BYJU'S Study Planner for Board Term I
(CBSE Grade 12)

Date: 15/11/2021

Subject: Chemistry

Topic : Biomolecules

Class: Standard XII

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1. Polynucleotides are called nucleic acids. Each nucleotide is made up of three parts, i.e, a pentose sugar, a heterocyclic nitrogenous base and phosphoric acid. Depending upon the nature of sugar whether, ribose or deoxyribose, nucleic acids are called RNA and DNA respectively. In all, there are five nitrogenous bases, two of which are purines while the remaining three are pyrimidines. Out of these five bases, each type of nucleic acid has four of them.

   Which of the following sets of bases is present in both DNA and RNA?

   ✗ **A.** Adenine, uracil, thymine

   ✓ **B.** Adenine, guanine, cytosine

   ✗ **C.** Adenine, guanine, uracil

   ✗ **D.** Adenine, guanine, thymine

   Adenine, guanine, and cytosine is present in both DNA and RNA.
   So, the correct answer is option (b).

2. Polynucleotides are called nucleic acids. Each nucleotide is made up of three parts, i.e, a pentose sugar, a heterocyclic nitrogenous base and phosphoric acid. Depending upon the nature of sugar whether, ribose or deoxyribose, nucleic acids are called RNA and DNA respectively. In all, there are five nitrogenous bases, two of which are purines while the remaining three are pyrimidines. Out of these five bases, each type of nucleic acid has four of them.

   Which base is only found in the nucleotide of RNA?

   ✗ **A.** Adenine

   ✓ **B.** Uracil

   ✗ **C.** Guanine

   ✗ **D.** Cytosine

   Uracil is only found in the nucleotide of RNA.
   So, the correct answer is option (b).

3. Polynucleotides are called nucleic acids. Each nucleotide is made up of three parts, i.e, a pentose sugar, a heterocyclic nitrogenous base and phosphoric acid. Depending upon the nature of sugar whether, ribose or deoxyribose, nucleic acids are called RNA and DNA respectively. In all, there are five nitrogenous bases, two of which are purines while the remaining three are pyrimidines. Out of these five bases, each type of nucleic acid has four of them.

   In nucleic acids, the nucleotides are linked to one another through:

   ✗ **A.** Hydrogen bond

   ✗ **B.** Peptide bond

   ✗ **C.** Glycosidic linkage

   ✓ **D.** Phosphodiester linkage

   In nucleic acids, the nucleotides are linked to one another through phosphodiester linkage.
   So, the correct answer is option (d).

4. Which of the following analogies is correct?
   Primary structure: polypeptide bond ::
   Secondary structure:

   ✗ **A.** Ionic bonds

   ✓ **B.** Hydrogen bonds

   ✗ **C.** Ether bonds

   ✗ **D.** Peptide bonds

   The main forces which stabilise the secondary structures of proteins are hydrogen bonds, disulphide linkages, van der Waals and electrostatic forces of attraction.
   So, the correct answer is option (b).

5.

Column - I	Column - II
(i) Keratin	(A) Aldohexose
(ii) Glucose	(B) Fibrous protien
(iii) Fructose	(C) Globular protein
(iv) Insulin	(D) Ketohexose

Which of the following is the best matched option?

- **A.** i-C, ii- A, iii- D, iv-B
- **B.** i-B, ii- A, iii- D, iv-C
- **C.** i-B, ii- D, iii- A, iv-C
- **D.** i-C, ii- D, iii- A, iv-B

Keratin is a fibrous protein.
Insulin is a globular protein.
Glucose has both an aldehyde group and six carbon, so it is an aldohexose.
Fructose contains both a keto group and six carbon, so it is a ketohexose.

6. Given below are two statements labelled as Assertion (A) and Reason (R).

Assertion (A): Proteins are made up of alpha amino acids.

Reason (R): During denaturation, secondary and tertiary structure of proteins are destroyed.

- **A.** Both A and R are true and R is the correct explanation of A
- **B.** Both A and R are true but R is not the correct explanation of A
- **C.** A is true but R is false
- **D.** A is false but R is true

During denaturation, secondary and tertiary structure of proteins are destroyed but the primary structure containing alpha amino acids does not change. So, assertion is true, reason is true but reason is not the correct explanation of assertion.
So, the correct answer is option (b).

