

## 2. Give Short Answers.

i) Decide whether sucrose is a disaccharide or monosaccharide. Give reason.

**Ans:** Since, sucrose consist of two monomers, therefore sucrose is a disaccharide (which we call table sugar, can "sugar" or sugar itself). Sucrose is a disachharide of glucose and fructose.

ii) What is Dextrose sugar?

**Ans: Dextro-rotatory or Dextrose sugars:**

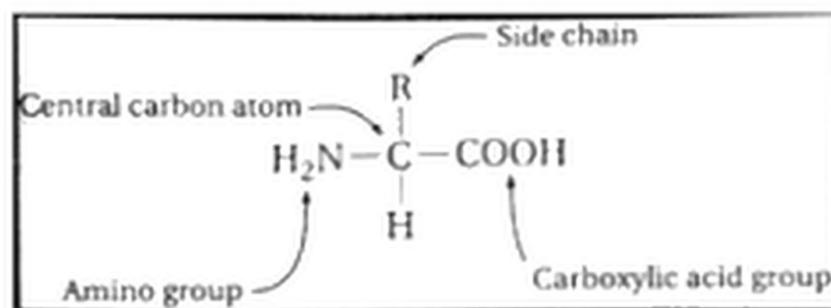
Some Monosacchride molecules can rotate the plane of plane polarized light to right (clockwise). They are called dextro-rotatory or dextrose sugars.

Glucose, manose, Galactose are dextrose sugars.

iii) Write the formula of an amino acid and identify functional groups in it.

**Ans:** An amino acid has two functional groups. All amino acids have a carboxyl and amino group in order for them to form long continous chains of proteins.

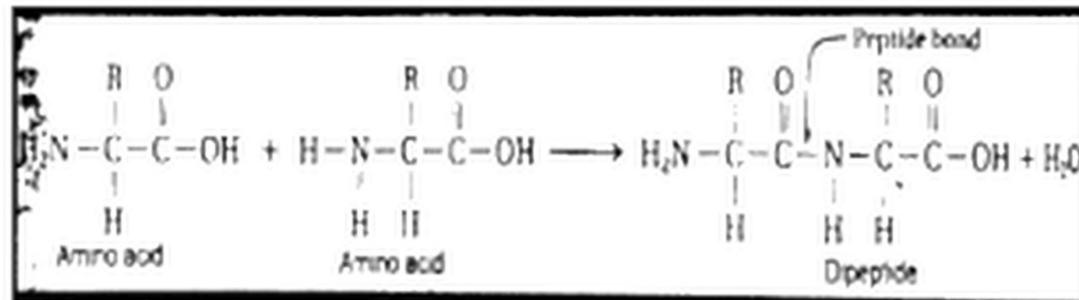
**Structure of amino acid:**



iv) What is a peptide bond?

**Ans: Peptide bond:**

The linkage  $\overset{\text{O}}{\parallel} \text{—C—NH—}$  which joins two amino acids units is called a peptide bond. The resulting molecule is called a dipeptide.



v) Which compounds are included in lipids?

Ans: Lipids include:

- Fats and oils
- Cholesterol
- Sex hormones
- Components of cell membranes called phospholipids.
- Some vitamins (A,D,E and K)

vi) What is the function of DNA?

Ans: Function of DNA:

DNA can store and transmit all the genetic information needed to build organisms. For instance, in human beings, the single fertilized egg cell carry the information for making legs, hand, head, liver, heart, kidneys etc. DNA is found primarily in the cell nucleus.

The key to the ability of DNA to store genetic information and to pass it on from generation to generation is its double stranded structure.

3. Distinguish between mono, di-, tri-saccharides. Give example.

Ans: Monosaccharides:

Monosaccharide is a simple unit consists of only one unit. They serve as building blocks for more complex carbohydrates.

**Example:**

Some important monosaccharides include:

- i. Glucose
- ii. Fructose
- iii. Galactose
- iv. Lyxose
- v. Xylose

**Disaccharides:**

Disaccharides is a group of sugars composed of two monosaccharides groups linked together through the loss of sugar.

**Example:**

Some important disaccharides include:

- i. Maltose = Glucose + Glucose
- ii. Sucrose = Glucose + Fructose
- iii. Lactose = glucose + Galactose

**Trisaccharides:**

Trisaccharides are sugars containing three hexoses.

**Examples:**

Raffinose found in molasses contain the three hexoses. Nigerotriose, Maltotriose, Melezitose.

