

SEAT No. _____

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SARDAR PATEL UNIVERSITY
M. Sc. (Semester-III) Examination
Saturday, 2nd January 2021
10:00 AM to 12:00 NOON
Industrial Polymer Chemistry, PS03CIPC22
(Manufacture, Properties and Applications of Thermosets)

Total Marks : 70

- Q-1 (A) Answer the following: [8]
- Which of the following reactant is useful in order to provide heat resistance property to polyester resin?
 - Lactic acid
 - Nadic acid anhydride
 - Maleic acid
 - Chlorendic acid
 - The rate of polyester synthesis by polycondensation depends on the....
 - Free radical
 - Styrene
 - Chemical structure of the reactants and the stoichiometry of the reactants
 - Molecular weight of the resulting product
 - Which of the following catalyst is used in the preparation of Novolac resin when the resin is utilized for electrical applications?
 - Hydrochloric acid
 - Sulfuric acid
 - Oxalic acid
 - p-toluene sulfonic acid
 - Which of the following stabilizer is added in the preparation of 100% formalin?
 - Acetone
 - Methanol
 - Sorbitol
 - Naphthol
 - Which of the following monomer pairs polymerize to give epoxy resin?
 - Epichlorohydrin and bisphenol A
 - Bisphenol A and diphenyl carbonate
 - Bisphenol A and phosgene
 - None of these
 - What is the use of epoxy resin from a commercial point of view?
 - as strength adhesives
 - as cementing agents
 - adhesives
 - mattresses & foam

(P.T.O.)

[1]

7. _____ are effective catalysts for isocyanate self-addition reactions.
- tertiary amines
 - secondary amines
 - primary amines
 - all of the above
8. The most obvious difference between the polyester foam and polyether foam is the
- lower resilience of the polyether materials
 - higher resilience of the polyester materials
 - lower resilience of the polyester materials
 - higher resilience of the polyether materials

(B) All questions are compulsory and each carry equal marks.

[16]

- Bakelite is a cross-linked polymer and is used in making switches and plugs. True or False?
- Novolac is prepared when $P/F < 1$ and Bakelite is prepared when $P/F > 1$. True or False?
- Urea-formaldehyde resins are used as adhesives for plywood and furniture. True or False?
- Thermosets are soluble in suitable solvents. True or False?
- Unsaturated polyester resins contain styrene enabled curing at room temperature- the process is called _____.
- The principle application of melamine formaldehyde is a high-pressure MF faced decorative laminate sheets, known as _____ commercially.
- Thermoset materials are often strong, brittle and lack toughness. True or False?
- As the mass of cross-linking resin increases the ability to transfer the exothermicity generated heat away from the reactions not significantly affected. True or False?
- In epoxy resin, the most common type of phenol used for the industrial production of resin is _____.
- Reducing the excess epichlorohydrin and increasing the alkaline concentration gives products of _____.
- In the synthesis of epoxy resin, manipulation in the value of n may be carried out by taking _____ and _____.
- The curing process is a cross-linking process which is carried out either through _____ or _____.
- Rigid and Semi-rigid foams are used mostly in _____.
- In one short process of PU-foam, a structure modifier and paraffin oil which helps to _____ and also prevent it _____.
- The structure of polymethylne polyphenyl isocyanate is _____.
- The urea groups react faster than then urethane groups and hence, when both these types of groups are present in equal numbers, most of the links formed are the _____.

Q-2 Answer the following (ANY SEVEN) : [14]

- (i) List out the applications of alkyd resins.
- (ii) Why phthalic anhydride is most widely used for the preparation of alkyd resins?
- (iii) Write the sulphonation process of phenol.
- (iv) The industry commonly refers to Novolac resins are two stage products. Why?
- (v) List out the factors on which various grades of epoxy resins are dependent?
- (vi) Why stoichiometry quantity of epichlorohydrin is to be considered for the preparation of epoxy resin?
- (vii) Indicate the functionality of Resorcinol and Bisphenol-A.
- (viii) Why hexamethylene di-isocyanate and tetramethylene glycol were the most accepted reactants for the manufacture of PU-resins?
- (ix) In spite of superior properties of PU-thermoplastics cannot be used as light engineering material. Why?

Q-3 (a) What are alkyd resins? How they are prepared by monoglyceride process. [8]

OR

(b) What are unsaturated polyester resins? Explain the properties of unsaturated polyester resins with reference to their molecular structure. [8]

Q-4 (a) Write briefly on Phenolic Laminates. [8]

OR

(b) Describe the industrial process of melamine formaldehyde moulding compound. [8]

Q-5 (a) What are the raw materials needed for the manufacture of epoxy resins and how are they formed? [8]

OR

(b) Discuss briefly the various types of curing systems used with epoxide resins. [8]

Q-6 (a) List out the most commonly used di-isocyanates for the preparation of polyurethanes and give preparation of any three isocyanate in detail. [8]

OR

(b) Write briefly on rigid and semi-rigid polyurethane foams. [8]

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[3]

