

[120]

SARDAR PATEL UNIVERSITY**M.Sc. 4th Semester (Surface Coating Technology) (CBCS) Examination**Tuesday, April 10th, 2018

Time: 02:00 pm to 05:00 pm

Course No.: PS04CSCT01

Subject: Technology of Resins for Surface Coatings-II**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 The weight of resin containing 1 gm equivalent of Epoxide is referred to as _____. 1
 (a) Epoxy Equivalent Weight (b) Epoxy Value
 (c) Weight per phenoxy (d) Esterification Molar Mass
- Q.1.2 _____ can acts as a viscosity reducer and catalyst in Epoxy - polyamide cure system. 1
 (a) Triphenyl phosphite (b) Resorcinol (c) DMP-30 (d) Triethanol amine
- Q.1.3 _____ based liquid epoxy resins have much lower viscosities for same 'n' than their 1
 corresponding BPA resins.
 (a) BPF (b) Halogenated Epoxy resin (c) Epoxy Novalac resins (d) Phenoxy resins.
- Q.1.4 The relative reaction rates of species with isocyanates are: 1
 $1^\circ\text{amine} > 2^\circ\text{amine} > \text{_____} > \text{Water} > \text{Urea} > \text{Urethane} > \text{Carboxyl}$
 (a) Allophanate (b) Hydroxyl (c) Biuret (d) Ethers.
- Q.1.5 Reactive Polyamide resin is use as a curing agent for _____ resin. 1
 (a) Alkyd (b) Epoxy (c) Polyester (d) None of these.
- Q.1.6 $\text{R-NCO} + \text{H}_2\text{O} \text{-----} \rightarrow \text{_____} + \text{_____}$ 1
 (a) $\text{R-NH}_2 + \text{CO}_2$ (b) $\text{R-NH-CO-R} + \text{CO}_2$ (c) $\text{R-NH}_2 + \text{H}_2\text{O}$ (d) $\text{R-NH-CO-R} + \text{H}_2\text{O}$
- Q.1.7 Film formation of Nitrocellulose lacquer is done by _____. 1
 (a) Solvent Evaporation & Chemical curing (b) Solvent Evaporation
 (c) Solvent Evaporation & Oxidative Polymerization (d) Radiation Polymerization
- Q.1.8 _____ + 2C ----- \rightarrow Si + _____ 1
 (a) $\text{SiO}_2 + 2\text{CO}$ (b) $\text{SiO}_2 + \text{CO}_2$ (c) $\text{RSiCl} + \text{H}_2\text{O}$ (d) $\text{RSiCl} + 2\text{CO}$
- Q.2 Write the reasons for the following statements (any seven) : 14

- Write the structure of EDA, DETA, TETA, TEPA and PEHA
- Bisphenol F based liquid epoxy resin have much lower viscosities for the same value of 'n' than their corresponding Bisphenol A resins?
- Monofunctional acids are used in the manufacture of Polyamides.
- Factors affecting pot life in Epoxy-Polyamide system. Explain in brief
- Calculate the amount of Hardener required for 100 parts of epoxy resins by using following data.

Epoxy Resins: (1) EEW = 200 (2) EEW = 250 (3) EEW = 450

Polyamide Hardener: Amine Value (Solid resin) = 220 mg of KOH/gm,

% Solid (Supplied) = 70 % in Xylene.

- f. Aromatic Amines do not cure satisfactorily at room temperature and require acceleration.
- g. Write the role and types of Reactive Diluent currently find use in Epoxy resin.
- h. Parameters which influence curing reaction condition of Blocked Isocyanates.
- i. Calculate Theoretical % NCO content for TDI, HDI and IPDI respectively.

Q.3 a Write a note on Epoxy resin not based on Bisphenol A 6

Q.3 b Describe the various curing agent used in epoxy coating. Explain ambient temperature cure and heat cure epoxy paints. Discuss type and curing agent used in both condition giving example. 6

Or

Q.3 b Explain the three main chemical reaction, manufacture, properties and application of Epoxy ester resin in surface coatings. 6

Q.4 a Describe the formation of an Epoxide moiety from Epichlorohydrin and Bisphenol A 6

Q.4 b Write a note on 6

- a) Accelerators and solvent selection in Epoxy-Polyamide system.
- b) Phenoxy Resins.

Or

Q.4 b Write the schematic representation of the preparation of an Epoxy-Amine adduct (Aliphatic DETA) and also formulate an epoxy-amine adduct (Aliphatic-DETA Adduct) having 40% solids and Amine value=393 mg of KOH/gm by using Epoxy resin (EEW=475 mg of KOH/gm, Solid = 75%) 6

Q.5 a What are Polyurethane resins? Give their classification as per ASTM standard based on their curing mechanism. Explain ASTM number 5 in detail. 6

Q.5 b Write a note on *Desmodur* E type Pigmented one part Moisture cured Urethane (MCU). 6

Or

Q.5.b Write a note on Polyurethane Dispersions (PUD's) 6

Q.6 a Write a note on Types of isocyanates used in Polyurethane coating. 6

Q.6 b Write a brief note on Catalysts used in Polyurethane coatings? 6

Or

Q.6 b Write the characteristics of silicone resins. 6

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