

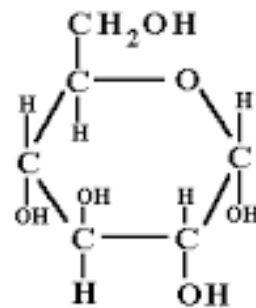
Macromolecules and Biomolecules

Macromolecules are very large molecules consisting of many smaller structural units linked together, **Biomolecules** are the macromolecules which exist in all living things. They are life's building blocks. All living things are formed from these biomolecules. There are four categories of biomolecules: carbohydrates, lipids, proteins and nucleic acids.

They are formed from small molecules called **monomers** which join to make more complex molecules, called polymers. **Polymers** consist of repeating monomer units which are joined together. Their **shape determines their function**. That means that their shape determines how they will behave and how they will react with other molecules.

Carbohydrates – contain C, H, O

Carbohydrates are the most common organic molecule because they make up most plant matter. They are made from carbon, hydrogen and oxygen. Their monomer is a single sugar called a monosaccharide. When two monosaccharides, or sugars, combine, they form a polymer called a disaccharide (di= two). When more than two monosaccharides join together, a polysaccharide (poly= many) is formed.

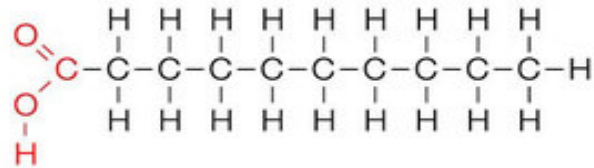


Glucose

There are three classes of carbohydrate polysaccharides. The first is starch. Starch is a carbohydrate used in food storage in plants. Potatoes, pasta and rice are rich in starch. Starches are very valuable to us because they **provide a quick form of energy** for our body. The second is glycogen. Glycogen is used for food storage in animals. The third is cellulose. Cellulose is used for **structural support** in plants (stems, leaves).

Lipids – contain C, H, O

Lipids are a class of organic molecules which includes fats and oils. They function as **long-term storage of energy** in the body, **insulation** (fat = warmth), **protects** organs and is a major structure that **makes up the cell membrane**.

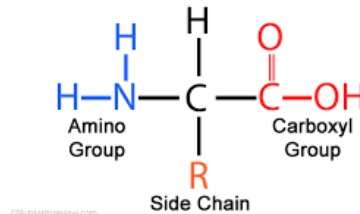


Proteins – contain C, H, O, N

Proteins are organic molecules that **form muscles, transport oxygen in blood** (hemoglobin), and act as **hormones and enzymes**. Most importantly, proteins determine how our bodies look and function. Their building block (monomer) is the amino acid. Proteins are made of amino acids combined in a long chain. When groups of amino acids are joined together, a protein is formed.

There are more than 20 different kinds of amino acids. The only difference among the amino acids is the "R" group. The "R" represents a group of elements that is attached to this point. The sequence and shapes of the "R" groups control the shape and function of the protein.

Amino Acid Structure

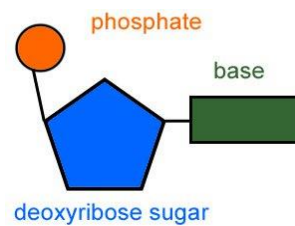
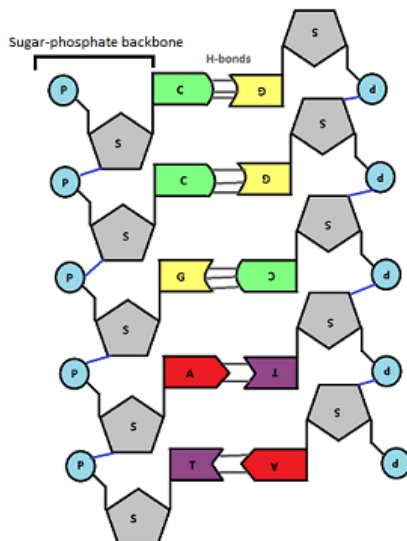
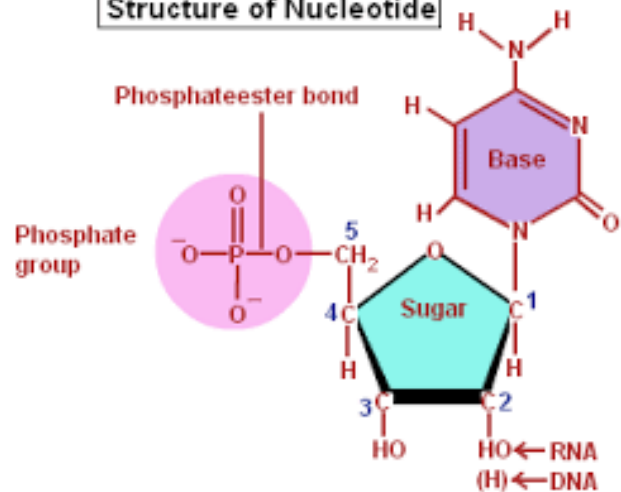


Nucleic Acids – contain C, H, O, N, P

The fourth class of organic molecules is the nucleic acids. This class involves the **genetic materials**, DNA and RNA. DNA is the **blueprint of life** because it contains instructions on how to make proteins in the body. Each individual's DNA is unique, which means that each individual has a unique set of proteins. That is why each of us looks and behaves differently. **All living things from bacteria to blue whales share the exact same components of DNA!** The only difference is the order the monomers are put in. The different orders of the monomers code for all the different living organisms. RNA is a copy of DNA that can leave the nucleus to make a protein.

The monomer of nucleic acids is the nucleotide. All nucleic acids are formed from a series of these nucleotides. Nucleotides consist of three parts: a five-carbon sugar, a phosphate group and a nitrogen base.

Structure of Nucleotide



© scienceaid.co.uk

