

Chapter = 04

Biochemistry

Q1. What are carbohydrates. Discuss the classification of carbohydrates

CARBOHYDRATES

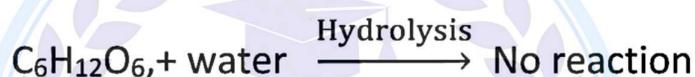


Carbohydrates are naturally occurring organic compounds and are important component of our food. Generally they contain elements like carbon, hydrogen and oxygen. Mostly carbohydrates are represented by general formula $C_x (H_2O)_y$ because in these compounds hydrogen and oxygen are in the ratio as in H_2O . Actually, these compounds do not contain water molecules.

CLASSIFICATION OF CARBOHYDRATES

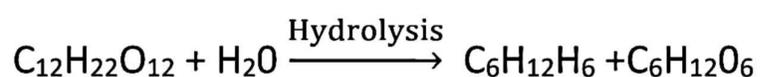
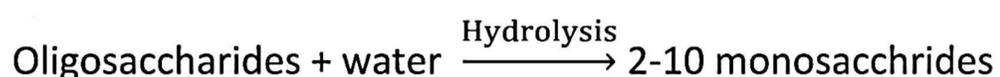
MONOSACCHARIDES (GREEK MONO = ONE)

These are also called simple sugars. These carbohydrates cannot be further simplified on hydrolysis. Monosaccharides contain 3 to 10 carbon atoms and may be subdivided into trioses, tetroses, pentoses, hexoses etc depending upon the number of carbon atoms they possess. Glucose (grape sugar) belongs to aldoses and fructose (honey) to ketoses are examples of monosaccharides.



OLIGOSACCHARIDES (GREEK OLIGO= FEW)

These carbohydrates produce 2 to 10 Monosaccharides on hydrolysis. The oligosaccharides which contain two monosaccharides are called disaccharides and those which contain three are known as trisaccharides and so on.



Sucrose Water

Glucose Fructose

POLYSACCHARIDES (GREEK POLY = MANY)

These carbohydrates produce more than ten monosaccharides on hydrolysis. These are also called polymeric carbohydrates. In these Carbohydrates, monosaccharides are connected by glycosidic linkage.

Polysaccharides + water → More than 10 monosacchrides



Cellulose or starch Water Glucose

Q2. Give sources of carbohydrates.

SOURCES OF CARBOHYDRATES

Carbohydrates are important food factor and obtained from various sources like

1. Fruits
2. Vegetables
3. Dairy products

Q3. Give uses of carbohydrates.

USES OF CARBOHYDRATES

1. They are required as energy source for the survival of both plants and animals.
2. They sustain structure of plants.
3. Carbohydrates, in the form of starch in plants and glucose in mammals, serve as energy storage.
4. They keep our blood sugar levels in check.
5. Sucrose is a food additive. It's found in confectioneries, condensed milk, canned fruits, jams, and jellies, among other things.
6. Carbohydrate fiber helps in cholesterol reduction and blood pressure regulation.
7. Carbohydrates coexist with a variety of proteins and lipids in biosystems.
8. Celluloses provide food its bulk and fiber. It promotes peristalsis in the intestine.

Q4. What are proteins?

PROTEINS

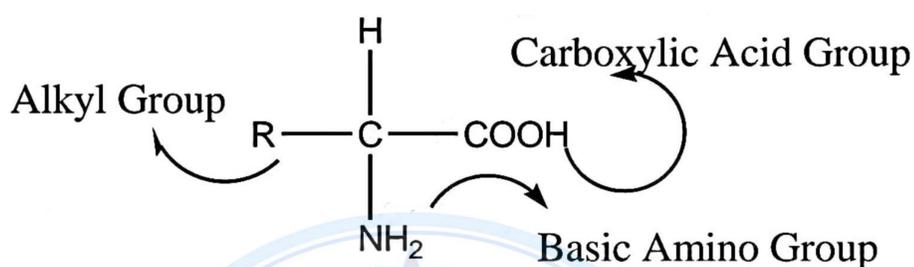
The word protein is taken from Greek Proteios means first. These are nitrogenous macro-molecules found in all the cells of living organisms. Proteins have central position in architecture and functioning of living matter. They are composed of carbon, hydrogen, nitrogen, oxygen and very rarely sulphur and phosphorus. Proteins are defined as: The polymers (macro-molecules formed of simple units called monomers) of amino acids are called proteins.



Q5. What do you know about Amino acid?

