



## CHEMISTRY

### BOOKS - R SHARMA CHEMISTRY (HINGLISH)

## POLYMERS

#### Follow Up Test 1

1. Which of the following statement is incorrect about polymers?

A. Polymers are substances made of recurring structural units, each of which can be regarded as derived from a specific compound called a monomer.

B. Polymers consist of macromolecules and a sample of a given polymer very often is a mixture of macromolecules with whereas with different molecular masses.

C. Polymers made from a single monomeric species are called homopolymers whereas those made up of two or more different monomeric species are called copolymers.

D. Polymers do not occur in nature.

**Answer: D**



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2. Which of the following is not a natural polymer?

- A. Neoprene
- B. Gun-cotton
- C. Silk
- D. Both (1) and (2)

**Answer: D**

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**3. Which of the following is cross-linked or network polymer?**

- A. Polyvinyl chloride
- B. High density polythene
- C. Bakelite
- D. Low density polythene

**Answer: C**

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4. The polymers made by addition polymerization from two different monomers are termed as

- A. addition polymers
- B. copolymers
- C. condensation polymers
- D. homopolymers

**Answer: B**

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5. Magnitude of intermolecular forces is maximum in case of

- A. fibres
- B. elastomers
- C. thermoplastics
- D. thermosetting polymers

**Answer: A**



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6. Thermoplastics are the polymers

- A. that can be moulded at room temperature or above but when heated more strongly become hard infusible due to formation of cross-links between the polymer chains.

- B. that are hard at room temperature but on heating became soft and viscous, and can be moulded
- C. that are amorphous and have elastic properties.
- D. from which fibres used in textiles can be made

**Answer: B**



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7. Which of the following is an example of thermoplastic polymer?

- A. Bakelite
- B. Melmac
- C. Urea-formaldehyde resin

D. Celluloid

**Answer: D**



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## Follow Up Test 2

1. Which of the following is incorrect for addition polymerisation?

- A. In this type of polymerisation, the molecules of the same monomer of different monomers simply add together on a large scale to form a polymer
- B. The monomers used are unsaturated compounds

C. This mode of polymerisation can take place only through formation of free radicals

D. This process of polymerisation is also called chain growth polymerisation is also called chain growth polymerisation

**Answer: C**



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2. Which of the following compounds may be employed as a free radical initiator for free radical polymerizations?

A. Azobisisobutyronitrile (*AIBN*)

B. Di-tert-butyl peroxide



C. Dibenzyl peroxide

D. All of these

**Answer: D**



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3. Which of the following is generally prepared by chain growth free-radical polymerization?

A. Polyacrylonitrile

B. Polytetrafluoroethylene

C. Polytetrafluoroethylene

D. High density polythene

**Answer: C**



4. Which of the following statement is correct about Ziegler-Natta Catalyst?

A. Ziegler-Natta catalyst is a coordination polymerization catalyst

B. The polymers of alkenes obtained by using Ziegler - Natta catalyst are linear and have practically no chain branching

C. The polymerization of alkenes using Ziegler-Natta catalyst, syndiotactic controlled and either of the isotactic, syndiotactic or atactic forms can be produced depending on the systems used

D. All of these

**Answer: D**

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5. Among the polymers, which one is generally prepared by cationic polymerization?

A. Polymerization

B. Teflon

C. Orlon

D. Polypropylene

**Answer: A**

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6. Anionic polymerization may be accomplished with

A. styrene

B. acrylonitrile

C. methyl methacrylate

D. All of these

**Answer: D**



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**Follow Up Test 3**

1. The polymerization process in which two or more chemically different monomers take part to form a polymer is called

A. addition polymerization

B. copolymerization

C. chain polymerization

D. homopolymerization

**Answer: B**



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2. Copolymerization of vinyl chloride and vinylidene chloride in a 1 : 4 ratio lead to the formation of a well known polymer called

A. nylon

B. orlon

C. saran

D. dacron

**Answer: C**



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**3.** Lexan is a polymer of usually high impact strength and is used to make helmets and bullet proof glass. It is obtained by copolymerization of

A. phenol and formaldehyde

B. bisphenol *A* and biphenyl carbonate.

C. urea and formaldehyde

D. phthalic acid and ethylene glycol

**Answer: B**

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**4. Bubble gum contains**

A. buna - *S* rubber

B. buna - *N* rubber

C. neoprene

D. natural rubber

**Answer: A**

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5. Melmac, a thermosetting plastic often used to make plastic dishes, is prepared by copolymerization of

