

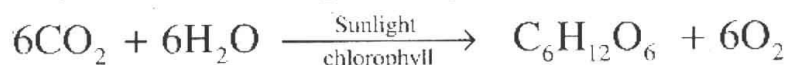
Short Answer Question

Q.1 Define carbohydrates. Give their general formula.

Ans. Carbohydrates are macromolecules defined as polyhydroxy aldehydes or ketones. They have general formula $C_n(H_2O)_n$.

Q.2 How carbohydrates are synthesized by plants?

Ans. Carbohydrates are synthesized by plants through photosynthesis process from carbon dioxide and water in the presence of sunlight and green pigment chlorophyll.



The glucose is further polymerized to form starch and cellulose.

Q.3 Give the classification of carbohydrates.

Ans. Carbohydrates are classified on the basis of units. They are classified as

- i) Monosaccharides
- ii) Oligosaccharides
- iii) Polysaccharides

Q.4 What are monosaccharides? How they are classified?

Ans. Monosaccharides are the simplest sugars which cannot be hydrolyzed. They consist of 3 to 9 carbon atoms in their molecules; they are classified according to the number of carbon atoms in their molecules as trioses, tetroses, pentoses, hexoses, and so on

Q.5 What is meant by glucose and fructose?

Ans. Glucose is a pentahydroxy aldehyde while fructose is pentahydroxy ketone having the open chain structures and general formula is $C_6H_{12}O_6$.

Q.6 Write characteristics of monosaccharides. Why they are called reducing agents?

Ans. Monosaccharides are white crystalline solids. They are soluble in water and have sweet taste. They cannot be hydrolyzed. They are reducing in nature, therefore, these are called reducing sugars.

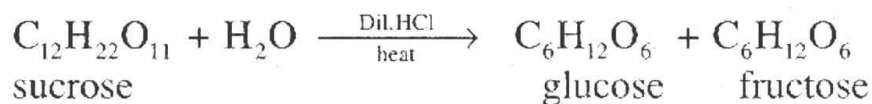
Q.7 What are oligosaccharides? How they are classified?

Ans. Oligosaccharides give 2 to 9 units of monosaccharides on hydrolysis. Therefore, they are classified as disaccharides, trisaccharides, tetrasaccharides, etc depending upon the

number of units they produce on hydrolysis. The most important oligosaccharides are disaccharides like sucrose.

Q.8 Describe hydrolysis of sucrose.

Ans. The most important oligosaccharides are disaccharides like sucrose. On hydrolysis sucrose produces one unit of glucose and one unit of fructose.



Q.9 Name the products formed by the hydrolysis of sucrose.

Ans. On hydrolysis sucrose produces one unit of glucose and one unit of fructose.

Q.10 Write characteristics of oligosaccharides.

Ans. Oligosaccharides are white, crystalline solids easily soluble in water. They are also sweet in taste. They may be reducing or non-reducing.

Q.11 What are polysaccharides? Write its characteristics.

Ans. Polysaccharides are macromolecular carbohydrates consisting of hundreds to thousands of monosaccharides. Examples of polysaccharides are starch and cellulose. They are amorphous solids. They are tasteless and insoluble in water. They are non reducing in nature.

Q.12 Write sources of simple sugars.

Ans. Glucose, fructose and galactose are simple sugars which are found in fruits, vegetables, honey and cereals.

Q.13 Write sources of sucrose.

Ans. Sucrose is found in sugar beet, sugar cane, and fruits.

Q.14 Write sources of Lactose

Ans. Lactose consisting of glucose and galactose is the main sugar in milk and dairy products.

Q.15 Write sources of maltose.

Ans. Maltose is found in cereals.

Q.16 Write sources of starch and cellulose.

Ans. Starch is found in cereal crops: wheat, barley, maize, rice, etc while cellulose is found in cotton.

Q.17 Describe source of energy for brain and muscle?

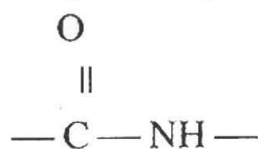
Ans. Our body uses carbohydrates in the form of glucose. Glucose is the only form of carbohydrates that is used directly by muscles for energy. It is important to note that brain needs glucose as an energy source, because it cannot use fat for this purpose.

