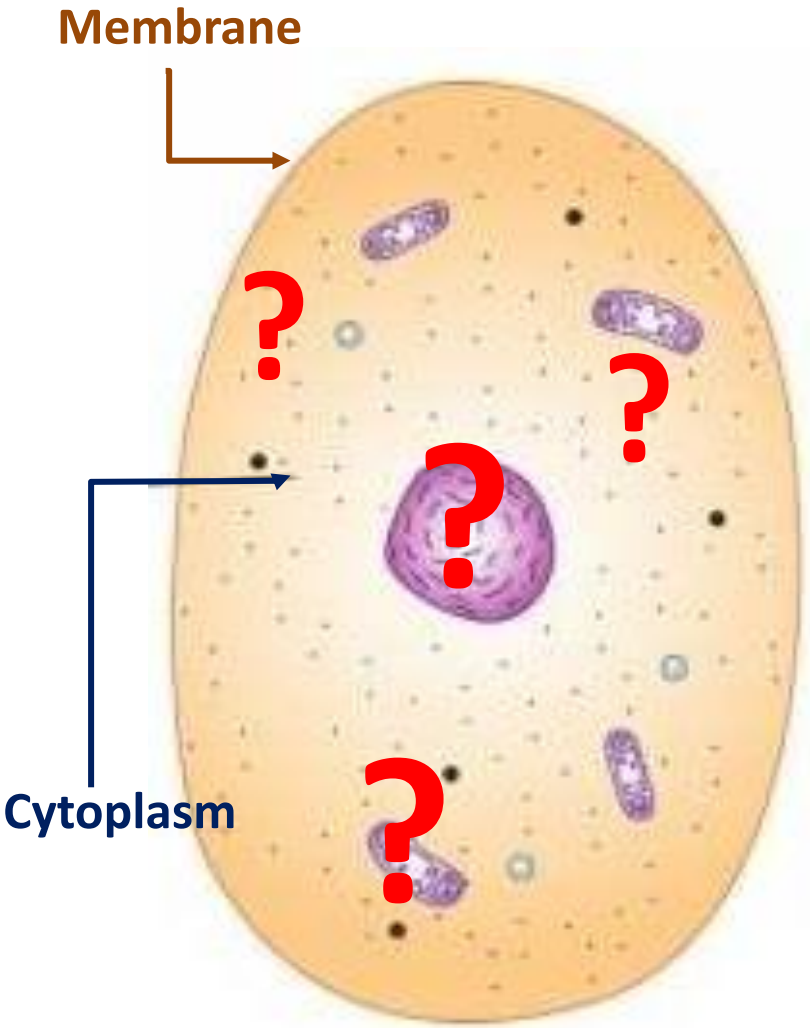
Cell Composition

All cells consist of a **cytoplasm** enclosed within a **membrane**.