- A. phenol and formaldehyde
- B. urea and formaldehyde
- C. melamine and formaldehyde
- D. terephthalic acid and ethylene glycol

**Answer: C**



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6. The copolymer of vinyl chloride and acrylonitrile, which is used for synthetic hair wigs, is called



A. orlon

B. *PVC*

C. nylon

D. dynel

**Answer: D**



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7. Rubber is vulcanized to form

A. sulphide and disulphide cross-links between the polymer chains to provide sufficient rigidity that makes rubber more elastic

- B. limited cross-link (by controlled vulcanization) to make rubber more elastic
- C. extensive cross-links (by extensive vulcanization) to make rubber highly resistance to wear and abrasion
- D. All of these

**Answer: D**



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**8. Buna -*S* rubber (*SBR*) is a copolymer of**

- A. buta - 1,3- diene and styrene
- B. beta -1,3-diene and isoprene
- C. beta-1,3-diene and chloroprene

D. beta-1,3-diene and acrylonitrile

**Answer: A**

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9. Gutta-percha, a naturally occurring highly crystalline non elastic rubber, consists of

A. 1,4- polyisoprenes in which all the double bonds have Z- configurations

B. 1, 4 – polyisoprenes in which all the double bonds have E- configurations

C. a mixture of  $Z - 1, 4 -$  polyisoprence and  $E - 1, 4-$  polyisoprences

D. 1,4- polyisoprenes in which some double bonds have Z- configurations and some other E- configurations

**Answer: B**

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## Follow Up Test 4

1. Which of the following statement about polymers in correct?

A. The number - average molecular  $\overline{M}_n$  and the weight - average molecular mass,  $\overline{M}_w$  are expressed by the equations

$$\overline{M}_n = \frac{\sum N_i M_i}{\sum N_i} \text{ and } \overline{M}_w = \frac{\sum N_i M_i^2}{\sum N_i M_i}$$

where  $N_i$  is the number of molecular mass  $M_i$  of the species  $i$ .

- B. Some physical properties such as freezing point, vapor pressure and osmotic pressure are related directly to  $\overline{M}_n$  whereas some other physical properties like light scattering, sedimentation and diffusion constant are related directly to  $\overline{M}_w$
- C. The ratio of the weight - average and number - average molecular masses,  $\overline{M}_w / \overline{M}_n$  is called polydispersity index (*PDI*),
- D. All of these

**Answer: D**



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2. The poly dispersity index ( $PDI$ ) is for - natural polymers

A. unit

B. higher than unity

C. smaller than unity

D. higher of smaller than unity depending the nature of monomer

**Answer: A**



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3.  $PHBV$  is a copolymer of

- A. 2 - hydroxybutanoic acid and 3 - hydroxypentanoic acid
- B. 3 - hydroxybutanoic acid and 3 - hydroxypentanoic acid
- C. 3 - hydroxybutanoic acid and 2 - hydroxypentanoic acid
- D. 2 - hydroxybutanoic acid and 2 - hydroxypentanoic acid

**Answer: B**

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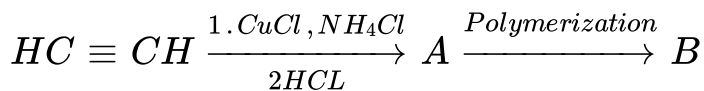
4. Nylon - 2 nylon - 6 is a copolymer of glycine and

- A. aminocaproic acid
- B. aminocaprylic acid
- C. aminocaproic acid
- D. aminovaleric acid

Answer: C

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5. Consider the following sequence of reaction



The polymer ( $B$ ) is

A. PVC

B. polystyrene

C. Polyisoprene

D. neorene

Answer: D

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6. Nylon 6, 6 is an example of

- A. polyamide
- B. polyester
- C. polyurethane
- D. polycarbonate

**Answer: A**



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**Question Bank Level I**

1. Natural rubber is a polymer of

A. ethyne

B. butadiene

C. styrene

D. isoprene

**Answer: D**



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**2. In elastomers, the intermolecular forces are**

A. strong

B. weak

C. nil

D. intermediate

**Answer: B**



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3. An example of biopolymer is

A. teflon

B. neoprene

C. nylon-66

D. *DNA*

**Answer: D**



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4. Terylene is a condensation polymer of ethylene glycol and

