# CHEMISTRY

# BOOKS - V PUBLICATION

# BIOMOLECULES

## Question Bank

**1.** Glucose or sucrose are soluble in water, but,cyclohexane or benzene (simple six

membered ring compounds) are insoluble in water. Explain.

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**2.** What are the expected products of hydrolysis of lactose ?

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**3.** How do you explain the absence of aldehyde group in the pentaacetate of D-glucose ?

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**4.** The melting points and solubility in water of amino acids are higher than those of the corresponding halo acids. Explain.

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**5.** Where does the water present in the egg go after boiling the egg ?

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**6.** Why cannot Vitamin C be stored in our body ?

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**7.** What does products would be formed when a nucleotide from DNA containing thymine is hydrolysed ?

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**8.** When RNA is hydrolysed, there is no relationship among the quantities of different bases obtained. What does this fact suggested about the structure of RNA ?

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**9.** Whät are the monosaccharides?

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**10.** What are reducing sugars?

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**11.** Write two main functions of carbohydrates in plants.

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**12.** Classify the following into monosacchrides and disaccharides .ribose,2-deoxyribose,maltose,galctose,fructose and lactose.

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**13.** What do you understand by the term glycosidic linkage?

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**14.** What is glycogen?How is it different from starch?

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**15.** What are the hydrolysis products of (a) sucrose (b) lactose

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**16.** What is the basic structural difference between starch and cellulose?

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**17.** Enumerate the reactions of D-glucose which cannot be explanined by its open chain

sturucture.

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**18.** Amino acids can be classified into essential and non-essential amino acids. Write one example each for essential amino acid.

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**19.** Define the following as related to proteins (i)Peptide linkage (ii)Primary structure

(iii)Denaturation

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**20.** What are thecommon types of secondary stucture of proteins?

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**21.** What type of bonding helps in stabilising the $\alpha -$ helix stucture of proteins?

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**22.** Differentiate between globular and fibrous proteins

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**23.** Explain the amphoteric behavior of amino acid.

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**24.** what are enzymes? Write in brief the mechanism of enzyme catalysis.

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**25.** What is the effect of denaturation on the structure of proteins?

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**26.** How are vitamins classified? Name the vitamin responisble for the coagulation of blood

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**27.** Why are Vitamin A and Vitamin C essential to us? Give their important sources

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**28.** What are nucleic acids? Mention their two important functions?

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**29.** Differentiate between nucleoside and nucleotide:

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**30.** The two strands inDNA are not identical but are complementary.Explain

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**31.** Write the important strúctural and functional differences between DNA and RNA

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**32.** What are diffferent types of RNA found in the cell?

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**33.** "Sucrose when hydrolysed with dil $HCl$ undergoes inversion while maltose donot" Is the statement correct? Justify.

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**34.** Human hair is made up of protein, It béhaves as an elastomer and can be easily stretched. Justify this behaviour with the molecular structure.

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**35.** Amino acids are usually possessing comparatively high B . P. Can you account for this?

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**36.** During transcription DNA can produce a RNA molecule. The strand of DNA which açtas the template for' the synthesis of one 'm-' RNA is given helow. Write seguence of bases from to in the newly formed 'm-' RNA strand.

'(##VPU_HSS_CHE_XII_C14_E03_004_Q01##)'

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**37.** When an egg is hard bolied, what happens to the egg proteins?

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**38.** For the synthesis of protein, the information abóut that protein'stored in DNA must be transmitted to cytoplasm through m-RNA. Write two differences betwéen RNA and DNA. (Hint: S=sugar, P=phosphate)

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**39.** What is the basic structural difference between starch and cellulose?

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**40.** Synopsis of the topics "The cell and energy cycle" and 'Photosynthesis and energy" is given. If Cell reactions in which there is decrense in. free energy '(Delta G<0)' are called exergónic re. actions. Cell reactions in which there is increase in -free energy '(Delta G>0)'

are called endergonic reactions. In light reaction of photosynthesis, energy rich ATP is synthesised. 'H_2 O+CO_2 stackrelh l/rarr' Organtic molecule '+' ATP '+0_2' +heat In dark reaction of photosynthesis, energy. rich ATP molecules convert 'CO_2' into glucose and starch. From this a student arrives at the following conclusions. 1. Catabolic reactions are 'generally ehdergonic. 2. Light reaction of photosynthesis is an anabolic rcaction. Comment on the above conclasions.

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**41.** When an egg is boiled its phyśical nature changes. i. Is there any change in its chemical nature? Méntion the peculiar type of bond present in proteins. iii. Explain the secondary structure of proteins"

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**42.** The Haworth- structure of a monosaccharide. sugai is drawn on a chart as follows.

'(##VPU_HSS_CHE_XII_C14_E03_010_Q01##)'

i. Identify the compoúnd and draw the Haworth structure of its anomer. ii. Explain the -phenomenon of mütarotation.

