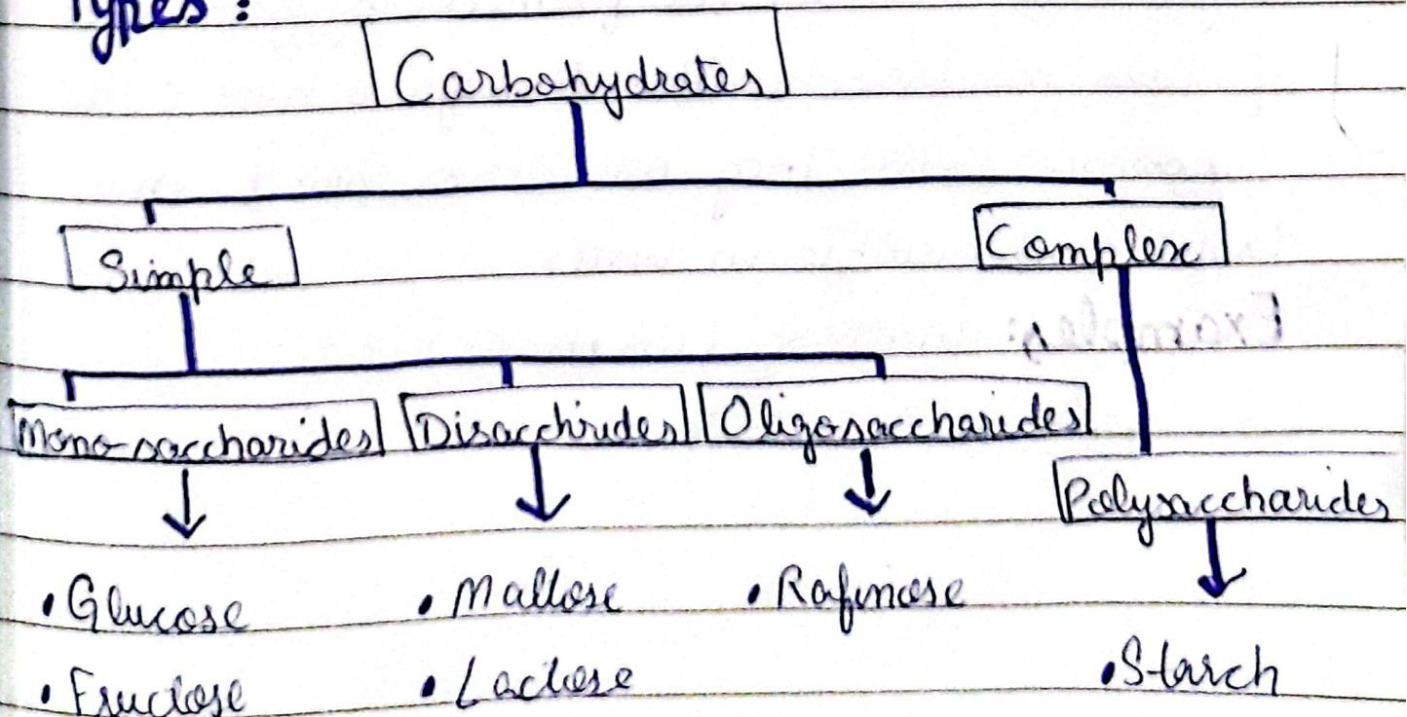


# Types of carbohydrates, proteins and fats. Write definition, characteristics and examples

**Carbohydrates:** Carbohydrates are organic compounds consisting of carbon, hydrogen, and oxygen and have a general formula of  $C_m(H_2O)_n$ . Carbohydrates are also called saccharides which means sugar. They are a primary source of energy in the body.

**Sources:** Apple, Banana, Bread, Cereal, Pasta, Milk, Yogurt, Potato etc.

**Types:**





# 1- Monosaccharides:

3-

"Mono" means one and "saccharide" means sugar. Monosaccharides are simple carbohydrates consisting of carbon, hydrogen and oxygen in a ratio 1:2:1. They have sweet taste and are soluble in water. They cannot be hydrolyzed into smaller carbohydrates.

4

Examples: Glucose, Fructose, Galactose, Ribose.

# 2- Disaccharides:

"Di" means two and "saccharide" means sugar. Disaccharides are formed by joining of two monosaccharides through a bond called glycosidic bond. They are also sweet in taste and soluble in water.