A. benzoic acid

B. phthalic acid

C. terephthalic acid

D. salicylic acid

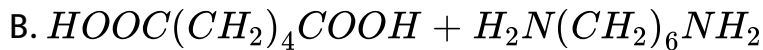
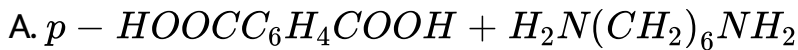
**Answer: C**



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**Question Bank Level II**

1. Nylon - 6,6 is a polyamide obtained by the reaction of



**Answer: B**



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2. Bakelite is prepared by the reaction between

A. urea and formaldehyde

B. melamine and formaldehyde

C. phenol and formaldehyde

D. aniline and formaldehyde

**Answer: C**

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

- A. Glyptal
- B. Polypropen
- C. Ployvinylchloride
- D. Bakelite

**Answer: A**

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4. Which one of the following is used to make 'non-stick' cookware?

A. *PVC*

B. polystyrene

C. Polyethyleneterephthalate

D. Polytetrafluoroethylene

**Answer: D**



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### Question Bank Level iii

1. Which one is not classified as a condensation polymer?

(i) teflon

(ii) Orlon

(iii) Dacron

(iv) Neoprene

A. (i), (ii), (iv)

B. (i), (ii), (iii) (iv)

C. (i),(ii)

D. (ii), (iv)

**Answer: A**



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**2. The total number of lone-pairs of electrons in melamine is**

A. six



B. five

C. four

D. three

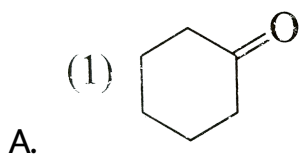
**Answer: A**

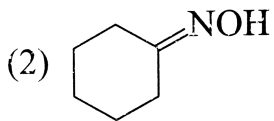


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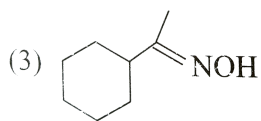
## Question Bank Level Iv

1. Caprolactam, a starting material for the manufacture of nylon 6, is prepared by sulphuric acid catalysed reaction of

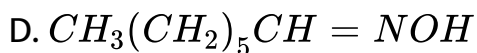




B.



C.

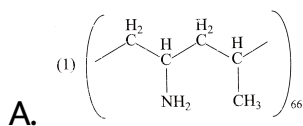


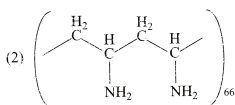
Answer: D

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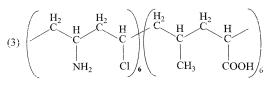
Archives

1. Which one of the following represent nylon 6,6 polymer?

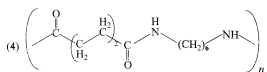




B.



C.



D.

**Answer: B**

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**2. Natural rubber has:**

A. Random - cis and trans- configuration

B. All cis - configuration

C. All trans- configuration

D. Alternate cis- and trans-configuration

**Answer: B**



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3. Caprolactam, is used for the manufacture of

A. Terylon

B. Nylon-6,6

C. Nylon-6

D. Teflon

**Answer: C**



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4. Biodegradable polymer which can be produced from glycine and aminocaproic acid is

A. Nylon 6,6

B. Nylon-2-nylon-6

C. *PHBV*

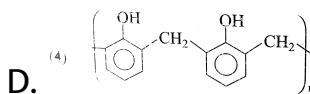
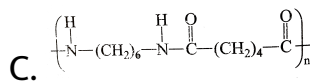
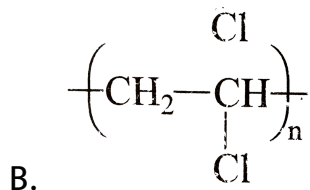
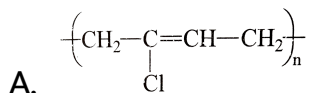
D. Buna - N

**Answer: B**



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



Answer: D

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6. Which of the following organic compounds polymerize to form the polyester Dacron?

