

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-I

UNIT- I: **14L**

A] Periodic Properties:

Atomic and ionic radii. Types of atomic radii (only definitions -covalent radius, metallic radius, Van der Wall's radius and ionic radius). Periodic trends in atomic and ionic radii. Ionization energy, electron affinity and electronegativity (definition and periodic trends). Effect of ionization energy and electronegativity on different properties of elements namely metallic and non-metallic character, relative reactivity, oxidizing and reducing properties., Scales of electronegativity Pauling scale and Mulliken Scales. Electronegativity and partial ionic character of a covalent bond. [6]

Screening effect, screening constant and effective nuclear charge. Slater's rules for calculating screening constant. Problems. [2]

B] Ionic bonding:

Definition of ionic bond, types of cations. Factors affecting ionic bond formation (energetic of ionic bond formation ionization energy, electron affinity and lattice energy). Born Lande equation (no derivation) to calculate lattice energy. Born-Haber's cycle to determine lattice energy. Solvation and salvation energy, factors affecting salvation energy, Determination of salvation energy. Solubility of ionic solids, lattice energy and salvation energy. [6]

UNIT- II: **14L**

A] S-Block element:

Comparative study of 1st and 2nd group elements with reference to electronic configuration, ionisation energy, oxidation states, reactivity and flame colouration. Diagonal relationship between Li and Mg. [5]

B] P-Block element:

Comparative study of 13th, 14th and 15th group elements with reference to electronic configuration, ionisation energy, oxidation states. Concept of inert pair effect. Diagonal relationship between Be and Al. Structure of diamond and graphite. Abnormal behaviour of nitrogen. Hydrides of boron- preparation(from BCl₃ and NaBH₄two), properties(action of heat, water, alkali and oxygen), structure and bonding in diborane. Carbides, types of carbides and fullerenes. [9]

UNIT- III:

14L

A] Electronic Displacements:

Inductive effect, Electromeric effect, Resonance and Hyperconjugation (definition, and applications of these effects). [3]

B] Reactive Intermediates:

Carbocations, Carbanions and free radicals:their generation stability and reactions. [2]

C] Aliphatic Hydrocarbons:

Alkanes: Methods of formation: i)Wurtz reaction and ii)Corey-House reaction,Reactions: i)Halogenation (With mechanism), ii) Aromatisation. [2]

Alkenes: Methods of formation (With mechanism):

i)Dehydrohalogenation of alkyl halides (E¹& E²) ii) Dehydration of alcohols, Reactions: Electrophilic and free radical addition of HX and X₂ (with mechanism). [3]

Alkynes: Preparation from vicinal and geminal dihalides, Reaction-Hydrogenation. [2]

Alkadienes: Classification,1,3-Butadiene- Preparation from cyclohexene, Reactions- Addition of H₂, Br₂ and HBr. [2]

UNIT-IV: Aromatic Hydrocarbons**14L**

A] Nomenclature and Isomerism of Aromatic Compounds. Structure of Benzene: Kekule structure and Molecular orbital structure. [4]

B] Aromaticity and Huckel's rule Aromatic, antiaromatic and nonaromatic systems. [4]

C] Mechanism of Electrophilic Aromatic Substitution: Nitration, Friedal-Craft Alkylation and Acylation. Nuclear and Side Chain Halogenation, Birch Reduction. [4]

D] Orientation: Effect of substituent groups. Activating and deactivating groups. Theory of reactivity and orientation on the basis of inductive and resonance effects (-CH₃, -OH, -NO₂ and -Cl groups). [2]

UNIT- V: Thermodynamics**14L**

Adiabatic and Isothermal processes. Work done in adiabatic and isothermal processes, Evaluation of different expressions showing relationship between pressure, volume and temperature. First law of Thermodynamics and its limitations, Need of Second law. Carnot's heat engine, derivation of expression for the work done and efficiency of Carnot's engine. Statements of Second law of thermodynamics. Concept of Entropy, Physical significance of Entropy, Derivation of expression for the Entropy change for an ideal gas in terms of pressure, temperature and volume. Entropy change for an ideal gas for isothermal, isobaric and isochoric processes, Entropy of fusion, sublimation, vapourization, transition and its calculations. Entropy change for reversible and irreversible processes. Entropy change as a criteria for spontaneity. Numericals. [14]

UNIT- VI:**14L****A] Gaseous State:**

Postulates of Kinetic theory of gases, Derivation of Kinetic gas equation. RMS, Average and Most probable velocities and their relationship. Maxwell-Boltzmann distribution law of molecular velocities (only qualitative treatment), Mean free path, collision number and collision diameter. Deviation of real gases from ideal gas behaviour. Vanderwaal's equation of state and its derivation for real gases. Critical phenomenon, Andrew's experiment – isotherm of CO₂.

Critical state, critical constant, P_c , V_c and T_c in terms of Vanderwaal's constants 'a' and 'b'.
Reduced equation of state and its derivation. Law of corresponding state. Numericals. [10]

B] Phase Rule:

Statement of phase rule, explanation of phase, number of components and degree of freedom.
Application of phase rule to water and sulfur system. [4]