AMCH9 ORGANIC & INORGANIC CHEMISTRY

SECTION-AN INORGANIC CHEMISTRY

UNIT-1 SREVIEW OF ATOMIC STRUCTURE

1.1 Atomic Structure- atomic orbitals,
1.2 Quantum numbers,
1.3 Electronic Configuration- energy levels.

UNIT-2 CHEMICAL BONDING

2.1 Covalent Bond- Valence bond theory- resonance, Shapes of molecules- linear, trigonal, tetrahedral, Square Planer, pentagonal, Octahedral with examples,
2.2 Molecular orbital theory- molecular orbital approximations- Linear combinations of atomic orbitals (LCAO)-
2.3 M.O. diagrams for diatomic molecules like hydrogen, oxygen and carbon monoxide, Multicenter bonding.

UNIT-3 CHEMISTRY OF S-BLOCK ELEMENTS WITH REFERENCE TO

3.1 General Characteristics,
3.2 Elemental properties and oxidation states, Oxides, hydroxides, halides and hydrides.

UNIT-4 STUDY OF ELEMENTS OF IST TRANSACTION SERIES (SC TO CU) WITH REFERENCE TO

4.1 Oxidation states, colours, magnetic behaviour, ability to form complexes and catalytic behaviour.

UNIT-5 CO-ORDINATION COMPLEXES (COMPOUNDS)

5.1 Co-ordination number, ligand, chelate EAN, Nature of metal-ligand bonding-
5.2 Theories of M-L bonding- V.B.T. and C.F.T.V.B.T. - Tetrahedral, square planner, octahedral complexes with examples. C.F.T.
5.3 Splitting of energy levels in Oh. And Td. Field, CFSE, Weak, strong field cases.
5.4 Application of C.F.T. to explain colour, magnetic properties, stability, stereochemistry of complexes.
5.5 Transition metal oxides and complexes as catalyst in different reactions – vanadium pentoxide, copper oxide, Zinc oxide, iron oxide.

SECTION-B ORGANIC CHEMISTRY

UNIT-1 STRUCTURE OF ORGANIC COMPOUNDS

1.1 Localized bonding- Revision of atomic orbitals, molecular orbitals, covalent bond, hybridization, bonding in organic compounds N C and OC and, electronegativity, polar covalent bond. (Inductive effect should be discussed in details).
1.2 Delocalized bonding- Concept of conjugation and delocalization,
1.3 Effect of delocalization on bond distance and bond energy.
1.4 Kinds of molecules which can have delocalized bond.

1.5 Rules of resonance, hyper conjugation, Tautomerism,
1.6 Concept of aromaticity (Huckel rule) with approximate examples.

UNIT-2 REACTION MECHANISM

2.1 Valance states of carbon (trivalent- carbonium ion, carbanion and free radical and divalent – carbene) and their structures.
2.2 Types of 8 bond fission,
2.3 Types of reagents, Types of reactions.
2.4 Mechanism of following reactions involving carbonium ion intermediate.

UNIT-3 NUCLEOPHILIC SUBSTITUTION

3.1 Hydrolysis of alkyl halides (SN1mechanism) Effect of structure of alkyl group, leaving group and solvent on rate of reaction.
3.2 Also discuss SN 2 reaction.
3.3 Electrophilic substitution in benzene and monosubstituted benzene:
3.4 Nitration, Sulphonotion, Halogenation,
3.5 Friedel –Craft alkylation and acylation, diazocoupling reactions.
3.6 Electrophilic addition to C=C: Polar addition of hydrogen halides and water,
3.7 Alkylation, dimerisation.
3.8 Eliminations: E1reaction in acid catalysed dehydration of alcohols and base catalysed dehydrohalogenation of alkyl halides.
3.9 Rearrangement: Acid catalysed rearrangement shown by hydrocarbons,
3.10 Beckmann rearrangement.

UNIT-4 MECHANISM OF THE FOLLOWING REACTIONS INVOLVING CARBANION INTERMEDIATES.

I. Addtion of carbon nucleophile to C= O – grignard reaction for preparation of primary, secondary and tertiary alcohols and carboxylic acids.
II. Nucleophilic substitution by carbon nucleophile-Wurtz reaction.
III. Carbonion involved in condension- aldol condensation, claisen ester condensation.
IV. Rearrangement involving carbonion-Favorskii rearrangement.
V. Elimination reactions involving carbonion-E1 CB mechanism.
VI. Michael addition to electrophilic double bond.
VII. Mechanism of the following reactions involving free radicals as intermediates:
VIII. Addition of hydrogen halide to C = C in presence of peroxide.
IX. Substitution reactions – halogenation of methane.
X. Dimerisation – Kolbe synthesis.
XI. DISPORPROTIONATION.

UNIT-5. SPECTROSCOPY

I. Introduction to spectroscopy: Nature of electromagnetic radiation, Units and symbols used to describe electromagnetic radiation, Different regions of electromagnetic spectrum, Interactions of radiation with matter, Excitation of molecules to different

energy levels such as rotational, vibrational and electronc levels. Types of spectroscopy, Advantages of spectroscopic methods.

II. Ultra: Violet Spectroscropy – Nature of U.V. Spectrum (graph), Beer- Lambert Law. Different electronic transitions such as n, and. Different terms used in u.v spectroscopy, chromophore, auxochrome, bathochromic shift,hypsochromic shift, U.V. spectrum of alkenes , aromatic compounds (benzene, aniline, nitrobenzene),Carbonyl compounds, Applications of U.V. spectroscopy.

III. I.R. spectroscopy: Principle of X.R.spectroscopy, Types of vibrations (stretching and bending, Fundamental modes of vibrations, conditions for absorbing I.R.radiation , Different regions of I.R spectrum. Characteristics of I.R absorption of alkanes, alkenes aromatic compounds , alcohols, ethers, al –dehydes, ketones, aromatic compound s, alcohols,ethers, al –dehydes , ketones, aromatic compounds, alcohols, ethers ,alehydes, ketones, carboxylic acids, amines. Effect of inductive effect, resonance effect and hydrogen bonding on I.R. spectrum. Applications of I.R. spectroscopy. Instrumentation for I.R. and u.v . spectroscopy is not expected . Calculatin of absorption maxima (Lamba max) by Woodword rule are not expected.)

Reference Books:

1. Organic Chemistry: Structure and Function" by P Volhardt and N Schore
2. Organic Chemistry" by T W G Solomons and C B Fryhle