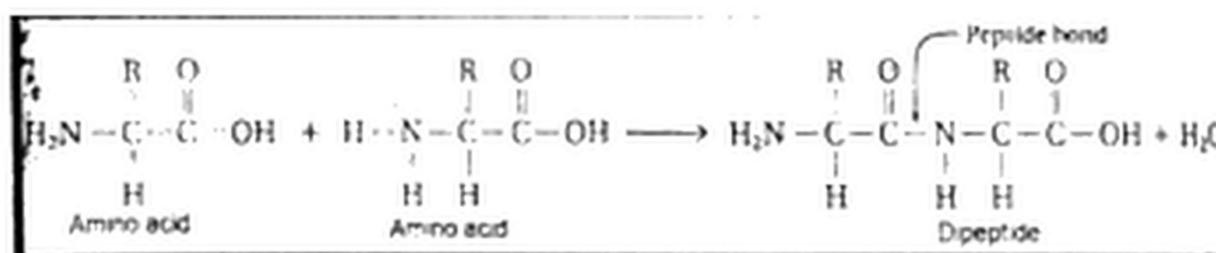
**4. Describe bonding in a protein molecule.**

**Ans: Amino acids as building blocks of proteins:**

Amino acids are building blocks of protein synthesis. Twenty different amino acids are involved in protein synthesis.

### Joining of two molecules of amino acids:

Molecules of amino acids join together through amino (-NH<sub>2</sub>) group of one molecule and carboxyl group (-COOH) of another molecule by eliminating a molecule of water.



### Peptide bond:

The linkage  $\begin{array}{c} \text{O} \\ || \\ -\text{C}-\text{NH}- \end{array}$  which joins two amino acids units is called a **peptide bond**. The resulting molecule is called a dipeptide. There is still an amino group on the left and a carboxyl group on the right. Each of these groups can react further to join more amino acids units. In this way thousands of amino acid units join to form a giant molecule of protein.

### 5. Explain sources and uses of lipids.

#### Ans: Sources of lipids:

Animals, plants and marine organisms such as salmon and whales are rich sources of lipids. Milk is an important source of animal fats from which butter, ghee, cheese etc are obtained. Seeds of many plants such as sunflower, corn, cotton, ground nut, coconut, olive etc are good source of vegetable oils. Cod liver oil is obtained from salmon and whales.

#### Uses of lipids:

Fats and oils have several important functions in living organisms.

- i. Butter, ghee and vegetable oils are used for cooking and frying of food, preparing bakery products and sweets.
- ii. In mammals a layer of fat is present under the skin. This layer acts as a thermal insulator.
- iii. Fats protect delicate organs from shocks. A layer of fat around our heart and kidneys protect these organs from injury.
- iv. Lipids provide some vitamins such as A, D, and E which are essential for health. These vitamins are insoluble in water and soluble in lipids.
- v. Fats and oils are important food stores in living organisms. They provide about twice, as much energy per gram as do carbohydrates.
- vi. Vegetable oils are converted into vegetable ghee or margarine by catalytic hydrogenation.
- vii. Fats and oils are also used for the manufacture of materials like soaps and detergents, cosmetics, polishes, paints and varnishes.
- viii. In our bodies cholesterol is essential for the synthesis of hormones, vitamin D and bile acids.

#### **6. Give sources and uses of proteins.**

##### **Ans: Sources of proteins:**

Meat, fish, eggs, milk and cheese are important sources of proteins. Plants also provide us proteins. For example, pulses, beans, meat, egg, fish etc are rich in proteins.

##### **Uses of proteins:**

- i. We require proteins in our diet, to provide amino acids, to provide muscles, hair, enzymes and repair of body tissues.
- ii. Proteins are essential for the formation of protoplasm and components of cells.

- iii. Proteins are essential for both physical and mental growth especially in children.
- iv. A protein called gelatin is obtained by heating bones and tendons in water. It is used in bakery goods.
- v. Enzymes are proteins that catalyze specific biological reactions, without which life would be impossible.
- vi. The antibodies that help us to fight against disease are large protein molecules.

### 7. Give sources and uses of carbohydrates.

#### Ans: Sources of carbohydrates:

Carbohydrates are the most abundant class of carbo containing compounds.

#### i. Monosaccharides:

Monosaccharides such as glucose, fructose and galactose are obtained from fruits, vegetables and cereals. They are also present in honey.

#### ii. Disaccharide:

Disaccharide such as sucrose is obtained in sugar cane, sugarbeet and fruits. Maltose is found in cereals. Lactose is main sugar in milk and dairy products.

#### iii. Cellulose:

Cellulose is obtained from plants e.g Cotton is pure cellulose.

#### iv. Starch:

Starch is present in cereals, wheat, barley, rice, maize, potato, sweet potato etc.

