# Some Basic Concepts of Chemistry

Significant figures, Basic units and interconversion, Law of multiple proportions , Law of combining volumes, Mole concept Molecular mass, molar mass, Average mass, Mass percentage of elements , Empirical formula, Stoichiometry Limiting reagent, Concentration terms: mass percentage, Concentration terms: Molarity, Molality, ppm, Molarity + mole fraction

# Structure of Atom

Atomic & Mass number, iso-series, Symbol of element, Mole concept, Quantization of charge, General unitary method questions, Rutherford’s experiment, Electromagnetic waves, Energy of photon, Photoelectric effect, Bohr’s radius, Energy of electron in Bohr’s orbit, Mixed questions on Bohr’s model, Electromagnetic spectra, energy of photons, Hydrogen spectrum, Number of spectral lines, de-Broglie wavelength-macroscopic particles ,

de-Broglie wavelength-microscopic particles, de-Broglie wavelength- Bohr model, Heisenberg uncertainty principle

Quantum numbers, Energy of orbitals, Electronic configurations, Effective nuclear charge and shielding effect

Classification of Elements and Periodicity in Properties

Introduction, Mendeleev’s periodic table, Nomenclature of elements, Basis of classification in modern periodic table, Placement of elements in groups and periods of periodic table, Significance of groups and periods in periodic table, Electronic configuration Atomic or ionic radius and its trends in periodic tables, Isoelectronic species, Ionization enthalpy and its trends in periodic table, Electron gain enthalpy and its trends in periodic table, Electronegativity and its trends in periodic table, Metallic character trends in periodic tables, Acid / Basic strength trends in periodic tables, Valence and oxidation state, Reactivity of element

# Chemical Bonding and Molecular Structure

Octet rule, Lewis dot structures for atoms and ions, Lewis dot structures for ionic compounds, Lewis dot structures for covalent compounds, Bond parameter, Electronegativity and polar covalent bonds, Ionic bonds, Resonating structures, Valence shell electron pair repulsion (VSEPR) theory, Valence bond theory (VBT): sigma and pi bonds

Valence bond theory (VBT): Formation of molecules, Hybridization, Dipole moment, Molecular orbital theory: Linear combination of atomic orbitals, Molecular orbital theory: bond order, magnetic nature and stability of molecules, Hydrogen bonding

# States of Matter

Mole concept, SI units, dimensional analysis, Boyle’s law, Charle’s law, Combined gas law, Ideal gas equation, Dalton’s law of partial pressure, Density of gases, Real gases, Liquefaction of gases

# Thermodynamics

Different types of processes, State functions / path functions, First law of thermodynamics, Isothermal irreversible work, Isothermal reversible work, Standard enthalpy, Molar heat capacity, Calorimeter, Enthalpy of vaporization, Enthalpy of condensation, Enthalpy of reaction from enthalpy of formation and combustion, Bond enthalpy, Entropy

Spontaneity and Gibbs energy, Gibbs energy and equilibrium constant

# Equilibrium

Law of mass action, Writing equilibrium constant simple questions, equilibrium constant Kc, Kp

equilibrium concentration, equilibrium pressure, Heterogeneous equilibrium questions, Relation between Kp and Kc, Characteristics of equilibrium constant, Equilibrium constant and Gibbs energy, Le Chatelier’s principle, Bronsted – Lowry acids and bases, Lewis acids and bases, pH = log[H+] simple questions , pH of strong acid or strong base solutions, pH of mixture of strong acid and strong base solution, pH of weak acid solutions , pH of weak base solutions

Polybasic acids, Ionization constants of conjugate acid-base pair, Buffer solution, pH of salt solutions, pH of salts of weak base and strong acid, pH of salts of weak acid and strong base, pH of salts of weak base and weak acid, Solubility of sparingly soluble salts in water, Solubility of sparingly soluble salts with common ion, Precipitation of sparingly soluble salts, Solubility of sparingly soluble salts in buffer solution

# Redox Reactions

Oxidation number simple questions, Fallacy in oxidation number, Redox reactions, Oxidising agent, reducing agent

Stock notation, Classification of redox reactions, Strength of oxidizing agents and reducing agents, Role of solvent in reactions,Balancing redox reactions by ion – electron method, Balancing redox reactions by oxidation number method, Disproportionation reactions, Reaction mechanism, Limiting reagets