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7. Given below are two statements labelled as Assertion (A) and Reason (R).
Assertion (A): Glucose and fructose can be distinguished by Tollens' reagent.
Reason (R): Glucose contains an aldehyde group while fructose contains a keto group.

- ✗ **A.** Both A and R are true and R is the correct explanation of A
- ✗ **B.** Both A and R are true but R is not the correct explanation of A
- ✗ **C.** A is true but R is false
- ✓ **D.** A is false but R is true

Glucose and fructose can not be distinguished by Tollens' reagent as both respond positively with this reagent. So, the assertion is false however reason is true.
So, the correct answer is option (d).

8. Given below are two statements labelled as Assertion (A) and Reason (R).
Assertion (A): Nucleotides are phosphate esters of nucleosides
Reason (R): .The various nucleotides in nucleic acids are linked either through purine or pyrimidine bases.

- ✗ **A.** Both A and R are true and R is the correct explanation of A
- ✗ **B.** Both A and R are true but R is not the correct explanation of A
- ✓ **C.** A is true but R is false
- ✗ **D.** A is false but R is true

Nucleotides are phosphate esters of nucleosides.
The various nucleotides in nucleic acids are linked through phosphate ester groups. So, the assertion is true but the reason is false.
So, the correct answer is option (c).

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9. Identify the correct formula for the carbohydrate rhamnose ?

- ✗ **A.** $C_5H_{10}O_5$
- ✓ **B.** $C_6H_{12}O_5$
- ✗ **C.** $C_6H_{12}O_6$
- ✗ **D.** $C_{12}H_{22}O_{11}$

Rhamnose is an example of a carbohydrate that does not satisfy the general formula $C_x(H_2O)_y$. Its formula is $C_6H_{12}O_5$.
Hence, (b) is correct.

10. Which of the following is a non-reducing sugar ?

- ✗ **A.** Galactose
- ✗ **B.** Glucose
- ✗ **C.** Fructose
- ✓ **D.** Sucrose

Sucrose is a non - reducing disaccharide which cannot convert to an open chain with a free aldehyde or ketone group because of $C1 - C2$ gycosidic bond between glucose and fructose and hence cannot reduce Fehling's solution and Tollen's reagent. All other disaccharides are reducing in nature.
Thus, (d) is correct.

11. What does the following reaction of glucose with HI elucidates about the structure of glucose?

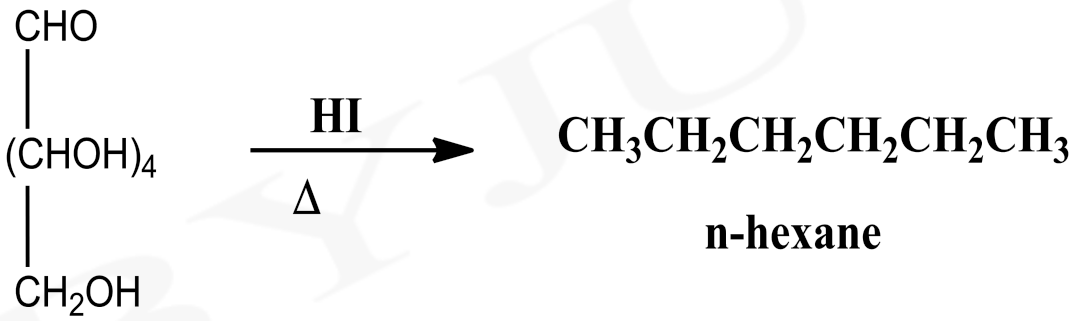
A. Shows the presence of $-CHO$ group.

B. Shows the presence of $C = O$ group.

C. Shows the presence of six carbons linked linearly.

D. Shows the presence of ring structure of glucose.

On prolonged heating with red P & HI, it forms n-Hexane, suggesting that all the six carbon atoms are linked in a straight chain.



This confirms the presence of 6 carbon linked linearly in glucose. Hence option (c) is correct.