A. Propylene and para  $\text{HO} - (\text{C}_6\text{H}_4) - \text{OH}$

B. Benzoic acid and ethanol

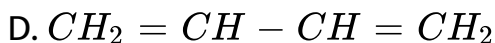
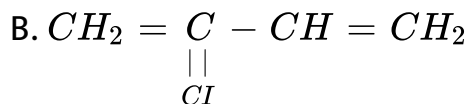
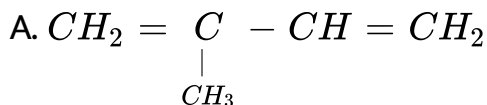
C. Terephthalic acid and ethylene glycol

D. Benzoic acid and styrene in the following?

**Answer: C**

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7. Which is the monomer of neoprene in the following?



**Answer: B**

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8. Nylon is an example of

- A. Polysaccharide
- B. Polyamide
- C. Polythene
- D. Polyester

**Answer: B**

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

- A. Melamine



B. Glyptal

C. Dacron

D. Neoprene

**Answer: D**



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**10. Which of the following statements is false?**

A. Artificial silk is derived from cellulose

B. Nylon - 6,6, is an example of elastomer

C. The repeat unit in natural rubber is isoprene

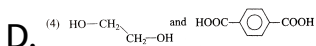
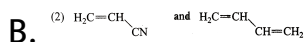
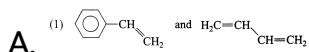
D. Both starch and cellulose are polymers of glucose

**Answer: B**



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



Answer: C



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

A. Nylon 6,6

B. Terylene

C. Bakelite

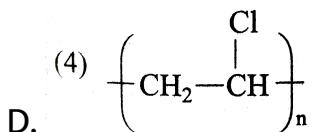
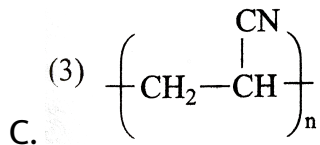
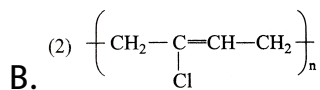
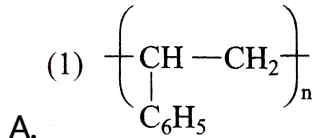
D. Melamine

**Answer: B**



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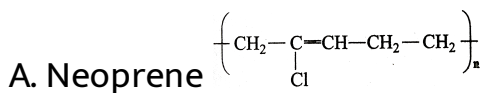
13. Which of the following structures represents neoprene polymers?



**Answer: B**

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**14.** Structures of some common polymers are given. Which one is not correctly represented?



B. Terylene  $\left( \text{OC}-\text{C}_6\text{H}_4-\text{COOCH}_2-\text{CH}_2-\text{O} \right)_n$

C. Nylon 6,6  $\left( \text{NH}(\text{CH}_2)_6\text{NHCO}(\text{CH}_2)_4-\text{CO} \right)_n$

D. Teflon  $-\left( \text{CF}_2-\text{CF}_2 \right)_n$

**Answer: A**



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15. The straight chain polymer is formed by

A. hydrolysis of  $\text{CH}_3\text{SiCl}_3$  followed by condensation polymerisation

B. hydrolysis of  $(\text{CH}_3)_4\text{Si}$  by addition Polymerisation

C. hydrolysis of  $(\text{CH}_3)_2\text{SiCl}_2$  followed by condensation polymerisation

D. hydrolysis of  $(CH_3)_3SiCl$  followed by condensation polymerisation

**Answer: C**

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**16.** Which of the following statement is not true?

A. Natural rubber is a 1,4- Polymer of isoprene

B. In vulcanization, the formation of sulphur bridges between chains makes rubber harder and stronger

C. Natural rubber has the trans configuration at every doubled bond

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

**Answer: C**



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17. Which one of the following polymers is prepared by condensation polymerization?

A. Rubber

B. styrene

C. Nylon-6,6

D. Teflon

**Answer: C**



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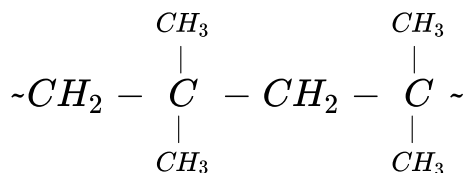
18.  $\sim [NH(CH_2)NHCO(CH_2)_4CO] \sim$  is a

- A. homopolymer
- B. copolymer
- C. addition polymer
- D. thermosetting polymer

**Answer: B**

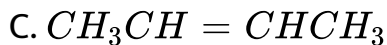
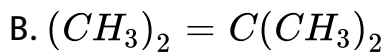
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19. The monomer of the polymer



- A.  $H_2C = C(CH_3)_2$





**Answer: A**



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**20.** Which one of the following is a chain growth polymer?

