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SEAT No._____

[29] *No. of Printed pages: [3]*

SARDAR PATEL UNIVERSITY

M. Sc. Chemistry, First semester Examination,
Course No.: PS01ECHE22, Polymer Chemistry-I,
Tuesday, 17th April 2018, 10:00 am to 01:00 pm

Total Marks: 70

Q. 1. Answer the highlighting the appropriate option. **[8]**

i. Solution polymerisation in CCl_4 often leads to
   (a) low mol.wt. polymers (b) high mol.wt. polymers
   (c) crosslinked polymers (d) no polymerization

ii. Gutta percha is
   (a) cis-1,4-polyisoprene (b) trans-1,4-polyisoprene
   (c) 1,2-polyisoprene (d) 1,3-polyisoprene

iii. The polystyrene has a number average molecular weight of 100,000 and a polydispersity of 5. What is the weight average molecular weight?
   (a) 20,000 (b) 1,00,000
   (c) 5,00,000 (d) 50,00,000

iv. Functionality of Phenol is _____ and____
   (a) 1, 2 (b) 1, 4 (c) 1, 5 (d) 1, 3

v. In GPC, the stationary & mobile phases are_____
   (a) Single liquid acts as both (b) Solid & liquid
   (c) Solid & Gas (d) Solid & Solid

vi. Camphor, di-butylphthalate, tri-cresyl phosphate are all example of
   (a) antioxidants (b) plasticizers
   (c) curing agents (d) None

vii. A copolymer can be obtained by
   (a) two identical monomers (b) two different polymers
   (c) two different monomers (d) two identical polymers

viii. The polymerization between monomer & metal catalyst is known as
   (a) Coordination (b) Insertion
   (c) Sandwich type (d) All of the above

[P.T.O]

Q. 2. Attempt any *Seven* **[14]**

1. Polymer chemistry is considered as a relatively new branch of chemistry. Why?
2. Define monomer and polymer with suitable example.
3. Differentiate: Thermoplastics and thermosetting plastics.
4. Why do we incorporate additives in polymers?
5. Explain glass transition temperature.
6. Give merits and demerits of bulk and solution polymerizations.
7. Define living polymers.
8. Explain that vapour pressure technique cannot accurately determine the molecular weight of very high molecular weight samples.
9. Find the osmotic pressure of a solution of 1.0gm Glucose ($C_6H_{12}O_6$) in 1000 cm^3 of water at 1 atmosphere and 25^0C. **[R= 82.06 cm^3. atm. $mole^{-1}$. deg^{-1}]**

Q. 3. [A]. Answer the followings.

1. Equal number of molecules of polymer with M_1=10,000gm/mole, M_2=1,00,000gm/mole are mixed. Calculate $\bar{M}_n$ and $\bar{M}_w$. **[3]**
2. Write differences between Ostwald viscometer and Ubbelohde viscometer. **[3]**

[B]. Show the structure of repeating units in: (a) Polyethylene, (b) Polystyrene, (c) Polychloroprene, (d) Polyethyleneterphthalate, (e) Polyacrylonitrile, (f) SBR **[6]**

OR

[B]. Elaborate GPC technique & explain use of GPC curves in determination of molecular weight distribution. **[6]**

Q. 4. [A]. Answer the following (Any Two) **[6]**

1. Give the salient features of anionic polymerization.
2. Explain importance of the Zeigler-Natta's catalyst?
3. Explain the role of chain transfer agents in free radical polymerization.

[B]. Write thermal decomposition reaction of Benzoyl Peroxide, *t*-Butyl Peroxide, Azobisisobutyronitrile (AIBN). **[6]**

OR

[B]. Give a brief account on bimetallic mechanism due to Natta for the synthesis of the stereo-regular polymers. **[6]**

Q. 5. [A]. **Answer the following (Any Two)** [6]

1. Show that the values of reactivity ratio of monomers govern the type and composition of copolymer.
2. Describe ring opening polymerization of ethylene oxide.
3. Define atom transfer polymerization giving suitable example.

[B]. Explain ring opening of polymerization and show the polymerization of caprolactum. [6]

OR

[B]. Define reactivity ratio and show how it changes with the type of structure of monomers. [6]

Q. 6. [A]. **Answer the following (Any Two)** [6]

1. Explain blowing agents
2. Give brief account of plasticizers
3. What are fillers?

[B]. Explain in details about aging in polymers, how to prevent aging? [6]

OR

[B]. Explain briefly mechanism of emulsion polymerization. [6]