# Hydrogen

Position of hydrogen in periodic table, Occurrence of hydrogen isotopes of hydrogen, Bond enthalpy of dihydrogen, Preparation of dihydrogen, Chemical reactions of hydrogen, Uses of dihydrogen, Hydrides: Ionic hydrides , Hydrides: Metallic hydrides, Hydrides: Covalent hydrides, Hydrides: Mixed questions, Importance of water in biosphere, Structure of ice,Chemical properties of water: Amphoteric nature, Chemical properties of water: Redox reactions, Chemical properties of water: hydrate formation, Chemical properties of water: mixed questions

Hard water: definition , Methods to remove hardness of water: Ion exchange, Structure of H2O2 , Reaction of H2O2: redox reactions, bleaching agent, Volume strength

# The s Block Elements

Occurrence of alkali metals, Properties of alkali metals, Properties of alkali metals

Anomalous properties of Lithium, Reactions of alkali metal oxides, Solubility of alkali metal compounds, Thermal stability of alkali metal compound, Some important compounds of sodium,Biological importance of sodium and potassium, Properties of alkaline earth metals, Properties of alkaline earth metals: reduction potential, Properties of alkaline earth metals: colour in oxidizing flame, Solubility of alkaline earth metal compounds, Thermal stability of alkaline earth metal compounds, Structure of BeCl2, Some important compounds of calcium, Biological importance of magnesium and calcium, Comparison in properties of alkali and alkaline earth metals, Comparison in properties of compounds of alkali and alkaline earth metals, Reaction of alkaline earth metals and their compound

# The p Block Elements

Radii of group 13 elements, Oxidation states of group 13 elements, Physical properties of aluminium, Reactions of aluminium: with air and water, Some important compounds of boron: boron halides, Some important compounds of boron: Diborane, Some important compounds of boron: Boric acid, Some important compounds of boron: Borax, Oxidation states of group 14 elements, Ionization enthalpy of group 14 elements, Allotropes of carbon Some important compounds of carbon,silicon: CO2,CO, SiO2

# Organic Chemistry –

# Some Basic principles and techniques

Number of pie and sigma bonds, Hybridization of carbon and shape of molecule, Condensed, structural and bond line formula, Functional groups in organic compounds, Nomenclature: Writing structure from name, Homologous series

Electrophiles and nucleophiles, Homolysis, heterolysis and reaction intermediates, Inductive effect, Stability of molecules on basis of inductive effect, Resonating structures, Isomerism, Stability and contribution of resonating structures, Electronic effects: mixed questions, Order of stability of carbocations, Methods of purification of organic compounds: distillation,steam distillation, distillation under reduced pressure, Methods of purification of organic compounds: crystallization,sublimation, Methods of purification of organic compounds: sublimation, Methods of purification of organic compounds: chromatography, Qualitative analysis of organic compounds: Lassaigne’s test

Quantitative estimation of carbon and hydrogen, Quantitative estimation of nitrogen: Dumas’ method, Quantitative estimation of nitrogen: Kjeldahl’s method,Quantitative estimation of halogens, Quantitative estimation of Sulphur,

Quantitative estimation of phosphorus

# Hydrocarbons

Number of pie and sigma bonds, Degree of carbon,Nomenclature of alkanes: writing structure from name, Nomenclature of alkanes: writing name from structure,Nomenclature of alkanes: finding reasons for incorrect name, Structural isomerism and nomenclature of alkanes, Physical properties of alkanes: boiling points, Preparation of alkanes: Decarboxylation, Preparation of alkanes: Wurtz reaction, Reaction of alkanes: Free radical substitution, Nomenclature of alkenes: writing name from structure, Structural isomerism and nomenclature in alkenes, Nomenclature and geometrical isomerism in alkenes, Reactions of alkenes: Hydrogenation, Reactions of alkenes:Markovnikov addition, Reactions of alkenes: Anti Markovnikov addition, Reactions of alkenes: Ozonolysis, Nomenclature and structural isomerism in alkynes, Aromaticity, Methods of preparation of benzene, Reactions of benzene: Electrophilic substitution, Reactions of benzene: rate of electrophilic substitution, Mixed questions on nomenclatureAcidity of hydrocarbons, Combustion reaction of Hydrogen.