

SARDAR PATEL UNIVERSITY

[59]

M.Sc. 2nd Semester (Surface Coating Technology) (CBCS) ExaminationTuesday, 11th April, 2017

PS02CSCT01: Polymer Physics & Properties of Polymer

Time: 10:00 am to 1:00 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 neat sketches and chemical equation

Q.1 Choose the correct Answer from the Followings:

1. Which one of the following statements is true? [01]
 - a) Gutta-percha exhibits rod-like structure and more crystalline
 - b) Gutta-percha exhibits elastic like structure and more crystalline
 - c) Gutta-percha exhibits rod like structure and more amorphous
 - d) Gutta-percha exhibits elastic like structure and more amorphous
2. Which one of the following statements is true? [01]
 - a) A London dispersion force exists in Low Polar polymers
 - b) A London dispersion force exists in Highly Polar polymers
 - c) A London dispersion force exists in Medium Polar polymers
 - d) A London dispersion force exists in Non-Polar polymers
3. When a polar molecule lies adjacent to a non-polar molecule, the polarity in the polar molecule tends to induce some electron displacement in the adjacent non polar molecule creating a weak _____ forces between the two. [01]
 - a) London dispersion
 - b) Hydrogen bond
 - c) Permanent dipoles
 - d) Induced dipoles
4. In coating application, polar groups in the polymer tend to orient toward a metal substrate and thus produce optimum _____. [01]
 - a) Permeability
 - b) Viscosity
 - c) Adhesion
 - d) Friction
5. Which one of the following statements is not false? [01]
 - a) Tg of Polyethylene is +150°C
 - b) Tg of Polyethylene is -125°C
 - c) Tg of Polyethylene is +125°C
 - d) Tg of Polyethylene is -69°C
6. The absence of Long range order and owing to decrease in the energy of thermal motion, the molecules lose their mobility and the substance becomes physically solid called as _____. [01]
 - a) Super cooled Liquid
 - b) Super-hot liquid
 - c) Hydrodynamic volume
 - d) Pore volume
7. Which one of the following statements is not false? [01]
 - a) A polymer capable of exhibiting long-range order is called as Amorphous State.
 - b) A polymer capable of exhibiting long-range order is called as Crystalline State.
 - c) A polymer capable of exhibiting long-range order is called as Gas State.
 - d) A polymer capable of exhibiting long-range order is called as Liquid State.
8. Which one of the following statements is true? [01]
 - a) A crystalline polymer is made to exist in a glassy state by rapidly cooling its melt to a very low temperature without allowing enough time to orient and form crystallites called as Quenching
 - b) A crystalline polymer is made to exist in a glassy state by rapidly heating without allowing enough time to orient and form crystallites called as Quenching
 - c) A amorphous polymer is made to exist in a rubbery state by rapidly
 - d) A crystalline polymer is made to exist in a rubbery state by rapidly

cooling its melt to a very low temperature without allowing enough time to orient and form crystallites called as Quenching

cooling its melt to a very low temperature without allowing enough time to orient and form crystallites called as Quenching

Q.2 Answer any Seven of the Followings:

[14]

- a. Two polymer samples can have the same chemical structure and almost similar molecular weight distribution but may have different properties.
- b. What is Grafting? Explain by giving suitable example.
- c. Explain Viscoelastic Deformation.
- d. Normally the polymer solution possesses high viscosity.
- e. Write down the characteristics properties of a Good Plasticizer with example.
- f. Give Classification of Adhesives by polarity giving suitable examples.
- g. An ordinary rubber ball if cooled below -70°C becomes so hard and brittle that it will break into pieces like a glass ball falling on a hard surface!
- h. Permeability is an important property which is affected by crystallinity.
- i. Aromatic groups in a polymer backbone increase the thermal stability.

Q.3 a. Discuss in brief about co-polymerization.

[06]

b. Classify and explain the polymers on the basis of Chemical and Geometrical structures.