Examples: Maltose ( $C_{12}H_{22}O_{11}$ ), Lactose, Sucrose





**3- Oligosaccharides:** These carbohydrates are made of 3-10 monosaccharides. They are less sweet in taste and less soluble in water.

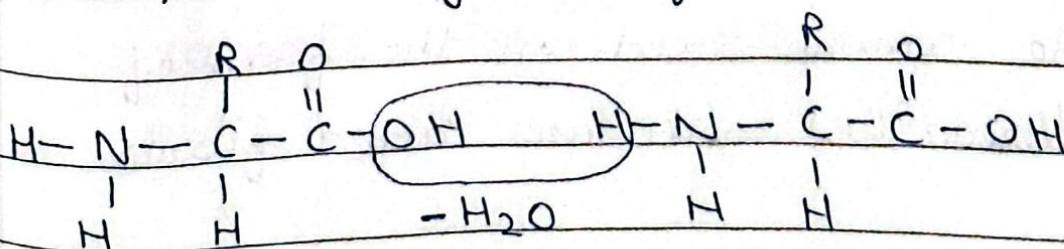
**Example:** Raffinose

**4- Polysaccharides:** These are complex carbohydrates consisting of thousands of monosaccharides. They are abundant in nature. They are sparingly soluble in water.

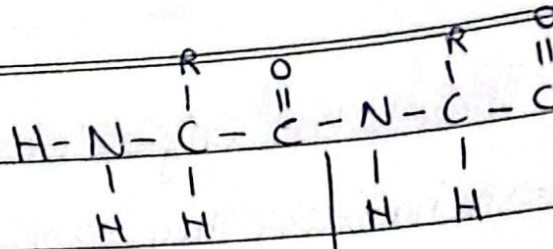
**Example:** Starch, Cellulose, Glycogen, Chitin

## Protein

Proteins are the building blocks of life. Proteins are made up of smaller units called amino acid joined together through peptide bonds. The peptide bond is formed between carboxyl group of one amino acid and the amino group of second amino acid:-



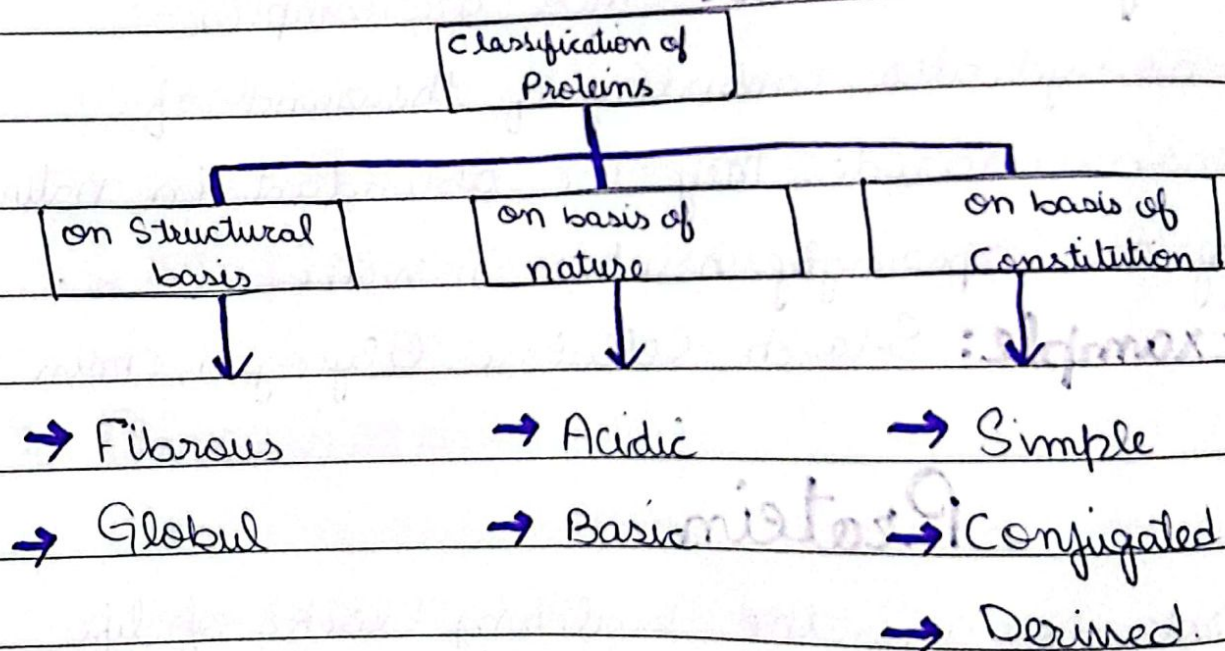




↓  
peptide bond.