12. The reaction of glucose with acetic anhydride confirms the presence of how many hydroxy groups in glucose?

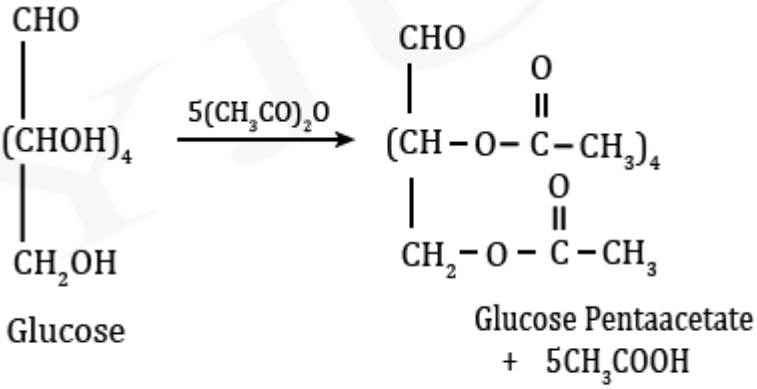
A. 3

B. 4

C. 5

D. 6

The reaction of glucose with $(CH_3CO)_2O$ gives glucose pentaacetate, which has five acetyl group in the structure. This reaction also proves that all the $5\ OH$ groups are present at different carbon atoms, because of the stable nature of glucose.

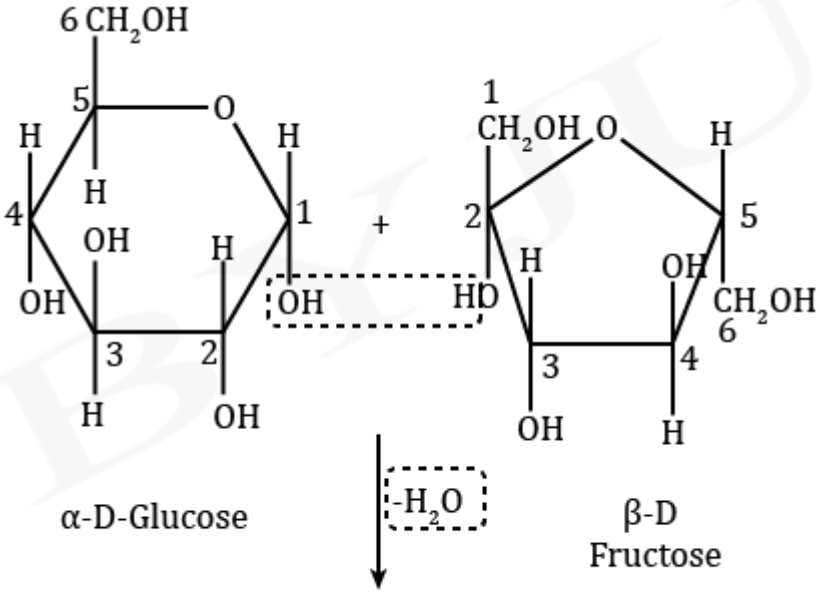


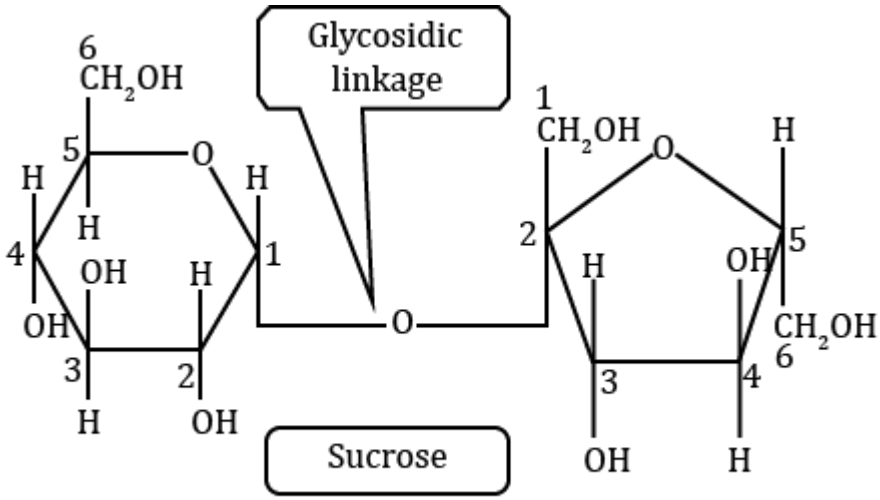
Hence, (c) is correct.

