3-1-106

Subject: CHEMISTRY

SEMESTER-I

Paper-I: Inorganic & Organic Chemistry

INORGANIC CHEMISTRY-I

UNIT - I

1. p-block elements:

General characteristics of elements of groups 13, 14, 15

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)

Group - 14: Preparation and applications of silanes and silicone

Group - 15: Preparation and reactions of hydrazine, hydroxylamine.

UNIT-II

1 p-block elements:

General characteristics of elements of groups 16 and 17

Group - 16: Classifications of oxides based on (i) Chemical behaviour and (ii) Oxygen content.

Group---17: Inter halogen compounds and pseudo halogens.

2. Organometallic Chemistry

Definition and classification of organometallic compounds, nomenclature, preparation, properties and applications of alkyls of Li and Mg elements

ORGANIC CHEMISTRY-I

UNIT-III

1. Structural theory in Organic Chemistry

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

acides (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 (mechanism not required).

UNIT-IV

1.Acyclic Hydrocarbons

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_2O, HOX, H_2SO_4 with mechanism and addition of HBr in the

presence of peroxide (anti - Markonikov's addition). Dienes - Types of dienes, reactions of conjugated dines - 1,2 and 1,4 addition of HBr to 1,3 - butadiene and Diel's - Alder reaction.

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Alkynes - Preparation by dehydrohalogenation of dihalides, dehalogenation of tetrahalides, Properties; Acidity of acetylenic hydrogen (formation of Metal acedtylides). Preperation of higher acetylenes, Metal ammonia reductions Physical properties. Chemical reactivity - electrophilic addition of X_2, HX, H_2O (Tautomerism), Oxidation with $KMnO_4$, OsO_4, reduction and Polymerisation reaction of acetylene.

2. Alicyclic hydrocarbons (Cycloalkanes)

Nomenclature, Preparation by Freunds methods, heating dicarboxylic metal salts. 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

1. Benzene and its reactivity

Concept of resonance, resonance energy. Heat of hydrogenation, heat of combustion of Benezene, mention of C-C bond lengths and orbital picture of Benzene.

Concept of aromaticity - aromaticity (definition), Huckel's rule - application to Benzenoid (Benzene, Napthalene) 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_2 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)

Practical-I

Qualitative inorganic analysis

Qualitative Analysis and Inorganic preparations:

Analysis of simple salt containing the following one anion and cation

Analysis of Anions: Carbonate, sulphate, chloride, bromide, iodide, acetate, nitrate, borate, phosphate,

Analysis of cations: Lead, copper, cadmium, iron, aluminum, zinc, manganese, nickel, calcium, strontium, barium, potassium and ammonium.

Inorganic preparations: Any one of the following inorganic preparations:

1) Ferrous ammonium sulphate

2) Tetrammine copper (II) sulphate

Recommended Text Books and Reference Books Inorganic Chemistry

1. Advanced Inorganic Chemistry Vol-I by Satyaprakash, Tuli, Basu and Madan
2. Inorganic Chemistry by R R Heslop and P.L. Robinson
3. Text book of Inorganic chemistry by R.Gopalan
4. A textbook of qualitative inorganic analysis by A.I. Vogel
5. Organometallic Chemistry - An introduction by R.C.Mehrotra and A.Singh

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B.Sc. Chemistry 1st Year/II year/III year

MODEL QUESTION PAPER

Duration : 3 Hours Maximum Marks: 75

PART –A

Answer any FIVE of the following Questions. Each Carries 5 Marks. 5 X 5 = 25

1.

2.

3.

4.

5.

6.

7.

8.

PART-B

Answer all the questions. Each question carries 10 Marks. 5 X 10 = 50

UNIT-I In ternal Choice
9 OR 10

UNIT- II In ternal Choice
11 OR 12

UNIT- III In ternal Choice
13 OR 14

UNIT- IV In ternal Choice
15 OR 16

UNIT- V In ternal Choice
17 OR 18

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