



CHEMISTRY

BOOKS - KALYANI CHEMISTRY (ENGLISH)

POLYMERS

Exercise Part I Objective Questions Fill In The Blanks

1. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Proteins are polymers.



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2. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Wool is an example of polymers while nylon-6,6 is an example of polymers.



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3. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Isoprene is the monomer of

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4. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Depending upon the growth of chain, two types of polymerization are and

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5. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium,

dimethyl terephthalate)

..... polymer is used for making unbreakable plates and cups.

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6. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Bakelite is a common example of plastics.

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7. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543,

100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Nylon-6,6 is an example of polymers.



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8. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

In fibres, the chains are held together bybonds.



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9. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting,

addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Elastomers are the polymers in which the polymer chains are held together by weak forces.

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10. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Polythene is an example ofpolymer.

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11. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Polymerization of ethene at K temperature and atmospheric pressure in presence of O_2 forms polythene.



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12. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

When hexamethylenediamine is condensed with adipic acid at K temperature, nylon-6,6 is formed.

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13. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Polystyrene is formed by the polymerization of styrene in presence of as initiator.

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14. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, cynoethene, thermo,

thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Acrylon has the formula

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15. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

When tetrafluoroethylene is subjected to polymerization in presence of, PTFE is formed.

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16. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

In the synthesis of terylene,can be used instead of terephthalic acid for better yield.



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17. Fill in the blanks by choosing the appropriate word/words from those given in the brackets : (Natural, synthetic, step-growth, chain-growth, natural rubber, synthetic rubber, melamine, thermo, thermosetting, addition, condensation, hydrogen bonds, van der Waals', 373-573, 543, 100, 10, benzoyl peroxide, acetyl peroxide, amide, butadiene, natrium, dimethyl terephthalate)

Wool is an example of polymers while nylon-6,6 is an example of polymers.

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18. The word Buna is derived by combining first two letters ofand with first two letters of

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Exercise Part I Objective Questions Complete The Following Statements By Selecting The Correct Alternative From The Choices Given

1. Natural polymer out of the following is

A. Oils

B. Protein

C. Buna-S

D. Polythene

Answer: B



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2. An example of addition polymer is

A. PVC

B. Bakelite

C. Cellulose

D. Nylon-6,6

Answer: A



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3. A copolymer out of the following is

A. PVC

B. Nylon-6,6

C. Teflon

D. Polybutadiene

Answer: B

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4. Give the structure of the monomer of PVC.

A. ethylene

B. chloroethene

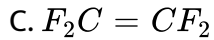
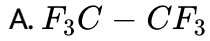
C. vinyl cyanide

D. none of these

Answer: B

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5. The repeating units of PTFE are



D. none of these

Answer: C



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6. The S in buna-S refers to

A. styrene

B. sulfur

C. sodium

D. none of these

Answer: A



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7. Due to vulcanization, rubber becomes

A. soft

B. hard

C. less elastic

D. soluble in water

Answer: B



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8. The inter-particle forces between linear chains in nylon-6,6 are

- A. ionic bonds
- B. covalent bonds
- C. hydrogen bond
- D. none of these

Answer: C

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9. Caprolactum is a monomer of

- A. glyptal
- B. nylon-6
- C. melamine
- D. PTFE

Answer: B

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10. The monomer of acrilon is

- A. vinyl cyanide
- B. vinyl chloride
- C. vinyl bromide
- D. vinyl alcohol

Answer: A



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11. Terylene is obtained by the condensation of

- A. urea and formaldehyde
- B. acrylic acid and hexamethylenediamine
- C. ethyleneglycol and phthalic acid

D. malonic acid and hexamethylenediamine

Answer: C

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12. Polymer obtained by the condensation polymerization is

A. polythene

B. teflon

C. phenol-formaldehyde resin

D. nitrile rubber.

Answer: C

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13. Bakelite is obtained from phenol by reaction with

