

# AMPTE06 POLYMER CHEMISTRY

## UNIT-1 BASIC CONCEPTS OF MACROMOLECULES

- 1.1 Monomers- Functionality- Classification and nomenclature of polymers.
- 1.2 Types of polymers- plastics and rubbers
- 1.3 Step growth polymerization- Mechanism
- 1.4 Kinetics- Bi-functional systems- Poly functional systems.

## UNIT-2 ADDITION POLYMERIZATION

- 2.1 Mechanism and kinetics of free radical- Cationic-Anionic Polymerisation- Initiator systems
- 2.2 Chain length and degree of Polymerisation- Control of molecular weight
- 2.3 Chain transfer- Inhibition Coordination polymerization
- 2.4 Mechanism- Kinetics- Ring opening polymerization- Diene polymerization
- 2.5 Advanced Polymerization Techniques
- 2.6 Atom Transfer Radical Polymerization (ATRP), Group Transfer Polymerization (GTP), Reversible Addition Fragmentation Termination (RAFT).

## UNIT-3 COPOLYMERIZATION

- 3.1 Mechanism and Kinetics of free radical - Ionic copolymerization.
- 3.2 Types of copolymers- Copolymer composition
- 3.3 Determination of Monomer reactivity ratios.
- 3.4 Polymerization techniques- Bulk polymerization- Solution polymerization-
- 3.5 Suspension polymerization - Emulsion polymerization - Interfacial condensation.

## UNIT-4 MOLECULAR WEIGHT

- 4.1 Molecular weight averages- Molecular weight distribution- Unidispersity, polydispersity, degree of polymerization
- 4.2 Molecular weight determination- Basic concepts of end group analysis, colligative properties, osmometry, light scattering, and gel permeation chromatography
- 4.3 Viscosity of polymers solutions, size of the polymer molecules.

## UNIT-5 CHEMICAL REACTIONS OF POLYMERS

- 5.1 Hydrolysis- Acidolysis- Aminolysis- Hydrogenation
- 5.2 Addition and substitution reactions–crosslinking reactions.
- 5.3 Polymer degradation- Mechanical degradation- Mechano-chemical degradation
- 5.4 Oxidative degradation Hydrolytic degradation– Photo degradation.

### References Books:

1. JM.G. Cowie, “Polymers: Chemistry and Physics of Modern Materials”, Blackie, and London, 1991.
2. R.J. Young and P.Lovell, “Introduction to Polymers”, 2nd Ed., Chapman & Hall, 1991.
3. Premamoy Ghosh, “Polymer Science and Technology of Plastics and Rubbers”, Tata McGraw- Hill, New Delhi, 1990