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Class: 12
Subject: chemistry
Topic: Biomolecules and polymers
No. of Questions: 25

1. Which of the following substances do(es) not fall in the category of carbohydrates?

a. Sugars

b. Starch

c. Glycerol

d. Cellulose

Sol.(c)The general formula of most of the carbohydrates can be written as $C_nH_{2n}O_n$. The formula of glycerol is $C_3H_5O_6$.

2. Which of the following does not represent a disaccharide?

a. Sucrose

b. Maltose

c. Lactose

d. Dextrose

Sol.(d)Dextrose is monosaccharide.

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3. Maltose is formed by the union of

a. one molecule of glucose and one molecule of fructose

b. one molecule of glucose and one molecule of galactose

c. two molecules of glucose

d. two molecules of galactose

Sol.(c) Maltose is formed by the union of two molecules of glucose.

4. Which of the following sugars has the largest relative sweetness with respect to sucrose?

a. Glucose

b. Fructose

c. Galactose

d. Maltose

Sol.(b)The relative sweetness of fructose is taken to be 173 while that of sucrose is taken to be 100.

5. Carbohydrates are the compounds of

a. C, H, N and O

b. C, H and O

c. C, N and H

d. N, H and O

Sol.(b)Carbohydrates are the compounds of C, H and O.

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6. The relative sweetness of sugars is measured with respect to the sugar

a. glucose
b. fructose
c. galactose
d. sucrose

Sol.(d)fact

7. Kwashiorkor is caused by the deficiency of

a. vitamins
b. hormones
c. amino acids
d. essential amino acids

Sol.(d)Essential amino acids are not synthesised by human body. These have to be supplied from outside in the diet. The lack of these amino acids causes Kwashiorkor.

8. The protein molecule present in haemoglobin is

a. thrombin
b. fibrinogen
c. globulin
d. casein

Sol(c) fact

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9. Structure of a DNA molecule is

a. linear

b. branched

c. single helix

d. double helix

Sol.(d) fact

10. Which of the following is not a lipid?

a. Oil

b. Wax

c. Cholesterol

d. Glycerol

Sol.(d)Glycerol is a poly-ol (sugar-alcohol) compound.

11. Buna-S is a

a. monomer

b. polymer

c. copolymer

d. dimer

Sol.(c)Buna-S is a copolymer. It involves two monomers: styrene ($H_2C=CHC_6H_5$) and butadiene ($H_2C=CHCH=CH_2$).

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12. Glucose is a monomer of

a. proteins
b. rubber
c. plastic
d. starch and cellulose

Sol.(d) Glucose is a monomer of starch and cellulose.

13. Oligomer is a

a. monomer
b. short-chain polymer
c. long-chain polymer
d. linear polymer

Sol.(b)Oligomer is a short-chain polymer.

14. Which of the following is a natural polymer?

a. Bakelite
b. Nylon
c. Protein
d. PVC

Sol.(c)Protein is a natural polymer.

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15. Which of the following is a synthetic polymer?

a. Starch

b. Cellulose

c. RNA

d. Terelyne

Sol.(c)Terelyne is a synthetic polymer.

16. Which of the following is an example of additional polymerisation?

a. Proteins

b. Teflon

c. Nylon-66

d. Glyptal

Sol.(b) Teflon is an example of additional polymerisation.

17. Which of the following is an example of condensation polymerisation?

a. PVC

b. Buna rubber

c. Dacron

d. Lutrex

Sol.(c)Dacron is an example of condensation polymerisation.

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18. Which of the following is an example of elastomers?

a. Rubbe
b. Nylon-66
c. PVC
d. Bakelite

Sol.(a)Rubber is an example of elastomers.

19. Which of the following is an example of fibre polymer?

a. Rubber
b. Nylon-66
c. PVC
d. Bakelite

Sol.(b) Nylon-66 is an example of fibre polymer.

20. The monomer of neoprene is

a. chloroprene
b. styrene
c. vinyl chloride
d. adipic acid

Sol.(a)Chloroprene is the monomer of neoprene.

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21.In E. coli DNA, the AT/GC ratio is 0.93. If the number of moles of adenine in the DNA sample is 558,000, calculate the number of moles of guanine present

Sol. Number of moles of adenine must be equal to that of thymine

(A + T) = 558,000 + 558,000 = 1116000

Since (A + T)/(C + G) = 0.93

Therefore, no of moles of C + G

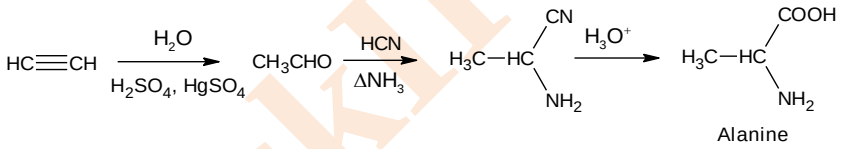
$$C + G = \frac{1116000}{0.93} = 1200000$$

Since number of moles of C = number of moles of G

$$\text{Number of moles of guanine} = \frac{1200000}{2} = 600000$$

22. How will you synthesize alanine from acetylene?

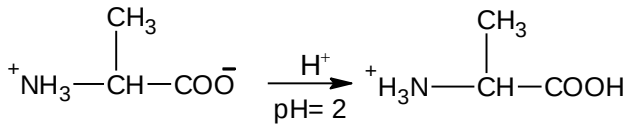
Sol.



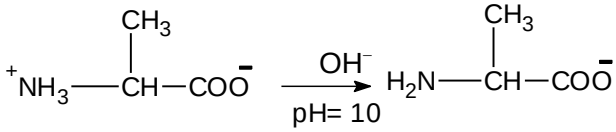
Alanine

23. Write the structure of alanine at pH =2 and pH = 10.

Sol. Amino acids exist as zwitter ions (I) in aqueous solution. In presence of acids (pH=2) basic COO^- accepts a proton to give cation (II) but in presence of base (pH = 10), the acidic $\overset{+}{N}H_3$ donates a proton to the base and thus exists as anion (III).



Alanine (I) (II)



Alanine (I) (III)

24. Glycine exists as ($H_3N^+CH_2COO^-$) while anthranilic acid ($P–NH_2C_6H_4–$ COOH) does not exist as dipolar ions.

Sol. – COOH is too weakly acidic to transfer H^+ to the weakly basic – NH_2 attached to the electron withdrawing benzene ring. When attached to an aliphatic carbon, the – NH_2 is sufficiently basic to accept H^+ from – COOH group

25. $nCF_2 = CF_2 \xrightarrow[\text{heat, high pressure}]{A} (–CF_2 – CF_2 –)_n$ Teflon

Sol. A = $(NH_4)_2S_2O_8$