CHEMISTRY

BOOKS - S DINESH & CO CHEMISTRY (HINGLISH)

POLYMERS

Example

1. A sample of a polymer contains 200 molecules of molecular mass 10^3 each, 300 molecules of molecular mass 10^4 each and 500 molecules each having 10^5 as molecular mass. Calculate $\overline{M}_N$ and $\overline{M}_W$ for the sample

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1. What are polymers ?

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2. How are polymers classified on the basis of structure ?

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3. Write the names of the monomers of the following polymers:

(i) $\left[-\overset{\overset{N}{|}}{N}-(CH_2)_6-\overset{\overset{H}{|}}{N}-\overset{\overset{O}{||}}{C}-(CH_2)_4-\overset{\overset{O}{||}}{C}-\right]_n$

(ii) $\left[-\overset{\overset{O}{||}}{C}-(CH_2)_6-\overset{\overset{H}{|}}{N}\right]$

(iii) $[-F_2C-CF_2-]_n$

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4. Classify the following as addition and condensation polymers :

Terylene, Bakelite, polyvinyl chloride, polythene.

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5. What is the difference between Buna-N and Buna-S.

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6. Arrangement the following polymers in increasing order of their intermolecular forces. Nylon 6, 6 Buna-S, Polythene.

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N C E R T Exercise

1. Explain the terms polymer and monomer.

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2. What are natural and synthetic polymers ? Give two examples of each type.

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3. Distinguish between the terms homopolymer and copolymer and give an example of each.

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4. How do you explain the functionality of a monomer?

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5. Define the term polymersation.

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6. Is $(NH-CHR-CO)_n$ a homopolymer or copolymer?

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7. In which classes, the polymers are classified on the basis of molecular forces ?

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8. How can you differentiate between addition and condensation polymerisation ?

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9. Explain the term copolymersation and give two examples.

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10. Define thermoplastics and thermosetting polymers with two examples of each.

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11. Write the monomers used for getting the following polymers.

(i) Polyvinyl chloride

(ii) Teflon

(iii) Bakelite.

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12. Write the name and structure of one of the common initiators used in free radical addition polymersations.

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13. How does the presence of double bonds in rubber molecules influence their structure and reactivity?

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14. Discuss the main purpose of vulcanisation of rubber.

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15. What are monomeric repeating units of nylon-6and nylon-6.6?

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16. Write the names and structures of the monomers of the following polymers:

(i)Buna-S,(ii)Buna-N

(iii)Dacron,(iv)Neoprene

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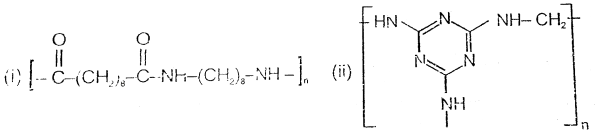
17. Identify the monomer in the following polymeric structure

(i) $\left[-\overset{O}{\overset{||}{C}} - (CH_2)_8 - \overset{O}{\overset{||}{C}} - NH - (CH_2)_8 - NH - \right]_n$

(ii) 

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18. How is Dacron obtained from ethylene glycol and terephthalic acid?

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19. What is a biodegradable polymer ? Give an example of a biodegradable aliphatic polyester.

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Short Answer Type Question

1. A natural linear polymer of 2 methyl -1,3 - butadiene becomes hard on treatment with suphur between 373 to 415 K and -s - s- bonda are formed between chains.Write the structure of the product of this treatment?

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2. Identify the type of polymer

-A-A-A-A-A-A-

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3. Identify the type of polymer

-A-B-B-A-A-A-B-A-

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4. out of chain growth polymerisation and step growth polymerisation,in which type will you place the following

$$\text{—}(A\text{—})_m + \text{—}(A\text{—})_n \longrightarrow \text{—}(A)_m\text{—}(A)_n \text{ or } \text{—}(A\text{—}A\text{—})_{m+n}$$

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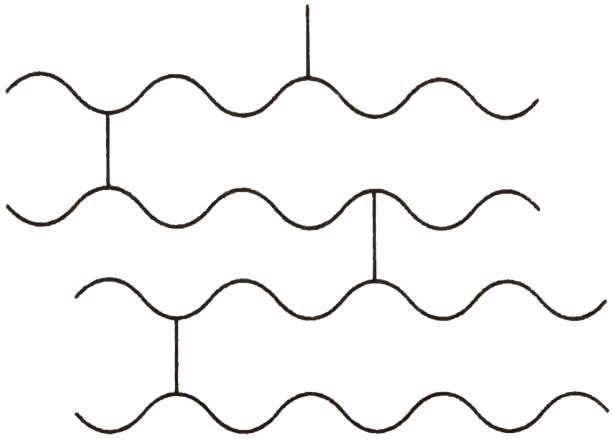
5. Identify the type of polymer given in the following figure



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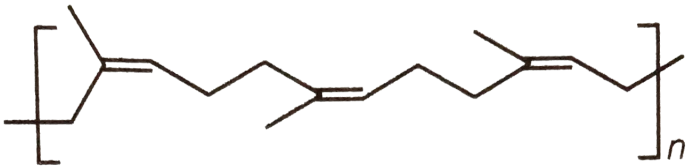
6. Identify the polymer given below



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7. why are rubber called elastomers?

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8. can enzyme be called a polymer?

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9. Can nucleic acid protein and starch be considered as step growth polymers?

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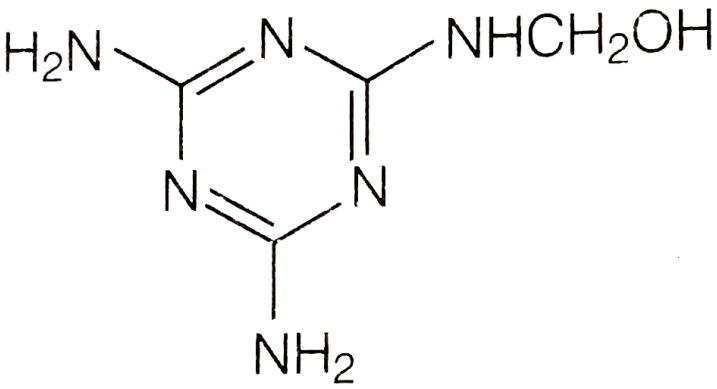
10. How is the following resin intermediate prepared and which polymers is formed by this monomer unit?



Resin intermediate

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11. To have practical applications why are cross links quetioined in rubber?

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12. Why does cis polyisoprene posses elastic porperty?

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13. What is the structural difference between HDP and LDP? How does the structure account for different behaviour and nature hence use of polymer?

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14. What is the role of benzoyl peroxide in addition polymerisation of alkenes? Explain its mode of action with the help of an example

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15. Which factor imparts crystalline nature to a polymer like nylon?

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16. Name the polymer used in laminating sheets and give the name of monomeric units involved in its formation

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17. Which type of biomolecules have some structural similarity with synthetic cpolyamides? What is similarity?

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18. Why should the monomer used in addition polymerisation through free radical pathway be very pure?