Q.18 How carbohydrates provide energy to our body system?

Ans. Carbohydrates provides 17 kilojoules of energy per gram. We take carbohydrates as food. Long chains of starch (carbohydrates) are broken down into simple sugars (glucose) by digestive enzymes. The glucose is absorbed directly by small intestine into the blood stream. Blood stream transports the glucose to its place of use, e.g., muscles.

Q.19 What are proteins? Write its composition.

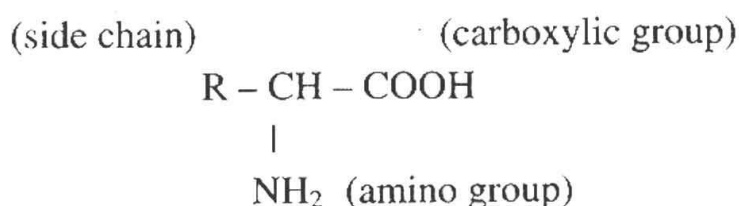
Ans. Proteins are highly complicated nitrogenous compounds made up of amino acids. Proteins consist of carbon, hydrogen, oxygen, nitrogen and sulphur. They are polymers of amino acids. Amino acids are linked with each other through peptide linkage. Protein has more than 10,000 amino acids. All proteins yield amino acids upon hydrolysis.

**Q.20 Write occurrence of protein in living organism.**

Ans. Proteins are present in all living organisms. They make up bulk of the non-bony structure of the animal bodies. They are major component of all cells and tissues of animals. About 50% of the dry weight of cell is made up of proteins. They are found in muscles, skin, hair, nails, wool, feathers etc.

Q.21 What are amino acids? Write its general formula

Ans. Amino acids are organic compounds consisting of both amino and carboxyl groups. They have the general formula

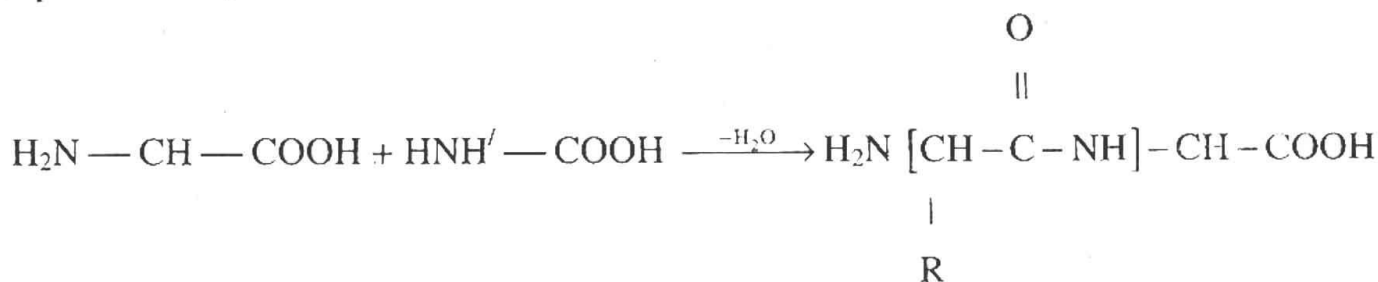


Side chain 'R' is different for different amino acids. There are 20 amino acids.

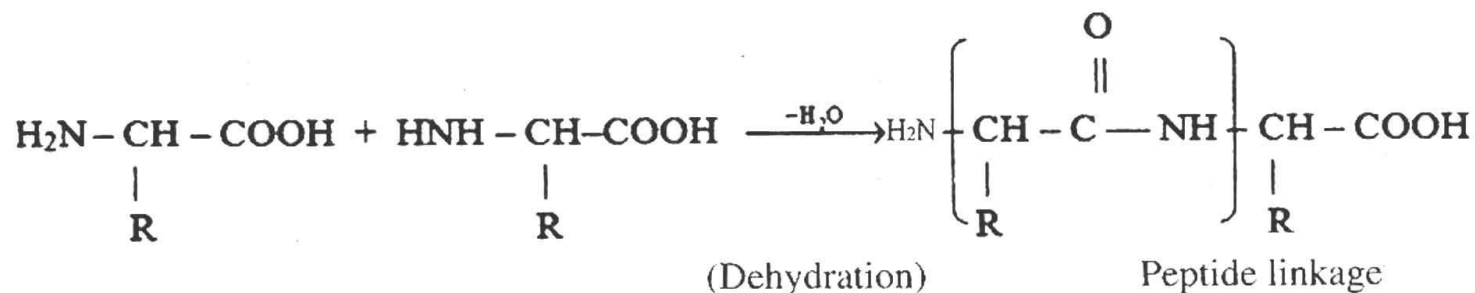
Ans. Ten out of twenty amino acids can be synthesized by human body

