

[129]

SEAT No. \_\_\_\_\_

No. of Printed pages: 2

## SARDAR PATEL UNIVERSITY

M.Sc. 4<sup>th</sup> Semester (Surface Coating Technology) (CBCS) Examination

Monday, 18<sup>th</sup> March 2019

Time: 02:00 pm to 5:00 pm

Course No.: PS04CSCT21

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

Choose the Correct Answer from the followings:

- Q.1. 1 Polyamide resin is widely used as a curing agent for epoxy resin, is formed by the condensation reaction between dimer acid and \_\_\_\_\_ which contains reactive primary and secondary amines in its molecules. (1)  
(a) Polymercaptan (b) Polyanhydride (c) Imidazoles (d) Polyamine
- Q.1. 2 \_\_\_\_\_ is used as a mono-functional epoxy reactive diluent. (1)  
(a) DMP 30 (b) Additive TI (c) Cardura E10 (d) Triglycidyl Isocyanurate.
- Q.1. 3 Epoxy resins have \_\_\_\_\_ alkali resistance but \_\_\_\_\_ exterior durability. (1)  
(a) Better, poor (b) Poor, poor (c) Better, Good (d) Poor, Better.
- Q.1. 4 Epoxy resins with EEW's in the region of 2500 to 3200 mg of KOH/gm are used for \_\_\_\_\_. (1)  
(a) Low temperature 2K system (b) Can Coating (c) Epoxy ester (d) Stoving Finish
- Q.1. 5 The drying rate of \_\_\_\_\_ coatings is dependent on the relative atmospheric humidity and the temperature. (1)  
(a) Blocked polyisocyanate (b) moisture cure urethane (c) 2K urethane (d) PUD's
- Q.1. 6 A \_\_\_\_\_ can be defined as an isocyanate reaction product which is stable at room temperature but dissociates to regenerate isocyanate functionality under the influence of heat. (1)  
(a) Blocked Polyisocyanate (b) moisture cure urethane (c) 2K urethane (d) PUD's
- Q.1. 7 Additive OF is used to eliminate the \_\_\_\_\_ in 2K- polyurethane systems by chemical reaction. (1)  
(a) Impurities (b) Solvent (c) Moisture (d) Gas
- Q.1. 8 \_\_\_\_\_ + 2C -----→ Si + \_\_\_\_\_ (1)  
(a) SiO<sub>2</sub> + 2 CO (b) SiO<sub>2</sub> + CO<sub>2</sub> (c) RSiCl + H<sub>2</sub>O (d) RSiCl + 2 CO
- Q.2 Attempt any Seven Questions (14)
- (a) Bisphenol F based liquid epoxy resin have much lower viscosities for the same value of 'n' than their corresponding Bisphenol A resins?
- (b) Write the structure of EDA, DETA, TETA, TEPA and PEHA
- (c) Define : Pot Life and the Epoxy Equivalent Weight
- (d) Write the role and types of Reactive Diluent currently find use in Epoxy resin.
- (e) What is the difference between Polyurethane and Polyurea?
- (f) Explain the effect of NCO/OH ratio when it is < 1 and >1.
- (g) For what reason Additive TI is used for? Write its structural formulae.
- (h) For what reason diisocyanates are transformed into Oligomers?
- (i) Calculate Theoretical % NCO content for TDI, HDI and IPDI respectively.

- Q.3 a Write a note on (6)  
a) Accelerators and solvent selection in Epoxy-Polyamide system.  
b) Phenoxo Resins.

- Q.3 b Write reaction of Epoxy amine Adduct and also Formulate an epoxy-amine adduct (Aliphatic 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)

OR

- Q.3 a Describe the formation of an Epoxide moiety from Epichlorohydrin and Bisphenol A (6)

- Q.3 b Calculate (6)

1. The EEW of Epoxy resin blend

2. phr of curing agent needed to cure 100 parts of the epoxy resin blend.

For 90 parts of epoxy resin (EEW=198) which is blended with 10 parts of reactive diluent (EEW=180) to reduce the viscosity. This epoxy resin blend will be reacted with curing agent (AHEW = 93).

- Q.4 a Describe the various curing agent used in epoxy coatings. (6)

- Q.4 b Write a note on Epoxy Acrylates-UV & EB Radiation curable oligomer (6)

OR

- Q.4 a Describe the chemical reactions and method for preparation of Polyamide resin based upon dimerised fatty acid and their uses. (6)

- Q.4 b Write a note on Epoxy Acid esters with no Acrylic Functionality. (6)

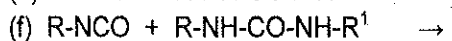
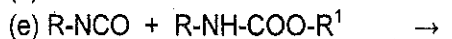
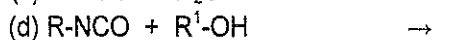
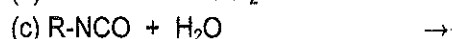
- Q.5 a Classify Polyurethane according to ASTM D 16. Explain Type 1 classification in detail. (6)

- Q.5 b Write the structure and formulation for Aromatic polyisocyanate (Desmodur L 75 % NCO Content =  $13.5 \pm 0.5$ ) synthesis from 1 mole of toluene diisocyanate (TDI) and 3 mole of trimethylol propane (TMP). (6)

OR

- Q.5 b Explain Type 2 or Type 3 classification of Polyurethane in detail. (6)

- Q.6 a Complete the following chemical reaction: (6)



- Q.6 b Write a note on Silicone based PUD's. (6)

OR

- Q.6 b Explain the three step synthesis of Silicone from Quartz (6)