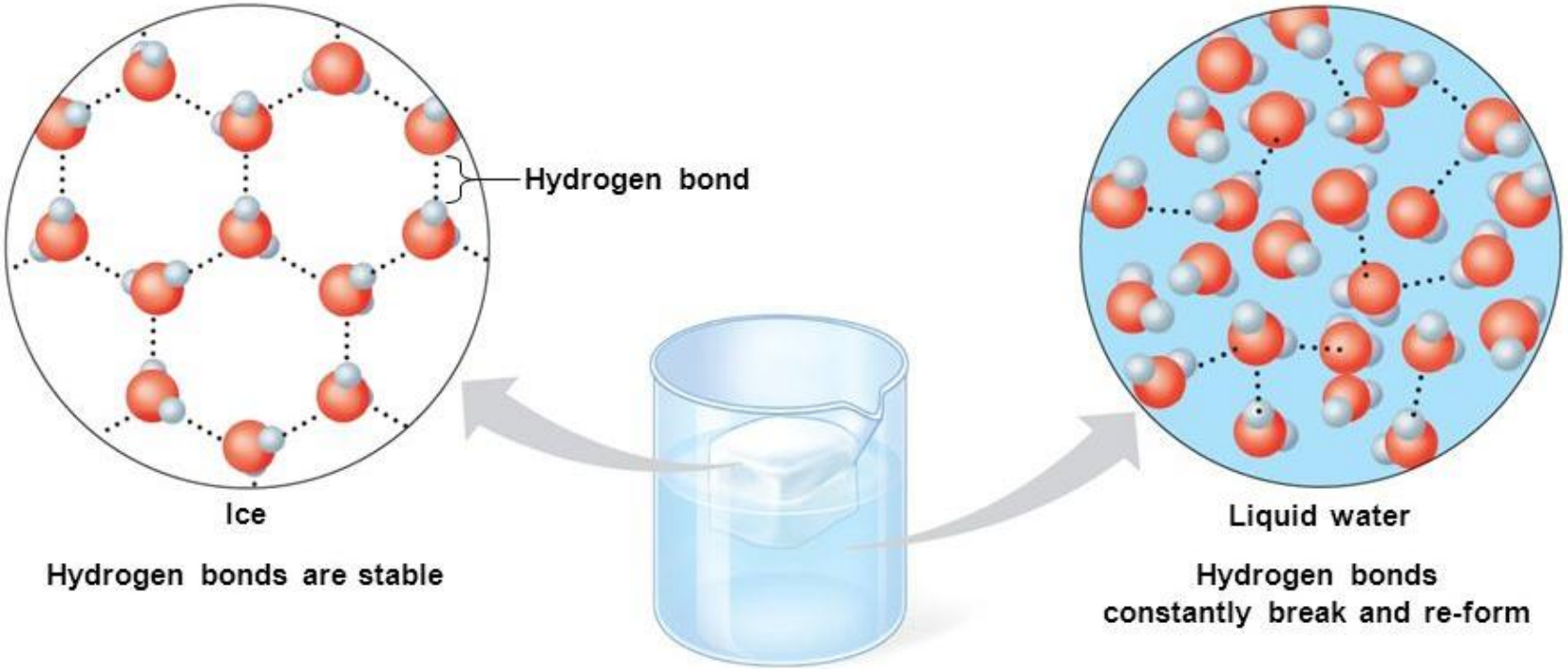
- All cells have the same basic chemical composition.
- **Membrane** is made of water insoluble lipids.
- **Cytoplasm** is a gelatinous liquid composed of a mixture of small molecules (ions, amino acids, sugars and 70-90% water), and macromolecules which are essential to the cell's functions.

Amazing Water

- **Water is the only substance on Earth that <u>naturally exists</u> as solid and liquid and gas.**

- **Water is the substance that is necessary for any form of life as we know it. It is directly involved in many chemical reactions to build and break down important components of the cell.**

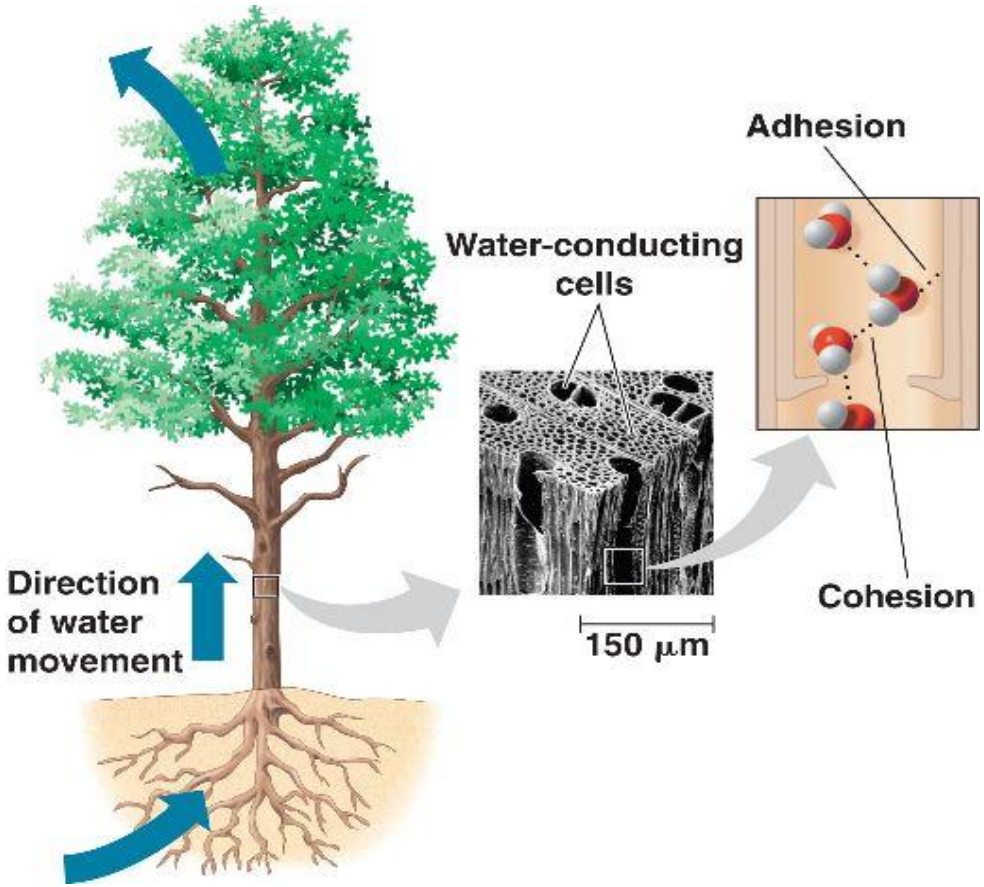
Water is less dense as a solid than as a liquid.