A. acetaldehyde

B. acetal

C. formaldehyde

D. chlorobenzene

Answer: C

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14. Natural rubber is a:

A. polyester

B. polyamide

C. polyisoprene

D. polysaccharide

Answer: C

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15. $CH_2 = CH_2$ is

- A. monomer
- B. polymer
- C. isomer
- D. epimer

Answer: A



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16. Natural rubber is a polymer of

- A. acrylic acid
- B. isoprene
- C. 1,3-butadiene

D. ethylene

Answer: B



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17. A raw material used in making nylon is

A. adipic acid

B. butadiene

C. ethylene

D. methyl methacrylate

Answer: A



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18. Nylon-6,6 is an example of

A. polystyrene

B. polypropylene

C. polyamide

D. polyisoprene

Answer: C

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19. Natural silk fibre is

A. polyester

B. polyamide

C. polyacid

D. polysaccharide

Answer: B

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20. 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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21. Which of the following is not a semi-synthetic polymer ?

- A. cis-polyisoprene
- B. Cellulose nitrate
- C. Cellulose acetate

D. Vulcanised rubber

Answer: A



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22. The commercial name of polyacrylonitrile is

A. Dacron

B. Orlon (acrilan)

C. PVC

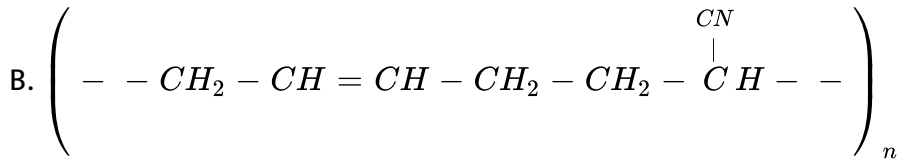
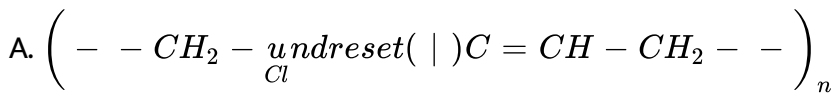
D. Bakelite

Answer: B

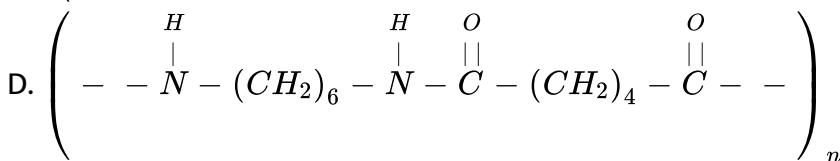
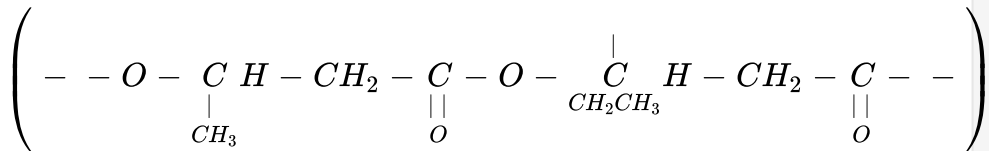


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23. Which of the following polymer is biodegradable ?



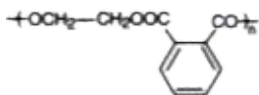
C.



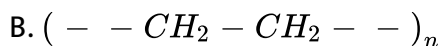
Answer: C

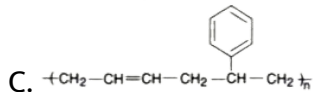
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24. In which of the following polymers ethylene glycol is one of the monomer units ?

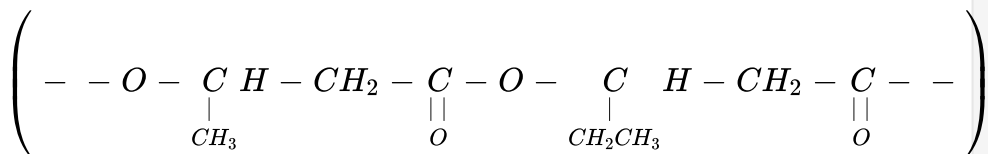


A.