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Long Answer Type Question

1. Synthetic polymers do not degrade in the environment for a long time. How can biodegradable synthetic piolymers be made. Differentiate between biopolymers and biodegradable polymers and give examples of each type.

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2. Differentiate between rubbers and plastics on the basis of intermolecular forces.

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3. Phenol and fomaldehyde undergo condensation to give a polymar (A) which on heating with formaldehyde gives a thermosetting polymer (B) Name the polymers. Write the

reaction involved in the formation of (A) what is the structural difference between two polymers?

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4. Low density polythene and high density polythene both are polymers of ethene but there is marked difference in their porperities. Explain.

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5. Which of the following polymers soften on heating and harden on colling? What are the polyfmers with this property collectively called ? What are the structural similarites between such polymers? Bakelite urea formaldehyde resin , polythene, polyvinyls, polystyrene.

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Additional Important Question

1. Name a substance which inhibits free radical polymerisation.

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2. Nylon -66 is

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3. What is mode of free radical polymerisation in alkenes ?

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4. Write the structures of the monomers used for getting the following polymers :

(a) PVC (b) Teflon (c) PMMA

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5. Why should the monomer used in addition polymerisation through free radical pathway be very pure?

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6. How does the presence of carbon tetrachloride influence the course of vinylic free radical polymerisation ? Explain with example

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7. Explain how does 1, 3-butadiene polymerise by different route

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8. Why does styrene undergo anionic polymerisation easily ?

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9. Why is cationic polymerisation preferred in case of vinylic monomers containing electron donating groups ?

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10. Depict a free radical mode of addition polymerisation in isoprene.

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11. Why are the number 66 and 6 put in the names of nylon 66 and nylon 6 ?

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12. What is the difference between thermosetthing and thermosplastic polymers ?

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13. How is bakelite formed ? Explains the reactions with equation

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14. Polymers are always macromolecules but macromolecules are not always polymers. Explain.

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15. Can a co-polymer be formed both in additin and condensation polymerisation ?

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16. Explain how does 1, 3-butadiene polymerise by different route

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17. Are polyesters and polyacrylates same ? Justify your answer.

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18. Will you prefer to polymerise acrylonitrile under anionic or cationic polymerisation conditions ? Explain your choice

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Question From Board Examinations

1. What is the difference between elastomers and fibres ?

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2. Give one example of (i) elastomers (ii) fibres (iii) thermoplastic.

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3. Write the names and the structures of monomers of following polymer :

(i) Natural rubber

(ii) Terylene.

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4. Write the monomers of each of the following :

(a) Teflon (b) Cellulose

(c) Neoprene (d) Polyethylene

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5. Why is bakelite a theromosetting polymer ?

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6. To what class does nylon -66 belong on the basis of intermolecular force ?

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7. Write the equation and monomers for the preparation of terylene.

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8. Distinguish between the terms homopolymer and copolymer and give an example of each.

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9. Write the structures of monomers used in preparation of:

(a) Teflon (b) PMMA

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10. Give synthesis of Buna-S

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11. What are elastomers ?

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12. Draw the structure of the monomers of (i) polyvinyl chloride

(ii) Nylon -6

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13. Write the formula of monomer unit of polythene

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14. Name the monomers of nylon-2-nylon-6

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15. Differentiate between the following pairs of polymers based on the property mentioned against each :

(i) Novolac and Bakelite (Structure)

(ii) Buna-S and Terylen (Intermolecular forces).

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16. What is the role of benzoyl peroxide in the polymerisation of ethene ?

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17. What do LDP and HDP signify ? How are these prepared ?

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18. What is the repeating structural unit in polythene polymer ?

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19. Give one example of elastromer

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20. Draw the structures of the monomers of the following polymers :

(i) Teflon

(ii) Polythene

OR

What is the repeating unit in the condensation polymer obtained by combining $HO_2CCH_2CH_2CO_2H$ (succinic acid) and $H_2NCH_2CH_2NH_2$ (ethylene diamine) ?

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21. What do '6, 6' indicate in the nylon-6, 6 ?

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22. What are homopolymers and co-polymers ? Give one example of each

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23. Define plasticizers

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24. Write the name and structure of the monomers of Bakelite polymer.

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25. (i) Identify aliphatic biodegradable polymer which is used in packing and in orthopedic devices

(ii) Write its full form

(iii) Give the structures of the monomers from which it is formed ?

(iv) Show the formation of the polymer

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26. (a) Write reaction involved in the preparation of a biodegradable polymer.

(b) Give monomer unit of synthetic rubber (neoprene)

(c) Give one use of nylon-66

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27. (a) Give an example of a synthetic rubber and mention its main advantage.

(b) Write the structure of the monomers of Dacron

(c) Arrange the given polymers in the increasing order of tensile strength Nylon-6, Buna-S, Polythene

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28. Mention two important uses of each of the following polymers.

(i) Bakelite (ii) Nylon-66 (iii) PVC

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29. What are biodegradable polymers ?

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30. (a) Write the names of the monomers of polymer used for making unbreakable crockery.

(b) Write the reaction involved in the preparation of neoprene

(c) Arrange the following polymers in decreasing order of intermolecular forces :

PVC, Nylon 66, Natural rubber.

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31. Draw the structure of the monomer for each of the following polymers :

(i) Nylon 6

(ii) Polypropene.

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32. Is $\left(-CH_2 - \underset{\underset{Cl}{|}}{C} \right)_n$ a homopolymer or copolymer ?

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33. Define thermoplastics and thermosetting polymers with two examples of each.

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34. Write the names and structures of the monomers of the following polymers:

(i) Buna-S (ii) Neoprene (iii) Nylon-6, 6

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35. Write the names of the monomers of the following polymers.

$$\left[-NH-(CH_2)_6-NH-\underset{\underset{O}{||}}{C}-(CH_2)-\underset{\underset{O}{||}}{C}- \right]_n$$

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36. Write the name of the monomers of the following polymers :

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37. Give synthesis of Nylon 66.

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38. Define homopolymers, co-polymers and plasticizers

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39. What are thermosetting polymers ?

(a) Give synthesis of Nylon -6.

(b) Wirte the synthesis of PVC

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40. Identify the monomer in the following polymeric structure :

$$\left[-CH_2 - CH = CH - CH_2 - CH_2 - \overset{CN}{\underset{|}{CH}} - \right]_n$$

(i) On the basis of force between their molecules in a polymer to which class does neoprene belong ?

(ii) Can both addition and condensation polymerization result in the formation of a copolymer ?

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41. Write the name of the monomers used for getting the following polymer (i) Bakelite (ii) Neoprene

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42. Briefly explain

(i) The main purpose of vulcanisation of rubber.

(ii) What are elastomers ? Explain

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43. Which out of Buna-S, protenis and PVC, is a natural polymer ?

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44. Name the monomers of Nylon -66

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45. Given the preparation and used of Nylon -66

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46. Write the name and structures of the monomers in the polymer BHBV

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47. Describe the classification of polymer based on their structure.

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48. Write the name and structures of the monomers of the following polymers :

(i) Buna-N (ii) Bakelite (iii) Teflon

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49. What is Teflon ? Give its formula

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50. What are co-polymers ? Give chemical equation for the preparation of glyptal.

