

# Biological Molecules

## Carbohydrates:

- Composed of carbon, hydrogen, and oxygen, carbohydrates are a key energy source.
- Types:
  - **Monosaccharides:** Simplest sugars (e.g., glucose) that cannot be broken down further.
  - **Disaccharides:** Formed by two monosaccharides.
  - **Polysaccharides:** Large chains of monosaccharides. Examples:
    - **Starch:** Long chains of glucose.
    - **Glycogen:** Glucose storage in animals.
    - **Cellulose:** Structural polysaccharide in plants.

## Fats/Oils:

- Made of carbon, hydrogen, and oxygen (lower oxygen than carbohydrates).  
Functions:
- Energy source (double the energy of carbohydrates).
- Heat insulation, myelin sheath, and cell membrane formation.
- Structure: Three fatty acids attached to a glycerol molecule.

## Proteins:

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- Made of carbon, hydrogen, oxygen, nitrogen, and sometimes sulfur or phosphorus.  
Functions:
- Growth, tissue repair, cell membrane formation, energy source.
- Composed of long chains of amino acids (20 types). The sequence of amino acids determines the 3D structure and function of the protein. Slight changes in sequence lead to different proteins.

## Food Testing:

- **Starch Test:** Iodine solution turns blue/black if starch is present.
- **Benedict's Test:** Boiling food with Benedict's solution changes color (from blue) if monosaccharides are present.
- **Biuret Test:** Sodium hydroxide and copper sulfate produce a violet color if proteins are present.
- **Emulsion Test:** Fat presence is indicated by a white emulsion when food dissolved in ethanol is added to water.

## DNA Structure:

- DNA consists of two coiled strands forming a double helix, held together by base pairs:
- **Adenine (A)** pairs with **Thymine (T)**, and **Cytosine (C)** pairs with **Guanine (G)**.

## Water:

- Essential as a solvent, aiding in nutrient/waste transport and enzyme function. Enzymes require water to catalyze chemical reactions in the body.

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