D.



Answer: A

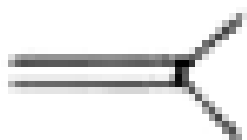
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25. Which of the following statements is not true about low density polythene ?

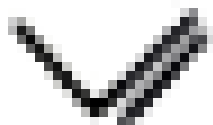
- A. Tough
- B. Hard
- C. Poor conductor of electricity
- D. Highly branched structure

Answer: D

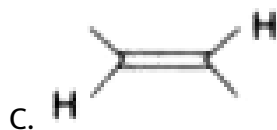
26. $\left(- - CH_2 - \overset{\overset{CH_3}{|}}{C} - CH_2 - \overset{\overset{CH_3}{|}}{C} - - \right)_n$ is a polymer having monomer units.



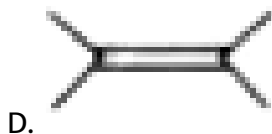
A.



B.



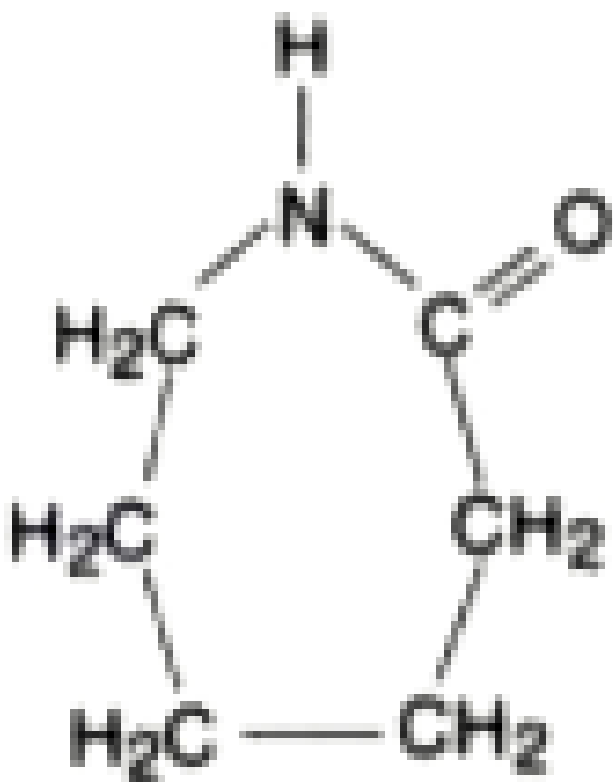
C.



D.

Answer: A

27. Which of the following polymer can be formed by using the monomer unit?



A. Nylon 6, 6

B. Nylon-2-nylon-6

C. Melamine polymer

D. Nylon-6

Answer: D



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28. Buna-S is formed by the condensation of

A. sodium and styrene

B. styrene and ethene

C. sodium and butadiene

D. butadiene and styrene

Answer: D



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29. The material used as coating material for non-stick pans is :

A. polystyrene

B. terylene

C. teflon

D. PVC

Answer: C



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30. The fibre obtained by the condensation of hexamethylenediamine and adipic acid is :

A. Nylon-6,6

B. Dacron

C. Teflon

D. Polyester

Answer: A

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Exercise Part I Objective Questions

1. Correct the following statements by changing the underlined part of the sentence.

Proteins are formed by the addition polymerization of aminoacids.

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2. Correct the following statements by changing the underlined part of the sentence.

Bakelite is a condensation polymer of ethanol and formaldehyde.

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3. Correct the following statements by changing the underlined part of the sentence.

PAN is prepared from butadiene.



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4. Correct the following statements by changing the underlined part of the sentence.

Polystyrene is an example of thermosetting plastics.



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5. Correct the following statements by changing the underlined part of the sentence.

Repeating unit of teflon is $H_2C = CF_2$.



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6. Correct the following statements by changing the underlined part of the sentence.