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51. Define the terms : (i) Elastomers (ii) Flibres (iii) Thermoplastics

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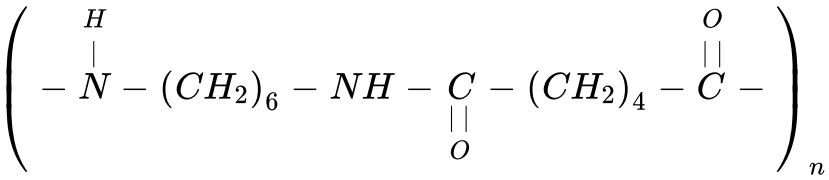
52. (i) What is the role of benzoyl peroxide in the polymerisation of ethene?

(ii) Identify the monomers in the following polymer :



(ii) Arrange the following polymers in the increasing order of their intermolecular forces : Nylon-6, 6 Polythene, Buna -S

OR

Write the mechanism of free radical polymerisation of ethene

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53. How is vulcanisation of rubber performed ?

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54. Write down full names of (i) PTFE (ii), PVC.

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55. Giving examples, how can you distinguish between homopolymers and co-polymers ?

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56. Define thermoplastics and thermosetting polymers with two examples of each.

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57. Name the type of reaction involved in the formation of the following polymers from their monomers

(i) PVC (ii) Nylon 6 (iii) PHBV

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58. How is Buna-S prepared ?

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59. Write the name of the biodegradable polymer used in orthopaedic devices.

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60. How is polythene prepared from ethene ? Give chemical equation only

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61. What is the difference between Buna-N and Buna-S.

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62. THERMOPLASTIC & THERMOSETTING POLYMER

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Assignment

1. Give the preparation and one use of:

(i) Neoprene (ii) Buna-S

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2. (a) Write the structure of the monomer of Teflon

(b) Define thermonsetting plastics.

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3. Give the preparation and uses of Teflon

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4. Relation belween number of average molecular mass $\left(\overline{M}_n\right)$ and weight of average molecular mass $\left(\overline{M}_w\right)$ of synthetid polymers is

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5. How are these prepared :

(i) PAN (ii) PVC (iii) Nylon-66

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6. Write the monomers of each of the following :

(a) Teflon (b) Cellulose

(c) Neoprene (d) Polyethylene

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7. Write equations for the synthesis of :

(i) Nylon-6 (ii) Buna-S

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8. What are elastomers ? Write the chemical equation to represent the preparation of Buna-S

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9. Write chemical equation to prepare

(i) Nylon-6 (ii) Nylon-66

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10. Write the names and structures of monomer units present in

(i) PMMA (ii) Buna-N

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11. Write the structures of the monomers used for getting the following polymers :

(i) PVC (ii) Teflon

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12. (a) What are thermoplastics ?

(b) What is the difference between copolumers and homopolymers ?

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13. Write the structures and names of the monomers of the following polymers :

(i) Bakelite (ii) PMMA

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14. Differentiate between addition and condensation polymers based on mode of polymerisation. Give one example of each type

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15. How are polymers classified on the basis of force operating between them ? To which of these classes does nylon-66 belong ?

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16. Write the monomers and equations for the preparation of terylene

Watch Video Solution

17. Give preparation and one use of nylon-6

Watch Video Solution

18. Distinguish between the terms homopolymer and copolymer and give an example of each.

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19. Write the structures of monomers used in preparation of:

(a) Teflon (b) PMMA

Watch Video Solution

20. Discuss the main purpose of vulcanisation of rubber.

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21. What are biodegradable polymers ?

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22. Write formula of monomers of polythene and teflon

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23. Write the structures of monomers of : PVC and Nylon-6

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24. WHAT ARE THERMOPLASTIC & THERMOSETTING POLYMER ?

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25. Give the preparation of (i) Glyptal (ii) Buna-S.

Watch Video Solution

26. What is the role of benzoyl peroxide in addition polymerisation of alkenes? Explain its mode of action with the help of an example

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27. Write the structure of the monomers of the following polymers.

(i) Buna-S (ii) Neoprene (iii) Nylon-6

Watch Video Solution

28. Define the term polymersation.

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29. Write the structures of the monomers of the following polymers.

(i) PVC (ii) Polypropene

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30. What are homopolymers and co-polymers ? Give one example of each

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31. Define thermoplastics and thermosetting polymers with two examples of each.

Watch Video Solution

32. What are elastomers ? Write the chemical equation to represent the preparation of Buna-S

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33. Give an example of elastomer.

(i) Teflon (ii) Polythene

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34. What is the repeating unit in the condensation polymer obtained by combining succinic acid $(HOOCH_2CH_2COOH)$ and ethylene glycol $(HOCH_2CH_2OH)$?

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35. What do '6, 6' indicate in the nylon-6, 6 ?

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36. Differentiate between the molecular structures and behaviour of thermoplastic and thermosetting polymers. Give one example of each type

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37. What is a biodegradable polymer ? Give an example of a biodegradable aliphatic polyester.

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38. Define platicizers

Watch Video Solution

39. Write the names and structures of the monomers of the polymers

(i) Nylon-6, 6 (ii) Polythene

Watch Video Solution

40. Write the structures of the monomers used for getting the following polymers :

(i) PVC (ii) Teflon

Watch Video Solution

41. Giving one example of each of :

(i) addition polymers

(ii) condensation polymers

(iii) copolymers.

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42. What are natural and synthetic polymers ? Give two examples of each type.

Watch Video Solution

43. What are biodegradable polymers ?

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44. Mention the important uses of

(i) Bakelite (ii) Nylon-6 (iii) PVC (iv) Nylon 6, 6.

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45. Name the monomer of nylon-6. How is nylon-6 prepared ?

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46. (a) Write the names of the monomers of polymer used for making unbreakable crockery.

(b) Write the reaction involved in the preparation of neoprene

(c) Arrange the following polymers in decreasing order of intermolecular forces :

PVC, Nylon 66, Natural rubber.

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47. Write the structures of the monomers of each of the following

(a) Nylon-6 (b) Teflon (c) Neoprene

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48. Explain the following giving one suitable example in each case

(i) Elastomers (ii) Condensation polymers (iii) Addition polymers

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49. Is $\left(-CH_2-\underset{Cl}{\underset{|}{CH}} \right)_n$ a homopolymer or copolymer ?

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50. Give an example of condensation polymer.

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51. Write the names of the monomers of the following polymers.

$$\left[-NH + (CH_2)_6 - NH - \underset{\underset{O}{||}}{C} - (CH_2) - \underset{\underset{O}{||}}{C} - \right]_n$$

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52. Define homopolymers, co-polymers and plasticizers

Watch Video Solution

53. Write the name of the monomers used for getting the following polymer (i) Bakelite (ii) Neoprene

Watch Video Solution

54. Discuss the main purpose of vulcanisation of rubber.

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55. Which out of Buna-S, protenis and PVC, is a natural polymer ?

