

SEAT No. _____

SARDAR PATEL UNIVERSITY

[59]

M.Sc. 2nd Semester (Surface Coating Technology) (CBCS) ExaminationTuesday, 11th April, 2017

PS02CSCT01: Polymer Physics & Properties of Polymer

Time: 10:00 am to 1:00 pm

Marks: 70

N.B. 1) Marks allotted to the question are on its RHS

2) Illustrate your answer whereas necessary with the help of neat sketches and chemical equation

Q.1 Choose the correct Answer from the Followings:

1. Which one of the following statements is true? [01]

a) Gutta-percha exhibits rod-like structure and more crystalline	b) Gutta-percha exhibits elastic like structure and more crystalline
c) Gutta-percha exhibits rod like structure and more amorphous	d) Gutta-percha exhibits elastic like structure and more amorphous
2. Which one of the following statements is true? [01]

a) A London dispersion force exists in Low Polar polymers	b) A London dispersion force exists in Highly Polar polymers
c) A London dispersion force exists in Medium Polar polymers	d) A London dispersion force exists in Non-Polar polymers
3. When a polar molecule lies adjacent to a non-polar molecule, the polarity in the polar molecule tends to induce some electron displacement in the adjacent non polar molecule creating a weak _____ forces between the two. [01]

a) London dispersion	b) Hydrogen bond
c) Permanent dipoles	d) Induced dipoles
4. In coating application, polar groups in the polymer tend to orient toward a metal substrate and thus produce optimum _____. [01]

a) Permeability	b) Viscosity
c) Adhesion	d) Friction
5. Which one of the following statements is not false? [01]

a) Tg of Polyethylene is +150°C	b) Tg of Polyethylene is -125°C
c) Tg of Polyethylene is +125°C	d) Tg of Polyethylene is -69°C
6. The absence of Long range order and owing to decrease in the energy of thermal motion, the molecules lose their mobility and the substance becomes physically solid called as _____. [01]

a) Super cooled Liquid	b) Super-hot liquid
c) Hydrodynamic volume	d) Pore volume
7. Which one of the following statements is not false? [01]

a) A polymer capable of exhibiting long-range order is called as Amorphous State.	b) A polymer capable of exhibiting long-range order is called as Crystalline State.
c) A polymer capable of exhibiting long-range order is called as Gas State.	d) A polymer capable of exhibiting long-range order is called as Liquid State.
8. Which one of the following statements is true? [01]

a) A crystalline polymer is made to exist in a glassy state by rapidly cooling its melt to a very low temperature without allowing enough time to orient and form crystallites called as Quenching	b) A crystalline polymer is made to exist in a glassy state by rapidly heating without allowing enough time to orient and form crystallites called as Quenching
c) A amorphous polymer is made to exist in a rubbery state by rapidly	d) A crystalline polymer is made to exist in a rubbery state by rapidly

cooling its melt to a very low temperature without allowing enough time to orient and form crystallites called as Quenching

cooling its melt to a very low temperature without allowing enough time to orient and form crystallites called as Quenching

Q.2 Answer any Seven of the Followings:

[14]

- a. Two polymer samples can have the same chemical structure and almost similar molecular weight distribution but may have different properties.
- b. What is Grafting? Explain by giving suitable example.
- c. Explain Viscoelastic Deformation.
- d. Normally the polymer solution possesses high viscosity.
- e. Write down the characteristics properties of a Good Plasticizer with example.
- f. Give Classification of Adhesives by polarity giving suitable examples.
- g. An ordinary rubber ball if cooled below -70°C becomes so hard and brittle that it will break into pieces like a glass ball falling on a hard surface!
- h. Permeability is an important property which is affected by crystallinity.
- i. Aromatic groups in a polymer backbone increase the thermal stability.

Q.3 a. Discuss in brief about co-polymerization.

[06]

b. Classify and explain the polymers on the basis of Chemical and Geometrical structures.

[06]

OR

b. What are Stereo-regular polymers? Draw structural formula indicating the stereo regular chain configuration in

[06]

(1) Atactic Polystyrene

(2) Isotactic Polystyrene

(3) Cis, 1-4 Polyisoprene

(4) Trans, 1-4 Polybutadiene.

Q.4 a. What are the factors affecting Glass transition temperature of a Polymer? Explain by giving the examples.

[06]

b. What is the importance of Tg? Calculate Tg of a copolymer with 30% Styrene, 40% MMA and 30 % Butyl acrylate. (Tg of Styrene = 100°C , MMA = 103°C , BA = -54°C)

[06]

OR

b. Explain the concept of various transition states associated with low molecular weight compounds and polymeric materials.

[06]

Q.5 a. State various intermolecular forces and outline the effects of permanent dipoles on properties of polymers.

[06]

b. Explain the process of polymer dissolution in detail.

[06]

OR

b. What is H-bonding in polymer? Discuss the effect of Hydrogen bonding on the properties of polymers.

[06]

Q.6 a. What is Thermal Degradation? Discuss in detail about factors affecting C-C bond stability.

[06]

b. Write a note on Antioxidants and Photo stabilizers used in Polymers.

[06]

OR

b. Classification of Viscometer on the basis of their Rheological State

[06]

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