13. Glycosidic linkage is an

- **A.** ester linkage
- **B.** peptide linkage
- **C.** ether linkage
- **D.** (a) and (c) above.

Glycosidic bond is an ether linkage between two monosaccharides. Oxide or ether linkage between two monosaccharides formed generally by the loss of water.



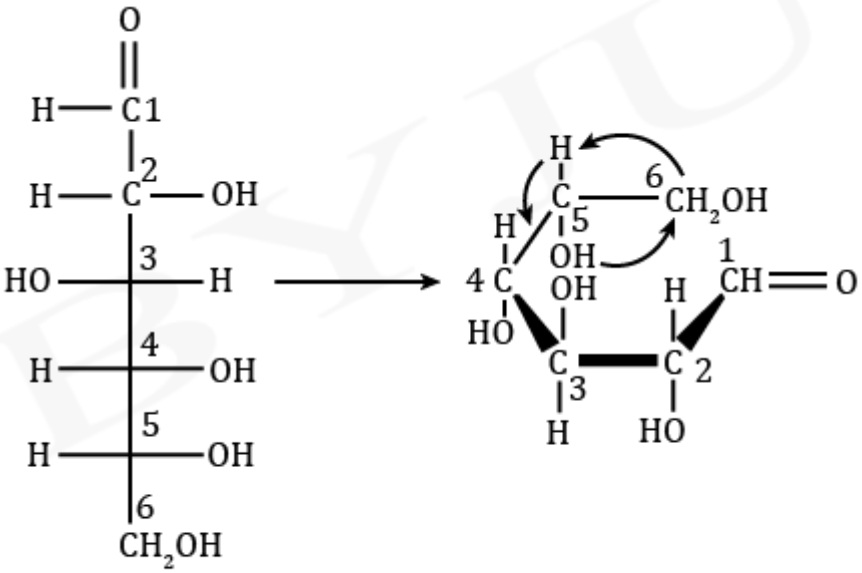


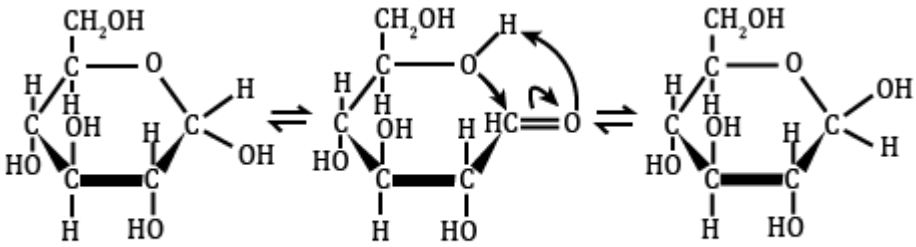
Peptide bond is present between two amino acids.
Hence, (d) is correct.

14. The hydroxyl group at which carbon is involved in ring formation of glucose?

- **A.** C_3
- **B.** C_4
- **C.** C_5
- **D.** C_6

Monosaccharides undergo intramolecular reaction to form cyclic hemiacetal structure. Generally in aldoses, the C_4 or C_5 carbon is involved in cyclisation. In glucose, the hemiacetal (six-membered ring) is formed between the CHO group and the OH group on the C_5 carbon.





Hence, (c)

is correct.

15. Amino acids are building blocks of :

A. carbohydrates

B. proteins

C. vitamins

D. fats

$\alpha-$ amino acids are the monomers which on polymerization gives protein as a polymer. Thus, they are the basic building block of proteins.
Hence, (b) is correct.

16. If the carboxylic acid group of glycine and amino acid group of alanine undergo elimination of a water molecule, the name of the compound thus formed is

- **A.** alanylglycide (dipeptide)
- **B.** glycylalanide (tripeptide)
- **C.** glycylalanine (dipeptide)
- **D.** alanylglycine (dipeptide)

The amino acid unit having free $-NH_2$ groups is called N-terminal end whereas, the amino acid unit with free $-COOH$ group is called C-terminal end.
The structure is written with N-terminal end to the left and C-terminal end to the right.

At N-terminal or C-terminal further bond formation takes place and tri, tetra, pentapeptides are formed.

Naming of Polypeptides

1. Starts from –N–terminal residue.

Suffix -ine of amino acids is replaced by -yl for all except amino acid of C-terminal residue.