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56. Nylon-66 is obtained from:

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57. Given the preparation and used of Nylon -66

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58. Define thermoplastics and thermosetting polymers with two examples of each.

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59. Write two examples of synthetic polymers

Watch Video Solution

60. Write the names and structures of the monomers of the following polymers :

(i) Polystyrene (ii) Nylon-6, 6 (iii) Terylene

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61. Give information about the following polymers :

(i) Bakelite : Starting materials needed for preparation.

(ii) Synthetic rubber : Monomer unit

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62. (i) What are thermosetting polymers ? Give one example

(ii) Give chemical name of teflon

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63. What is the role of tertiary-butyl peroxide in the polymerisation alkene ?

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64. Arrange the following in increasing order of intermolecular forces. Polystyrene, Terylene, Buna-S

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65. (i) How is Nylon-66 synthesised ?

(ii) Explain biodegradable polymers.

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66. Write mechanism of free radical polymerisation of alkenes

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67. How is vulcanisation of rubber-performed ?

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68. Write down full names of (i) PTFE (ii), PVC.

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69. Giving examples, how can you distinguish between homopolymers and co-polymers ?

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70. Give the preparation of Buna-S

Watch Video Solution

71. Discuss the main purpose of vulcanisation of rubber.

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72. Give synthesis of Buna-S

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Multiple Choice Question

1. Which of the following polymers of glucose is stored by animals?

A. Cellulose

B. Amylose

C. Amylopectin

D. Glycogen

Answer: D

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2. Which of the following is not semisynthetic polymer?

A. cis-polyisoprene

B. Cellulose nitrate

C. Cellulose acetate

D. Vulcanised rubber

Answer: A

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3. The comercial name of polyacrylonitrile is .....

A. Dacron

B. Orlon (acrilan)

C. PVC

D. Bakelite

Answer: B

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4. Which of the following polymers is biodegradable ?

A. $\left(-CH_2 - \underset{Cl}{\underset{|}{C}} = CH - CH_2 - \right)_n$

B. $\left(-CH_2 - CH = CH - CH_2 - CH_2 - \overset{CN}{\overset{|}{C}}H - \right)_n$

C.

$$\left(-O-\underset{CH_3}{\underset{|}{CH}}-CH_2-\overset{\overset{||}{O}}{\overset{|}{C}}-O-\underset{CH_2CH_3}{\underset{|}{CH}}-CH_2-\underset{O}{\overset{||}{C}}- \right)_n$$

D.

$$\left(-\overset{H}{\overset{|}{N}}-(CH_2)_6-\overset{H}{\overset{|}{N}}-\overset{O}{\overset{||}{C}}-(CH_2)_4-\overset{O}{\overset{||}{C}}- \right)_n$$

Answer: D

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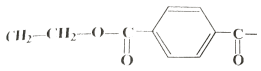
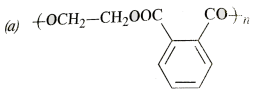
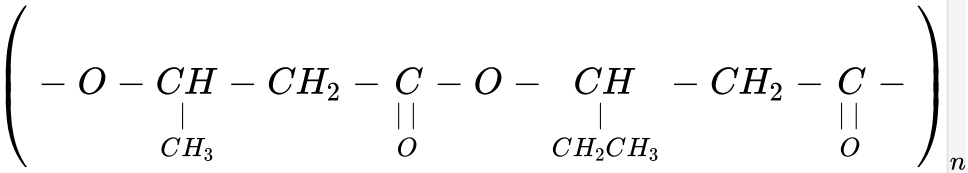
5. In which of the following polymers ethylene gylcol is one of the monomer units?

A. 

B. $\left(-CH_2-CH_2- \right)_n$

C. 

D.



Answer: A

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6. Which of the following statements is not true about low density polythene ?

A. Tough

B. Hard

C. Poor conductor of electricity

D. Highly branched structure

Answer: B

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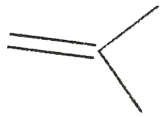
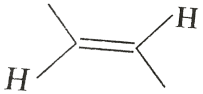
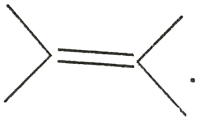
7. The monomer of the polymer

$$\sim CH_2 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} \sim$$

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: A

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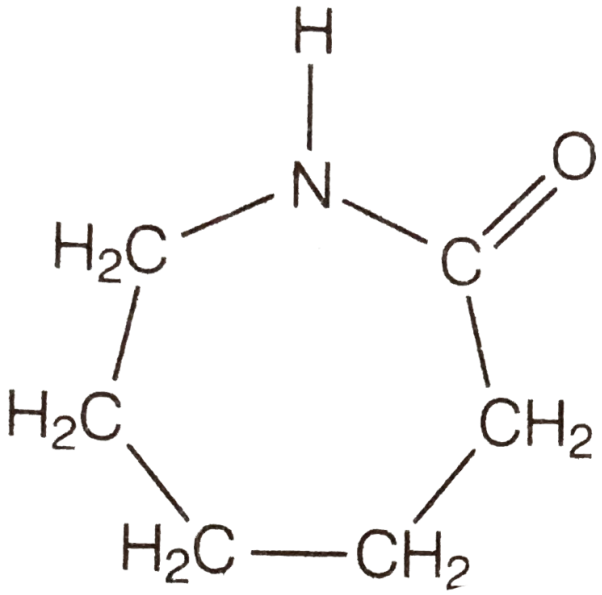
8. Which of the following polymer can be formed by using the following monomer units



A. Nylon6, 6

B. Nylon2-nylon-6

C. Melamine polymer

D. Nylon-6

Answer: D

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9. Which of the following polymers, need atleast one diene monomer for their preparation?

A. Dacron

B. Buna-S

C. Neoprene

D. Novolac

Answer: B::C

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10. Which of the following characteristics of thermosetting polymers?

A. Heavily branched cross linked polymer

B. Linear, slightly branched long chain molecules

C. Become infusible on moulding ,so cannot be reused

D. soften on heating and harden on cooling , can be reused

Answer: A::C

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11. Which of the following polymers are thermoplastic?

A. Teflon

B. Natural rubber

C. Neoprene

D. Polystyrene

Answer: A::D

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12. Which opf the following polymers are used as fibre?

A. Polytetrafluoroethane

B. Polychloroprene

C. Nylong

D. Terylene

Answer: C::D

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13. Which of the following are addition polymers?

A. Nylon

B. Melamine formaldehyde resin

C. Orlon

D. Polystyrene

Answer: C::D

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14. Which of the following polymers are condensation polymes?

A. Bakelite

B. Teflon

C. Butyl rubber

D. Melamine formaldehyde resin

Answer: A::D

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15. Which of the following monomers form biodegradable polymers?

A. 3-hydroxybutanonic acid +

3-hydroxypentanoic acid

B. Glycine + amino caporic acid

C. Ethylene glyco + phthalic acid

D. Caprolactum

Answer: A::B

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16. Which of the following are example of synthetic rubber?

A. Polychoroprene

B. Polyacrylonitrile

C. Buna-N

D. cis-polyisoprene

Answer: A::C

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17. Which of the following polymers can have strong intermolecular forces ?

