SEAT No._____

No of printed pages: 2

[1307]

SARDAR PATEL UNIVERSITY

M.Sc. 4th Semester (Surface Coating Technology) (CBCS) Examination

Tuesday, 11h April, 2017

PS04CSCT01: Technology of Resins for Surface Coatings - II

Time: 02:00 pm to 5:00 pm **Marks: 70**

N.B. 1) Marks allotted to the question are on its RHS

2) Illustrate your answer whereas necessary with the help of heat sketches and chemical equation

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Q.1 Choose the correct Answer from the Followings:

1. Which one of the following statements is true? [01]
   a) Film formation of Nitrocellulose lacquer occurs by solvent evaporation and Chemical Curing
   b) Film formation of Nitrocellulose lacquer occurs by solvent evaporation and Oxidative Polymerization
   c) Film formation of Nitrocellulose lacquer occurs by Solvent Evaporation
   d) Film formation of Nitrocellulose lacquer occurs by solvent evaporation and UR Radiation.
2. Which one of the following statements is true? [01]
   a) Dimer Fatty Acid based Non-Reactive Polyamide resin is use as a curing agent for epoxy resin.
   b) Saturated Acid based Reactive Polyamide resin is use as a curing agent for Polyester resin.
   c) Mineral Acid based Reactive Polyamide resin is use as a curing agent for epoxy resin.
   d) Dimer Fatty Acid based Reactive Polyamide resin is use as a curing agent for epoxy resin.
3. Which one of the following statements is not false? [01]
   a) Chlorinated rubber is a chemically inert material with poor film-forming properties. It is flammable, toxic and consists of white powder.
   b) Chlorinated rubber is a reactive material which is highly flammable, toxic and consists of white powder.
   c) Chlorinated rubber is a thermally stable material with excellent film-forming properties. It is non-flammable, nontoxic and consists of white powder.
   d) Chlorinated rubber is a chemically inert material with excellent film-forming properties. It is non-flammable, nontoxic and consists of white powder.
4. Which of the generic coating types listed below is recommended for service in sea water immersion? [01]
   a) Epoxy polyamide
   b) Epoxy ester
   c) Silicone alkyd
   d) Epoxy Melamine
5. Epoxy resins have _____ alkali resistance but _____ exterior durability. [01]
   a) Better, Poor
   b) Poor, Poor
   c) Better, Good
   d) Poor, Better
6. Solvents containing a labile hydrogen i.e _____ should be avoided in PU coatings. [01]
   a) Ketone
   b) Alcohols
   c) Aliphatic Hydrocarbon
   d) Aromatic Hydrocarbon
7. 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. [01]
   a) Blocked Polyisocynate
   b) moisture cure urethane
   c) 2K urethane
   d) PUD's

8. The relative reaction rates of species with isocyanates are: [01]
1°amine > 2° amine > _____ > Water > Urea > Urethane > Carboxyl
a) Allophanate b) Ethers
c) Biuret d) Hydroxyl

Q.2 Answer any Seven of the Followings: [14]

a. Discuss about Nitrocellulose polymers used for NC lacquers.
b. Why and for what reasons DMP-30 is used and write its structure
c. Write the role and types of Reactive Diluent currently find use in Epoxy resin.
d. Bisphenol F based liquid epoxy resin have much lower viscosities for the same value of 'n' than their corresponding Bisphenol A resins?
e. Factors affecting pot life in Epoxy-Polyamide system.
f. Parameters which influence curing reaction condition of Blocked Isocynates
g. Explain the effect of NCO/OH ratio when it is < 1 and >1
h. Write the chemical reaction to prepare Urethane Oil.
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. [06]

b. Describe the chemical reactions, method for preparation and formulation recipe for Reactive Polyamide resin based upon dimerised fatty acid and their uses. [06]

OR

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%) [06]

Q.4 a. Explain the formation of an Epoxide moiety from Epichlorohydrin and Bisphenol A. Explain the various grades of epoxy resins used in surface coating based on their molecular weight. [06]

b. Explain the three main chemical reaction, manufacture, properties and application of D4 type Epoxy ester resin in surface coatings. [06]

OR

b. Write a note on Epoxy Acid esters with no Acrylic Functionality. [06]

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. [06]

b. Write a note on one part Moisture Cured Urethane (MCU). [06]

OR

b. Write a note on Blocked Polyurethane. [06]

Q.6 a. List different types of diisocyanates and Polyisocyantes. For what reason diisocynates are transformed into Polyisocyantes. [06]

b. Write a note on Silicone based PUD's. [06]

OR

b. What are the Specification, Characteristics and Analytical methods used to test the quality of Isocyantes? [06]