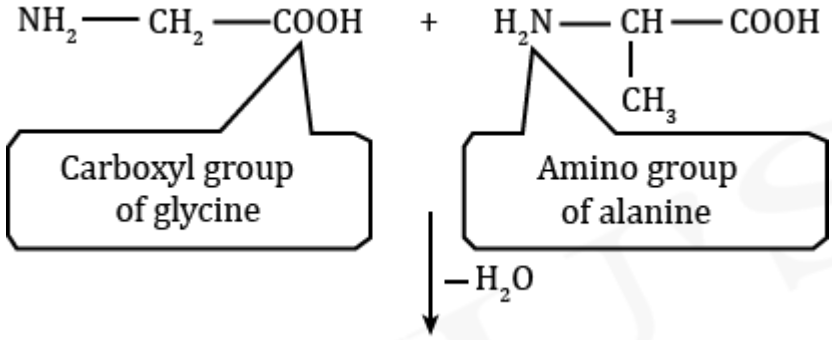
Example: Glycine $\rightarrow$ Glycyl

Alanine $\rightarrow$ Alanyl

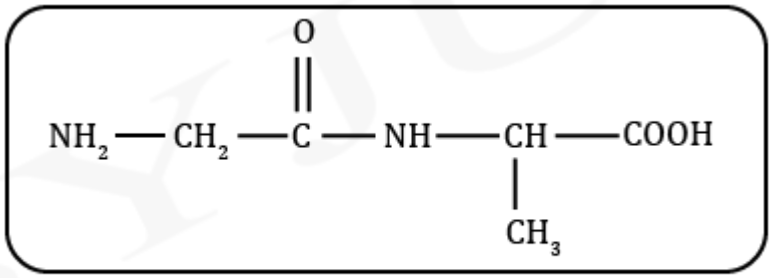
Lysine $\rightarrow$ Lysyl

Alanylglycylphenylalanine means Ala-Gly-Phe or A-G-F.

If the carboxyl acid group of glycine and amino group of alanine undergo elimination of a water molecule, the formed compound is glycylalanine



(dipeptide).



Hence, (c) is correct.