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**43.** Glucose is commercially prepared from a polysaccharide. i. Which is the polysaccharide used for the production of glucose? ii. Name the process involved in the formation of glucose in the above method.

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**44.** Fresh tomatoes are a better source of vitamin C than those which have been stored for sometime. Why?

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**45.** Name the purine and pyrimidine bases present: in DNA and RNA?

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**46.** How is oxygen replenished in our atmosphere?

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**47.** B.complex is an often prescribed vitamin? What is complex about it and what is its use?

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**48.** Group B vitamins except vitamin $B_{12}$ should be supplied regularly in diet. Why?

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**49.** Why amino acid is amphoteric in nature. Explain:

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**50.** Give reason for the following: On electrolysis in acidic solution, amino acids migrate towards cathode while in alkaline solution these migrate towards anode. ii) The mono amine monocarboxylic acids have two $p^K$ values.

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**51.** Glucose and fructose give the same osazone. Explain.

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**52.** Two samples of DNA, A and B have melting. temperatures $T_m 340$ and `350 K respectively. Can you draw any conclusion from these data regarding their base content.

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**53.** An optically active amino acid A can exist in three forms depending upon the pH of the medium. If the molecular formula of '(A)' is C_3

H_7 NO_2' write 1) structure of compound (A) in'aqueous medium. What are such ions called?. 2) In which medium will the cationic form of compound '(A)' exist? 3) In alkaline medium, towards which electrode Field will the compound migrate in electric field?

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**54.** i) Give the Fischer projection of L-glucose ii) What is the product óf reaction of L-glucose with Tollen's reagent.

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**55.** Name the following: i) An $\alpha$ -amino acid which is not optically active. ii) Pyrimidine bases present in RNA iii) The secondary structure of proteins Iv) The sweetest carbohydrate v) A reducing sugar and a non-reducing sugar

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**56.** a) Name the following: 1) A water soluble vitamin 2) An oil soluble vitamin 3) A vitamin which is neither soluble in water nor is fat 4) The disease caused. by deficiency of vitamin 'B1' 5) The diseases caused by deficiency of vitamin C' b) What do you understand by avitaminosis?

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**57.** During a seminar session, presenter said that, there is two type of nucleic acids "DNA and RNA" Identify the sugar that is present in DNA and RN A Give thé differences between DNA.and RNA.

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**58.** Complete the following table TABLE

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**59.** Starch on enzymatic hydrolysis by diastase gives a reducing disaccharide 'A' which undergoes hydrolysis by enzyme maltase to form 'B' which is also a reducing sugar. 1. Identify the compound 'A' and 'B' with suitable chemical equations. 2. Explain the term reducing sugar.

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**60.** Why do proteins form an Indispensable part of our food?

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**61.** i. What are the two good sources of vitamin'A' ?

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**62.** Glucose reacts with X number of molecules of phenylhydrazine to yield osazone.The value of X is

A. Three

B. Two

C. One

D. Four

**Answer: A**

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**63.** The disaccharide present in milk is

A. Maltose

B. Galactose

C. Sucrose

D. Lactose

**Answer: D**

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**64.** Glucose reacts with acetic anhydride to form

A. monoacetate

B. tetra-acetate

C. penta-acetate

D. hexa-acetate

**Answer: C**

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**65.** Which of the following is a ketohexose?

A. Fructose

B. Maltose

C. Glucose

D. Ribose

**Answer: A**

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**66.** Which carbohydrate is an essential constitutent of plant cells?

A. starch

B. Cellulose

C. Sucrose

D. Vitamins

**Answer: B**

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**67.** Complete hydrolysis of cellulose gives

A. L-glucose

B. D-fructose

C. D-ribose

D. D- glucose

**Answer: D**

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**68.** The carbohydrate which cannot be hydrolysed by the human digestive system is

A. starch

B. Glycogen

C. Cellulose

D. all the above

**Answer: C**

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**69.** Methyl- α-D-glucoside and methyl β-D-glucoside are : epimers, anomers, enantiomers, conformational diastereomers

A. epimers

B. anomers

C. enantiomers

D. conformational diastereomers

**Answer: B**

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**70.** Cellulose is soluble in

A. ammoniacal cupric hydroxide solution

B. organic solvents

C. water

D. none of these

**Answer: A**

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**71.** Pick out the incorrect statements from the following: 1) Glucose exists in two differént crystalline forms. $\alpha - D$ -glucose and $\beta - D$ -glucose 2)$\alpha - D$ -glucose and $\beta - D$ -glucose are anomers 3)$\alpha - D$-glucose and $\beta - D$-glucose are enantiomers 4)cellulose is, a straight chain polysaccharide made of only $\beta$ -D-glucose units 5)Starch is a mixture of amylose and amylopectin, both contain unbranched chain of $\alpha - D$-glucose in its.