Sources: Eggs, Meat, Cereal

Classification:



## 1- Structural classification

On the basis of shape and structure, proteins can be classified into following:

### 1.1- Fibrous proteins:

Fibrous proteins consist of one or more polypeptide amino acid in the form of small thread-like structures called fibrils.

They are insoluble in water, non-crystalline and elastic.

**Examples:** Collagen, Keratin

## 1.2- Globular proteins:

Globular proteins are made up of polypeptides that are coiled about themselves to form spherical molecules. They are soluble in water.

They may be crystallized.

**Example:** Egg albumin, insulin, haemoglobin

## 2. Based on the nature of molecules

On the basis of nature of molecules, proteins can be classified into following:

**2.1- Acidic proteins:** These exist as anion and contain acidic amino acids e.g. blood groups.

**2.2- Basic proteins:** These exist as cations and are rich in basic amino acids.

**Example:** Lysine, Arginine



### 3. Based on constitution :

3.1- **Simple proteins**: These proteins are made up of amino acids only.

**Example**: Albumins, Globulins etc.

3.2- **Conjugated proteins**: These are complex proteins that are combined with the characteristics of non-amino acid substance called as a prosthetic group.

**Examples**: Nucleoproteins, Glycoproteins, Metalloprotein, Phosphoprotein.

3.3- **Derived proteins**: When proteins are hydrolyzed by acids, alkalis or enzymes, the degradation products obtained from them are called derived proteins.

## Fats

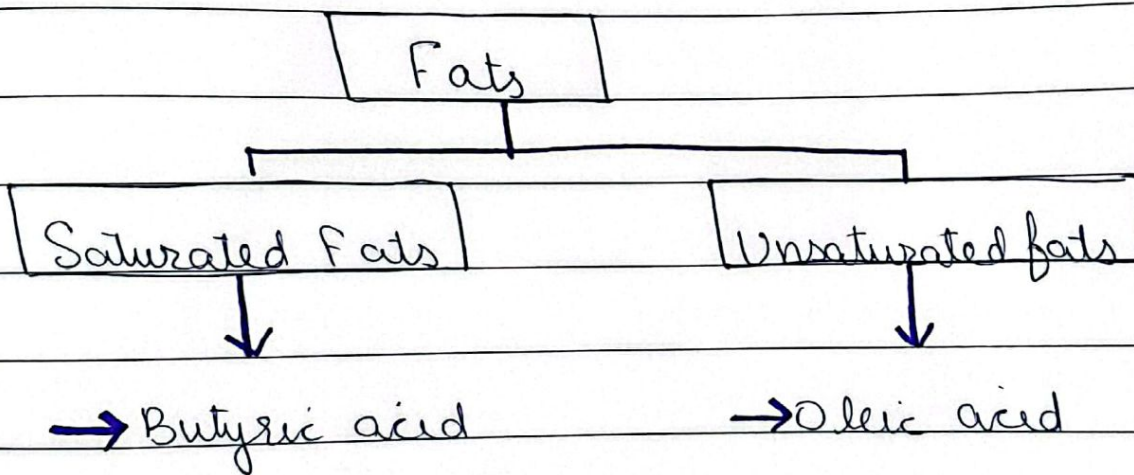
Fats are naturally occurring molecules that are an essential part of our diet. They belong to a larger group of compounds named lipids. They are insoluble in water but are readily soluble in organic solvents like ether.



benzene, alcohol. They have oily texture. They have long chains of carbon and hydrogen and can store a lot of energy.

**Sources:** Vegetable oils, walnuts, fish etc.

**Classification:**



**1- Saturated Fats:** Saturated fats are solid at room temperature. For example Butyric Acid.

**2- Unsaturated Fats:** Unsaturated fats are liquid at room temperature. For example Oleic acid.

Hydrogenation of unsaturated fats gives saturated fats. For example conversion of vegetable oil into ghee.