A. Starch

B. Nucleic acid

C. Polystyrene

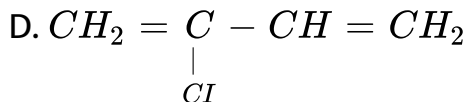
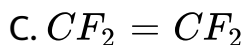
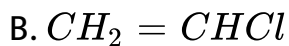
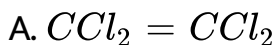
D. Protein

**Answer: C**



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21. Which one of the following monomers gives the polymer neoprene on polymerization?

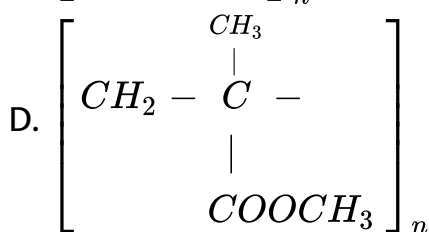
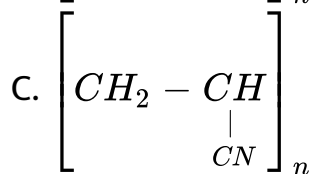
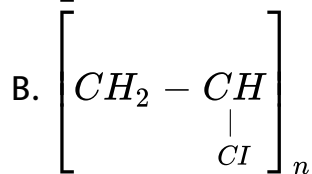
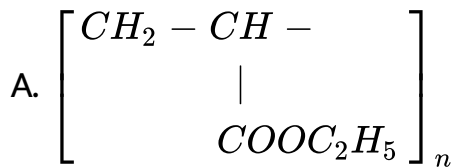


Answer: D



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



Answer: C



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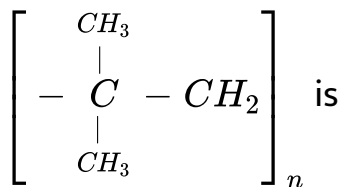
23. Cellulose is a polymer of

- A. glucose
- B. fructose
- C. ribose
- D. sucrose

**Answer: A**

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24. Monomer of



- A. styrene

B. 2-methylpropene

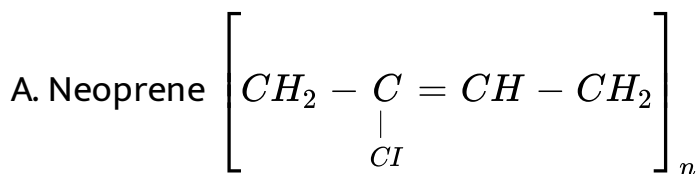
C. propylene

D. ethene

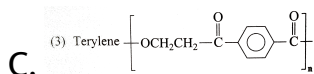
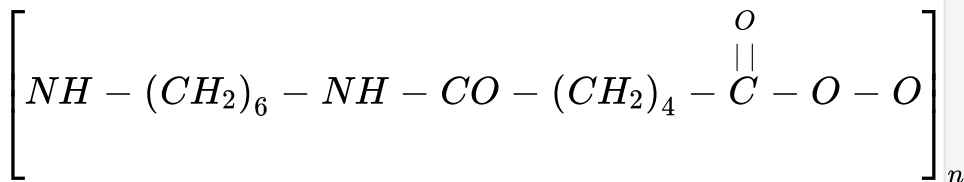
**Answer: B**

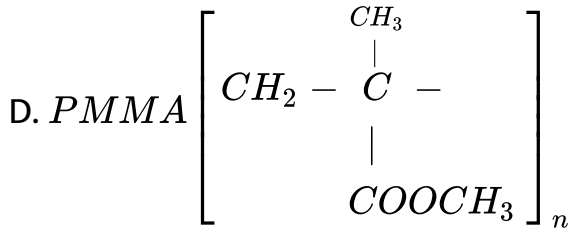
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25. Which one of the following is not correctly matched?



B. Nylon -6,6





**Answer: B**

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26.  $CF_2 = CF_2$  is a monomer of

- A. Glyptal
- B. nylon-6
- C. teflon
- D. buna-S

**Answer: C**

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## Others

1. Calculate the average molecular mass of a polymer sample in which 30% molecules have a molecular mass 20,000, 40% have 30,000, and rest have 60,000.

Strategy: Work out number average molecular mass ( $\overline{M}_n$ ) as well as weight average molecular mass ( $\overline{M}_w$ )



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