

INORGANIC CHEMISTRY

Unit 1 - Atomic Structure -II

Dual properties of electrons - de-Broglie relation - Heisenberg's uncertainty principle - Wave nature of an electron - Schrodinger wave equation (only equation, no derivation) - Eigen values and Eigen function- significance only - molecular orbital method. Application to Homo diatomic and Hetero diatomic molecules - Metallic Bond - Hybridization of atomic orbitals Hybridization involving s, p and d Orbitals - Types of forces between molecules.

Unit 2 - Periodic classification-II

Review of periodic properties - Calculation of atomic radii - Calculation of ionic radii - Method of determination of Ionisation potential - Factors affecting ionisation potential - Method to determine the electron affinity - Factors affecting EA - Various scales on electro negativity values.

Unit 3 - p - Block Elements - II

Group -13 General trends - Potash alum- Preparation, Properties and uses - Group 14 General trends - Silicates - Types and structure - Silicones - Structure and uses - Extraction of lead - Group - 15. General trends - Phosphorous - Allotropes and extraction - Compounds of phosphorous - Group - 16. General trends - H_2SO_4 - Manufacture and properties. - Group - 17 General characteristics. Physical and Chemical properties - Isolation of fluorine and its properties - Interhalogen compounds Group-18 Inert gases - Isolation, properties and uses.

Unit 4 d - BLOCK ELEMENTS

General characteristics of d-block elements - First transition series - Occurrence and principles of extraction - chromium, copper and zinc - Alloys - Second transition series - Occurrence and principles of extraction of silver - Third transition series - Compounds - $\text{K}_2\text{Cr}_2\text{O}_7$, $\text{CuSO}_4\cdot 5\text{H}_2\text{O}$, AgNO_3 , Hg_2Cl_2 , ZnCO_3 , Purple of cassius.

Unit 5 - f-block elements

General characteristics of f - block elements and extraction - Comparison of Lanthanides and Actinides - Uses of lanthanides and actinides.

Unit 6 - Coordination Compounds and Bio-coordination Compounds

An introduction - Terminology in coordination chemistry - IUPAC nomenclature of mononuclear coordination compounds - Isomerism in coordination compounds - Structural isomerism - Geometrical isomerism in 4 - coordinate, 6 – coordinate complexes - Theories on coordination compounds - Werner's theory (brief) - Valence Bond theory - Crystal field theory - Uses of coordination compounds - Biocoordination compounds. Haemoglobin and chlorophyll.

Unit 7 - Nuclear chemistry

Nuclear energy nuclear fission and fusion - Radio carbon dating - Nuclear reaction in sun - Uses of radioactive isotopes.

PHYSICAL CHEMISTRY

Unit 8 - Solid state II

Types of packing in crystals - X-Ray crystal structure - Types of ionic crystals - Imperfections in solids - Properties of crystalline solids - Amorphous solid.

Unit 9 - Thermodynamics - II

Review of I law - Need for the II law of thermodynamics - Spontaneous and non spontaneous processes - Entropy - Gibb's free energy - Free energy change and chemical equilibrium - Third law of thermodynamics.

Unit 10 - Chemical equilibrium II

Applications of law of mass action - Le Chatlier's principle.

Unit 11 - Chemical Kinetics -II

First order reaction and pseudo first order reaction - Experimental determination of first order reaction - method of determining order of reaction - temperature dependence of rate constant - Simple and complex reactions.

Unit 12 – Surface Chemistry

Adsorption - Catalysis - Theory of catalysis - Colloids - Preparation of colloids - Properties of colloids - Emulsions.

Unit 13 – Electrochemistry – I

Conductors, insulators and semi conductors - Theory of electrical conductance - Theory of strong electrolytes - Faraday's laws of electrolysis - Specific resistance, specific conductance, equivalent and molar conductance - Variation of conductance with dilution - Kohlraush's law - Ionic product of water, pH and pOH - Buffer solutions - Use of pH values.

Unit 14 – Electrochemistry - II

Cells - Electrodes and electrode potentials - Construction of cell and EMF - Corrosion and its preventions - commercial production of chemicals - Fuel cells.

Unit 15 – Isomerism in Organic Chemistry

Geometrical isomerism - Conformations of cyclic compounds - Optical isomerism - Optical activity - Chirality - Compounds containing chiral centres - D-L and R-S notation - Isomerism in benzene.

Unit 16 – Hydroxy Derivatives

Nomenclature of alcohols - Classification of alcohols - General methods of preparation of primary alcohols - Properties Methods of distinction between three classes of alcohols (1° , 2° and 3°) - Methods of preparation of dihydric alcohols. (glycol) - Properties - Uses - Methods of preparation of trihydric alcohols - Properties - Uses - Aromatic alcohols - Methods of preparation of benzyl alcohol - Properties - Uses - Phenols - Manufacture of phenols - Properties - Chemical properties - Uses of Phenols.

Unit 17 - Ethers

Ethers - General methods of preparation of aliphatic ethers - Properties - Uses - Aromatic ethers - Preparation of anisole - Reactions of anisole - Uses.

Unit – 18 Carbonyl Compounds

Nomenclature of carbonyl compounds - Comparison of aldehydes and ketones - General methods of preparation of aldehydes - Properties - Uses Aromatic aldehydes - Preparation of benzaldehyde - Properties - Uses - Ketones - general methods of preparation of aliphatic ketones (acetone) - Properties - Uses - Aromatic ketones - preparation of acetophenone- Properties - Uses - preparation of benzophenone - Properties.

Unit 19 – Carboxylic Acids

Nomenclature - Preparation of aliphatic monocarboxylic acids – formic acid - Properties - Uses - Tests for carboxylic acid - Monohydroxy mono carboxylic acids - Lactic acid – Sources - Synthesis of lactic acid - Aliphatic dicarboxylic acids - preparation of dicarboxylic acids – oxalic and succinic acids - Properties - Strengths of carboxylic acids - Aromatic acids - Preparation of benzoic acid - Properties - Uses - Preparation of salicylic acid - Properties - Uses - Derivatives of carboxylic acids - Preparation of acid chloride – acetyl chloride (CH_3COCl) - Preparation - Properties - Uses - Preparation of acetamide - Properties - Preparation of acetic anhydride - Properties - Preparation of esters- methyl acetate - Properties.

Unit - 20 Organic Nitrogen Compounds

Aliphatic nitro compounds - Preparation of aliphatic nitroalkanes - Properties - Uses - Aromatic nitro compounds - Preparation - Properties - Uses - Distinction between aliphatic and aromatic nitro compounds - Amines - Aliphatic amines - General methods of preparation - Properties - Distinction between 1°, 2°, and 3° amines - Aromatic amines - Synthesis of benzylamine - Properties - Aniline–preparation - Properties - Uses - Distinction between aliphatic and aromatic amines - Aliphatic nitriles - Preparation - properties - Uses - Diazonium salts - Preparation of benzene diazoniumchloride - Properties.

Unit 21 - Biomolecules

Carbohydrates - structural elucidation - Disaccharides and polysaccharides - Proteins - Amino acids - structure of proteins - Nucleic acids - Lipids.

Unit 22 - Chemistry in Action

Medicinal chemistry - Drug abuse - Dyes – classification and uses - Cosmetics – creams, perfumes, talcum powder and deodorants - chemicals in food - Preservatives artificial sweetening agents, antioxidants and edible colours - Insect repellent – pheromones and sex attractants - Rocket fuels - Types of polymers, preparation and uses.