#### Uses of carbohydrates:

- i. Carbohydrates store energy in both plants and animals . 1g of glucose provide us 15.6KJ energy.
- ii. They serve as food source for most organisms.
- iii. Carbohydrates serve as structural material for plants. Cellulose in the human diet is reffered as fiber. It is found in bran, whole meal bread, fruit, and vegetables. We cannot digest it but it is very impotant for us. It helps the muscles of your intestines to move food efficiently through the digestive tract. It absorbs and carries away toxic chemicals in food that would otherwise harm us. It also helps us in lowering chloestrol and regulates blood pressure.
- iv. Sucrose is used as commo table sugar.
- v. Glucose is stored in animal muscles and liver cells in the form of glycogen. Glycogen serves as long termm energy reservoir. It can be converted back to glucose when needed for energy. Plants store excess energy as starch.
- vi. Starch is used to make rectifies spirit by fermentation process.
- vii. Starch is converted into dextrin which is used as an adhesive for stamp and wallpaper glue.
- viii. Cows, cattles, goats, deer, sheeps and termites derive nutrition from cellulose.
- ix. We use cellulose in the form of wood for heat, housing and furniture.
- x. Wood is also used to make paper and wood pulp.
- xi. Cellulose fiber of cotton is used to make rayon and cellulose acetate, which are used in textile energy for making cloth.

#### 8. Differentiate between fats and oils.

**Ans: Difference between fats and oils:**

A lipid is called fat if it is solid at room temperature.

A lipid is called oil if it is liquid at room temperature.

The differences in melting points are due to the degree of unsaturation of constituent fatty acids. Fats contain larger proportion of saturated fatty acids units. Oils contain larger proportion of unsaturated fatty acid units.

**OR (Second Answer)**

- **Fats:**
- Are solid at room temperature
- Made by animals, mostly
- Are more saturated
- **Oils:**
- Are liquid at room temperature
- Are made by plants, mostly
- Are less saturated
- Both are lipids the main difference is that oil is liquid at room temperature, and fat is not.

**9. Define and explain vitamins.**

**Ans: Vitamins:**

Vitamins are specific organic compounds which are required by our bodies to prevent specific diseases but cannot be produced by our bodies.

They must be present in our diet in addition to proteins, fats, carbohydrates and minerals.

Vitamin D deficiency causes softening of bones. Vitamin B3 deficiency cause inflammation and abnormal pigmentation.

**Importance of vitamins:**

Vitamins are substances that are essential for our bodies.

**Vitamin A:**

Vitamin A is important in vision. It helps in chemical transmission of images from eyes to brain. It also keeps the cornea moist.

**Vitamin C:**

Vitamin C is required for the formation of blood and boosting the immune system that protects against illnesses ranging from common cold to cancer.

**Vitamin B:**

Vitamin B helps to regulate nerve impulse in the formation of hemoglobin and activates the function of more than 100 different enzymes.

**Vitamin D:**

Vitamin D regulates blood calcium. It is necessary for proper bone and tooth growth.

**10. Why are vitamins important for us?****Ans: Importance of vitamins:**

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**11. Describe the importance of nucleic acids.****Ans: Importance of nucleic acids:**

Nucleic acids are vital components of all life. They are found in every living cell. They serve as information and control centers of cell.

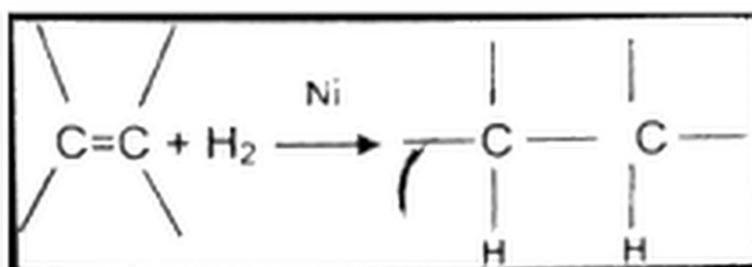
**12. Explain why agricultural and nutritional sciences are vital?****Ans: Vital importance of agricultural and nutritional sciences:**

Protein deficiency leads to physical and mental retardation. Excess lipids or fats may lead to heart disease or a stroke, cancer, diabetes and other health problems. The nutritional chemists recommend that no more than 30% of your daily caloric intake comes from fat.

Healthy crops fruits and vegetables are necessary for our proper growth and health. So both agricultural and nutritional sciences are vital for us.

**13. Explain hydrogenation of vegetable oil.****Ans: Hydrogenation:**

Addition of hydrogen to an alkene is called hydrogenation. This reaction takes place in the presence of Ni, Pd or Pt catalyst.



This reaction is used to make margarine or vegetable ghee. Fatty acid component of vegetable oil contains carbon-carbon double bonds. When hydrogen is added to these oils, they become saturated and harder.

#### 14. List commercial uses of enzymes.

**Ans: Enzymes:**

Enzymes are large protein molecules. They are biological catalysts. They catalyze chemical reactions in living organisms. Enzymes are also commercially important. They are used in the production of sweeteners, chocolate syrup, bakery products, infant foods, detergents to remove food stain, in cheese making, in paper and pulp industries to remove sticky matter, to prepare fabrics for clothes, furniture and other household items.