17. In aqueous solution, amino acids mostly exist as:

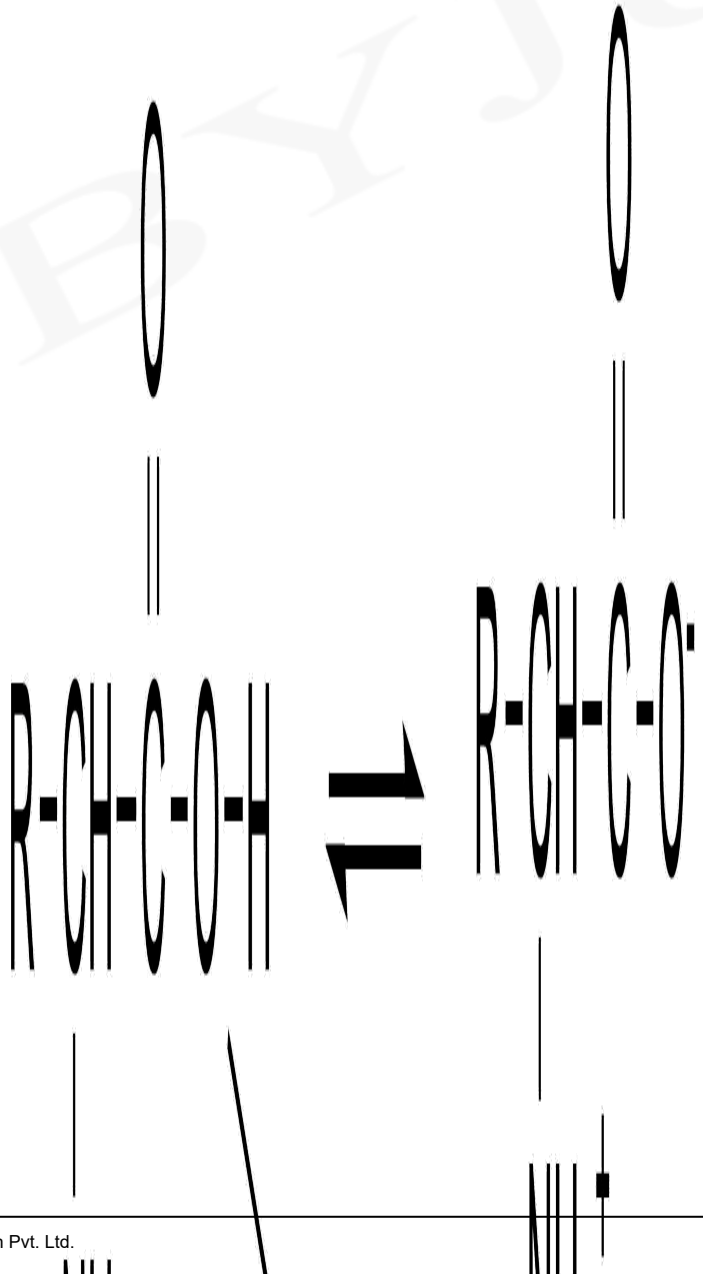
A. $H_2N - CH(R) - COOH$

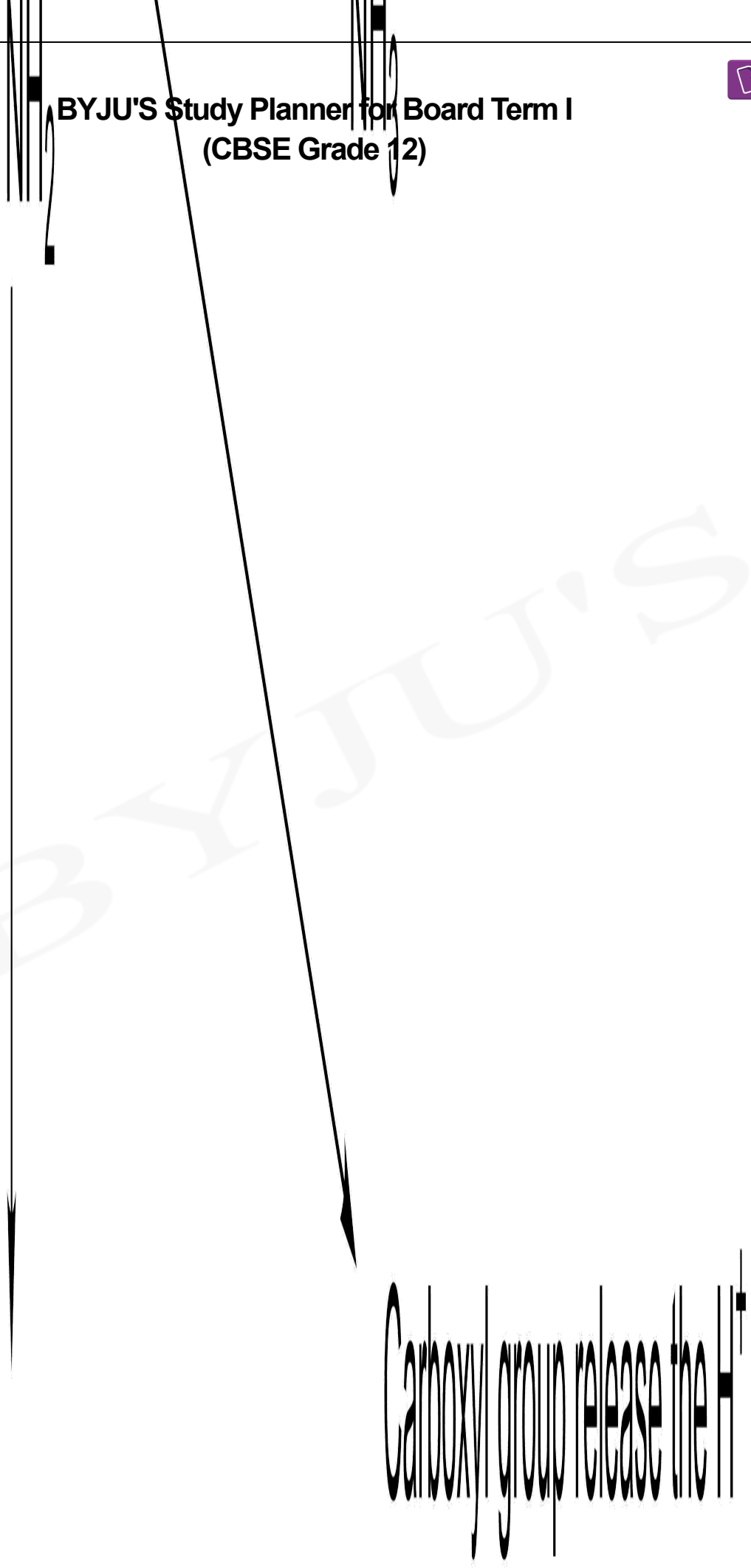
B. $H_2N - CH(R) - COO^-$

C. $H_3N^+ - CH(R) - COOH$

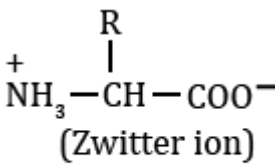
D. $H_3N^+ - CH(R) - COO^-$

In aqueous solution, amino acids mostly exist as Zwitter ions. Amino group is protonated and carboxylic group is deprotonated.





Amino group acts as



18. Which of the following factors is not responsible for the denaturation of proteins?

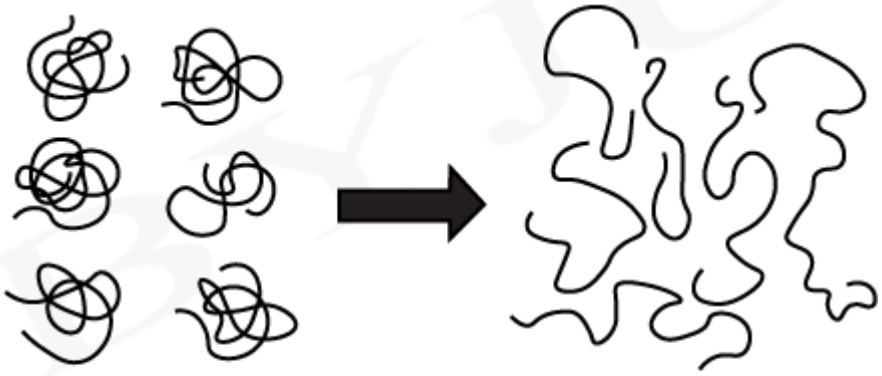
A. Heat

B. low pressure

C. pH change

D. None of the above

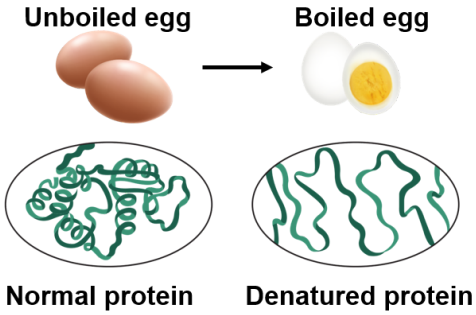
When protein in native form is subjected to a physical change like temperature or pH, the hydrogen bonds are disturbed. As a result, globules get unfold and helices get uncoiled therefore,proteins lose its activity. During denaturation 2^o and 3^o structures get destroyed but 1^o structure remains the same.



Native protein Denatured protein

Example:

1. Coagulation of egg while on boiling.
2. Curdling of milk caused by bacteria present in milk.



19. The reason for double helical structure of DNA is operation of

- ✗ **A.** Vander Waal's forces
- ✗ **B.** Dipole-dipole interaction
- ✓ **C.** Hydrogen bonding
- ✗ **D.** Electrostatic attractions

The reason for double helical structure of DNA is operation of Hydrogen bonding between complementary bases. Cytosine forms three hydrogen bonds with guanine, and adenine forms two hydrogen bonds with thymine.
$\text{Adenine} = \text{Thymine}, \text{Guanine} \equiv \text{Cytosine}$
Hence correct option is (c).

20. Which of the following is not essential amino acid?

- ✗ **A.** Valine
- ✗ **B.** Lysine
- ✗ **C.** Histidine
- ✓ **D.** Glycine

Essential amino acids are those that are essential in the diet. In other words we cannot create them through our own metabolism.
The 10 essential amino acids are Phenylalanine, Threonine, Tryptophan, Methionine, Leucine, Isoleucine, Lysine, Valine, Arginine and Histidine.
Hence glycine is not a essential amino acid.