Ans. That amino acid which cannot be synthesized in our body is termed as essential amino acids, while those which can be synthesized in our body are termed as non-essential amino acids. Essential amino acids are required by our bodies and must be supplied through diet.

Ans. Two amino acids link through peptide linkage. Peptide linkage (bond) is formed by the elimination of water molecule between the amino group of one amino acid and carboxyl acid group of another, such as

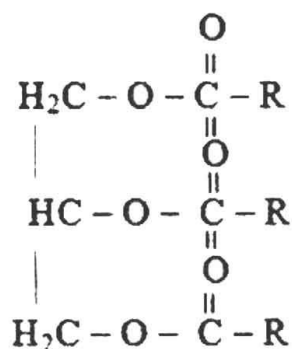


Ans.



Ans. Lipids are macromolecules made up of fatty acids. Lipids are classified into oils and fats. Oil and fats are esters of long chain carboxylic (fatty) acid with glycerol.

Ans. Oils and fats are esters of long chain carboxylic (fatty) acids with glycerol. These esters are made of three fatty acids, therefore, they are called triglyceride. General formula of triglycerides is as under



Q.28 What is the difference between oils and fats?

Ans. Oils exist in liquid form at room temperature. They are triglycerides of unsaturated fatty acids. While fats exist in solid form at room temperature. They are triglycerides of saturated fatty acids

Q.29 What are fatty acids? Give example

Ans. Fatty acids are building blocks of lipids. They are long chain saturated or unsaturated carboxylic acids. Examples are

Palmitic acid $\text{C}_{15}\text{H}_{31}\text{COOH}$

Stearic acid $\text{C}_{17}\text{H}_{35}\text{COOH}$

These acids form esters with glycerol in the presence of mineral acids.

Q.30 How esters are formed?

Ans. Fatty acids form esters (oils or fats) with glycerol in the presence of mineral acids.

Q.31 What are the sources of vitamins A, D and E? Write their uses

Ans. Fats and oils are high energy foods. They are the source of vitamins A, D and E. They are used to build brain cells, nerve cells and cell membranes. They are insoluble in water but soluble in organic solvents. The fats stored in the body insulate it as they are poor conductor of heat and electricity.

Q.32 How vegetable oil is converted into vegetable ghee?

Ans. Vegetable oils are triester of glycerol and fatty acids of unsaturated long chains. These oils are hydrogenated in the presence of nickel catalyst at 250 to 300 $^{\circ}\text{C}$ to form vegetable ghee.



Q.33 How margarine is produced?

Ans. Margarine is produced by adding hydrogen to vegetable oil at 200°C in the presence of catalyst. Greater the amount of hydrogen is added the more solid the margarine becomes.

Q.34 As the presence of butanoic acid causes smell in food fruits? If yes, give suitable example.

Ans. The esters of butanoic acid have fruity smell. For example, methyl butanoate smells like apples and ethyl butanoate smells like pineapple.

Q.35 Why rancid butter has a foul smell?

Ans. Rancid butter has a foul smell because of butanoic acid.

Q.36 What is meant by nucleic acid? How it is classified?

Ans. Nucleic acids are essential components of every living cell. They are generally long chain molecules made up of nucleotides. Each nucleotide consists of three components; nitrogenous base, a pentose sugar and a phosphate group.

Q.37 Nucleic acid is classified into

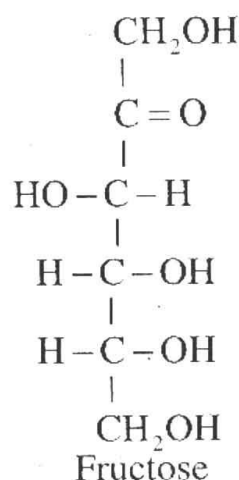
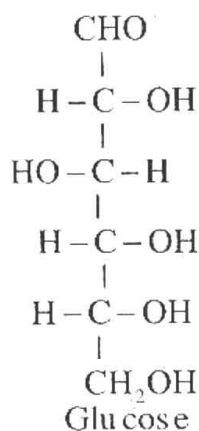
Ans. i) DNA (Deoxyribonucleic acid)
ii) RNA (Ribonucleic acids)

Q.38 Give the balanced chemical equation for the formation of glucose.

