বিদ্যাসাগর বিশ্ববিদ্যালয়
VIDYASAGAR UNIVERSITY

Question Paper

B.Sc. Honours Examinations 2021
(Under CBCS Pattern)
Semester - VI
Subject: CHEMISTRY
Paper: DSE 4-T & P
(Polymer Chemistry)

Full Marks : 60
Time : 3 Hours

Candiates are required to give their answer in their own words as far as practicable.
The figures in the margin indicate full marks.

Part - A

(THEORY 40)

Answer any ***two*** of the following questions : 15×2=30

1. (a) Explain the terms "Number average molecular weight" and "Size average molecular weight" of polymers. Briefly write down the method of determination of molecular weight of a polymer by the end group analysis. 2 × 2 + 3 = 7

   (b) What do you mean by random and block copolymer ? Write down two major differences between thermoplastic and thermosetting polymers? What do you mean by pendant groups? How do these affect the physical properties of polymers? 3 + 2 + 1 + 2 = 8

2. (a) Comment on the term "Cohesive energy density". Explain how structural irregularity is related to crystallinity of polymers? Write down two major differences between addition polymerisation and condensation polymerisation. 2 + 3 + 2 = 7

(b) What do you mean by glass transition temperature (Tg) of polymers and mention its significance? Plastics fall between the structural extremes represented by fibres and elastomers — explain. How entropy is related to chain flexibility. (2+2) + 2 + 2 = 8

3. (a) Write down the method of preparation and one application of Teflon and Novolac. What is meant by PDI ? 3 × 2 + 1 = 7

(b) Mention the criteria for polymer solubility. Write down the Flory-Huggins theory. Write down the structure of Zeigler Nata Catalyst. 4 + 3 + 1 = 8

4. (a) Mention the monomers used in each of the polymers; fluoro polymers, polyamides and related polymers, bakelite and polycarbonates. High pressure polythylene is less crystalline than low pressure polythylene — Explain. What are lamellae and spherulite ?

2 + 3 + 2 = 7

(b) Write a short note on silicon rubber compounds. What is latent functionality of polymers? Define lower and upper critical solution temperatures of polymers. 3 + 1 + (2 + 2) = 8

Part - B

Answer any ***one*** of the following questions : 10×1=10

5. (a) Write the role of Zeigler Natta catalyst for the formation of HDPE. Calculate the degree of polymerization of Nylon 66 having a number average molecular weight of 30,000. Write down the significance of molecular weight distribution of a polymer. Mention one limitation of molecular weight determination of polymers by end group analysis. 3 + 3 + 3 + 1 = 10

6. (a) Mention two differences between crystalline and amorphous polymers. Characterize crystallization kinetics using nucleation and growth kinetics. Write down WLF equation expressing the relationship between viscosity and absolute temperature. How can polymers be made to conduct electricity ? 2 + 3 + 3 + 2 = 10

Group - B

PRACTICAL (Marks : 20)

Answer any ***one*** of the followings : $20 \times 1 = 20$

1. (a) Explain the procedure of free radical solution polymerization of styrene and Acrylic acid.

   (b) How do you prepare nylon 66 in the laboratory? $10 + 10 = 20$

2. (a) Mention the method of precipitation polymerization of acrylonitrile.

   (b) Describe the procedure of determination of the molecular weight of poly (vinyl alcohol) using viscometry $10 + 10 = 20$

3. (a) How will you prepare urea-formaldehyde resin in the laboratory?

   (b) Discuss the method of preparation of polyacrylamide and its electrophoresis.

$10 + 10 = 20$