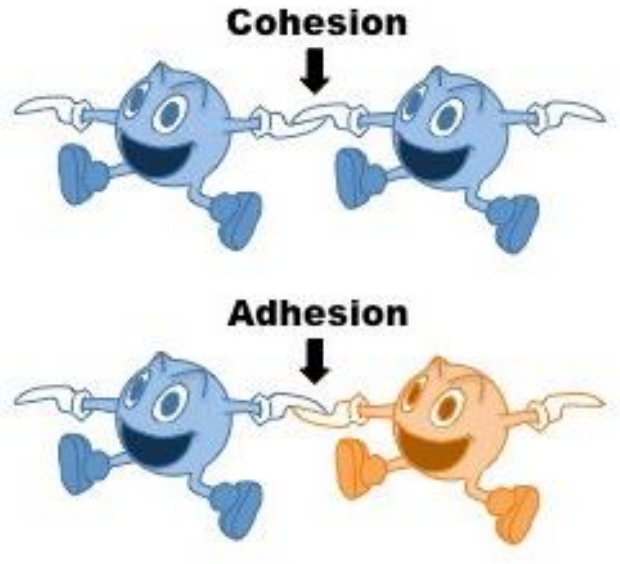


- This means that ice is less dense than liquid water, and therefore it floats. This property is important, as it keeps ponds, lakes, and oceans from freezing solid and allows life to continue to thrive under the icy surface.

Water has strong cohesive and adhesive forces: water molecules are attracted to one another and to other materials.

- This is essential for fluid transport in many different forms of life.



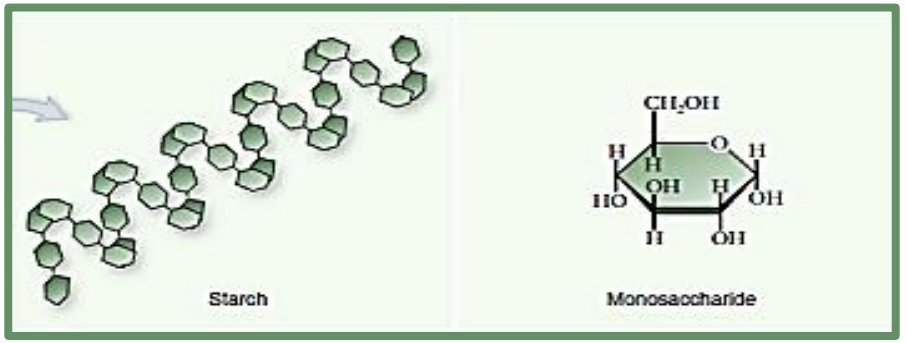


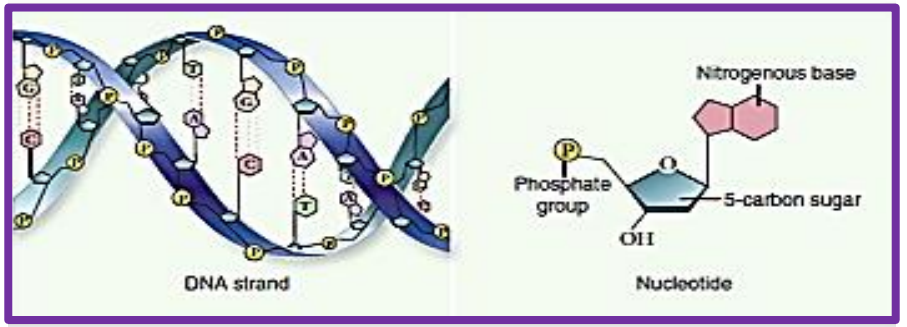
- For example, cohesion and adhesion combined allow nutrients to be transported to the top of a tree against the force of gravity.

