

NATIONAL OFFICERS ACADEMY (NOA)

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(ASSIGNMENT # 01)

## CARBOHYDRATES:-

The term "carbohydrates" is combination of two words, "Carbo" and "hydrate". "Carbo" is short form of Carbon and hydrate mean water, so they contain C, H and O, with empirical formula  $C_x(H_2O)_y$ . They are most abundant biomolecules on surface of earth. They are commonly called "sugars".

### → Classification:-

Carbohydrates are classified further:-

into:-

- 1) Monosaccharides
- 2) Oligosaccharides
- 3) Polysaccharides

### Monosaccharides:-

These are simple sugars, which cannot be hydrolyzed.

Common examples are Glucose, Fructose

- Their sources are Grape sugar, blood sugar, sweet fruits and honey.
- They are sweet in taste and soluble in water.

### • Oligosaccharides:-

- They are formed when 2 to 9 monosaccharide units combine through a bond (Glycosidic linkage).
- Common disaccharides are Sucrose (common table sugar), lactose and maltose and trisaccharides example is raffinose.
- Their sources are sugar cane, sugar beet, mango apricot almond, coffee and honey.
- They are crystalline solids, soluble in water and sweet in taste.
- They are collectively known as sugars.

### • 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 form of Glycogen and starch respectively.

## • Characteristics:-

- CHO are compounds with large molecular weight.
- CHO are polyhydrated compounds having at least 3 carbon atoms and a potentially active carbonyl group.
- Almost all are derived from aldehyde or ketones.
- They have in their molecules mainly C, H and O.

## • Examples:-

- Leafy greens (Spinach, lettuce)
- Berries
- Starchy veggies (sweet potato, potatoes)
- Fruits (bananas, pineapple, papaya)
- Grains (rice, bread, cereals)

## • PROTEINS:-

The name protein is derived from "Proteios" meaning. Prime importance.

## • Characteristics:-

- They are polymers of Amino Acids.
- Proteins are colourless and tasteless.
- The solubility of protein depends upon pH (solubility increase with increase in acidity or alkalinity).

- they are high molecular weight biomolecules.
- there are 10,000 different kinds of proteins in human body.
- they contain elements, Carbon, Hydrogen, Oxygen and Nitrogen.
- they may also contain phosphorus, Iron, copper, iodine, sulphur and zinc.

### • Classification:-

→ Based on physical-chemical properties:-

#### • Simple Proteins:-

these proteins are made of only one type of amino acid, as structural component. On decomposition of / with acids, they liberate constituent amino acids. They are mostly globular type of proteins. Examples are albumin, globulin, collagen etc. They are most abundant protein in animal kingdom.

#### • Compound or Conjugated Proteins:-

The proteins, which is attached to some non-proteins groups (prosthetic group). Examples are phospho-proteins, lipo-protein etc.

## • Derived Proteins:

These proteins which are derived from simple or conjugated proteins from action of heat, enzyme or chemical agents. For examples, Proteoses, enzymes peptones, oligo peptides etc.

## -> Based on Structure of Proteins:

### • Primary Protein:

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

### • Secondary Protein:

The linear, unfolded structure of polypeptide chain assumes helical shape to produce secondary structure. The secondary structure refers to regular folding pattern of twists and kinds of polypeptide chain.

### • Tertiary Protein:

Tertiary structure of protein is three dimensional structure formed by bending and twisting of polypeptide chain. The linear sequence

of polypeptide chain is folded into compact globular structure.

### • Examples:

- Meat, fish, eggs, chicken etc.

### • LIPIDS:-

"Lipids" word is derived from "lipos" means Fat. Primary building block of lipids are Fatty Acids, Glycerol and sterols.

### • Characteristics:-

- They are most heterogeneous group of substances.
- They are insoluble in water.
- Soluble in organic compounds like ether, alcohol, chloroform, benzene etc.
- Fats, oils and steroids are most important lipids found in nature.
- They are poor conductor of heat and electricity.
- They not only occupy place in human diet but also used as a raw material in manufacturing of soap, detergents, varnishes, paints, polishes, cosmetics and pharmaceuticals.

## • Classification

### • Simple lipids:

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

### • Compound lipids:

These are compounds of fatty acids with glycerol and possess additional groups also. For example, phospholipids (Phosphoric Acid), Glycolipids (carbohydrates), lipoprotein.

### • Derived lipids:

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

### Examples:

cheese, Butter, Ghee, Yogurt, oil etc.