

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-IV

UNIT- I: **14L**

A] Chemistry of elements of transition series:

Definition of transition elements. General characteristics of transition elements. Comparative study of first transition series elements (3d) with reference to following properties: (i) Electronic configuration (ii) Atomic and ionic size (iii) Ionization energy (iv) Metallic nature (v) Oxidation states (vi) Magnetic properties (vii) Color of salts (viii) Catalytic properties (ix) Complex formation behavior. Study of 4d and 5d series elements electronic configuration. Comparison of 3d series elements with 4d and 5d series elements with respect to size, oxidation states, magnetic properties and color. **[11]**

B] Extraction of elements:

Principles involved in extraction of elements. Major methods of extraction of elements. Factors affecting choice of extraction method. Thermodynamics of reduction processes-Ellingham diagrams for oxides and importance of this diagram (only preliminary ideas). **[3]**

UNIT- II: **14L**

A] Inner transition elements:

Definition, Lanthanides and Actinides. Comparative study of Lanthanides with respect to following properties: (i) Electronic configuration (ii) Atomic and ionic radii lanthanide contraction definition, cause and effect of lanthanide contraction (iii) Oxidation states (iv) Magnetic properties (v) Color of salts (vi) Complex formation behavior. Occurrence of

lanthanides. Isolation of lanthanides by ion exchange method. Actinides- Electronic configuration and oxidation states. Comparison of lanthanides and actinides. [11]

B] General Principles of Metallurgy:

Definition of metallurgy, steps in metallurgy. Ore dressing by gravity separation, froath floatation and electromagnetic separation. Calcination, roasting, smelting and refining of metals. Meaning of terms hydrometallurgy and pyrometallurgy. [3]

UNIT- III: 14L

A] Polynuclear hydrocarbons:

Naphthalene - Haworth synthesis, orbital picture, Reactions – electrophilic substitution (orientation) Preparation of naphthols from naphthalene sulphonic acids and naphthylamines from naphthols. [4]

B] Reactive methylene compounds:

Malonic Ester: Synthesis from acetic acid, Synthetic applications- Synthesis of acetic acid, succinic acid, glutaric acid, crotonic acid and malonyl urea. Acetoacetic ester: Synthesis from ethyl acetate, Synthetic applications- Synthesis of acetic acid, propionic acid, isobutyric acid, succinic acid, glutaric acid, crotonic acid, acetyl acetone and 4-methyl uracil. [6]

C] Carbohydrates:

Constitution of glucose, cyclic structure, Pyranose and Furanose structure, Epimerization, conversion of glucose to fructose and vice-versa, Introduction to fructose, ribose, 2- deoxyribose, maltose, sucrose (their structures only determination not needed). [4]

UNIT- IV: 14L

A] Aromatic nitro compounds:

Nitrobenzene: Synthesis from benzene, Reduction of nitrobenzene in acidic, neutral and alkaline medium. [3]

B] Amino Compounds:

Basicity and effect of substituents. Methods of preparation of aniline from nitrobenzene, Reactions: with acetyl and benzoyl chlorides, Br_2 (aq) and Br_2 (CS_2), Carbylamine reaction, alkylation, Hoffmann's exhaustive methylation and its mechanism. [4]

C] Diazonium Salts:

Preparation benzene diazonium chloride, Synthetic applications- Preparation of benzene, phenol, halobenzene, nitrobenzene, benzonitrile, coupling with phenol and aniline. [3]

D] Amino acids and Proteins:

Classification, Strecker and Gabriel phthalimide synthesis, Zwitterion structure, Isoelectric point, peptide synthesis, Structure determination of polypeptides by end group analysis. [4]

UNIT- V: Colligative Properties of Dilute Solutions 14L

(i) Definition and examples of colligative properties. (ii) Elevation of boiling point, thermodynamic derivation of the relationship between elevation of boiling point and molar mass of a non-volatile solute. Cottrell's method for determination of elevation of boiling point. (iii) Depression of freezing point, thermodynamic derivation of the relationship between depression of freezing point and molar mass of a non-volatile solute. Rast's method for determination of depression of freezing point. (iv) Abnormal behavior of solution. Van't Hoff's factor 'i'. Determination of degree of association and dissociation from Van't Hoff's factor. (v) Numericals.

UNIT- VI: Crystalline state 14L

Symmetry in crystal, plane of symmetry, axis of symmetry and point of symmetry. Law of constancy of interfacial angles. Elements of symmetry in cubic crystals. Laws of symmetry. Law of rational indices, Weiss and Miller indices of a lattice planes, calculation of interplaner distance $d(h,k,l)$ from Miller indices in a cubic system. Seven crystal systems and fourteen Bravais lattices, Bravais lattices of cubic system. Simple cubic system (S.C.C.), body centered cubic system (B.C.C.) and face centered cubic system (F.C.C.). Calculation of number of constituent units in S.C.C., B.C.C. and F.C.C. Ratio of interplaner distances for 100, 110 and 111 lattice plane in S.C.C., B.C.C. and F.C.C. (No geometrical derivation). Derivation of Bragg's

equation for X-ray diffraction, Bragg's X-ray spectrometer method for the determination of crystal structure of NaCl and KCl. Anomalous behaviour of KCl towards X-ray. Numericals.