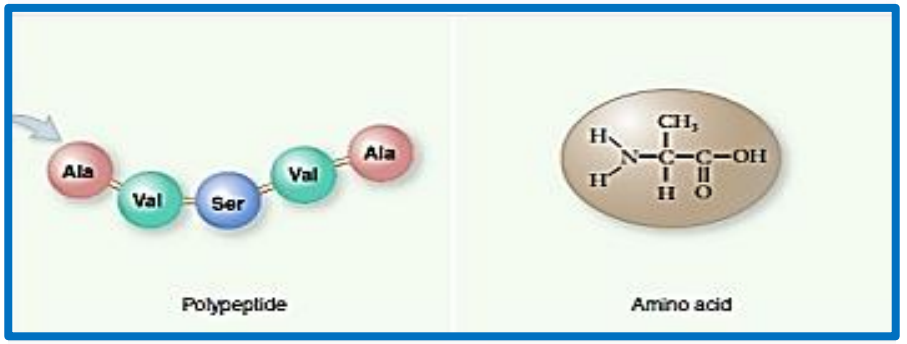
- Carbohydrates
- Nucleic acids

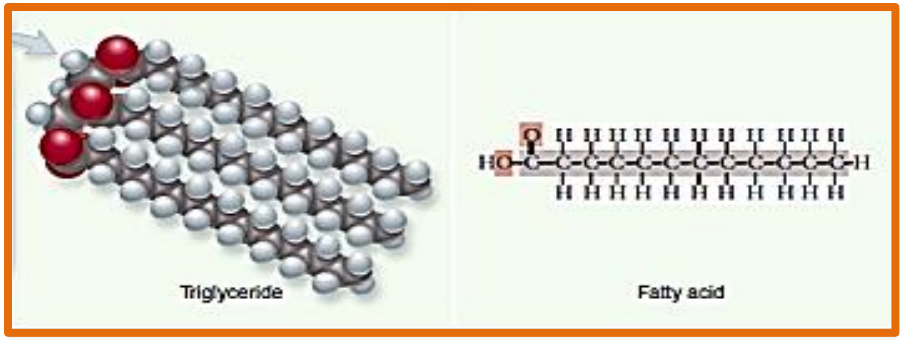
Four major classes of intracellular macromolecules (large biological molecules)