Polyisoprene is an example of step-growth polymer.

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7. Correct the following statements by changing the underlined part of the sentence.

Neoprene is a polymer of isoprene

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8. Correct the following statements by changing the underlined part of the sentence.

Natural rubber is a condensation polymer.

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9. Correct the following statements by changing the underlined part of the sentence.

Neoprene is a biopolymer.

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10. Correct the following statements by changing the underlined part of the sentence.

Teflon is an example of copolymers

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11. Correct the following statements by changing the underlined part of the sentence.

Teflon is an example of copolymers

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12. Correct the following statements by changing the underlined part of the sentence.

Both polystyrene and terylene are addition polymers.

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Exercise Part I Objective Questions Match The Following

1. Match the following

- | | |
|------------------------|-----------------------------|
| (i) Starch | (a) Natural rubber |
| (ii) Bakelite | (b) Nylon-6 |
| (iii) cis-polyisoprene | (c) 1-3-butadiene + styrene |
| (iv) Caprolatum | (d) Phenol + formaldehyde |
| (v) Buna-S | (e) Glucose |

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Exercise Part II Descriptive Questions Very Short Answer Questions

1. What are polymers ?



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2. What are monomers ?



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3. What are natural and synthetic polymers.



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



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

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6. Define the term 'polymerisation'

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7. Is $(NHCHR - CO)_n$, a homopolymer or copolymer?

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8. What is meant by degree of polymerization ?

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9. What are homochain polymers?



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



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11. What is meant by addition polymerization ?



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12. What is meant by condensation polymerization?



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13. Classify the following as addition and condensation polymers:

Terylene, Bakelite, Polyvinyl chloride, Polythene.



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14. Name the different polymers based on the mode of polymerization.

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15. What are the alternative terms for addition polymerization and condensation polymerisation?

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16. What is the primary structural feature necessary for a molecule to make it useful in a condensation polymerization reaction ?

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





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18. Arrange the following polymers in increasing order of their intermolecular forces.

(i) (Nylon-6, 6, Buna-S, Polythene.

(ii) Nylon-6, Neoprene, Polyvinyl chloride.



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19. Give an example of elastomers .



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20. Name a natural elastomer.



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21. Why nylon makes good fibres ?



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22. What does the part '6,6' mean in the name nylon-6,6 ?



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



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24. Explain the term thermosetting plastics and give two examples.



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25. Write the monomers used for getting the following polymers:

Polyvinyl chloride

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26. Write the monomers used for getting the following polymers:

Teflon

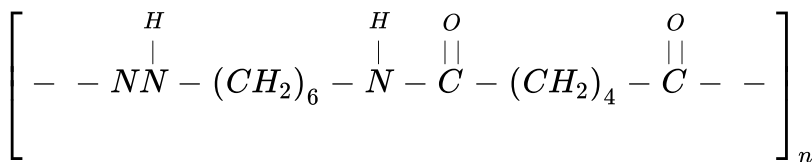
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27. Write the monomers used for getting the following polymers:

Bakelite

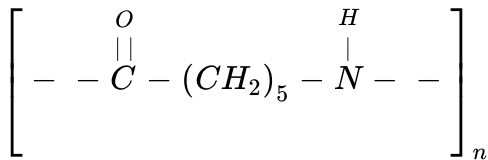
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28. Write the names of the monomers of the following polymers:



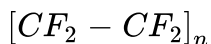
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29. Write the names of the monomers of the following polymers:



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



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31. What is a plasticizer?

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32. Why plasticizers are used during manufacturing of plastics?

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33. What is gutta-percha?

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34. What are the monomers of SBR.

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35. Name the monomers of nylon-2 or nylon-6.

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36. What is the difference between nylon-6 and nylon-6, 6? Give their formulae

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37. What is vulcanization and when it is done?

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38. Why does rubber become stiff on stretching?

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39. Why do all simple organic molecules not produce polymers?

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40. Why does natural rubber need compounding?

