



## Elements & Macromolecules in Organisms

Most common elements in living things are **carbon, hydrogen, nitrogen, and oxygen**. These four elements constitute about **95% of your body weight**. All compounds can be classified in **two broad categories --- organic and inorganic compounds**.

**Organic compounds** are made primarily of carbon. Carbon has four outer electrons and can form four bonds. Carbon can also bond to other carbon molecules forming double, triple, or quadruple bonds. Organic compounds also contain hydrogen. Since hydrogen has only one electron, it can form only single bonds.

Each small organic molecule can be a unit of a large organic molecule called a **macromolecule**. There are **four classes of macromolecules** (polysaccharides or **carbohydrates**, triglycerides or **lipids**, polypeptides or **proteins**, and **nucleic acids** such as DNA & RNA).

- **Carbohydrates and lipids** are made of only carbon, hydrogen, and oxygen (**CHO**).
- **Proteins** are made of carbon, hydrogen, oxygen, and nitrogen (**CHON**).
- **Nucleic acids** such as DNA and RNA contain carbon, hydrogen, oxygen, nitrogen, and phosphorus (**CHON P**).

The body also needs **trace amounts** of other elements such as calcium, potassium, and sulfur for proper functioning of muscles, nerves, etc.

1. **Color** each of the elements on the drawing sheet according to the color listed next to the element's symbol.
2. **Color code** the squirrel & carrot on the drawing sheet with the correct proportion of each element's color.
3. **Use the diagrams of glucose** to tell how many carbon, hydrogen, and oxygen atoms are in a single molecule.
4. **Use the two drawings of glucose to determine the number of bonds formed by Oxygen & Nitrogen**
5. **Use the two drawings of glucose to determine the number of Carbon, Hydrogen, and Oxygen atoms.**

The four main classes of organic compounds (carbohydrates, lipids, proteins, and nucleic acids) that are essential to the proper functioning of all living things are known as **polymers or macromolecules**. All of these compounds are built primarily of carbon, hydrogen, and oxygen but in different ratios. This gives each compound different properties.

**Carbohydrates** are used by the body for energy and structural support in cell walls of plants and exoskeletons of insects and crustaceans. They are made of smaller subunits called **monosaccharide**.

**Monosaccharides** have carbon, hydrogen, and oxygen in a 1:2:1 ratio. Monosaccharides or **simple sugars** include **glucose, galactose, and fructose**. Although their **chemical formulas are the same**, they have **different structural formulas**. These simple sugars combine to make disaccharides (double sugars like sucrose) and polysaccharides (long chains like cellulose, chitin, and glycogen).