**For Example:**

- (a) Enzymes like diastase, invertase and zymase are used in the fermentation of molasses and starch to produce Ethanol.
- (b) Amylase is used in bread making.
- (c) Proteases and amylase are used in detergents to remove food stains on cloths.
- (d) Lactase is used in infant foods.

#### 15. Explain the use of dextrose in strips.

**Ans: Use of dextrose in drips:**

5% m/v solution of dextrose is used in drips. 5% m/v solution of dextrose means 5 grams of dextrose dissolved in water to form 100cm<sup>3</sup> of solution. It is intravenously given to patient who is severely dehydrated, or is unable to eat or is not allowed to eat.

**16. Separate water soluble vitamins from the following. Vitamin A, Vitamin C, Vitamin E, Vitamin B.**

**Ans: Water soluble vitamins:** Vitamin A, Vitamin C, Vitamin B.

### Think-Tank

**17. Compare components on both proteins and carbohydrates.**

**Ans:** Proteins are the complex compounds made up of carbon, hydrogen, oxygen, nitrogen and sulphur.

Carbohydrates are the compounds made up of three elements carbon, hydrogen and oxygen.

**18. What is the name of the bond which forms between two amino acids in building a protein?**

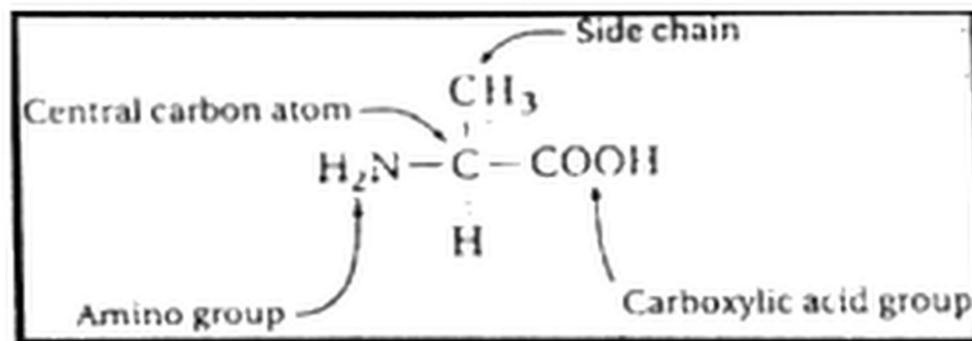
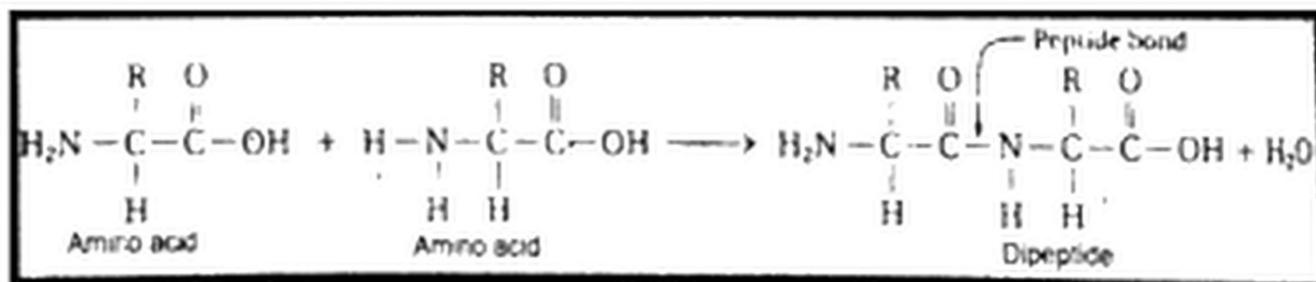
**Ans:** Peptide Bond

**19. How many molecules of water are needed to allow a disaccharide to form monosaccharides?**

**Ans:** One water molecule.

**20. Draw the structure of each of the following molecules.**

**(a) An amino acid having a -CH<sub>3</sub> as R group**

**(b) A protein containing two amino acids****Ans: (a)****(b)****21. Distinguish between DNA and RNA?****Ans:** These are two **differences** that **distinguish DNA** from **RNA**.**(a)** RNA contains the sugar ribose, while DNA contains slightly different sugar deoxyribose (a type of ribose that lacks one oxygen atom).**(b)** RNA has the nucleobase uracil while DNA contains thymine.**22. Hydrogenation is an important reaction in food industry. Interpret this statement.****Ans:** Hydrogenation is a chemical reaction – widely used in the processing of cooking oils and fats – that turns unsaturated fatty acids into saturated ones.

There are two major reasons why foods are hydrogenated

- It increases the shelf-life of foods.
- It increases flavour stability in foods.

Complete hydrogenation converts unstaured fatty acids into saturated ones for use in products like margarine.

