

RPET 2009

SYLLABUS CHEMISTRY

DEVELOPMENT OF CLASSICAL MODEL OF AN ATOM :

Bohr model of an atom, calculation of radius of bohr`s orbit, quantization of electronic energy levels, Spectral evidence for quantization, introductory concept of four quantum numbers, pauli`s exclusion principle, hund`s rule, aufbau`s principle, concept of spatial distribution of s and p orbitals, isotopes.

THE PERIODIC LAW :

Long form of periodic table, electronic configuration and the periodic table, periodicity in properties, elementary ideas about ionization potential, electron affinity, electronegativity and atomic radii, position of hydrogen.

THE THEORY OF CHEMICAL BONDING :

The ionic bond, characteristic properties of ionic compound, the covalent bond, introductory concept of overlapping of orbitals, (sigma) and (pi) bonds , coordinate bond. Oxidation number, characteristic properties of covalent compounds, hybridization as illustrated by common molecules like NH_3 , H_2O , CH_4 , C_2H_4 and C_2H_2 .

CHEMICAL EQUILIBRIUM AND IONIC EQUILIBRIA :

Generalized expression of law of mass action and its applications, Arrhenius theory, evidence in favour of dissociation theory, ionic product of water, hydrolysis, relation between hydrolysis

constant, solubility product and its application to analytical chemistry.

CHEMICAL KINETICS :

Order and molecularity of reaction, Expression for first and second order reactions .

ACIDS AND BASES :

Hydrogen and hydroxyl ions in aqueous solution, Lewis concept of acids and dissociation of acids, PH value, buffer solutions, theory of indicators for acid-alkali titration. Oxidation-reduction, ion-electron concept, solid and liquid state of matter, crystalline and amorphous solids, four type of crystalline solids, crystal lattice and unit cell. Types of solution, properties of solution, osmosis and osmotic pressure, preparation and properties of colloidal solution .

METALS :

Nature of metallic state, The metallic bond, occurrence of metals in nature. General principle of metallurgy as illustrated by methods used for extraction of iron, copper, aluminium and silver from various type of ores. Preparation and properties of heavy water, ozone and hydrogen peroxide .

s-BLOCK ELEMENTS :

General characteristics, trends in variation of properties in periodic table of alkali and alkaline earth metals .

d-BLOCK ELEMENTS :

General characteristics, Elementary idea about paramagnetism and diamagnetism, different oxidation states of transition elements as illustrated by chromium, manganese and iron .

Classification of organic compound, nomenclature, homologous series, Functional groups: isomerism(position, chain, functional, metamerism). Petroleum as the commercial source of hydrocarbon and organic chemicals, petroleum refining practice, octane number .

General methods of preparation of alkanes (upto 5 carbon atoms) . Isomerism of butanes and pentanes, substitution reaction (free radical mechanism) .

Alkenes : General method of preparation, properties and uses . Ethylene: Electrophilic addition (mechanism). Markownikoff`s rule, peroxide effect. Alkynes: General method of preparation, properties and uses Acetylene: substitution reaction, polymerization. General method of preparation, properties and uses of mono, di and tri-halogen derivatives (excluding unsaturated) upto two carbon atoms, haloform reaction, synthetic uses of alkyl halides, polarity of carbon-halogen bond: Elementary concept of nucleophilic substitution. Ferrous preparation and uses. Grignard`s reagent and their synthetic applications. General methods of preparation, properties and uses of alcohols with reference to methyl and ethyl alcohols: Absolute alcohol and power alcohol, fermentation. General methods of preparation, properties and uses of ether with reference to diethyl ether . General methods of preparation of aldehydes and ketons with reference to formaldehyde, acetaldehyde and acetone, polymerization and condensation reaction (no mechanism) . General method of preparation, properties and uses of monocarboxylic acids with reference to formic and acetic acids . Derivatives of fatty acids, acetyl chlorides,

acetamide, acetic anhydride and ethyl acetate . Soaps and detergents. General methods of preparation, properties and uses of aliphatic amines with reference to methyl and ethyl amines. Urea. Preparation, properties and uses of Benzene (structure excluded), nitrobenzene, aniline and phenol, benzaldehyde, benzoic acid . Polymers : examples of natural and synthetic polymers and their importance. Preparation and uses of nylon, terylene and Buna-S