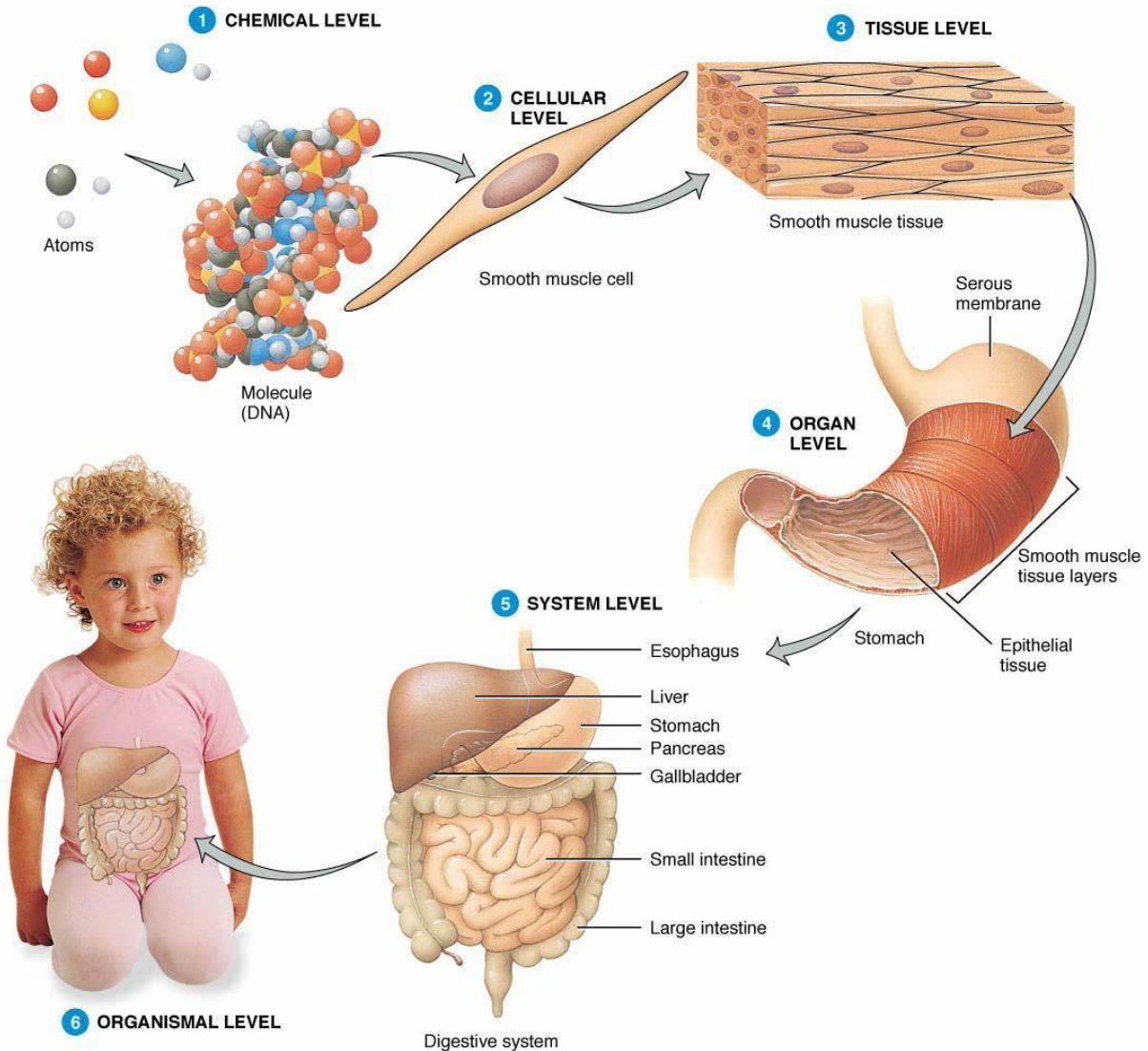


Chemical structure of living organism

- You know that the structure of higher living organism is represented by sequenced