- Proteins
- Lipids

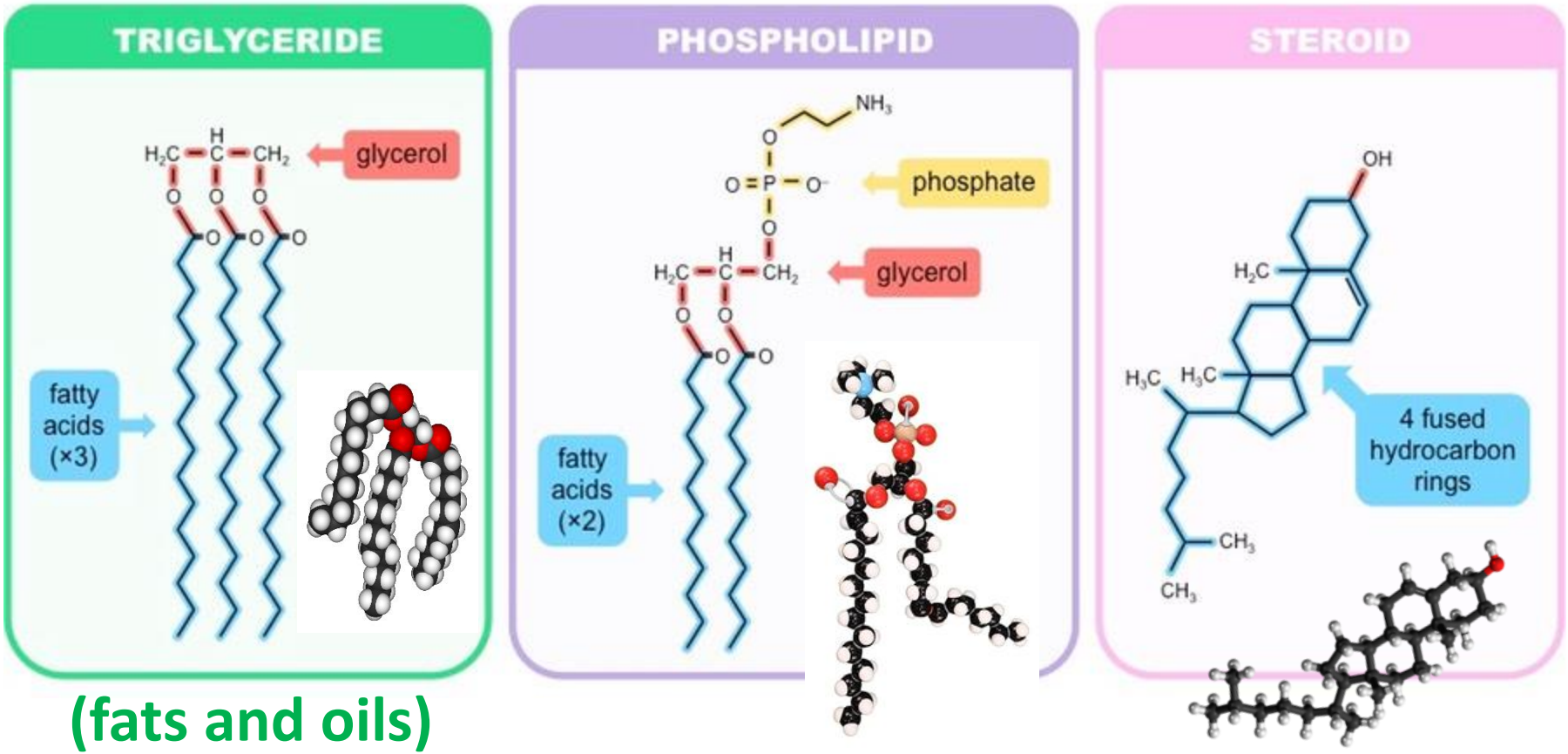








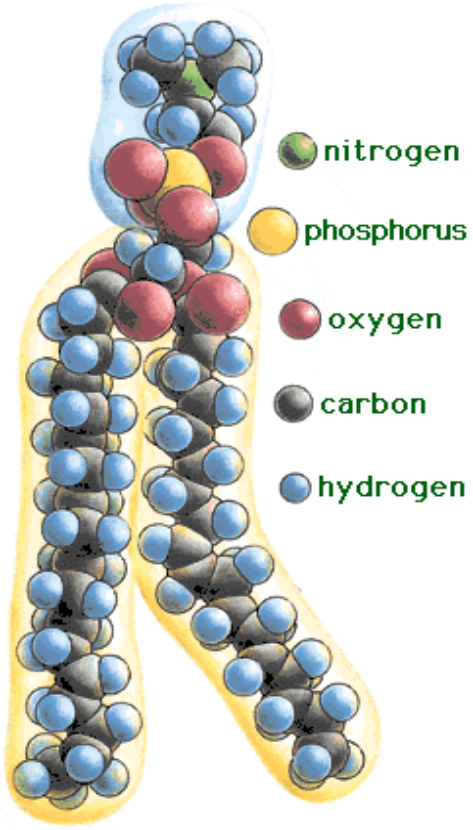
Lipids are long chains of hydrocarbon molecules insoluble in water



(fats and oils)

Lipids are components of cell membranes; they are also involved in energy storage, as well as relaying signals within cells.