AMINO ACIDS

Amino acids are building blocks of proteins. They are bi functional compounds and contain basic amino ($-NH_2$) and acidic carboxyl group ($-COOH$) groups. Up to twenty amino acids have been found in nature, ten are essential and remaining ten non-essential. Body can only synthesize non-essential ten amino acids. The general formula for amino acids is:



Q6. Give sources of protein

SOURCES OF PROTEIN

The important sources of proteins are

1. Eggs
2. Meat
3. Pulses
4. Nuts
5. edible seeds
6. beans
7. peas
8. cheese etc.

Q7. Give uses of protein

USES OF PROTEINS:

Animal proteins can be found in meat, mutton, poultry, fish, and eggs. Humans consume them as food since they are required for protoplasm production.



Enzymes are proteins generated by living organisms. They help to stimulate chemical processes in our body. They are highly specialized and extremely efficient. Many enzymes are utilized in pharmaceuticals. They cure blood cancer as well as decrease bleeding.

Proteins are hides. These are used in the tanning process to create leather. Leather is used to produce shoes, coats, and sports equipment, among other things.

Bones are rich in proteins. When bones are cooked, gelatin is produced. Bakery goods are made with gelatin.

Plants, such as pulses, beans, and other legumes manufacture proteins as well. These are utilized as a source of food.

Q8. What are lipids?

LIPIDS

A group of naturally occurring heterogeneous organic compounds which includes fats, oils, waxes and are insoluble in water means hydrophobic (water repellent) but easily soluble in Bloor's reagent (mixture of diethyl ether and ethyl alcohol in the ratio of 2:1) and organic solvents like ether, benzene, acetone, carbon tetra chloride and chloroform.

Generally, lipids are composed of elements like carbon, hydrogen and oxygen, but there are some lipids which contain nitrogen and phosphorous too.

Lipids are the building blocks of cells.

Q9. Define fatty acid. also give its example

FATTY ACIDS

Fatty acids are lipids building components. They're carboxylic acids with a lengthy chain, either saturated or unsaturated

FOR EXAMPLE:

$C_{15}H_{31}COOH$ Palmitic acid

$C_{17}H_{35}COOH$ Stearic acid



In the presence of mineral acids, these acids produce esters (oils or fats) with glycerol.

Q10. Differentiate between fat and oil

<u>FATS</u>	<u>OILS</u>
These are solids at ordinary room temperature	These are liquids at ordinary room temperature
They are obtained mainly from animals.	They are obtained mainly from plants.
These are saturated compounds.	These are unsaturated compounds.
They have high melting points.	They have low melting points.
They increase cholesterol level in body.	They maintain cholesterol level in body.

Q11. Give sources of lipids

ANIMALS:

Marine animals like salmon and whales are rich sources of lipids. Butter, ghee, cheese are obtained from animals.

PLANTS:

Sunflower, coconut, ground nuts, corn, cotton seed, olive etc. are important plant sources of lipids.

Q12. Give uses of lipids.

USES OF LIPIDS:

1. They act as transporter of fatty acids and fat soluble vitamins (vitamin A, D, E &K) in body.
2. Some lipids reduce cholesterol level in body.
3. Fats and oils are used for cooking and frying of food.
4. Fats and oils are used in detergents, soaps, cosmetic polishes and paints.

5. They activate the enzymes.
6. Animal fats are found in adipose tissue cells. Animals secrete milk from which butter and ghee is obtained. Butter and ghee are used for cooking and frying of food, for preparing bakery products and sweets.



Q13. Write short note on nucleic acid

NUCLEIC ACIDS

The name nucleic acid implies that they generally occur in nuclei of the cells. But some nucleic acids are also present in cytoplasm. Like proteins, nucleic acids are biopolymers. They are most important of all biomolecules because they store and transmit hereditary information from parents to children. In living organisms, even single fertilized egg carries the information for making the different organs like heart, liver, eyes, kidneys, hands, legs, heads etc.

Each nucleotide is composed of:

1. Pentose sugar
2. Phosphate group
3. Nitrogenous base (purines and pyrimidines)

Q14. Discuss the types of nucleic acid

TYPES OF NUCLEIC ACIDS

There are two types of nucleic acids. These both types of nucleic acids are present in all animals and plants.

DEOXYRIBONUCLEIC ACID (DNA)

Deoxyribose sugar is found in DNA. J. Watson and F Crick identified its structure in 1953. It's a two-chained double-stranded molecule with a considerable length. Sugar, phosphate, and a base make up each chain. The backbone of the chains is made up of sugar and phosphate groups, and two chains are joined by bases. Chains are wrapped around each other in a double helix shape

In the nucleus of a cell, DNA is the permanent storage for genetic information. It transports and stores all of the cell's genetic information conveys these instructions on how to build certain proteins from amino acids from generation to generation. These instructions are referred to as the "genetic/code of

life." They decide whether a cell is nerve cell or a muscle cell, and if an organism is a man, a tree, or a buffalo.