[06]

OR

b. What are Stereo-regular polymers? Draw structural formula indicating the stereo regular chain configuration in

[06]

(1) Atactic Polystyrene

(2) Isotactic Polystyrene

(3) Cis, 1-4 Polyisoprene

(4) Trans, 1-4 Polybutadiene.

Q.4 a. What are the factors affecting Glass transition temperature of a Polymer? Explain by giving the examples.

[06]

b. What is the importance of Tg? Calculate Tg of a copolymer with 30% Styrene, 40% MMA and 30% Butyl acrylate. (Tg of Styrene = 100°C , MMA = 103°C , BA = -54°C)

[06]

OR

b. Explain the concept of various transition states associated with low molecular weight compounds and polymeric materials.

[06]

Q.5 a. State various intermolecular forces and outline the effects of permanent dipoles on properties of polymers.

[06]

b. Explain the process of polymer dissolution in detail.

[06]

OR

b. What is H-bonding in polymer? Discuss the effect of Hydrogen bonding on the properties of polymers.

[06]

Q.6 a. What is Thermal Degradation? Discuss in detail about factors affecting C-C bond stability.

[06]

b. Write a note on Antioxidants and Photo stabilizers used in Polymers.

[06]

OR

b. Classification of Viscometer on the basis of their Rheological State

[06]

—X—

SARDAR PATEL UNIVERSITY

[65] M.Sc. 2nd Semester (Surface Coating Technology) (CBCS) ExaminationThursday, 13th April, 2017PS02CSCT02: Chemistry & Technology of Organic Pigments, High Performance Pigments,
Additives & Solvents

Time: 10:00 am to 1:00 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 neat sketches and chemical equation

Q.1 Choose the correct Answer from the Followings:

1. In Water based system the stabilizing mechanism of the dispersing additives is due to [01]
 - a) Nonionic Charge
 - b) Electro Charge
 - c) Anionic Charge
 - d) Electrostatic repulsion
2. Craters in a paint surface can occur due to [01]
 - a) Poor Dispersion
 - b) Auxiliary Drier
 - c) Over spray
 - d) High viscosity
3. Which of the following is high performance pigment? [01]
 - a) Naphthol red AS
 - b) Pyrazolone orange
 - c) Indanthrone blue
 - d) Copper ferrocyanide violet
4. In the history of drier technology, Driers were prepared with _____ other than octoates [01]
 - a) Vanadates
 - b) Oxides
 - c) Naphthanates
 - d) Urethane
5. Which hydrocarbon solvent has highest viscosity? [01]
 - a) Paraffins
 - b) Naphthenes
 - c) Aromatics
 - d) ketones
6. Which of the following is violet organic pigment? [01]
 - a) Complex Naphthol
 - b) Diketo Pyrrolo-Pyrrol (DPP)
 - c) Dioxazine
 - d) Azo Bona Pigment
7. It has been suggested that the auxiliary drier improves _____ of active drier [01]
 - a) Solubility
 - b) Precipitation
 - c) Viscosity
 - d) Conjugation
8. Which solvents have most poor hydrogen bonding? [01]
 - a) Ketones
 - b) Esters
 - c) Alcohols
 - d) Hydrocarbons

Q.2 Answer any Seven of the Followings:

[14]

- a. What are basic requirements of drier to perform as drier?
- b. Flocculation leads to instability of pigment dispersion – Justify.
- c. What is "Loss of Dry"? Write Primary causes for Loss of Dry.
- d. Explain Intercoat adhesion with suitable figure.