Ans. $6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow[\text{chlorophyll}]{\text{sunlight}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$

Q.39 Draw the structure of glucose and fructose

Ans.



Q.49 What is meant by RNA? What is its function?

Ans. RNA is synthesized by DNA to transmit the genetic information. RNA receives, reads, decodes and uses the given information to synthesize new proteins. Thus RNA is responsible for directing the synthesis of new proteins.

Q.50 Write brief history of vitamins

Ans. In 1912 Hopkins noticed that in addition to carbohydrates, proteins and fats there are other substances needed for normal growth. Although these substances were needed in small quantity, yet these substances were called Accessory Growth Factors. Later Funk proposed the name Vitamin for these substances. He discovered Vitamin B₁ (Thiamin).

Q.51 Write a short note on fats soluble vitamins?

Ans. the vitamins which dissolve in fats are called fat soluble vitamins. These are vitamin A, D, E and K. If these vitamins are taken in large quantity, they accumulate in the body and cause diseases. For example accumulation of vitamin D in the body causes bone-pain and bone-like deposits in the kidney. However, their deficiency also causes diseases.

Q.52 Write a short note on water soluble vitamins?

Ans. The vitamins that dissolve in water are called water soluble vitamins. These vitamins are B complex (this include 10 vitamins) and vitamin C (ascorbic acid). Water soluble vitamins are rapidly excreted from the body. Hence these vitamins are not toxic even if taken in large quantity. However, their deficiency causes diseases.

Q.53 What are the sources of vitamins A?

Ans. Dairy products eggs, oils, fats and fish. It can also be obtained from the beta-carotene found in green vegetables, carrots and liver.

Q.54 What is the importance of vitamin A?

Ans. Maintains the health of the epithelium and acts on the retina's dark adaptation mechanism.

Q.55 Write any two diseases caused by the deficiency of vitamin A

Ans. Night blindness and eye inflammation

Q.56 What is the source and importance of vitamin D?

Ans. Fish liver, dairy products oils and fats. Vitamin D is formed in the skin when it is exposed to sunlight

Q.57 What is the role of vitamin D in body?

Ans. Vitamin D has a role in the absorption of calcium which is essential for the maintenance of healthy bones.

Q.58 Write uses of amylases enzyme.

Ans. Amylase enzymes are used in bread making because they can yield more starch of the flour. Even they are efficient enough to convert starch to sweet glucose syrup. This can be used as sweetener in the food as well as bread making.

Q.59 Write uses of lactase enzyme

Ans. Lactase enzyme is used to increase sweetness in ice cream. Lactase enzyme metabolizes the lactase sugar in the body. As lactose in milk is broken down to galactose and glucose. Which are sweeter than lactose.

Q.60 What is meant by denaturing of proteins?

Ans. Denaturing of protein means precipitation or coagulation of protein. It can be carried out by heating or changing pH. A simple common method for denaturing of protein is boiling of an egg. White viscous fluid (albumen) present in an egg is protein. When egg is boiled for a few minutes, albumen coagulates i.e., solidifies.

Q.61 What are macromolecules?

Ans. Macromolecules are the bigger molecules which are formed by smaller molecules. Macromolecules are synthesized by living organisms from simple molecules present in the environment. Macromolecules are essential for us as they are reservoirs of energy.

Multiple Choice Questions

1. Carbohydrates are synthesized by plants through photosynthesis process which requires the following except:

- (a) CO₂ and water
- (b) Sunlight
- (c) O₂
- (d) Chlorophyll

2. Which of the followings is a disaccharide?

- (a) Glucose
- (b) Fructose
- (c) Sucrose
- (d) Starch

3. Photosynthesis process produces

- (a) starch
- (b) cellulose
- (c) sucrose
- (d) glucose

4. Which of the following is tasteless?