RIBONUCLEIC ACID (RNA)



It is made up of ribose sugar. It's a molecule with only one strand. It is in charge of putting genetic information to work in the cell in order to produce proteins. Its function is similar to that of a messenger.

DNA produces RNA in order to convey genetic information. The information sent to RNA is received, read, decoded, and used to build new proteins. As a result, RNA is in charge of guiding the production of new proteins.

Q15. Give some importance of nucleic acid?

IMPORTANCE OF NUCLEIC ACID

1. Nucleic acid are the most vital, material for cell functioning.
2. Nucleic acids are the storage of genetic information
3. Nucleic acid work for mutation to save the cells and body from threatening diseases.
4. Nucleic acids transfer heredity characters from one generation to another generation.
5. Nucleic acids serve as source of energy in the form of ATP

Q16. What do you know about Vitamins?

1) TYPES OF VITAMINS

On the basis of solubility, there are two types of Vitamins

(a) Water soluble vitamins

(a) Fat soluble vitamins

Q17. Discus the type of vitamins

TYPES OF VITAMINS

(a) WATER SOLUBLE VITAMINS

Those vitamins which are soluble in water are called water soluble vitamins. These vitamins are obtained from cereals and nuts. Generally, vitamin B (complex) and vitamin C are water soluble vitamins. These vitamins are not stored in body. If we take these vitamins in excess, they cannot harm. Further, these vitamins are easily excreted from our body.



(b) FAT SOLUBLE VITAMINS

Those vitamins which are soluble in fats and organic solvents are called fat soluble vitamins. Vitamins A, D (sunshine vitamin), E and K are fat soluble vitamins and are stored in the body for long period of time. These vitamins are obtained from lipids. If we take overdoses of vitamins, they may harm us and cause diseases. For example, excess of vitamin, A causes irritation and headache, vitamin D calcification and pain in bones, vitamin E fatigue and headache and vitamin K liver and kidney diseases.

Q18. Give uses of enzymes.

USES OF ENZYMES

1. Commercially, yeast enzymes are utilized in the fermentation of molasses and starch to make alcohol (Ethanol).
2. Detergents include microbial enzymes (powder or liquid). Lipases are enzymes that break down fats into more water-soluble molecules.
3. Fruit juices are purified with the help of retimes.
4. Amylase enzymes are utilized in the Production of bread because they can increase the amount of starch in the flour Even they are capable of converting starch to sugary glucose syrup.
5. This may be used as sweetener in cuisine as well as in the baking of bread.
6. The lactase enzyme is used to make ice cream sweeter. Lactose is broken down in milk to galactose and glucose, both of which are sweeter than lactose.
7. Enzymes ore used in the dairy sector to make cheeses, yogurt, and other dairy products, while others are employed to improve the texture or flavor of the product.

Q19. Write sources, importance, deficiency disease of following vitamins A, B, C, D, E, k

<u>VITAMINS</u>	<u>SOURCES</u>	<u>IMPORTANCE</u>	<u>DEFICIENCY DISEASES</u>
A	Butter, fish, eggs, milk, cheese, carrots etc. It may	Eyes (form visual pigments), skin	Night blindness (an inability to see in dim

	be obtained from the coloring matter of green and yellow vegetables.		light), Xerophthalmia (tear glands cease to function), dryness of skin etc.
B (Complex)	 Wheat, rice, eggs, milk, meat, live, nuts, yeast etc.	Nerves, skin	Beriberi (causes inflammation of nerves and heart failure), Dermatitis (red and swollen skin), loss of hairs, tongue inflammation, inflammation of lips, burning of eyes, thickening of skin etc.
C (ascorbic acid)	Oranges, lemon, tomatoes, green peepers etc.	Heal wounds, prevent gum beading and cold.	Scurvy (swelling gums and opening of healed Wounds).
D (Anthracitic vitamin)	Fish, Milk, butter mushroomed sunshine etc.	Bones, teeth (controls the metabolism of calcium and phosphorus in body).	Rickets (softening and weakening of bones in children).
E (some time it is called fertility factor)	Plant oils like wheat germ oil, cotton seed oil, corn germ oil, Soybean oil, peanut oil etc. It also occurs in green leafy Vegetables.	Maintain cell membrane and proper functioning of reproductive system.	Sterility, hemolysis (fragility of R.B.C) etc.
K	Green vegetables like spinach, alfalfa, cabbage, cereals etc..	Form blood clotting factor.	Hemorrhage (increase blood clotting time)