A. Nylon

B. Polystyrene

C. Rubber

D. Polyesters

Answer: A::D

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18. Which of the following polymers have vinylic monomer units

A. Acrilan

B. Polystyrene

C. Nylon

D. Teflon

Answer: A::B::D

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19. Vulcanisation makes rubber

A. more elastic

B. soluble in inorganic solvent

C. crystalline

D. more stiff

Answer: A::D

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20. Match the polymer of column I with correct monomer of column II

Column I	Column II
(a) High density polythene	(i) Isoprene
(b) Neoprene	(ii) Tetrafluoroethene
(c) Natural rubber	(iii) Chloroprene
(d) Teflon	(iv) Acrylonitrile
(e) Acrilan	(v) Ethene

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21. Match the polymer given in Column I with their chemical names given in Column II

Column I	Column II
(a) Nylon 6	(i) Polyvinyl chloride
(b) PVC	(ii) Polyacrylonitrile
(c) Acrilan	(iii) Polycaprolactum
(d) Natural rubber	(iv) Low density polythene
(e) LDP	(v) cis-polyisoprene

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22. Match the polymers given in column I with their commerical names given in column II

	Column I		Column II
A.	Polyester of glycol and phthalic acid	1.	Novolac
B.	Copolymer of 1, 3-butadiene and styrene	2.	Glyptal
C.	Phenol and formaldehyde resin	3.	Buna-S
D.	Polyester of glycol and terephthalic acid	4.	Buna-N
E.	Copolymer of 1,3- butadiene and acrylonitrile	5.	Dacron

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23. Match the polymers given in column I with their main applications given in column II

	Column I		Column II
A.	Bakelite	1.	Unbreakable crockery
B.	Low density polyethene	2.	Non-stick cookwares
C.	Melamine-formaldehyde resin	3.	Packaging material for shock absorbance
D.	Nylon-6	4.	Electrical switches
E.	Polytetrafluoroethane	5.	Squeeze bottles
F.	Polystyrene	6.	Tyre, cords

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24. Match the polymers given in column I with the preferred mode of polymerisation followed by their monomers columnII

Column I		Column II	
A.	Nylon-6,6	1.	Free radical polymerisation
B.	PVC	2.	Ziegler-Natta polymerisation or coordination polymerisation
C.	HDP	3.	Anionic polymerisation
		4.	Condensation polymerisation

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25. Match the polymers given in column I with the type of linkage present in them given in column II

Column I		Column II	
A.	Terylene	1.	Glycosidic linkage
B.	Nylon	2.	Ester linkage
C.	Cellulose	3.	Phosphodiester linkage
D.	Protein	4.	Amide linkage
E.	RNA		

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26. Match materials given in column I with the polymers given in column II

Column I		Column II	
A.	Natural rubber latex	1.	Nylon
B.	Wood laminates	2.	Neoprene
C.	Ropes and fibres	3.	Dacron
D.	Polyester fabric	4.	Melamine formaldehyde resins
E.	Synthetic rubber	5.	Urea-formaldehyde resins
F.	Unbreakable crockery	6.	*cis*-polyisoprene

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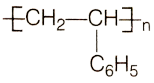
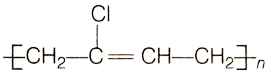
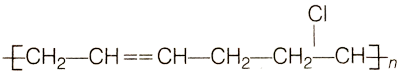
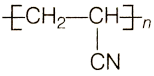
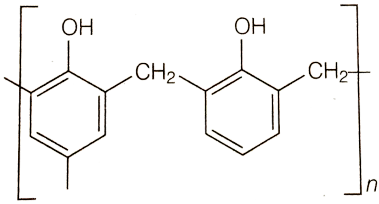
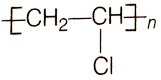
27. Match the polymers given in column I with their repeating units given in column II

Column I	Column II
A. Acrilan	1. 
B. Polystyrene	2. 
C. Neoprene	3. 
D. Novolac	4. 
E. Buna–N	5. 
	6. 

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28. Assertion (A) Rayon is a semisynthetic polymer and is taken as a better choice than cotton fabric.

Reason (R) Mechanical and aesthetic properties of cellulose can be improved by Acetylation

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29. Assertion (A) Most of the synthetic polymers are not biodegradable

Reason (R) Polymerisation process induces toxic character in organic molecules

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30. Assertion (A) Olefinic monomers undergo addition polymerisation

Reason (R) Polymerisation of vinyl chloride is initiated by peroixdes/persulphates

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31. Assertion (A) Polyamides are best used fas fibres because of high tensile strength.

Reason (R) Strong intermolecular foces (like hydrogen bonding within polyamides) lead to close packing of chains and increase the crystalline character hence , provide high tensile strength to polymers

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32. Assertion (A) For making rubber synthetically isoprene molecules are polymerised .

reason (R) Neoprene (a polymer of chloroprene) is a syntheitc rubber

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33. Assertion (A) Network polymers are thermosetting

Reason (R) Network Polymers have high molecular mass

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34. Assertion (A) Polytetrafluorothene is used in making non stick cookwares.

Reason (R) Fluorine has highest electronegativity.

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35. Nylon-6 is made from

A. 1, 3-Butadiene

B. Chloroprene

C. Adipic acid

D. Caprolactum

Answer: D

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36. Which is used for the formation of nylon-66 ?

A. Sulphur hexafluoride

B. Adipic acid

C. Sulphurous acid

D. Phathalic acid

Answer: B

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37. $F_2C = CF_2$ is a monomer of

A. Teflon

B. Glyptal

C. Nylon-6

D. Buna-S

Answer: A

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38. Soft drinks and baby feeding bottles are generally made up of:

A. Polyester

B. Polyurethane

C. Polystyrene

D. Polyamide

Answer: B

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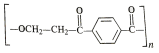
39. Which of the following are not correclty matched ?

A. neoprene : $\left[-CH_2 - \underset{Cl}{\underset{|}{C}} = CH - CH_2 - \right]_n$

B. nylon-66

$$\left[-NH - (CH_2)_6 - NH - CO - (CH_2)_4 - \overset{O}{\overset{||}{C}} - \right]_n$$

(C) terylene :

C. terylene : 

D. $PMMA$: $\left[-CH_2 - \underset{COOCH_3}{\overset{CH_3}{\overset{|}{\underset{|}{C}}}} - \right]_n$

Answer: C

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40. Which of the following has ester linkage ?

A. Nylon-6,6

B. Bakelite

C. Terylene

D. PVC

Answer: C

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41. A condensation polymer among the following polymer is

A. Teflon

B. Polystyrene

C. PVC

D. Dacron

Answer: D

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42. Nylon-6 is :

A. Polyamide

B. Polyester

C. Polystyrene

D. Polyvinyl

Answer: A

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43. Teflon is a polymer of:

A. Tetrafluoroethylene

B. Tetraiodoethylene

C. Tetrabromoethylene

D. Tetrachloroethylene

Answer: A

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44. Which of the following is used in tyre cords ?

