

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI – 86
(For candidates admitted from the academic year 2004 –05 & thereafter)

SUBJECT CODE : CH/PS/PM44

M.Sc. DEGREE EXAMINATION APRIL 2007
BRANCH IV – CHEMISTRY
FOURTH SEMESTER

REG.NO

COURSE : SPECIALISATION - CORE

PAPER : POLYMER MATERIALS AND APPLICATIONS

TIME : 30 MINS

MAX. MARKS :20

SECTION – A

ANSWER ALL QUESTIONS:

(20 X 1 =20)

I Choose the correct answer:

1. Hardening of plastics often involves cross-linking. This process is called
a) curing b) vulcanization c) compounding d) plasticization
2. Plasticizers do not affect
a) Modulus b) Tg c) Tm d) Dielectric loss
3. Wool and silk are natural polymers. They are basically
a) proteins b) Polysaccharides c) Polyesters d) Polyethers
4. Which of the following thermal methods can be used to determine Tg
a) TGA b) DTA c) TMA d) DSC
5. Which of the following polymer are often highly crystalline
a) Fiber b) Plastics c) Elastomers d) Surface coating materials
6. Which of the following additive is added during polymerization
a) Plasticizers b) Antioxidant c) thermal stabilizers d) chain transfer agent
7. The mixing of two polymers yields
a) Block copolymer b) Alternate copolymer
c) Polyblend d) None of the above
8. Which of the following is a non-polar polymer
a) Polyacrylic acid b) Polyacrylonitrile
c) Polypropylene d) Polyvinyl alcohol
9. The most inert polymer, used in nonstick kitchen-ware is
a) Teflon b) PMMA c) PVC d) PVA
10. Which is considered as a first synthetic polymer
a) Bakelite b) Teflon c) Nylon d) Neoprene

II Fill in the blanks:

11. _____ polymers can be obtained by polymerizing a monomer in the presence of polymer.
12. Fluid, which exhibits laminar flow, can be called as _____.
13. The OH stretching vibration can be seen in the IR spectrum of PVA at _____.
14. Water soluble charged polymers are called _____.
15. Segmented polyurethane fibers are commonly known as _____.

III Answer in one or two sentences:

16. What is Cold process in SBR?
17. Explain the difference between strength and flexural strength.
18. Secondary cellulose acetate is more widely used than cellulose acetate, Why ?
19. Why does the solution polymerization often result to low mol.wt.polymer?
20. Thermal decomposition of polymer of formaldehyde is called unzipping. Why?

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TIME : 2 hrs & 30 mins

MAX. MARKS: 80

SECTION – B

ANSWER ANY FIVE QUESTIONS:

(5 X 8 =40)

1. Plasticizers make the polymers flexible and rubbery, Why ?
2. Explain the three types of thermal degradation
 - (i) Non-chain scission
 - (ii) Random-chain scission
 - (iii) Depropagation
3. Draw the structures of 1,4-cis polyisoprene and 1,4-trans polyisoprene.
4. What is mold flow?
5. Polystyrene has the density of 1.05 and repeating unit mass of 104. Write the repeating unit structure and calculate the solubility parameter (δ) [CH=28, CH₂=133, phenyl=735 are the molar attractions]
6. Explain the difference between thermal stability and thermo oxidative stability?
7. Interpenetrating polymer networks (IPNs) form polymer mixtures. Why?

SECTION – C

ANSWER ANY TWO QUESTIONS:

(2 X 20 =40)

8. Write the definitions of the following terms and explain with suitable examples and polymer structures
 - (a) Depropagation
 - (b) Ionomer
 - (c) Non-chain scission
 - (d) Vulcanization
9. Calculate Mn, Mw and Mz for polydispersity of a polymer composed of the following mixture of fraction (mass% and molecular weight of each fraction are given):

| | | | |
|-------------|--------|----------|----------|
| Mass% | 20 | 30 | 50 |
| Mol. Weight | 50,000 | 1,00,000 | 2,00,000 |
10.
 - a) Write the advantages and disadvantages of the water based adhesives. Explain with suitable examples.
 - b) Write the biomedical application of Polyurethanes and Polysilicones.
