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SARDAR PATEL UNIVERSITY
M.Sc. 2nd Semester (Surface Coating Technology) (CBCS) Examination
Saturday, April 18th, 2015
Time: 10:30 am to 1:30 pm
Course No.: PS02CSCT01
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 equations

- Q.1 Choose the correct answer from the followings:
- Q.1.1 If in the polymer molecule the functional group (R) located alternate above and below of the plane of the carbon-carbon chain than the polymer is said to be _____ 1
 (a) Heterotactic (b) Isotactic (c) Syndiotactic (d) None of these.
- Q.1.2 The temperature at which the amorphous polymer passes from the rubbery state to the liquid state is called its _____ 1
 (a) Melting Point (b) Flow Point (c) Freezing Point (d) Glass Transition Temperature.
- Q.1.3 Permeability is another property affected by _____ 1
 (a) Crystallinity (b) H-Bond (c) Induced Dipole (d) London dispersion force
- Q.1.4 When a polar molecules 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. 1
 (a) London dispersion (b) Hydrogen bond (c) Permanent dipoles (d) Induced diploes
- Q.1.5 The Calorimetric method is a technique used to measure the _____ 1
 of the polymeric sample as a function of _____.
 (a) Dimensional changes, Time (b) Heat Capacity, Time.
 (c) Dimensional changes, Temperature (d) Heat Capacity, Temperature
- Q.1.6 Many polymers are protected against oxidative degradation by incorporating chemical compounds called _____. 1
 (a) Stabilizer (b) Antioxidants (c) Driers (d) None of these.
- Q.1.7 When the $T\Delta S$ value decreases and becomes equal to $+\Delta H$. ΔF becomes zero and at this stage an equilibrium is established between entropy gain and enthalpy gain and the number of solute molecules going into solution equals those precipitating out. The solution at this point is known as _____. 1
 (a) Saturated (b) Melting (c) Unsaturated (d) None of these.
- Q.1.8 The apparent volume occupied by the expanded coil along with the bound solvent is referred to as the _____. 1
 (a) Hydrodynamic Volume (b) Free volume (c) Unsolvated coil (d) None of these.
- Q.2 Answer **any Seven** of the following short questions: 14
1. Explain Viscoelastic Deformation.
 2. Define Configuration and Conformation.
 3. 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 !.
 4. T_g value of Polyvinyl carbazole (150°C) and Polyethylene terephthalate (69°C) is high
 5. A polymer shows all features of a Glassy brittle material or elastic rubber or

- viscous liquid depending on temperature scale measurements.
6. Give Classification of Adhesives by polarity giving suitable examples.
 7. Justify the statement "All substituent's do not always reduce the thermal stability of the polymeric system".
 8. Permeability is an important property which is affected by crystallinity.
 9. Aromatic groups in a polymer backbone increase the thermal stability.
- Q.3 a Write a note on Plasticizer used in polymer. 6
- Q.3 b Discuss in details about the factors affecting Crystallinity in Polymers. 6
- Or**
- Q.3 b What is H-bonding in polymer? Discuss the effect of Hydrogen bonding on the properties of polymers. 6
- Q.4 a Give the importance of Tg on polymers and explain the concept of various transition states associated with low molecular weight compounds and polymeric materials. 6
- Q.4 b What are Stereo-regular polymers? Draw structural formula indicating the stereo regular chain configuration in 6
- (1) Atactic Polystyrene
 - (2) Isotactic Polystyrene
 - (3) Cis, 1-4 Polyisoprene
 - (4) Trans, 1-4 Polybutadiene.
- Or**
- Q.4 b What are the factors affecting Glass transition temperature of a Polymer? Discuss in brief about co-polymerization. 6
- Q.5 a Explain the process of polymer dissolution in detail. 6
- Q.5 b Explain thermodynamic principles governing the dissolution of low and high molecular weight substances. 6
- Or**
- Q.5 b Write a note on Effect of Molecular weight on Solubility: 6
- Q.6 a Write a note on Polymer Degradation and its types. 6
- b Write a note on Thermal degradation of Polymers 6
- Or**
- Q.6 a Write a note on Antioxidants or Photo stabilizers used in Polymers. 6
- b Give Classification of Viscometer on the basis of their Rheological State 6
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