A. Terylene

B. Polyethylene

C. Polypropylene

D. Bakelite

Answer: D

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45. Acrilan is a hard, horny and a high melting matrial. Which of the following represent its structure?

A. $\left(-CH_2 - \underset{\underset{CN}{|}}{CH} - \right)_n$

B. $\left(-CH_2 - \underset{\underset{COOCH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - \right)_n$

C. $\left(-CH_2 - \underset{\underset{COOC_2H_5}{|}}{CH} - \right)_n$

D. $\left(-CH_2 - \underset{\underset{Cl}{|}}{CH} - \right)_n$

Answer: A

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46. Nylon threads are made up of

A. polyamide polymer

B. polyethylene polymer

C. polyvinyl polymer

D. polyester polymer

Answer: A

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47. Bakelite is a polymer of

A. $HCHO$ and acetic acid

B. $HCHO$ and phenol

C. C_2H_5OH and phenol

D. CH_3COOH and benzene

Answer: B

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48. Which of the following is a biodegradable polymer ?

A. Cellulose

B. Polythene

C. Polyvinyl chloride

D. Nylon-6

Answer: A

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49. Nylon 66 is not a :

A. condensation polymer

B. co-polymer

C. polyamide

D. homopolymer

Answer: D

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50. Which of the following is a chain-growth polymer?

A. Starch

B. Nucleic acid

C. Polystyrene

D. Protein

Answer: C

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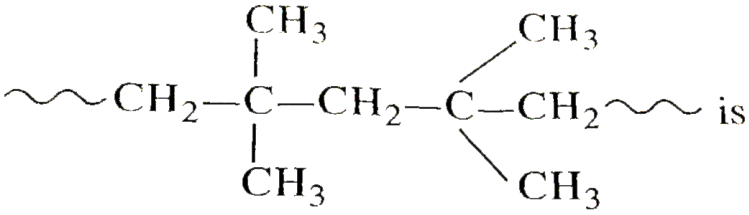
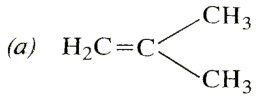
51. The monomer of polymer



is

A. 

B. $CH_3CH = CHCH_3$

C. $CH_3CH = CH_2$

D. $(CH_3)_2C = C(CH_3)_2$

Answer: A

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52. Three dimensional molecules with cross-links are formed in case of

A. thermoplastic

B. thermosetting plastic

C. both

D. none

Answer: B

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53. Which of the following is a polyamide ?

A. Teflon

B. Nylon-66

C. Terylene

D. Bakelite

Answer: B

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54. Which of the following polymers is prepared by condensation polymerisation ?

A. Teflon

B. Natural rubber

C. Styrene

D. Nylon-66

Answer: D

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55. Which of the following is not true ?

A. Buna-S is a copolymer of butadiene and styrene

B. Natural rubber is a 1, 4 polymer of isoprene

C. In vulcanisation, the formation of sulphur bridges between the chains makes the rubber harder and stronger

D.

Answer: D

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56. The monomer of Buna-S are :

A. Styrene and butadiene

B. Isoprene and butadiene

C. Vinyl chloride and sulphur

D. Butadiene

Answer: A

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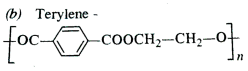
57. Struchures of some common polymers are given. Which one is not correctly represented?

A. Neoprene $\left[-CH_2 = \underset{Cl}{C} - CH - CH_2 - \right]_n$

B. Terylene 

C. Nylon 66- $\left[-NH(CH_2)_6NHCO(CH_2)_4 - CO - \right]_n$

D. Teflon $[-CF_2-CG_2-]_n$

Answer: A

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58. Among cellulose, poly (vinyl chloride), nylon and natural rubber, the polymer in which the intermolecular force of attraction is weakest is

A. nylon

B. polyvinyl chloride

C. cellulose

D. natural rubber

Answer: D

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59. The polymer containing strong intermolecular forces, e.g., hydrogen bonding is:

A. Teflon

B. nulon 6, 6

C. Polystyrene

D. natural rubber

Answer: B

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60. The monomers used for the synthesis of nylon-2-nylon-6 are :

A. caprolactum

B. alanine and amino caporic acid

C. glycine are amino caporic acid

D. hexamthylene diamine and adipic acid

Answer: C

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61. Of the following which one is classified as polyester polymer?

A. Terylene

B. Bakelite

C. Melamine

D. Nylon-6, 6

Answer: A

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62. Which of the following statements is wrong?

A. Artifical silk is derived from cellulose

B. Nylon-66 is an example of elastomer

C. The repeat unit in natural rubber is isoprene

D. Both starch and cellulose are polymers of glucose

Answer: B

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63. Which one of the following is not a condensation polymer?

A. Melamine

B. Glyptal

C. Dacron

D. Neoprene

Answer: D

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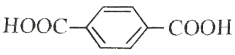
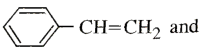
64. Which one of the following sets forms biodegradable polymer?

A. $CH_2 = CH - CH$ and $CH_2 = CH - CH = CH_2$

B. $H_2N - CH_2 - COOH$ and $H_2N - (CH_2)_5 - COOH$

C. $HO-CH_2-CH_2-OH$ and 

D. (d)  and

Answer: B

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65. In Buna-S symbol 'Bu' stands for:

A. But-1-ene

B. n-Butene

C. But-2-ene

D. 1, 3-Butadiene

Answer: D

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66. Which of the following is called polymide ?

A. Rayon

B. Nylon

C. Orlon

D. Terylene

Answer: B

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67. Identify the incorrect statement

A. Bakelite and urea-formaldehyde resins are elastomers.

B. Polyamides like nylon 6, nylon 6, 6 are the examples of fibres

C. Polymstyrene, polyvinyl and polythene are thermoplastic polymers

D. thermoplastic polymers have intermolecular forces between elastomers and fibres

Answer: A

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68. The repeating unit present in nylon-6 is:

A. $\left[NH_2(CH_2)_6NHCO(CH_2)_4CO\right]-$

B. $-\left[CO(CH_2)_5NH\right]-$

C. $-\left[CO(CH_2)_6NH\right]-$

D. $-\left[CO(CH_2)_4NH\right]-$

Answer: B

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69. The monomeric unit of teflon consists of:

A. Isoprene

B. 2-chloro-1, 3-butadiene (chloroprene)

C. Butadiene

D. Tetrachloroethylene

Answer: D

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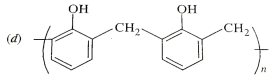
70. Which one of the following is an example of a thermosetting polymer?

A. $\left(-CH_2 - \underset{\underset{Cl}{|}}{C} = CH - CH_2 - \right)_n$

B. $\left(-CH_2 - \underset{\underset{Cl}{|}}{CH} - \right)_n$

C. $\left(-\overset{\overset{H}{|}}{N} - (CH_2)_6 - \overset{\overset{H}{|}}{N} - \overset{\overset{O}{||}}{C} - (CH_2)_4 - \overset{\overset{O}{||}}{C} - \right)_n$

D. 

Answer: D

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71. Which of the following organic compounds polymerizes to form the polyster Dacron ?