- The human body

- Consists of a group of systems, each system consists of a group of organs (The organ level)
- Each **organ** consists of group of **tissues** (The tissue level)
- Each **tissue** consists of a group of **cells** (The cell level)
- Each **cell** consists of a group of **organelles** (The organelle level)
- Each **organelle** consists of a group of **molecules** (The chemical level)
- Each **molecule** consists of a group of **atoms**

- We find that the cells of the living organism are made up of :-

Organic compound	In organic compound
<ul style="list-style-type: none"> - They are large molecules. - Mainly contain carbon (C) and hydrogen (H) atoms. - May contain other elements, such as oxygen (O) and nitrogen (N). - They are called biological macro-molecules. <p>Examples: Carbohydrates, lipids, proteins and nucleic acids.</p>	<p>They are molecules that don't contain carbon (atoms)</p> <p>Examples: 1- Water (H₂O) 2- mineral salts (e.g. NaCl)</p>

Biological macro-molecules.

- All of them contain carbon atom
- They are extremely necessary for the life
- Most of macro-molecule are called polymers that are formed by the combination of small-sized molecule called monomers through polymerization process (condensation process)
- They are classified according to their molecular structure and the function that they perform into four group

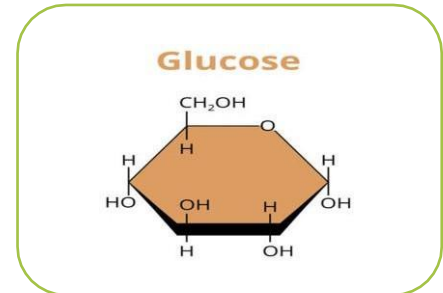
1	Carbohydrates
2	Lipids
3	Proteins
4	Nucleic acid

Each one of them consist of a different monomer for example:-

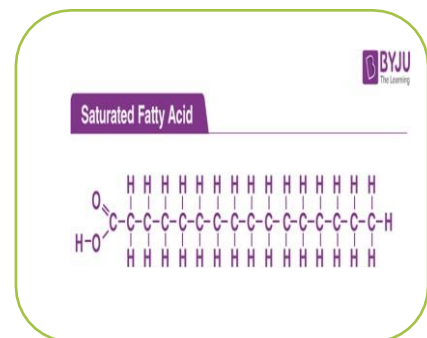
Polymer

monomer

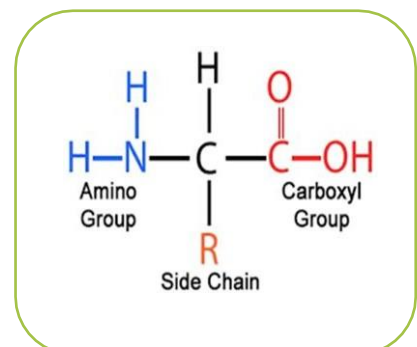
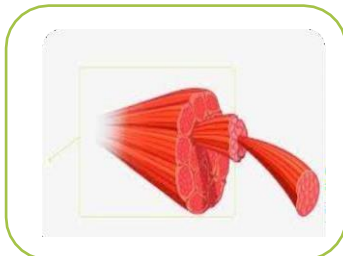
1-carbohydrates



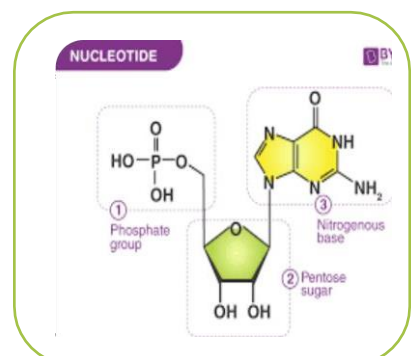
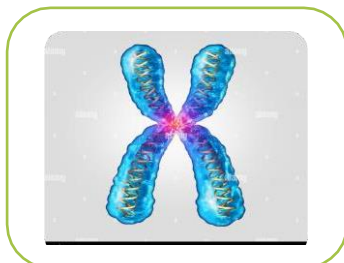
2-lipids



3-protein



4-nucleic acid





Carbohydrates

A Carbohydrates are.....