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41. Write the name and structure of one of the common initiators used in free radical addition polymerisation.

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42. How do double bonds in rubber molecules influence their structure and reactivity ?

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43. Name a synthetic polymer which is an amide.

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44. Name a synthetic polymer which is an ester.

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45. Give the name of the polymer which is used for making non stick utensils.

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46. Name a copolymer which is used for making non-breakable plastic crockery.

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47. Give name and structure of monomer of polyvinyl chloride (PVC).

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48. How is nylon 6, 6 synthesised ?

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49. Name two synthetic rubbers.

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50. Give one example of copolymer.

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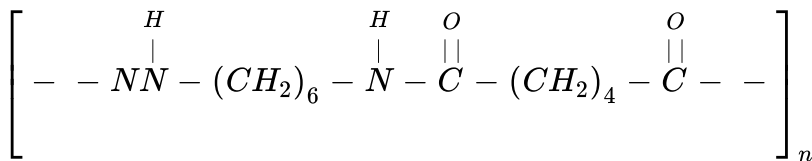
51. Which is the monomer unit of natural rubber?

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52. Write the monomer units of bakelite.

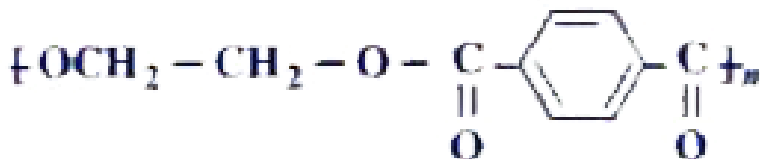
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53. Write the names of the monomers of the following polymers:



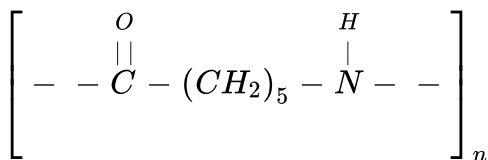
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54. Write the names of monomers of the following polymer :



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



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Exercise Part II Descriptive Questions Short Answer Questions

1. Define the following terms

Polymer

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Exercise Part II Descriptive Questions Short Answer Questions

1. Define the following terms

polymerization

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2. Define the following terms

degree of polymerization

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3. Define the following terms

monomers

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4. Give two differences between linear polymers and branched chain polymers.

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5. Give two differences between condensation polymers and addition polymers.

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6. How are polymers classified according to their structure? Give important features of each class. Also give two examples of each class.



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7. Explain the chain-growth and step-growth polymerization.

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8. How are teflon and nylon-6 synthesised ? Identify the type of polymerization on the basis of chain-growth and step-growth polymerization.

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9. How is dacron prepared ? Name the type to which this polymer belongs?

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10. How will you classify polymers on the basis of molecular forces?

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11. Briefly describe the following terms giving one example of each.

(i) polyolefins (ii) polyamides (iii) polyesters.

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12. Define the following terms.

thermoplastics

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13. Define the following terms:

Thermosetting plastics

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14. Define the following terms.

elastomers

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15. Give two points of difference between thermoplastic and thermosetting polymers.

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16. What are copolymers ? Give the chemical equation for the preparation of terylene.

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17. What are elastomers ? Give the chemical equation for the preparation of Buna-S.

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18. Mention which of the following are addition polymers?

(i) terylene (ii) nylon-6,6

(iii) neoprene (iv) teflon.

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19. What is teflon? How is it synthesised ? Is it an addition or condensation polymer ?

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20. What is the difference between nylon-6 and nylon-6, 6? Give their formulae

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21. What is Buna-S ? How is it synthesised ?

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22. Name any two plasticizers.

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23. Write the formula of compound of which PVC is a polymerized product.

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24. What is the function of sulfur in vulcanization of rubber?

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25. Give two uses of caprolactam.

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26. How are Buna-S and Terylene synthesized ? Give chemical equations

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27. What is the difference between the two notations : nylon-6 and nylon-6, 6 ? Write one use of nylon. Specify the property responsible for this use.