A. Propylene and para $HO - (C_6H_4) - OH$

B. Benzoic acid and ethanol

C. Terephthalic acid and ethylene glycol

D. Benzoic acid and para $HO-(C_6H_4)-OH$

Answer: C

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72. Which one is classified as a condensation polymer ?

A. Dacron

B. Neoprene

C. Terflon

D. Acrylonitrile

Answer: A

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73. Terylene is not a

A. Copolymer

B. polyester fibre

C. chain grwoth polymer

D. step growth polymer

Answer: C

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74. The polymer used in the manufacture of squeeze bottles is:

A. Polystyrene

B. Teflon

C. Polypropylene

D. low density polythene

Answer: D

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75. Which polymer is used in the manufacture of paints and lacquers?

A. polypropene

B. polyvinyl chloride

C. Bakelite

D. Glyptal

Answer: D

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76. Caprolactum is used to prepare which of the following polymer?

A. Teflon

B. terylene

C. nylon 6, 6

D. nylon 6

Answer: D

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77. Which of the following monomers form biodegradable polymers ?

A. Urea formaldehyde

B. Ethylene glycol and terephthali acid

C. 3-hydroxybutanoic acid and 3-hydroxypentanoic acid

D. Phenol and caproic acid

Answer: C

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78. Identify the heteropolymer from the list given below :

A. Polythene

B. Nylon-6

C. Teflon

D. Nylon6 , 6

Answer: D

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79. The polymer obtained with a methylene bridges by condensation polymerisation is:

A. PVC

B. Buna-S

C. Polyacrylonitrile

D. Bakelite

Answer: D

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80. Which polymer has different types of bond between the monomers from the other three

A. Cellulose

B. Wool

C. Silk

D. Nylon

Answer: A

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81. In Buna-S, the symbol S stands for :

A. sulphur

B. soft

C. styrene

D. sodium

Answer: C

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82. Which of the following statements about low density polythene is false ?

A. It is a poor conductor of electricity

B. Its synthesis requires dioxygen

C. It is used in the manufacture of buckets, dust-bins etc

D. Its synthesis requires high pressure

Answer: C

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83. Natural rubber has:

A. alternate cis-and trands-configuration

B. randomcis-and trans-configuraton

C. all cis-configuration

D. all trands-configuration

Answer: C

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84. On complete hydrogenation, natural rubber produces

A. ethylene-propylene copolymer

B. vulcanised rubber

C. Polypropylene

D. polybutylene

Answer: A

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85. The formation of which of the following polymers involves hydrolysis reaction ?

A. Bakelite

B. Nylon 6, 6

C. Terylene

D. Nylon 6

Answer: D

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86. Regarding cross-linked or network polymers, which of the following statements is incorrect?

A. They contain covalent bonds between various linear polymer chains

B. They are formed from bi-and tri-functional monomers

C. Examples are bakelite and melamine

D. They contain strong covalent bonds in their polymer chains

Answer: D

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Comprehension 1

1. Polymers are made up of small molecules called monomers. Polymers which are formed by one type of monomer called homopolymers and which are formed by more than one type of monomers are called co-polymers. Natural polymers are biodegradable whereas systhetic polymers may or may not be. Addition or chain growth polymerization involves the repeated addition of monomers to the polymer chain. The monomers are unsaturated compounds and this type of polymerization takes placed by ionic (cationic or anionic) as well as free radical a series of condensation reactions between the monomers. Each monomer normally contains two functional groups. Branch chain polymers may be condensation polymers or addition but cross linked polymers are always condensation polymers.

Which of the these are natural polymers ?

A. Proteins

B. Cellulose

C. Nucleic acid

D. All of these

Answer: D

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Comprehension 2

1. Polymers are made up of small molecules called monomers. Polymers which are formed by one type of monomer called homopolymers and which are formed by more than one type of monomers are called co-polymers. Natural polymers are biodegradable whereas systhetic polymers may or may not be. Addition or chain growth polymerization involves the repeated addition of monomers to the polymer chain. The monomers are

unsaturated compounds and this type of polymerization takes placed by ionic (cationic or anionic) as well as free radical a series of condensation reactions between the monomers. Each monomer normally contains two functional groups. Branch chain polymers may be condensation polymers or addition but cross linked polymers are always condensation polymers.

Which one of the following polymers is prepared by condensation polumerization ?

A. Terylene

B. Teflon

C. Styrene

D. Rubber

Answer: A

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Comprehension 3

1. Polymers are made up of small molecules called monomers. Polymers which are formed by one type of monomer called homopolymers and which are formed by more than one type of monomers are called co-polymers. Natural polymers are biodegradable whereas systhetic polymers may or may not be. Addition or chain growth polymerization involves the repeated addition of monomers to the polymer chain. The monomers are unsaturated compounds and this type of polymerization takes placed by ionic (cationic or anionic) as well as free radical a series of condensation reactions between the monomers. Each monomer normally contains two functional groups. Branch chain polymers may be condensation polymers or addition but cross linked polymers are always condensation polymers.

Which one of the following is biogegradable polymer ?

A. Nylon -66

B. Glyptal

C. Cellulose

D. PVC

Answer: C

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Comprehension 4

1. Polymers are made up of small molecules called monomers. Polymers which are formed by one type of monomer called homopolymers and which are formed by more than one type of monomers are called co-polymers. Natural polymers are biodegradable whereas systhetic polymers may or may not be.

Addition or chain growth polymerization involves the repeated addition of monomers to the polymer chain. The monomers are unsaturated compounds and this type of polymerization takes placed by ionic (cationic or anionic) as well as free radical a series of condensation reactions between the monomers. Each monomer normally contains two functional groups. Branch chain polymers may be condensation polymers or addition but cross linked polymers are always condensation polymers.

Which of the following is a chain growth polymer ?

A. Polystyrene

B. PTFE

C. Polybutadiene

D. All of these

Answer: D

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Comprehension 5

1. Polymers are made up of small molecules called monomers. Polymers which are formed by one type of monomer called homopolymers and which are formed by more than one type of monomers are called co-polymers. Natural polymers are biodegradable whereas systhetic polymers may or may not be. Addition or chain growth polymerization involves the repeated addition of monomers to the polymer chain. The monomers are unsaturated compounds and this type of polymerization takes placed by ionic (cationic or anionic) as well as free radical a series of condensation reactions between the monomers. Each monomer normally contains two functional groups. Branch chain polymers may be condensation polymers or addition but cross linked polymers are always condensation polymers.

Which one of the following monomers is most reactive for anionic polymerization ?

A. $C_6H_5 - CH = CH_2$

B. $C_6H_5 - \underset{CH_6H_5}{C} - CH_2$

C. $CH_3 - \underset{\underset{CH_3}{|}}{C} = CH_2$

D. $H_2C = CH_2$

Answer: B

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Comprehension 6

1. Polymers are made up of small molecules called monomers. Polymers which are formed by one type of monomer called

homopolymers and which are formed by more than one type of monomers are called co-polymers. Natural polymers are biodegradable whereas systhetic polymers may or may not be. Addition or chain growth polymerization involves the repeated addition of monomers to the polymer chain. The monomers are unsaturated compounds and this type of polymerization takes placed by ionic (cationic or anionic) as well as free radical a series of condensation reactions between the monomers. Each monomer normally contains two functional groups. Branch chain polymers may be condensation polymers or addition but cross linked polymers are always condensation polymers.