1-They are biological macro-molecules (polymers) that are made up of many smaller molecules (monomers) called monosaccharaides

2-They include sugar, starches, and fibers

3- $(CH_2O)_n$ this is the chemical formula of carbohydrates

So the molecule consist of carbon(c), hydrogen (H) and oxygen (o) atoms in a ratio) 1:2:1(representatively

B Classification of carbohydrates

Carbohydrates are classified according to their molecular structure as follows:-

1 Simple sugar

2 Complex sugar

1

Simple sugar

Properties of simple sugar:-

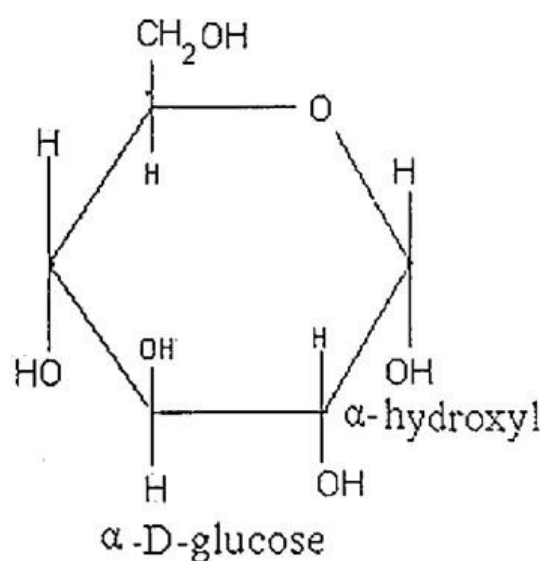
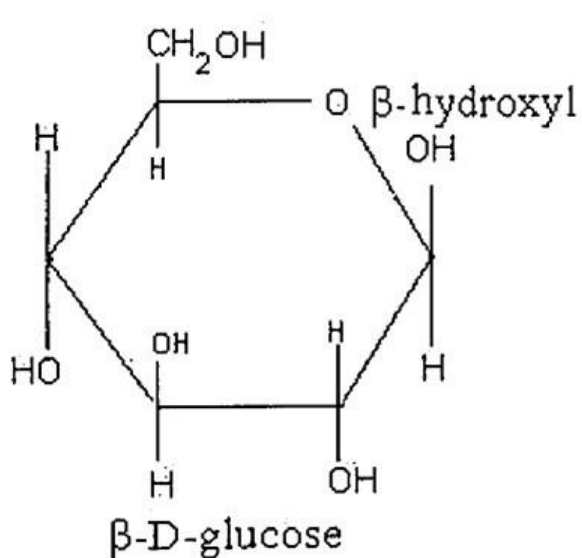
- 1-water soluble
- 2- Having a low molecular weight
- 3-having sweet taste

They are two types:-

Monosaccharaides	Disaccharides
<ul style="list-style-type: none"> - No. of carbon atoms 3 to 6 each atom is connected to oxygen and hydrogen atoms in a certain way. - The simplest type of sugars (G.R). - Formed of one molecule. <p>Examples :</p> <ul style="list-style-type: none"> - Glucose (grape sugar) - Fructose (fruit sugar) - Ribose (pentose sugar) - Galactose. (made in the glands that produce milk) 	<ul style="list-style-type: none"> - Each molecule is made up of two molecules of monosaccharaides linked Together <p>Examples :</p> <ul style="list-style-type: none"> - Maltose (malt sugar) :- Formed of Two Glucose. Molecule - Lactose (milk sugar) :- Formed of glucose + galactose - Sucrose (cane sugar) :-Formed of glucose +fructose

