

Jivan Vikas Shikshan Sanstha Risod's
Late Pushpadevi Patil Arts & Science College Risod, Dist-Washim (M.S.) 444506
NAAC Accredited with 'B' grade, Recognized with 2(f) status by UGC
(Affiliated to Sant Gadge Baba Amravati University, Amravati)

Department of Chemistry

Syllabus

Semester-II

UNIT- I: 14L

A] Polarisation-Definition, polarising power, polarizability, effect of polarization on nature of bond. Fajan's rules of polarisation and its applications. [4]

B] Covalent bonding-Directional nature of covalent bond. Hybridisation, types of hybridisation to explain geometries of NH_4^+ ion, PCl_5 , SF_6 and IF_7 . [4]

C] **Acids and Bases:** Theory of solvent systems and Lux-Flood concept of acids and bases. Hard and soft acids and bases. Pearsons HSAB or SHAB principle with important applications. [6]

UNIT- II: 14L

A] **P-Block Elements:** Comparative study of 16th and 17th group elements with reference to electronic configuration, ionization energy and oxidation states. Oxidising properties of halogens with reference to oxidation potential. Interhalogen compounds, structure and bondings. Introduction to fluorocarbons. [6]

B] **Noble Gases:** Inertness of noble gases. Compounds of noble gases only structure and bonding in XeF_2 , XeF_4 , XeF_6 , XeO_3 and XeO_4 [2]

C] **Nonaqueous Solvents-**Requirements of a good solvent. Water as an universal solvent. Physical properties of solvents namely liquid range, dielectric constant, dipole moment, heat of vaporisation and solubility behaviour. Classification of solvents. Acid base, precipitation, redox, solvolysis and complexation reactions in liquid ammonia. Merits and demerits of liquid ammonia as a solvent. [6]

UNIT- III: 14L

A] Alkyl Halides: Synthesis of vinyl chloride from acetylene and allyl chloride from propylene, Reactions of both with aqueous and alcoholic KOH, Comparison of reactivity of vinyl an allyl chloride. [4]

B] Aryl Halides: Synthesis chlorobenzene from benzene, phenol and benzene diazonium chloride, Synthesis of benzyl chloride from toluene and benzyl alcohol, Reactions of both with aqueous KOH, NH_3 and sodium ethoxide, Comparison of reactivity of chlorobenzene and benzyl chloride. Benzyne intermediate mechanism. [4]

C] Alcohols: Dihydric alcohols: Ethylene glycol- Preparation from ethylene, ethylene chloride and ethylene oxide, Reactions- with Na, PCl_5 , CH_3COOH , ZnCl_2 , conc. H_2SO_4 and dehydration with heat. Trihydric alcohols: Glycerol- Preparation from propylene, Reactions- with Na, HCl, PCl_5 , HNO_3 and KHSO_4 . Pinacolpinacolone rearrangement (mechanism). [6]

UNIT- IV: 14L

A] Phenols: Methods of formations a) from aniline b) from cumene. Acidic character, Reaction of Phenols- a) Carboxylation (Kolb's reaction), b) Fries Rearrangement, c) Claisen Rearrangement and d) Reimer – Tiemann reaction. [6]

B] Ethers: Diethyl ether- Preparation by Williamson's synthesis and continuous etherification process, Reactions-with cold and hot HI. [4]

C] Epoxides: Synthesis of ethylene oxide from ethylene and styreneoxide from styrene. Ring opening reactions of both catalysed by acid and alkali. [4]

UNIT- V: Physical Properties and Molecular Structure 14L

A] Electrical Properties:

(i) Polar and non-polar molecules. Dipole moment. (ii) Induced polarization and orientation polarization. Clausius- Mossotti equation (only qualitative treatment). (iii) Measurement of dipole moment by temperature and refractivity methods. (iv) Applications of dipole moment for the determination of molecular structure. i. e. percentage ionic character of covalent bonding,

molecular geometry, cis-trans isomers, ortho, meta and para isomers of a disubstituted benzene. [7]

B] Magnetic Properties:

(i) Paramagnetic and diamagnetic substances, origin of paramagnetism, diamagnetism, ferromagnetism and antiferromagnetism. (ii) Volume, specific, mass and molar susceptibility. Relationship between molar magnetic susceptibility and magnetic moment. (iii) Relationship between magnetic moment and number of unpaired electrons. (iv) Gouy's balance method for determination of magnetic susceptibility. (v) Application of magnetic moment in the determination of molecular structure. (vi) Numericals. [7]

UNIT- VI: Chemical Kinetics **14L**

Explanation of terms like rate of reaction, order of a reaction and molecularity. Definition with one example of zero, first and second order reaction. Half life period of a reaction. Derivation of rate equation for first and second order reaction with equal initial concentration and different initial concentration of a reactant. Characteristics of first and second order reaction. Examples of first and second order reaction and their kinetics study with modified rate equation viz. the reactions (i) decomposition of H_2O_2 , (ii) reaction between $\text{K}_2\text{S}_2\text{O}_8$ and KI, (iii) hydrolysis of methyl acetate catalyzed by acid, (iv) saponification of ethyl acetate by NaOH and (v) inversion of canesugar. Determination of order of a reaction by integration, graphical, equifractional change, vant Hoff's differential method and Ostwald's isolation method. Effect of temperature on reaction rates. Arrhenius equation, activation energy and its determination using Arrhenius equation. Numericals. [14]