

Biological Chemistry and Macromolecules

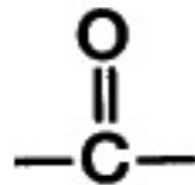
Organic Chemistry

- * Molecules made up of carbon and hydrogen are called organic compounds.
- * Oxygen and Nitrogen are common atoms found in organic compounds as well.
- * In many molecules, atoms are arranged in special clusters called functional groups.

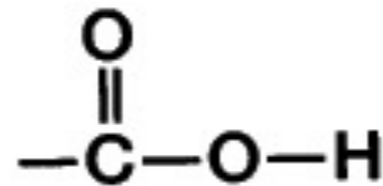
Common Functional Groups



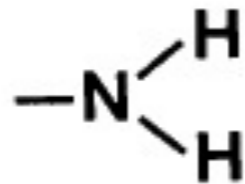
Hydroxyl group



Carbonyl group



Carboxyl group



Amino group



Sulfhydryl group

Macromolecules

- * A macromolecule is a large molecule made up of smaller subunits often with many functional groups.
- * The four major groups of macromolecules are: carbohydrates, lipids, proteins and nucleic acids.



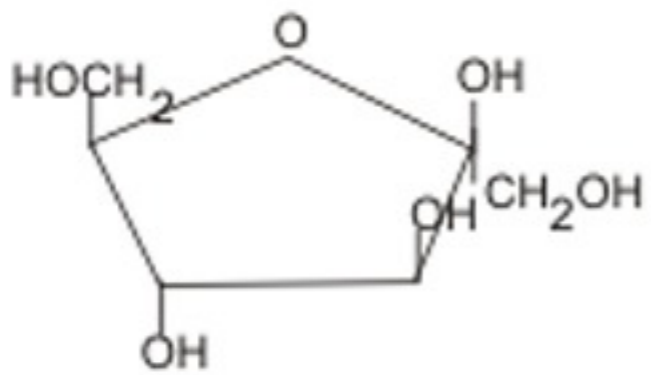
Carbohydrates

Carbohydrates

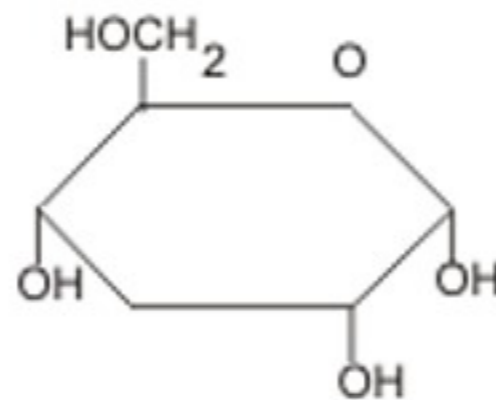
- * Contain carbon, hydrogen and oxygen.
- * Used mostly for energy.
- * Produced by plants in photosynthesis.
- * Broken down into energy by animals in cellular respiration.

Carbohydrates

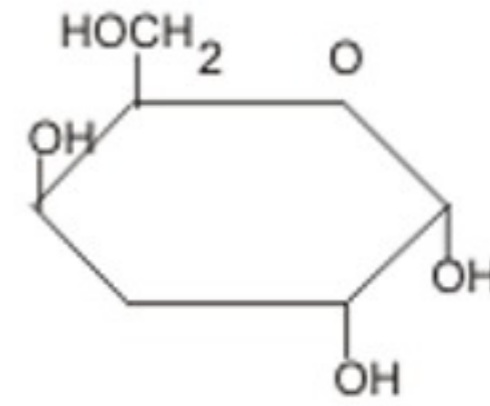
- * Monosaccharides are “simple sugars” and have a sweet taste. The most common one is glucose $C_6H_{12}O_6$.
- * Disaccharides occur when two monosaccharides join together (i.e. glucose + fructose = sucrose, which is table sugar).