Note:-

There are two types of glucose:-



Properties of complex sugar

- 1-insoluble in water
- 2-have high molecular weight
- 3-don't have sweet taste

They are made up of many monosaccharaides linked together

Examples

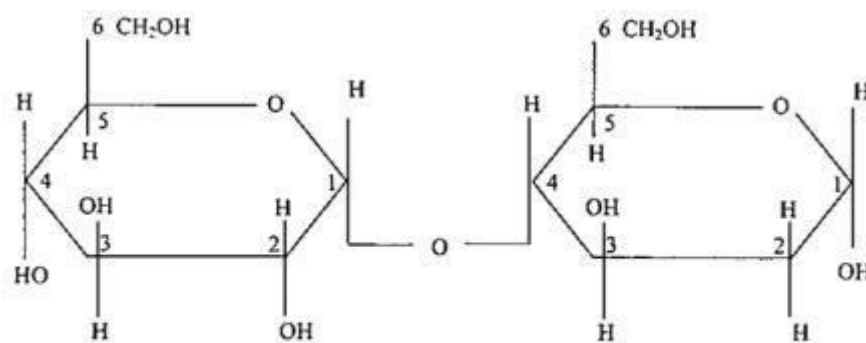
- Starch - (alpha glucose)

Cellulose (beta glucose)

Glycogen

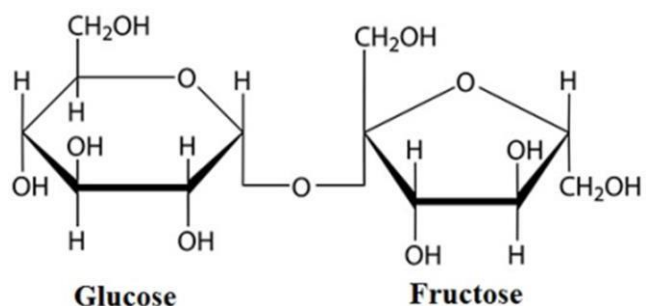
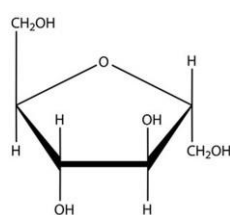
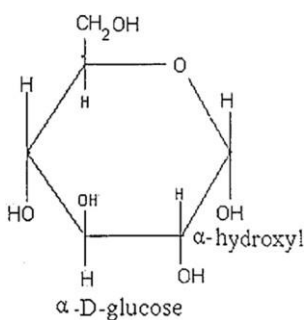
- Each of these molecules Consists of many glucose molecules linked together

Monosaccharaides are linked together by bonds called glycosidic bond which are covalent bond result in the formation of water molecule such as maltose molecule



MALTOSE (α - form)

That is mean when two glucose molecule combine together one molecule of water is resulted (**rehydration**) and also one glycosidic bond



C

Importance of carbohydrates

1-obtaining energy: it is considered from the basic and fast sources for energy

2-storing energy

During glucose oxidation inside the cells in mitochondria. the stored energy in the chemical bond that are present in glucose molecule is released to be stored in compounds called adenosine triphosphate (ATP) which are transferred into other places in the cell to perform all vital process

3-Building cells

Carbohydrates are considered a basic component of some parts of the cell such as: cellulose in the structure of plant cell wall

Carbohydrates enter in the structure of cell membranes and cell protoplasm

D

Practical activity:-

1- Detection of simple sugars

- By using **Benedict' reagent** where:
Its colour turns from **blue** into **orange**.
- Benedict' reagent is used to detect Mono- and di-saccharides.
- Benedict' reagent is used to detect Simple sugars in urine and blood.
- Benedict' reagent is used to detect Simple sugars in foods

2- Detection of starch:

- By using **iodine solution** where:
Its colour turns from **orange** into **dark Blue**.
- Iodine solution is used to detect Starch in food samples.
- The degree of the colour of iodine Solution depends on the amount of Starch in the food samples.

