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SEAT No. _____

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SARDAR PATEL UNIVERSITY

B.Sc. VIth Semester Industrial Chemistry (Voc) (CBCS) Examination

Friday, 29th March 2019

Time: 10:00 am to 01:00 pm

Industrial Chemistry Vocational

Course No.: US06CICV03

Subject: Polymers Science

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 Answer the following Multiple Choice Questions. (All are compulsory)

- 1.1 Pick the odd one out polymer. (1)
(a) polyethylene (b) phenol formaldehyde (c) polyurethane (d) epoxy resin
- 1.2 If the substituent groups regularly alternate from one side of the plane to the other, the polymer is termed _____. (1)
(a) atactic (b) isotactic (c) syndiotactic (d) graft
- 1.3 The rate of polymerization of vinyl monomers can be reduced or almost completely stop by the addition of relative small amounts of certain molecules, called _____ and _____. (1)
(a) initiator and retarders (b) promoter and retarders
(c) inhibitor and retarders (d) promoter and initiator
- 1.4 Temperature boundary between _____ and _____ phase of polymer is denoted as T_g . (1)
(a) viscous and elastic (b) plastic and elastic
(c) viscous and plastic (d) fluidity and elastic
- 1.5 Give the relation between T_g and T_m for symmetrical polymer _____. (1)
(a) $T_g = 4/3 T_m$ (b) $T_g = 2/4 T_m$ (c) $T_g = 4/2 T_m$ (d) $T_g = 1/2 T_m$
- 1.6 The reaction between the _____ and _____ gives polyurethane polymer. (1)
(a) $---NCO + ---NH_2$ (b) $---OH + ---COOH$ (c) $---OH + ---OH$ (d) $---NCO + ---OH$
- 1.7 Dihydroxy diphenyl methane is also known as _____. (1)
(a) bisphenol A (b) bisphenol C (c) bisphenol E (d) bisphenol F
- 1.8 _____ is prepared from polycondensation of hexamethylene diamine and adipic acid. (1)
(a) polyether (b) nylon 6,6 (c) polyester (d) polyurethane
- 1.9 A possible sequence of repeat units A and B in a _____ copolymer might be ~A-A-A-A-A-A-A-B-B-B-B-B-B-A-A-A-A~ (1)
(a) graft (b) block (c) alternate (d) random
- 1.10 Polytetrafluoroethylene (PTFE) is a synthetic fluoropolymer of tetrafluoroethylene under the brand name of _____. (1)
(a) Synclon (b) Teflon (c) Fluon (d) All of these

Q.2 Answer the following short questions, Any Ten (20)

1. What is the difference between Atactic, isotactic and syndiotactic polymers?
2. Distinguish between thermosetting & thermoplastic polymer.
3. Why the molecular weights of polymer explain in terms of average value?
4. Difference between monodisperse and polydisperse polymers.
5. Enlist & express the method of average molecular weight.
6. What is glass transition temperature?
7. Explain the term crystallinity and degree of crystallinity.
8. Write the chemical reaction and its reaction condition for preparation of novolac

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and resole.

9. Give the preparation of isocyanate by phosgenation process.
10. What are the reactants of nylon 6 & nylon 6, 10? Give their reactions.
11. Write the structure for cis-1, 4 and trans-1, 4 polybutadiene.
12. Write the structure for SBR, ABS and SAN copolymer.

Q.3 a Explain the concept of Functionality and justify that functionality of monomer is not a constant. (5)

Q.3 b What is Tacticity? How are the polymers classified on the basis of their Tacticity? Give its examples. (5)

Or

Q.3 Explain in detail Emulsion polymerization and Suspension polymerization techniques along with its advantages and disadvantages. (10)

Q.4 a Explain how molecular weight of a polymer is calculated by number average method. (5)

Q.4 b Explain the relationship between glass transition temperature (T_g) and melting point (T_m). (5)

Or

Q.4 a Write a note on Molecular weight determination by Cryoscopy. (5)

Q.4 b Write a note on "Polymer End-Group Analysis: The Determination of Average Molecular Weight". (5)

Q.5 a Explain Methylolation and Condensation steps in synthesis of Phenol formaldehyde resin. (5)

Q.5 b Discuss in detail the manufacturing process of Melamine formaldehyde resin. (5)

Or

Q.5 a Write a note on Different grades of Epoxy resins. (5)

Q.5 b Describe an industrial process for manufacturing polyurethane along with its uses & properties. (5)

Q.6 a What are polyacetals? Explain the manufacturing of polyacetals. (5)

Q.6 b With suitable flow diagram, explain briefly how vinyl chloride monomer is prepared from acetylene. (5)

Or

Q.6 a Describe the commercial process of manufacturing Nylon 6,6. What are its important properties and application? (5)

Q.6 b With a neat sketch of flow diagram describe the high pressure process of manufacturing of polyethylene. (5)

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