FTEAM02 CHEMISTRY

UNIT-1 MOLECULAR THEORY OF HETERODIATOMIC MOLECULES

1.1 Band theory of bonding in metals, Hydrogen bonding.

1.2 Solid state chemistry: Radius ratio rule, Space lattice (only cubes), Type of unit cell, Bragg's Law, Calculation of density of unit cell.

1.3 One and Two Dimensional solids, Graphite as two dimensional solid and its conducting properties. Fullerene and its applications.

UNIT-2 BASIC PRINCIPLES OF SPECTROSCOPIC METHODS.

2.1 The use of UV, Visible, IR, 1HNMR, for the determination of structure of simple organic compounds. Characteristics and classification of polymers.

2.2 Structures of the polymers: Natural and synthetic rubbers, Polyamides and polyester fibers, Polymethylmethacrylate, Polyacrylonitrile and Polystyrene.

2.3 A brief account of conducting polymers (polypyrrole and polythiophene) and their applications.

UNIT-3 STABILITY OF REACTION INTERMEDIATES

3.1 E.g. Carbanions, Carbocations and free radicals. Types of organic reactions, and mechanism of nucleophilic substitution reactions. Mechanism of following reactions.

3.2 1. Aldol condensation (ii) Cannizzaro reaction (iii) Beckmann rearrangement (iv) Hofmann rearrangement and (v) Diels-Alder reaction.

3.3 2. E-Z Nomenclature. Optical isomerism of organic compounds containing one chiral center. Examples of Optically active compounds without chirality. Conformations of n-butane.

UNIT-4 ORDER AND MOLECULARITY OF REACTIONS.

4.1 First and second order reactions. Energy of activation.

4.2 Phase Rule, its application to one component system (water).

4.3 Equilibrium potential, electrochemical cells (galvanic and concentration cells),

4.4 Electrochemical theory of corrosion and protection of corrosion.

UNIT-5 CLASSIFICATION OF FUELS, COAL, BIOMASS AND BIOGAS.

5.1 Determination of gross and net calorific values using Bomb Calorimeter.

5.2 First law of thermodynamics and its mathematical statement, heat, energy and work; Heat content or Enthalpy of a system;

5.3 Thermochemistry: Hess's law of constant heat summation, Heat of reaction, Heat of combustion, Heat of neutralization, Heat of formation, Heat of fusion, Heat of vaporization,

5.4 Heat of sublimation, Heat of solution and Heat of dilution (only definition and explanation).

5.5 Hardness of water, softening of water by Lime-Soda process, Zeolites and ionexchange resins process and Reverse Osmosis. Treatment of boiler feed water by Calgon process.

Reference books:

1. Engineering Chemistry by Jain and Iain. 2. Engineering Chemistry by R. K. Agrawal