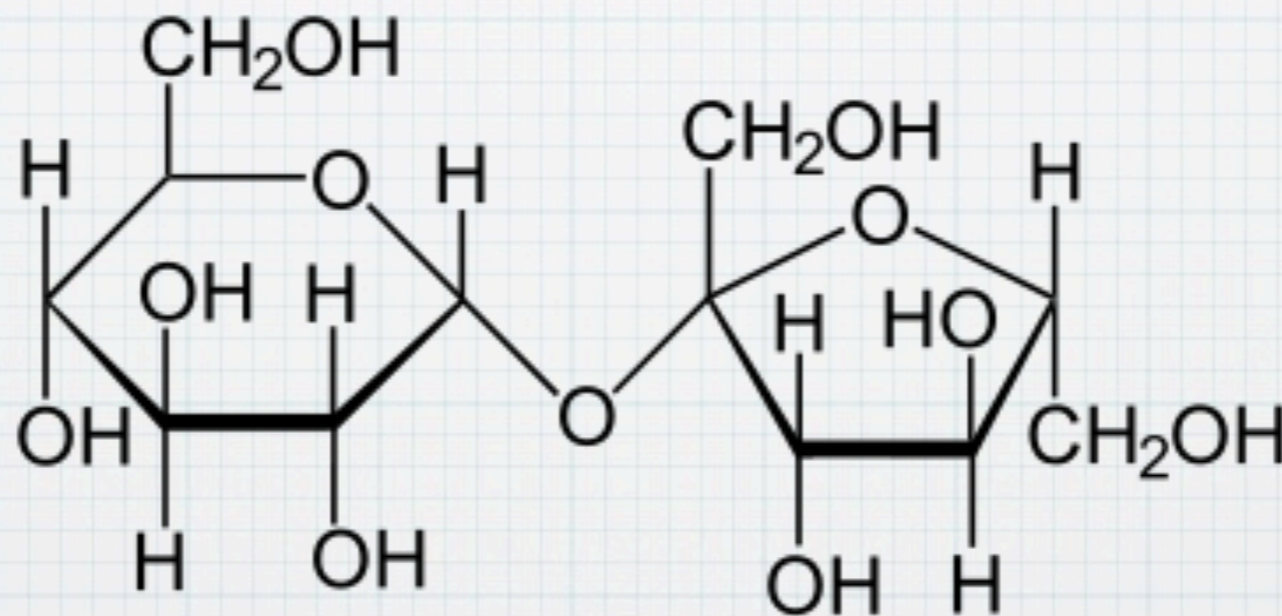
Fructose



Glucose



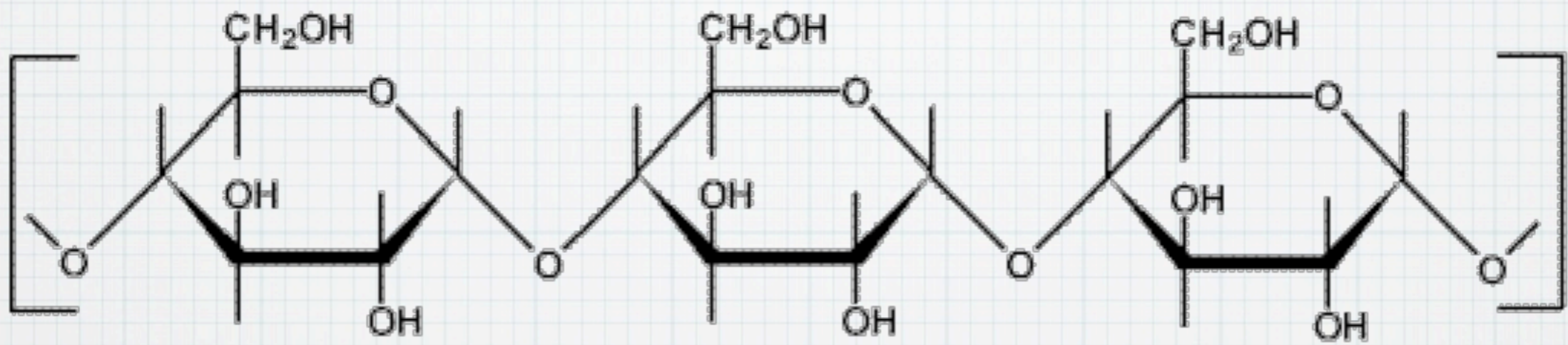
Galactose



Sucrose

Carbohydrates

- * Long chains of simple sugars combine to form polysaccharides.
- * These are called "complex carbohydrates".



Carbohydrates

- * Polysaccharides are used for energy storage like starch in plants and glycogen in animals OR used for structural support like cellulose in plant cell walls and chitin in insect exoskeletons (contact lenses and stitches as well).



Starch



Cellulose



Chitin

Carbohydrates and nutrition

ENERGY for your body
Provide glucose

1 Graham = 4 calories

Simple Carbs

- metabolized quickly
 - lactose in milk
 - fructose in fruit
 - added sugar in foods

Complex Carbs

- metabolized slowly
- grains, cereals, vegetables, beans, nuts