CY-313 POLYMER SCIENCE

Monomers, polymers, nomenclature; molecular forces and chemical bonding (primary and secondary atomic and molecular bonding) in polymers; different functional groups and their properties; classification of polymers (thermoplastics and thermosets); polymer structure: skeletal structure, copolymers, tacticity, and geometrical isomerism; molar mass and its distribution.

Principles of polymerization: Classification of polymerization reaction, step-growth polymerization; kinetics, chain length regulation, Carothers equation.

Addition / chain growth polymerization, mechanism and kinetics of chain growth polymerization, ionic polymerization, chain transfer, inhibition and retardation, control of molecular weight.

Co polymerization: Principle and Industrial practice

Polymerization techniques: bulk polymerization, solution polymerization, suspension polymerization, and emulsion polymerization. Thermoplastics, thermosets, and elastomers.

Properties and applications: Commodity thermoplastics: polyolefins, vinyl polymers, polymethyl methacrylate.

Engineering thermoplastics – acrylonitrile butadiene styrene ABS, polyamides, polycarbonate, thermoplastic polyester (PET), acetal, modified poly (phenylene-oxide), polysulfones, poly (phenylene-sulphide), fluoropolymers. Engineering thermosets: phenol formaldehyde, epoxies, formaldehyde resins, unsaturated polyesters, and polyurethane.

Elastomer: natural rubber, styrene butadiene rubber (SBR), nitrile rubber, polycloroprene, ethylene propylene diene monomer (EPDM), silicone, thermoplastic elastomer. Compounding, vulcanization, and role of different additives in elastomer.

Specialty Polymers: Polyimides, Ionic polymers, polyaryetherketones, specialty polyolefins, inorganic polymers, liquid crystal polymers, conductive polymers, high performance fibers, and dendritic polymers.

Polymer additives: Fillers and reinforcements, plasticizers, and other important additives.