric Estimation method.
- Apply this knowledge for the estimation of individual and mixture of metal ions.

CHEMISTRY LAB- C I LAB:

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Objectives:

Students will be able to know

- Thorough concept of Normality and Molality, Primary standard, Secondary standard, Equivalent weight of oxidising and reducing agent.
- Preparation of Standard solution of oxidising and reducing agent
- Details of Volumetric method
- Estimation Carbonate and and hydroxide in a mixture.
- Estimation of Carbonate and Bicarbonate in a mixture.
- Redox Titration
- Redox Indicator both Internal and External
- Estimation of metal ions by titrating with Standard solution of$KMnO_4$ and $K_2Cr_2O_7$.

Outcomes:

Enables one student to

- Prepare Standard solution of oxidising and reducing agent
- Estimate Carbonate and and hydroxide in a mixture.
- Estimate Carbonate and Bicarbonate in a mixture.
- Perform Redox Titration
- Estimate metal ions by titrating with Standard solution of$KMnO_4$ and $K_2Cr_2O_7$.
- Utilise this knowledge as future research tools.

Semester III

CHEMISTRY-C V: INORGANIC CHEMISTRY-II

Objectives

Students will be able to know

- Understand the general trends in chemistry of s and p block elements.
- Explain Inert pair effect, Anomalous behaviour of the first member of each group(p-block elements).
- Describe the allotropy, catenation of different p-block elements.
- Gather knowledge about rich chemistry of carbon, boron and silicon.
- Describe some haogen compounds(Interhalogen, polyhalides, pseudohalogen e.t.c.).
- Understand new concept of covalent bonding.
- Be familiar with structure and chemistry of some important complex compounds of s and p-block compounds(Chlorophyll, Ca and Mg EDTA complexes).

Outcomes:

Enables one student to

- Co- relate the general trends in chemistry of s and p block elements.
- Explain Inert pair effect, Anomalous behaviour of the first member of each group(p-block elements).
- Describe the allotropy, catenation of different p-block elements.
- Gather knowledge about rich chemistry of carbon, boron and silicon.
- Describe some haogen compounds(Interhalogen, polyhalides, pseudohalogen e.t.c.).
- Explain new concept of covalent bonding.
- Be familiar with structure and chemistry of some important complex compounds of s and p-block compounds(Chlorophyll, Ca and Mg EDTA complexes).
- Utilise this knowledge to explain the Chemistry of many other s and p-block elements.

Objectives

Students will be able to know

- The structural features of Inorganic polymer, Hybrid Polymer.
- Compare Inorganic Polymer with Organic polymer in physical and chemical properties.
- understand the structures of common inorganic polymers, their preparation and
- applications.
- Know the preparation, properties, structure and application in different fields of some very important polymers like Silicones and Siloxanes, Borazines, Silicates and phosphazenes and polysulphides.

Outcomes:

Enables one student to

- Understand the structural features of Inorganic polymer, Hybrid Polymer.
- Compare Inorganic Polymer with Organic polymer in physical and chemical properties.
- understand the structures of common inorganic polymers, their preparation and

- applications.
- Be familiar with the preparation, properties, structure and application in different fields of some very important polymers like Silicones and Siloxanes, Borazines, Silicates and phosphazenes and polysulphides.
- Use this knowledge for further study.

CHEMISTRY LAB-C V LAB

Objectives

Students will be able to know

- Iodomeric and Iodimetric methods.
- Quantitative estimation of Cu(II) using sodium thiosulphate iodimetrically.
- Estimation of (i) arsenite and (ii) antimony Iodimetrically
- Quantitative estimation of available chlorine in bleaching powder iodometrically.
- Quantitative estimation of mixture of metal ions like Fe^{3+} and Cu^{2+}, Fe^{3+} and Cr^{3+}, Fe^{3+} and Ca^{2+}

Outcomes:

Enables one student to

- Know Iodomeric and Iodimetric methods.
- Quantitatively estimate Cu(II) using sodium thiosulphate iodimetrically.
- Estimate (i) arsenite and (ii) antimony Iodimetrically
- Quantitatively estimate available chlorine in bleaching powder iodometrically.
- Quantitatively estimate mixture of metal ions like Fe^{3+} and Cu^{2+}, Fe^{3+} and Cr^{3+}, Fe^{3+} and Ca^{2+}.

Semester IV

CHEMISTRY-VIII: INORGANIC CHEMISTRY-III

Objectives

Students will be able to know

- To understand the key features of coordination compounds, including:
  - the variety of structures
  - oxidation numbers and electronic configurations
  - coordination numbers
  - ligands, chelates, Innermetallic complexes
  - bonding, stability of complexes
- Valence bond theory and application
- To be able to use Crystal Field Theory to understand the magnetic properties (and in simple terms the colour) of coordination compounds.

- To be able to describe the shapes and structures of coordination complexes with coordination numbers ranging from 4 to 12.
- To be able to describe the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them.
- Crystal Field Stabilisation Energy and its application
- To be able to recognize the types of isomers in coordination compounds.
- To be able to name coordination compounds and to be able to draw the structure based on it's name.
- Jahn Teller Distortion in Coordination complexes.
- To become familiar with some applications of coordination compounds.

Outcomes:

Enables one student to

- understand the key features of coordination compounds, including:
  - the variety of structures
  - oxidation numbers and electronic configurations
  - coordination numbers
  - ligands, chelates, Innermetallic complexes
  - bonding, stability of complexes
- Describe Valence bond theory and application
- Be able to use Crystal Field Theory to understand the magnetic properties (and in simple terms the colour) and spectral properties of coordination compounds.
- Be able to describe the shapes and structures of coordination complexes with coordination numbers ranging from 4 to 12.
- Be able to describe the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them.
- Understand Crystal Field Stabilisation Energy and its application
- Be able to recognize the types of isomers in coordination compounds.
- Be able to name coordination compounds and to be able to draw the structure based on it's name.
- Describe Jahn Teller Distortion in Coordination complexes.
- Become familiar with some applications of coordination compounds.

UNIT IV:

Objectives

Students will be able to know

- Understand typical roles and chemistry of the elements, in particular the metal ions, essential for living systems, e.g. structural, recognition, sensor roles and redox and non-redox catalytic roles.
- Gather knowledge about the classification of elements as Essential, trace, ultra trace elements.
- Geochemical effect on the distribution of metals.
- About Sodium/Potassium- pump, carbonic anhydrase and carboxy peptidases and their specific roles.
- Dose responce of some trace metals to human body.
- Toxicity of metals like Hg, Pb, Cd and As and reasons for toxicity.

- Uses of chelates in medicine.
- Chemistry of metalloprotein like Haemoglobin and its application in bio-system.

Outcomes:

Enables one student to

- Understand typical roles and chemistry of the elements, in particular the metal ions,essential for living systems, e.g. structural, recognition, sensor roles and redox and non-redox catalytic roles.
- Be familiar about the classification of elements as Essential, trace, ultra traceelements.
- Know Geochemical effect on the distribution of metals.
- Gather knowledge about Sodium/Potassium- pump, carbonic anhydrase and carboxypeptidases and their specific roles.
- Understand Dose responce of some trace metals to human body.
- Be familiar with Toxicity of metals like Hg, Pb, Cd and As and reasons for toxicity.
- Know about uses of chelates in medicine.
- Understand the chemistry of metalloprotein like Haemoglobin and its application inbio-system.
- Apply this knowledge for future study.