A. 1 and 2 only

B. 2 and 3 only

C. 3 and 4 only

D. 3 and 5 only

**Answer: D**

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**72.** alpha-D(+) glucose and beta-D(+) glucose are

A. enantimers

B. conformers

C. epimers

D. anomers

**Answer: D**

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**73.** Which is an example of a non-reducing sugar

A. Sucrose

B. Lactose

C. Maltose

D. Cellulose

**Answer: A**

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**74.** Lactose on hydrolysis yields

A. glucose

B. fructose

C. Glucose and fructose

D. glucose and galactose

**Answer: D**

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**75.** The pair of compounds in which both the compounds give positive test with Tollen's reagent is : glucose and sucrose, fructose and

sucrose, acetophenone and hexaneal, glucose and fructose

A. glucose and sucrose

B. fructose and sucrose

C. acetophenone and hexaneal

D. glucose and fructose

**Answer: D**

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**76.** The two forms of D-glucopyranose are called

A. enantiomers

B. epimers

C. anomers

D. diasteromers

**Answer: C**

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**77.** The helical structure of protein is stablised by

A. peptide bonds

B. dipeptide bonds

C. hydrogen bonds

D. vander Waals forces

**Answer: C**

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**78.** Number of chiral carbons in beta-D(+) glucose is

A. six

B. three

C. four

D. five

**Answer: D**

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**79.** Which is not a protein

A. wool

B. nail

C. hair

D. cellulose

**Answer: D**

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**80.** Carbohydrates are stored in human body as the polysaccharide

A. starch

B. Glycogen

C. galactose

D. fructose

**Answer: C**

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**81.** Sucrose on hydrolysis gives

A. glucose + glucose

B. glucose +galactose

C. glucose + fructose

D. glucose +lactose

**Answer: C**

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**82.** During the process of digestion, the proteins present in food materials are hydrolysed into amino acids.The two enzymes involved in the process are

A. invertase and zymase

B. amylase and maltase

C. diastase and lipase

D. pepsin and trypsin

**Answer: D**

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**83.** The secondary structure of aprotein refers to

A. fixed configuration of the polypetide back=bone

B. 'alpha' - helical backbone

C. hydrophobic interactions

D. sequence of 'alpha' -amino acids

**Answer: B**

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**84.** Denaturation of protein

A. disrupts the primary or secondary or tertiary sturucture of protein

B. disrupts the secondary and tertiary structures only

C. disrupts all the primary -secondary and dtertiary and even the quanternary sturcture of protein

D. will not affect the orignal bilogical activity

**Answer: B**

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**85.** The function of enzymes in the living system is to

A. transport oxygen

B. provide immunity

C. catalyse biochemical reacation

D. provide energy

**Answer: C**

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**86.** The efficiency of an enzyme to catalyse a reaction is due to its capacity to

A. reduce the ativation energy of the reaction

B. form strong enzyme susbtrate complex

C. decrease the bond energies of all the substrate molecules

D. alter the substate gemetry of fit into the shape of the enzyme molecuel

**Answer: A**

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**87.** The human body does not produce

A. enzymes

B. DNA

C. vitamins

D. hormones

**Answer: C**

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**88.** The vitamins absorbed from intestine along with fats are

A. A,D

B. A,B

C. A,C

D. D,B

**Answer: A**

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**89.** The vitamin which is neither soluble in water nor in fat is

A. biotin

B. phylloquinone

C. thiamine

D. calciferol

**Answer: A**

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**90.** Which of the following is water soluble?

A. vitamin E

B. vitamin K

C. vitamin A

D. VitaminB

**Answer: D**

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**91.** Vitamin $B_1$ is : Riboflavin, Cobalamin, thiamine, pyrodoxine

A. Riboflavin

B. Cobalamin

C. thiamine

D. pyrodoxine

**Answer: C**

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**92.** Which of the following biomolecules is insoluble in water?

A. alpha- keratin

B. heamoglobin

C. ribo-nucleose

D. adenine

**Answer: A**

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**93.** Which of the following is a vitamin

A. benzoic acid

B. Ascorbic acid

C. oxalic acid

D. formic acid

**Answer: B**

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**94.** Ergocalciferol is name of vitamin

A. A

B. B

C. C

D. D

**Answer: D**

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**95.** Which is an example ofglobular protein?

A. Myosin

B. collagen

C. keratin

D. heamoglobin

**Answer: D**

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**96.** Enzymes belong to which class of compounds?

A. polysaccharides

B. polypeptides

C. Polynitroheterocyclic compounds

D. Hydrocarbons

**Answer: B**

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**97.** Enzymes are

A. Fatty acids

B. Vitamins

C. Proteins

D. none of these

**Answer:**

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**98.** Which is not an amino acid? glycine, alanine, histidine, benzidine

A. glycine

B. alamine

C. histidine

D. benzidine

**Answer: D**

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**99.** In nucleic acids,the sequence is : phosphate -base -sugar, sugar-phosphate-base, phosphate -sugar-base, base -phosphate sugar

A. phosphate -base -sugar

B. sugar-phosphate-base

C. phosphate -sugar-base

D. base -phosphate sugar

**Answer: C**

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