

S. No. of Question Paper: 7941

Unique Paper Code: 2173552005

Name of the Paper: DSE- Basics of Polymer Chemistry

Name of the Course: B.Sc. (APS) Industrial Chemistry

Semester: III/V

Duration: 2 hours

Maximum Marks: 60 Marks

Instruction for the candidates

1. Write your Roll no on the top immediately on the receipt of the question paper.
2. Attempt any *four* questions. Each questions carries equal marks.
3. Simple calculator is allowed.

1. (a) Fill in the blanks:

(i) Monomers used in the preparation of Nylon – 6, 6 are _____ and _____.

(ii) For the polymerization of acrylonitrile _____ is used as the initiator and _____ acts as the catalyst.

(iii) The type of molecular weight of polymers obtained from viscometric measurements is _____

(iv) Atmospheric oxygen acts as _____ for the polymerization process.

(v) Gun-Cotton is a nitro derivative of naturally occurring polymer named _____

(b) Identify monomer and write the name of the following polymers

(i) $-\text{NH}(\text{CH}_2)_6\text{NHCO}(\text{CH}_2)_4\text{CO}-$

(ii) $-\text{O}(\text{C}_6\text{H}_5)-$

(iii) $-\text{CH}(\text{C}_6\text{H}_5)\text{CH}_2-$

(iv) $-\text{CH}_2\text{C}(\text{COOH})(\text{CH}_3)-$

(v) $-(\text{CH}_3)_2\text{C}-\text{CH}-$

(c) Explain why?

(i) A steep increase in the melting point is observed when p-phenylene group is introduced in the polymer.

(ii) An amorphous polymer becomes brittle on cooling.

(5, 5, 5)

2. (a) Define polymers? Distinguish between a low molecular weight compound and a polymer.

(b) How are polymers classified on the basis of

(i) structure (ii) molecular forces

(c) Define functionality? Discuss the effect of functionality on polymerization process with suitable example.

(5, 5, 5)

3. (a) What is M_n and M_w ? Which is one is greater and why?
 (b) Explain osmometric method for determination of average molecular weight of polymer. Which molecular weight is determined by this method and why?
 (c) In a polymer sample, 10% molecules have molecular mass 5000, 60 % molecules have molecular mass 35,000 and rest 35 % have molecular mass 20,000. Calculate $\bar{M}_n$ and $\bar{M}_w$ and PDI of the polymer.
 (5, 5, 5)
4. (a) Define Tacticity. How does tacticity affect the T_g and T_m of polymer?
 (b) Define glass transition temperature. Discuss any one method for determination of glass transition temperature.
 (c) What are the criteria for the solubility of the polymer? What is the significance of Hilderbrand-Scott Equation?
 (5, 5, 5)
5. (a) What are conducting polymers? Discuss the synthesis and applications of polyaniline.
 (b) Write the method of preparation of novolac. Draw its structure and mention any three applications.
 (c) Differentiate between addition and condensation polymerization processes. Classify the following as addition or condensation polymers:
 (i) Polyacrylonitrile
 (ii) Nylon
 (iii) Polystyrene
 (iv) Polyethylene terephthalate
 (5, 5, 5)
6. (a) Write a note on biodegradable polymers using suitable examples.
 (b) Write the points of differences between any *two* of the following:
 (i) Syndiotactic and Atactic Polymers
 (ii) Bulk Polymerization and Emulsion Polymerization
 (iii) Thermosetting and Thermoplastic Polymers
 (c) Write the structure, method of preparation and applications of any *two* of the following:
 (i) PVC
 (ii) Chitosan
 (iii) Polyurethanes
 (iv) Cellulose
 (5, 5, 5)