SARDAR PATEL UNIVERSITY

M.Sc. 2nd Semester (Surface Coating Technology) (CBCS) ExaminationMonday, 17th April, 2017

PS02CSCT03: Coating Properties & Analysis of Coating

Time: 10:00 am to 1:00 pm

Marks: 70

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

2) Illustrate your answer wherever necessary with the help of neat sketches and chemical equation

Q.1 Choose the correct Answer from the Followings:

1. In cross-cut test 0 B = _____ % area of removed. [01]
 - a) 15 – 35 %
 - b) less than 5%
 - c) 35 – 65 %
 - d) None of them
2. Skinning phenomena is seen in _____. [01]
 - a) Oxidative cured coating
 - b) Baked alkyd amino coating
 - c) Non-convertible coating
 - d) Latex paint
3. Which is the Surface related test? [01]
 - a) Dew Point
 - b) Soluble Salts test
 - c) Wind Speed
 - d) Relative Humidity
4. Readings at _____ gloss head is related to sheen. [01]
 - a) 20°
 - b) 85°
 - c) 60°
 - d) None of them
5. Which of the force are not operated in adhesion of coating to mild steel substrate? [01]
 - a) Ionic
 - b) Debey
 - c) London
 - d) Keesom
6. Settling is not observed in _____. [01]
 - a) Varnish
 - b) Enamel
 - c) Sealer
 - d) Primer
7. Flocculation is in context to _____. [01]
 - a) Breaking of emulsion
 - b) Viscosity increases
 - c) Poor wetting of pigment
 - d) Gloss
8. Pick the odd one with respect to testing of coating. [01]
 - a) Density
 - b) Cross-cut test
 - c) Viscosity
 - d) % Solid

Q.2 Answer Any Seven of the followings:

[14]

1. Write about alkyd–amino stoving system?
2. What will be the theoretical WFT and DFT of a pigmented coating which has coverage of 20 m²/lit? (NVV_T = 50%)

3. How the results of cross-cut adhesion test are interpreted for 5B and 4B.
4. Give the main six causes of the Coating failures.
5. Give the classification of different Viscometer.
6. What is Dew point? Explain its importance in coating application.
7. What is shear thickening and shear thinning?
8. What will be the effect of pigment dispersion on paint properties?
9. List the surface temperature measurement instrument and explain any one.

Q.3 (a) Explain the film formation in water based paint, stoving enamels and air drying system by giving suitable example. [06]

(b) Explain in detail Cone and Plate viscometer. [06]

OR

(b) What is the cause and remedy of viscosity increases and poor drying phenomenon [06]

Q.4 (a) Write about CIE theory of color measurement. [06]

(b) What is the difference between flexibility & elasticity? List the factor affecting flexibility and how it is checked? [06]

OR

(b) Enlist formulation related coating defect and explain any six. [06]

Q.5 (a) How solution for salt spray is prepared as per IS standard and discuss about working of salt spray test. [06]

(b) What is the important of the gloss in coating and explain different gloss head use in coating industry. [06]

OR

(b) What is the importance of the Q-Fog whetherometer in coating? Explain in detail. [06]

Q.6 (a) Give the failure appearance, cause of failure and remedy for settling and gelling in solvent base paints. [06]

(b) Give the remedy and cause for the following film defects: [06]
Brush Mark, Ceasing, Fish Eye, Poor Adhesion, Wrinkling, Blisters

OR

(b) Enlist the different hardness test and explain in detail pendulum hardness test. [06]

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(2)

- Q.3 (a) Write in brief principle, construction and operation of ball mill. [06]
(b) Explain principle, construction and working of Jaw crusher. [06]

OR

- (b) Explain with neat diagram the working principle and industrial application of Gyrotory crusher. [06]

- Q.4 (a) How pumps are classified? Write in detail about the centrifugal pumps. [06]
(b) Write about construction and working of reciprocating pumps. [06]

OR

- (b) Write a note Diaphragm pump. [06]

- Q.5 (a) Write a note on rotary drum filter. [06]
(b) What is drying? Explain typical rate of drying curve under constant drying condition. [06]

OR

- (b) Write a note on Plate & Frame filter press. [06]

- Q.6 (a) Write a note on Azeotropic distillation. [06]
(b) Derive the equation for heat flow through cylinder by conduction. [06]

OR

- (b) Explain in brief classification and flow patterns of impellers. [06]

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