

SEAT No. _____

No. of Printed Pages: 02

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SARDAR PATEL UNIVERSITY

M.Sc. 2nd Semester (Surface Coating Technology) (CBCS) Examination

Tuesday, April 10th, 2018

Time: 10:00 am to 01:00 pm

Course No.: PS02CSCT21

Subject: Polymer Physics & Properties of Polymer

Total Marks: 70

- N.B. (1) Marks allotted to the question are on its RHS
(2) Illustrate your answers wherever necessary with the help of neat sketches & chemical

Q.1. Choose the **Correct Answer** from the followings:

- 1.1 Which of the following is the strongest force? 1
a) London dispersion b) Dipole interaction c) H-bonding d) Covalent bond
- 1.2 Due to cross-linking in polymer, T_g of the polymer will _____? 1
a) Increase b) Decrease c) No change d) Increase and then decrease
- 1.3 In hard rubber, which type of cross-linking is observed? 1
a) Labile b) Light c) High d) None
- 1.4 Which of the following will have higher T_g? 1
a) Polyethylene b) Polystyrene c) Polyvinylcarbazole d) Polypropylene
- 1.5 Which of the Brownian movement is activated above T_f in case of polymer? 1
a) IBM b) EBM c) Both d) None
- 1.6 Chain end degradation is also known as _____. 1
a) Depolymerization b) Unzipping c) Both a & b d) None
- 1.7 Crystalline solid can exist in _____ state. 1
a) Solid b) Liquid c) Glassy solid d) Both b & c
- 1.8 Which of the following is more thermally stable? 1
a) Polyethylene b) PTFE c) Polyphynelene d) Polytetrafluorophenylene

Q.2) Answer the following short questions (any seven) 14

- a) List out the different types of monomers class used for addition polymerization.
- b) The T_g of polymer increases with increasing branching. Explain citing suitable example.
- c) Crystallinity depends on geometrical structure of polymer. Explain giving suitable example.
- d) How photostabilizer prevent the photodegradation of polymer. Explain giving suitable example.
- e) What are spherulites? How they affect property of polymer?
- f) Define true solvent and non-solvent.
- g) Discuss different types of co-polymers.
- h) Describe the equation to find out T_g of homopolymer and co-polymer.
- i) Define cohesive energy density.

(P.T.O.)

- Q.3 a. i) Increase in length of side chain increases T_g . Justify giving suitable example. 6
ii) Describe the classification of polymer on the basis of chemical structure.
b. Describe the following polymers in isotactic, syndiotactic and atactic forms. 6
i) polyvinyl alcohol ii) polymethylacrylate
And also describe cis, trans and vinyl structure for polybutadiene

OR

- Q.3 a. i) Explain dilatometry technique to find out T_g of polymer. 6
ii) Write a note on plasticizer.
b. Write a note on state of aggregates and state of phases in case of polymers. 6
Q.4 a. Explain how structural regularity of polymer affects crystallinity. 6
b. i) Write a note on degree of crystallinity. 6
ii) Define quenching and explain why 100% crystalline polymer formation is difficult.

OR

- Q.4 a. Describe the factors affecting T_g . 6
b. Describe the T_g curves for amorphous, crystalline and partly crystalline polymers. 6
Q.5 a. i) Discuss heavy cross-linking and its effect on polymer properties. 6
ii) What will be the effect on processability, mechanical properties and chemical properties due to cross-linking?
b. Write a note on permanent dipoles in polymers and how it affects different 6
properties of polymers.

OR

- Q.5 a. Discuss the different types of forces that are encountered in polymers and write a 6
note on London Dispersion Force.
b. Write a note on oxidative degradation and antioxidant used to prevent 6
degradation.
Q.6 a. Describe the mechanism of degradation of PVC and how it can be minimized. 6
b. Write a note on degradation and explain unzipping and random degradation. 6
Also list out factors affecting degradation.

OR

- Q.6 a. Describe degradation by mechanical force and ultrasonic waves. 6
b. i) Discuss ozone oxidation in polymers taking suitable example. 6
ii) Write a note on photodegradation.

X