

ADIKAVI NANNAYA UNIVERSITY  
RAJAMAHENDRAVARAM  
CBCS / Semester System  
(W.e.f. 2016-17 Admitted Batch)  
I Semester Syllabus  
**CHEMISTRY**

**Paper I - Inorganic & Organic Chemistry 60hrs (4h/w)**

**INORGANIC CHEMISTRY 30 hrs (2h / w)**

**UNIT –I**

**p-block elements –I 15h**

Group-13: Synthesis and structure of diborane and higher boranes  
( $B_4H_{10}$  and  $B_5H_9$ ), boron-nitrogen compounds ( $B_3N_3H_6$  and BN) and carboranes  
Group - 14: Preparation and applications of silanes, silicones and graphitic compounds.  
Group - 15: Preparation and reactions of hydrazine, hydroxylamine and Phosphazenes.

**UNIT-II**

**1. p-block elements -II 8h**

Group - 16: Classifications of oxides based on (i) Chemical behaviour and  
(ii) Oxygen content, Oxyacids of sulphur (structures only).  
Group-17: Inter halogen compounds, pseudo halogens and comparison with halogens.

**2. Organometallic Chemistry 7h**

Definition - classification of Organometallic compounds - nomenclature, preparation, properties and applications of alkyls of Li and Mg.

**ORGANIC CHEMISTRY 30hrs (2h /w)**

**UNIT-III**

**Structural theory in Organic Chemistry 10 h**

Types of bond fission and organic reagents (Electrophilic, Nucleophilic, and free radical reagents including neutral molecules like  $H_2O$ ,  $NH_3$  &  $AlCl_3$ ).

Bond polarization: Factors influencing the polarization of covalent bonds, electro negativity - inductive effect. Application of inductive effect (a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance or Mesomeric effect, application to (a) acidity of phenol, and (b) acidity of carboxylic acids. Hyper conjugation and its application to stability of carbonium ions, Free radicals and alkenes, carbanions, carbenes and nitrenes.

Types of Organic reactions : Addition - electrophilic, nucleophilic and free radical. Substitution - electrophilic, nucleophilic and free radical. Elimination- Examples.

## UNIT-IV

### 1. Acyclic Hydrocarbons

6 h

Alkenes - Preparation of alkenes. Properties: Addition of hydrogen - heat of hydrogenation and stability of alkenes. Addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H<sub>2</sub>O, HOX, H<sub>2</sub>SO<sub>4</sub> with mechanism and addition of HBr in the presence of peroxide (anti - Markonikov's addition). Dienes - Types of dienes, reactions of conjugated dienes - 1,2 and 1,4 addition of HBr to 1,3 - butadiene and Diel's - Alder reaction.

Alkynes - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acetylides). Preparation of higher acetylenes, Metal ammonia reductions, Physical properties. Chemical reactivity - electrophilic addition of X<sub>2</sub>, HX, H<sub>2</sub>O (Tautomerism), Oxidation with KMnO<sub>4</sub>, OsO<sub>4</sub>, reduction and Polymerisation reaction of acetylene.

### 2. Alicyclic hydrocarbons (Cycloalkanes)

4 h

Nomenclature, Preparation by Freund's method, Wislicenus method. Properties - reactivity of cyclopropane and cyclobutane by comparing with alkanes, Stability of cycloalkanes - Baeyer's strain theory, Sachse and Mohr predictions and Pitzer's strain theory. Conformational structures of cyclobutane, cyclopentane, cyclohexane.

## UNIT-V

### Benzene and its reactivity

10h

Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benzene, mention of C-C bond lengths and orbital picture of Benzene. Concept of aromaticity - aromaticity (definition), Huckel's rule - application to Benzenoid (Benzene, Naphthalene) and Non - Benzenoid compounds (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation)

Reactions - General mechanism of electrophilic substitution, mechanism of nitration, Friedel Craft's alkylation and acylation. Orientation of aromatic substitution - Definition of ortho, para and meta directing groups. Ring activating and deactivating groups with examples (Electronic interpretation of various groups like NO<sub>2</sub> and Phenolic). Orientation of (i) Amino, methoxy and methyl groups (ii) Carboxy, nitro, nitrile, carbonyl and sulphonic acid groups (iii) Halogens  
(Explanation by taking minimum of one example from each type)

### List of Reference Books

1. Inorganic Chemistry by J.E.Huheey
2. Basic Inorganic Chemistry by Cotton and Wilkinson
3. A textbook of qualitative inorganic analysis by A.I. Vogel
4. Organic Chemistry by Morrison and Boyd
5. A Text Book of Organic chemistry by I L Finar Vol I
6. Concise Inorganic Chemistry by J.D.Lee
7. A Text Book of Organic Chemistry by B.S. Bahl and Arun Bahl

**LABORATORY COURSE-I**  
**Practical-I Simple Salt Analysis**  
**(At the end of Semester-I)**

**30 hrs (2 h / w)**

**Qualitative Inorganic Analysis**

**50 Marks**

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

**Anions:** Carbonate, Sulphate, Chloride, Bromide, Acetate, Nitrate, Borate, Phosphate.

**Cations:** Lead, Copper, Iron, Aluminum, Zinc, Manganese, Nickel, Calcium, Strontium, Barium, Potassium and Ammonium.