A02

U.G. 5th Semester Examination-2024

CHEMISTRY

[HONOURS]

Discipline Specific Elective (DSE)

Course Code : CHEM-H-DSE-T-1A

(Polymer Chemistry)

Full Marks : 40 Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **five** questions: $2\times5=10$

a) Draw the structure of the polymers synthesized from

i) $CH_2=CH-CO_2H$ and

ii) $HO-(CH_2)_5-COOH$

b) Give an example of a co-polymer and a block-polymer.

c) Define η_J, η_{SP} and LVN.

d) Why hydrogen halides are not suitable initiators for ionic polymerization?

e) What is Zimm Plot?

f) What is living polymerization?

g) Write the Hildebrand equation and explain the terms.

h) What is Carothel's equation?

i) What are polyurethanes?

j) Define Fluoro polymers.

k) State lower and upper critical solution temperatures of polymer solution.

2. Answer any **two** questions: 5×2=10

a) What is polydispersity index? If 5 g of a monodisperse polystyrene sample of molecular weight 10,000 g $mole^{-1}$ is mixed with 15 g of another monodisperse polystyrene sample of molecular weight 20,000 g $mole^{-1}$, calculate the polydispersity of the polymer mixture. 1+4

b) Compare the essential features of the step-growth and chain-growth polymerization processes. 5

c) Define glass transition temperature (T_g) and state how to determine T_g. 5

d) Compare the natures of different types of initiator and co-initiators used for ionic polymerization. 5

3. Answer any **two** questions: 10×2=20

a) What are the absolute and relative methods for determining the molecular weight of polymers? What is osmosis? Describe how M_n can be determined from osmotic pressure of a polymer solution. 2+2+6

b) What is the difference between chain-growth and condensation polymerization? Explain why the DP_n value for step-growth polymerization changes slowly? Derive the kinetic rate expressions and DP_n for the catalyzed condensation reaction for a polyamide. 2+2+6

c) What are radical initiators? How they are generated in situ? Describe the mechanism and kinetics of free radical polymerization of styrene. 2+2+6

d) Write notes on conducting polymers such as polyaniline, poly p-phenylene sulphide, polypyrrole, polythiophene. 10
