

CHM 102 General Chemistry (II) 2+1+0 (3 Credits).

Derivation of ideal gas equation leading to Boyle's law and Avogadro's hypothesis. A simplified treatment (e.g. particle in a box). The assumption for ideal behaviour and their limitation for real gases at high pressure and low temperature. Boltzmann distribution and molecule speed. Boltzmann constant. Liquid; the kinetic concept of the liquid state and simple kinetic/molecular description of melting, vapourization and vapour pressure, saturated and unsaturated vapours. Phase equilibria; phase rule, equilibria involving one, two and three components. Solids; lattice structure and spacing. Sodium chloride as ionic lattice. Cu as a cubic closed packed metal lattice. Granite and diamond; their properties as macromolecular structures. Lattice energy and forces between the particles in atomic, molecular and ionic lattice.

Electrolysis; The factors affecting the mass of substance liberated during electrolysis. Relationship between Faraday and the Avogadro constant and the charge of the electron. Chemical Stoichiometry, oxidation and reduction.

Equilibria; Chemical equilibria; reversible reactions and dynamic equilibrium, factors affecting chemical equilibria, the Le Chatelier's principle. Equilibrium constraints; their definition and calculation in terms of concentration. Effect of temperature on equilibrium constants. Ionic equilibria; Brønsted-Lowry theory of acid and bases. Strong and weak acids in terms of conductivity. Strong and weak electrolyte. Degree of dissociation. The ionic product of water K_w , pH and calculation, pH indicators; choice of indicators, buffer solutions.

Introduction to Organic Chemistry: Hybridization in carbon sp^3 , sp^2 , sp . Nomenclature and classes of organic compounds. Homologous series, functional groups. Isolation and purification of organic compound. Types of organic reactions: elimination, addition, substitution and rearrangement. Isomerism and types: structural- chemical, position, metamerism and tautomerism. Stereoisomerism – optical and geometrical isomerism. Chemistry of hydrocarbons: Alkanes, Alkenes and Alkynes, alkyl halides and Grignard reagent with respect to – nomenclatures, preparations, properties and application.