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28. How is PTFE prepared ? Give its two uses.

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29. How is bakelite made and what is its major use? Why is bakelite a thermosetting polymer ?

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30. Can a copolymer be formed in both addition and condensation polymerization ? Explain with examples.

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Exercise Part II Descriptive Questions Long Answer Questions

1. What are polymers? Why are they called macromolecules ? How are the polymers classified on the basis of their source?



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2. How are polymers classified according to their structure? Give important features of each class. Also give two examples of each class.



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3. Explain the chain-growth and step-growth polymerization.



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4. Write the mechanism of free radical polymerization of ethene.



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5. How does the presence of benzoquinone inhibit the free radical polymerization of a vinyl derivative.

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6. What are chain-growth polymers ?

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7. Describe briefly:

Radical polymerization

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8. Describe briefly:

Cationic polymerization

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9. Describe briefly:

Anionic polymerization

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10. Why should one always use purest monomer in free radical polymerization ?

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11. Elaborate the structure of natural rubber.

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12. How do double bonds in rubber molecules influence their structure and reactivity ?

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13. What is vulcanization? How does vulcanization improve the quality of natural and synthetic rubbers.

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14. What is the monomer of natural rubber? What is the difference in the structures of natural rubber and gutta percha?

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15. What is vulcanization ? Why is it done? Why is diphenyl added to rubber?

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16. Why is neoprene non-inflammable? Give one of its uses.

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17. Define the following terms:

Thermoplastics



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18. Define the following terms:

Thermosetting plastics



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19. Define the following terms:

Elastomers



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20. Give two points of difference between thermoplastic and thermosetting polymers.

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21. Give a brief description of natural and synthetic polymers

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22. What do you mean by copolymerization ? What are its advantages over homopolymerization ?

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23. How is dacron prepared ? Name the type to which this polymer belongs?

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24. How will you prepare the following

(a) Buna-S (b) Bakelite (c) Teflon (d) PVC (e) Nylon 6,6 (f) Polystyrene

Give one use of in each case.

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25. What are low density and high density polythenes? How are these manufactured ? Why do these differ in densities?

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26. How are teflon and nylon-6 synthesised ? Identify the type of polymerization on the basis of chain-growth and step-growth polymerization.

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27. How is nylon-6, 10 prepared ?

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28. What is teflon? What are its uses ?

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29. Write the names and structures of the monomers of bakelite. To which class (thermoplastic or thermosetting) does bakelite belong ? Give reasons.

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30. What is polypropene ? Give its two important uses.

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31. Give one example of a polyester used as a synthetic fibre.

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32. Name the compounds from which this polyester is prepared.

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33. What type of condensation takes place in the formation of the polyester from these compounds?

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34. Differentiate between thermoplastic and thermosetting polymers .
Give one example of each.

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35. Give the monomers of the following polymers:

(i) Teflon (ii) Bakelite.



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36. Give any one example of a cross-linked synthetic polymer.



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37. With reference to the polymer named by you:

(1) Write the compounds from which it is prepared. (2) Give the physical property of the cross-linked synthetic polymer.



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1. What are polyolefins ? Give the reaction for the preparation of polythene, a polyolefin.

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2. Give one example each of addition and condensation polymer. Name the monomers in each case.

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3. What type of polymerization takes place when a polyester is formed ? Give one example of a polyester and name the monomers from which it is formed.

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4. Give two examples of natural polymers.





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5. What are thermoplastics and thermosetting plastics ? Give one example of each kind.



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6. What are polyamides? Give one example of a polyamide and name its monomers



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7. Name the type of polymerization (addition or condensation) and name the monomers in each of the following polymers:

(i) Protein (ii) Polyethylene



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8. Natural rubber is a:

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9. Name the monomers and the type of polymerization in each of the following polymers:

(a) Polyester (b) Bakelite

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10. Name the monomers and the type of polymerization in each of the following polymers:

1. Terylene 2. Polyvinyl chloride

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