

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIFTH SEMESTER EXAMINATION, DECEMBER 2018

THIRD YEAR [BATCH 2016-19]

INDUSTRIAL CHEMISTRY [Honours]

Paper : V[Gr-B & C]

Date : 19/12/2018

Time : 11 am – 1 pm

Full Marks : 50

[Use a separate Answer Book for each Group]

Group-B

1. Choose the best response among the following options for each question. (Answer any five)

[5×1]

- i) Of the following which one is classified as polyester polymer?
a) Nylon-66 b) Terylene c) Bakelite d) Melamine
- ii) As the crystallinity increases The ductility of the polymer——
a) Increases b) Decreases c) Moderate d) Remains constant
- iii) Which among the following are used as initiators for free radical polymerization?
P) K_2SO_4 Q) $K_2S_2O_8$ R) AIBN S) t-Butyl hydroperoxide + Fe^{2+}
(A) P,Q & R only
(B) Q,R & S only
(C) P,R & S only
(D) P,Q,R & S
- iv) Example of a semisynthetic polymer is —
a) Cellulose nitrate b) PF Resin c) Butyl Rubber d) PAN
- v) The polymer synthesized by ring opening polymerization is——
a) Poly(acrylic acid) b) Nylon 6 c) Poly(ethylene terephthalate) d) Nylon 66
- vi) Stereo-regular polymers are synthesized by using ——
a) AIBN b) ZnO c) Heavy metal catalyst d) Ziegler-Natta Catalyst

Answer any three questions from question nos. 2 to 5:

[3×5]

2. a) Match the following catalyst/initiator with the type of polymerization reaction:

Catalyst/initiator	Polymerization reaction
P. butyl lithium	1. Ziegler-Natta
Q. $TiCl_4 + Et_3Al$	2. Cationic
R. H_2SO_4	3. Anionic

[1.5]

b) The degree of polymerization of Nylon 6 (ignore end-groups) with molar mass of $1,00,000 \text{ g mol}^{-1}$ is—. [1.5]

c) What is cage effect. Give examples of inhibitor and retarder. [1+1]

3. a) For the following values of r_1 and r_2 what type of polymers will be expected in case of a copolymerisation?

i) $r_1 = 0, r_2 = 0$, ii) $r_2 \gg 0, r_2 \gg 1$, iii) r_1 infinity, r_2 infinity. [3]

b) What do you mean by "Azeotropic Copolymerizations"? [1]

c) How do you introduce carboxylic group in a polymer? [1]

4. a) Enlist the distinguishing features among LDPE, LLDPE and HDPE.

b) Match column A with column B [3+2]

A	B
P. Polystyrene	1. Non-flammable polymer
Q. PVC	2. Contact lance

R. PAN	3. Foam
S. PMMA	4. Oil pipe

5. a) Explain the following 'Nylon 6,6 and nylon 6 are used as fibres but nylon 6,10 and nylon 6,12 are used as surgical sutures (cord used to stitch) and brushes' [2]
 b) Write "True" or "False" and justify.
 i) Polymers having narrow Molecular weight distribution generally show good processability. [1+1]
 ii) LLDPE is a copolymer. [1]
 c) State the use of Urea-Formaldehyde resin.

Answer any two questions from question nos. 6 to 8:

[2×5]

6. You are a rubber component manufacturer. the Ministry of Indian Railways wants:
 a) a fire resistant insulating cable coating compound.
 b) a weather resistant door and window seal compound for Rajdhani, Satabdi, Duronto and Metro trains.
 Both the products will be made by extrusion.
 Write down a formulation of the rubber compounds with proper reason (in each case) for your choice of rubber, filler and vulcanization system. [5]
 7. a) Draw a cure curve and mention the parameters obtained from it. Also mention the three types of curing curve in the same figure with an example in each case. [2]
 b) Write down the classification of the filler system with example. What do you mean by SAF. [1.5+0.5]
 c) Give two examples of self-reinforcing rubbers. [1]
 8. a) EPM is an example of ——— resistant rubber and NBR is an example of ——— resistant rubber. [1]
 b) Name a polymer used for making golf balls. Write down its structure. [1]
 c) A company from Nepal wants a rubber oil seal for an application that will serve the sealing purpose even at a temperature of -50°C. They have sent you the following data of polymer. A with T_g - 90°C and polymer B with T_g + 95°C and will be made by random co-polymerization.
 i) At what weight percentage will you mix the polymers to attain the service temperature?
 ii) What are the polymers A and B? What did you think about the application (Static or dynamic)? [3]

Group-C

Answer any four questions from question nos. 9 to 14:

[4×5]

9. Briefly describe the heterogeneous reaction taking place in stratosphere leading to ozone depletion over Antarctica. State the effect of ozone depletion on man and biodiversity. [3+2]
 10. a) What do you mean by water pollution?
 b) Mention the names of Primary water pollutants?
 c) Give a brief account of various methods of controlling water pollution. [1+1+3]
 11. Enumerate the remedial measures adopted to manage air pollution. Distinguish between Advection & Percolation. Mention the major sources of Dissolved oxygen in water. What is Chemical Oxygen Demand? [2+1+1+1]
 12. Describe the process of photochemical smog formation in urban areas? State how it affects human health. [3+2]
 13. What is MIC? Name the disaster which happened out of escape of this gas. What is C & D debris? Illustrate how elemental mercury affects human being. [1+1+1+2]
 14. a) What is meant by global warming?
 b) What are the consequences of global warming?
 c) Write a short note on composition of atmosphere. Discuss the hydrologic cycle. [1+2+2]

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