Total number of lone pairs of electrons in melamine is:

A. 4

B. 6

C. 8

D. 10

Answer: B

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Assertion Reaon Type Questions

1. Assertion : Polyproplyene is an addition polymer

Reason : It result because of chain growth polymerisation

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion

C. If assertion is correct but reason is incorrect

D. If assertion and reason are both incorrect

Answer: C

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2. Assertion : Glyptal is formed by the condensation polymerisation of ethylene glycol and terephthalic acid

Reason : Glyptal is used in the manufacture of paints and lacquers

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion

C. If assertion is correct but reason is incorrect

D. If assertion and reason are both incorrect

Answer: D

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3. Assertion : Bakelite is a thermosetting polymer

Reason : In Bakelite, there is a cross linking in the monomer chains

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion

C. If assertion is correct but reason is incorrect

D. If assertion and reason are both incorrect

Answer: A

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4. Assertion : Nylon-6, 6 is a copolymer

Reason : In Nylon-6, 6 the monomer molecules are linked through their functional groups

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion

C. If assertion is correct but reason is incorrect

D. If assertion and reason are both incorrect

Answer: C

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5. Assertion : 1, 3-Butadiene is the monomer of natural rubber

Reason : In natural rubber, the monomers are linked by cationic polymerisation

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion

C. If assertion is correct but reason is incorrect

D. If assertion and reason are both incorrect

Answer: D

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6. Assertion : Natural rubber is vulcansied through cross-linking

Reason : Vulcanisation of natural rubber is done with the help of molten sulphur

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion

C. If assertion is correct but reason is incorrect

D. If assertion and reason are both incorrect

Answer: A

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7. Assertion : Nylon-6, 6, is a polymade

Reason : In Nylon 6, 6 the monomers are adipic acid and hexxamethylene diamine

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion

C. If assertion is correct but reason is incorrect

D. If assertion and reason are both incorrect

Answer: B

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8. Assertion : HDPE is a linear chain polymer

Reason : The monomer chain in HDPE are very closely packed

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion

C. If assertion is correct but reason is incorrect

D. If assertion and reason are both incorrect

Answer: A

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9. Assertion : Neoprene can be further hardened by heating on the presence of sulpur

Reason : Neoprene contains allylic double bonds which help in introducing sulpur bridges between different polymer chams

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion

C. If assertion is correct but reason is incorrect

D. If assertion and reason are both incorrect

Answer: A

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10. Assertion : Bakelite is formed when novalac is heated with formaldehyde and it is a thermosetting polymer.

Reason : Bakelite is an infusible solid mass

A. If both assertion and reason are correct and reason is correct explanation for assertion

B. If both assertion and reason are correct but reason is not correct explanation for assertion

C. If assertion is correct but reason is incorrect

D. If assertion and reason are both incorrect

Answer: A

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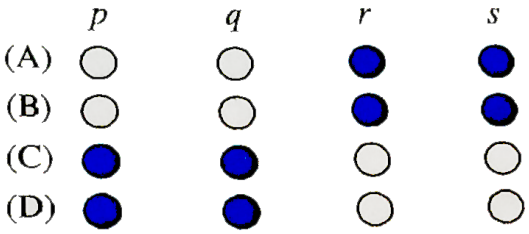
Matrix

1. Match the following columns

Column I	Column II
(A) Nylon-6	(p) Addition polymer
(B) Bakelite	(q) Chain growth polymer
(C) LDP	(r) Condensation polymer
(D) Natural rubber	(s) Step growth polymer.



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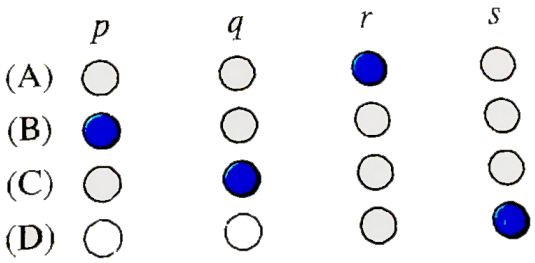
2. Match the following columns

Column I	**Column II**
(A) Natural rubber latex	(*p*) Chloroprene
(B) Synthetic rubber	(*q*) Urea-formaldehyde resins
(C) Wood laminations	(*r*) *cis*-polyisoprene
(D) Starch	(*s*) Glycosidic linkage.



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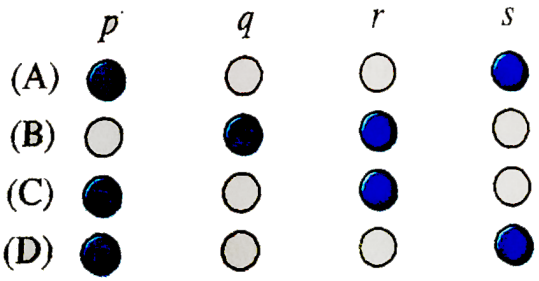
3. Match the following columns

Column I	Column II
(A) Cellulose	(p) Natural polymer
(B) Nylon-6, 6	(q) Synthetic polymer
(C) Proteins	(r) Amide linkage
(D) Starch	(s) Glycosidic linkage.



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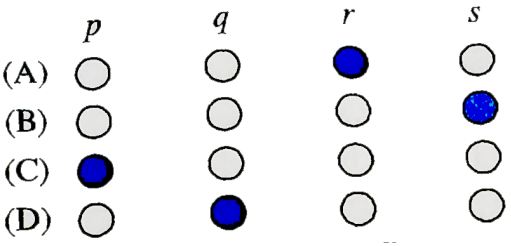
4. Match the following columns

Column I (List of Polymers)	Column II (List of Monomers)
(A) Dacron	(*p*) Phenol and formaldehyde
(B) Nylon-6, 6	(*q*) Buta-1, 3-diene and styrene
(C) Bakelite	(*r*) Ethylene glycol and terephthalic acid
(D) Buna-S	(*s*) Hexamethylene diamine and adipic acid



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5. Match the following columns

Column I	Column II
(*i*) Biodegradable polymer	(*p*) 3 - Hydroxybutanoic acid
(*ii*) Bakelite	(*q*) phenol
(*iii*) Neoprene	(*r*) 2-chlorobuta-1,3 - diene
(*iv*) Glyptal	(s) Phthalic acid

(A) (*i*) – (*p*); (*ii*) – (*q*); (*iii*) – (*r*); (*iv*) – (*s*)

(B) (*i*) – (*p*); (*ii*) – (*p*); (*iii*) – (*r*); (*iv*) – (*s*)

(C) (*i*) – (*p*); (*ii*) – (*q*); (*iii*) – (*s*); (*iv*) – (*r*)

(D) (*i*) – (*s*); (*ii*) – (*r*); (*iii*) – (*p*); (*iv*) – (*q*)

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