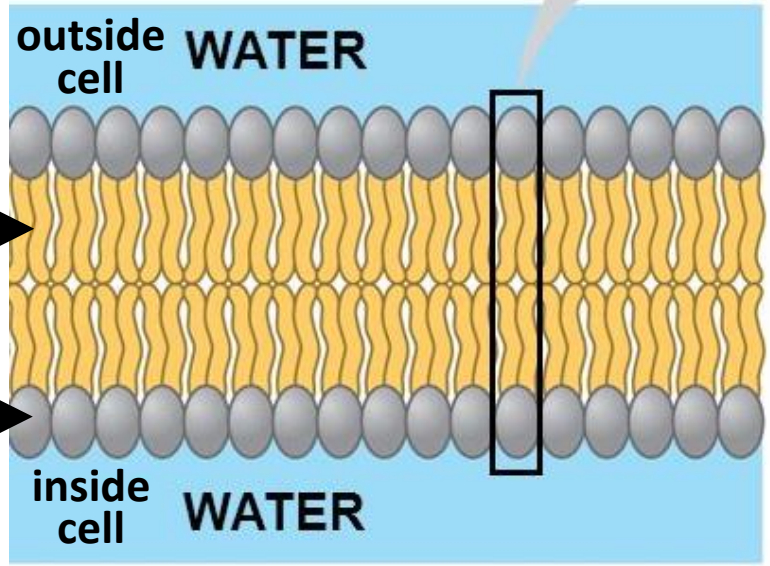
Phospholipids

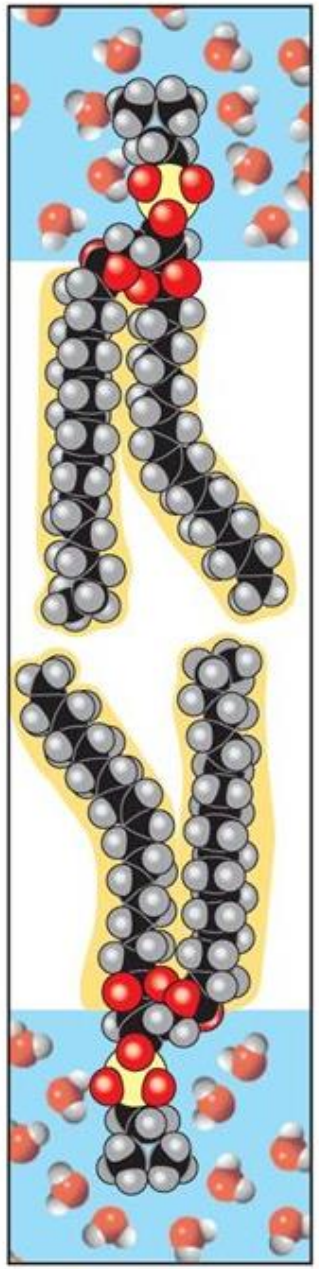


make up a continuous bi-layer barrier around all cells, the fundamental structure of cell membranes

Hydrophobic
(water-repelling)
tail

Hydrophilic
(water-attracting)
head



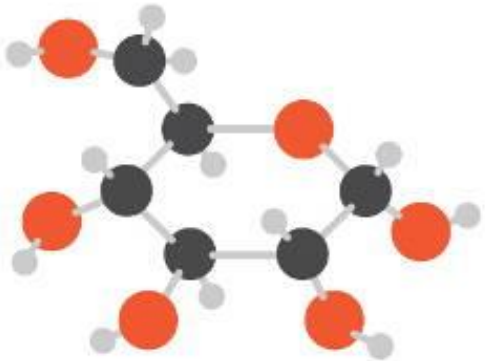


Carbohydrates

- **The most basic units of carbohydrates, <u>simple carbohydrates</u> (*sugars or monosaccharides*) are used for the cell's immediate energy demands.**

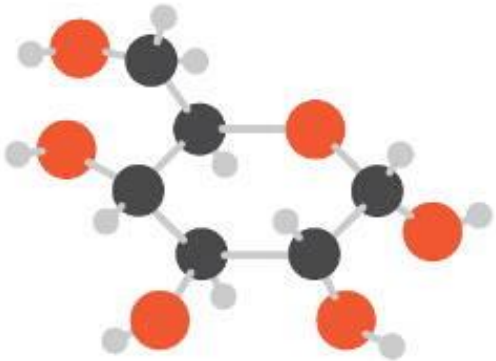
Hydrogen
Oxygen
Carbon

SOME COMMON MONOSACCHARIDES



Glucose
$C_6H_{12}O_6$

Fructose
$C_6H_{12}O_6$



Galactose
$C_6H_{12}O_6$

Carbohydrates

- **<u>Complex carbohydrates</u> (*polysaccharides*) can serve as intracellular energy stores (*starches* and *glycogen*) or have structural functions (*cellulose* and *chitin*); they are also found on a cell's surface, where they play a crucial role in cell recognition.**