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Subject: General Science and Ability

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Topic:

Classification of Carbohydrates, proteins, and lipids (fats).

→ Carbohydrates.

Carbohydrates are the most abundant biomolecules on the surface of the earth. The term carbohydrate is a combination of two words "carbo" and hydrate. Here ~~carbo~~ carbo refers to carbon and hydrate means water, so these are the biomolecules containing C, H and O with empirical formula $C_x(H_2O)_y$. These are mainly called sugars.

→ Classification:

There are large number of carbohydrates. To understand their nomenclature, these are divided into four major groups. i.e. monosaccharides, disaccharides, oligosaccharides and polysaccharides.

(i) Monosaccharides:

These are simple sugars, which cannot be hydrolyzed. Common examples are Glucose, and fructose. These both

have same formula. They are sweet in taste and soluble in water.

Sources: Grape sugar, blood sugar, sweet fruits and honey.

② ~~Di~~ Disaccharides:

② Oligosaccharides:

These type of carbohydrates are formed when 2 to 9 monosaccharide units

combine through a bond called glycosidic linkage. They are crystalline solid, soluble in water and sweet

in taste. They are collectively known as

sugars. Common disaccharides are sucrose, lactose, and maltose and ~~the~~ trisaccharides are raffinose.

Sources: Sugar cane, sugar beet, mango, apricot, almond, coffee and honey.

③ Polysaccharides:

They are insoluble in water and tasteless. They are called non-sugars.

They are used as energy storage compounds in animals and plants in the form of Glycogen and Starch respectively.

→ Proteins

The name protein is derived from "Proteios" meaning prime importance. Proteins are needed for the body to function properly. They are the basis of body structures, such as skin and hair and of other substances such as enzymes, cytokines and antibodies.

→ Classification:

They are classified on the basis of physical-chemical ~~prop~~ properties and on the basis of structure.

- ① Based on physical-chemical properties.

(a) simple proteins:

These proteins are made up of only one type of amino acid as structural component. On decomposition with acids, they liberate constituent amino acids. They are globular type of proteins.

Example: albumin, globulin, collagen etc

(b) Compound or conjugated proteins.

The protein that is attached to some nonprotein groups i.e prosthetic groups, are classified into ~~the~~ compound or conjugated proteins.

Example: phospo-protein, lipo-protein etc.

(c) Derived proteins:

These are the proteins which are derived from the simple or compound proteins from the action of heat, enzymes or chemical agents.

Example: Proteases, enzymes, peptones, oligo peptides etc.

② Based on the structure of proteins:

(a) Primary protein:

Primary structure of proteins is the linear sequence of amino acids that make up the polypeptide chain.

(b) Secondary Protein:

The linear, unfolded structure of polypeptide chain assumes helical shape to produce the secondary structure.

The secondary structure refers to the regular folding pattern of twists and kinds of the polypeptide chain.

(c) Tertiary protein:

Tertiary structure of proteins is three dimensional structure formed by the bending and twisting of the polypeptide chain. The linear sequence of polypeptide chain is folded into compact globular structures.

→ ③ Lipids:

"Lipids" word is derived from "Lipos" means fat. Primary building blocks of lipids are Fatty acids, Glycerol and sterols. They are insoluble in water. Fats, oils and steroids are most important lipids found in nature.

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classification:

1) Simple lipids

These are the compounds of fatty acids with glycerol. For example, common fats and oils.

2) compound lipids:

These are compounds of fatty acids with glycerol and possess additional group also. These include phospholipids, Glycolipids, lipoprotein.

3) Derived lipids:

These are the substances ~~are~~ derived from simple and compound lipids by hydrolysis. Examples are sterols, vitamin D and Terpenes.

