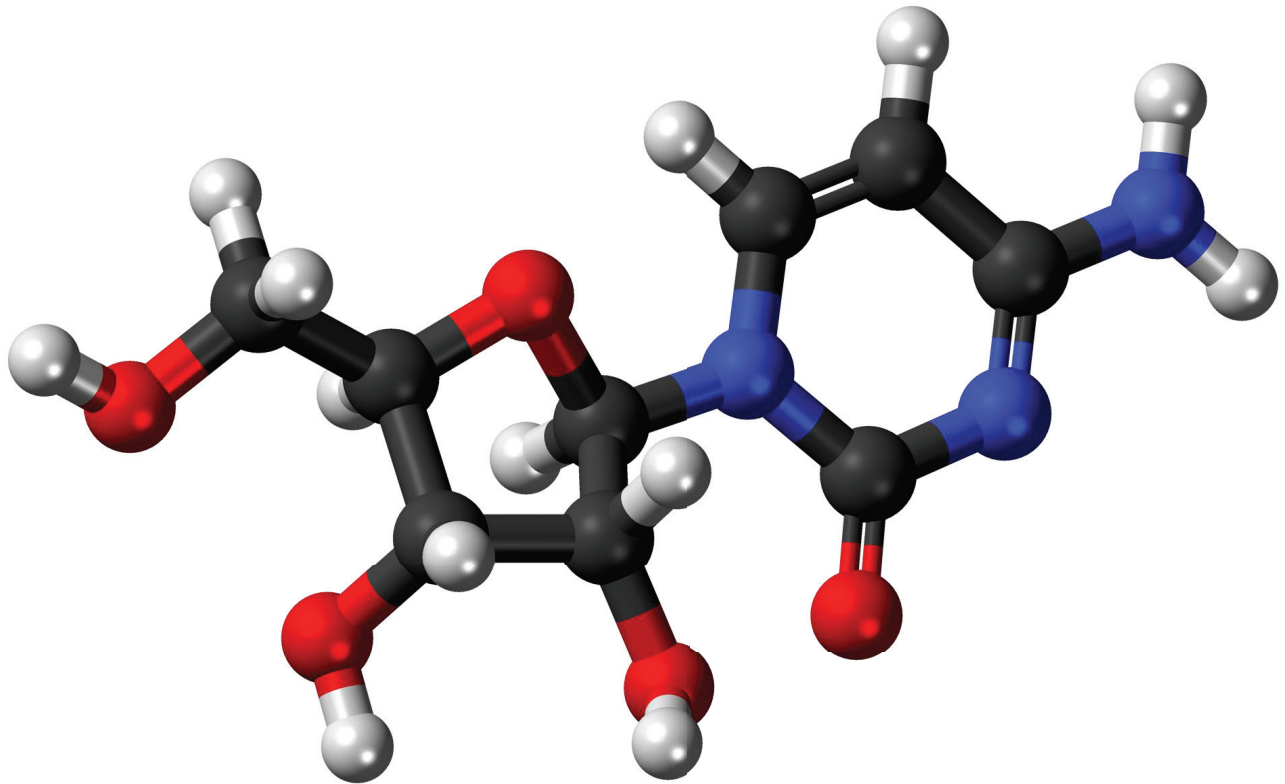


BIOMOLECULES



BIOMOLECULES

Biomolecules

All the carbon compounds that we get from living tissues.

Biomolecules: Molecules which have molecular weights less than one thousand Dalton. They are also known as monomers.

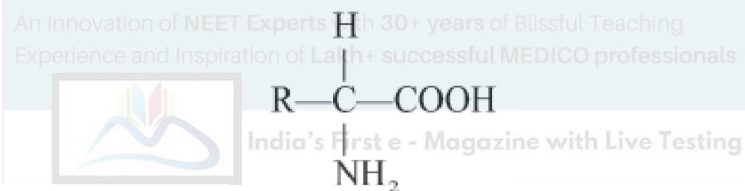
Biomacromolecules: Have molecular weight more than 10000 Daltons (generally 10,000 Daltons and above). They are generally polymers. A biomolecule with molecular weight in the range of ten thousand daltons and above; found in acid insoluble fraction. e.g. polysaccharides, nucleic acids, proteins and lipids.

Primary and secondary metabolites

- **Primary metabolites:** have identifiable functions and play important roles in normal physiological process eg. Amino acids, nitrogenous bases, proteins and nucleic acid.
- **Secondary metabolites:** are product of certain metabolic pathways from primary metabolites, eg. carotenoids, drugs, alkaloids, essential oils, rubber, gum, cellulose and resins etc.

Amino acids

Organic compounds containing an amino group and one carboxyl group (acid group) and both these groups are attached to the same carbon atom called a carbon and so they are called amino acids.



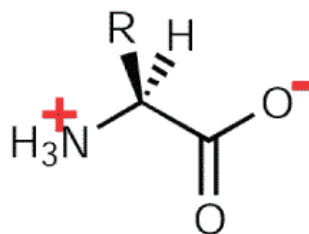
e.g. In Glycine R = H

In alanine R = CH₃

In serine R = CH₂ – OH

Twenty types of amino acids. Amino acid exists in Zwitterionic form at different pHs.

Zwitterionic



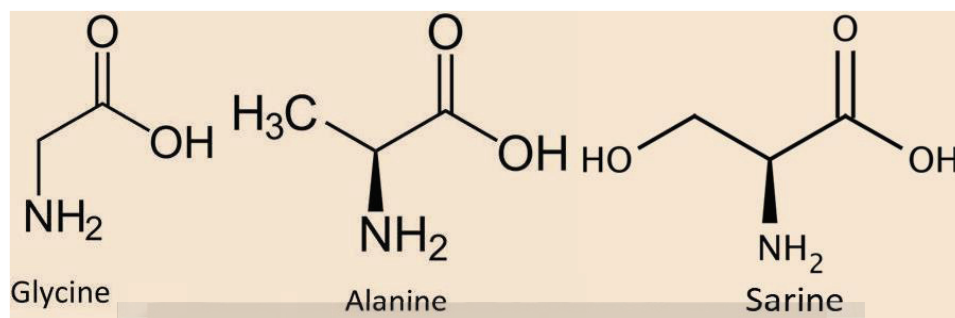
Based on number of amino and carboxyl groups, amino acids can be:

Aromatic: Tryptophan, phenylalanine and Tyrosine are aromatic (give smell) amino acids.

Proteins: Proteins are polypeptide chains made up of amino acids. There are 20 types of amino acids joined together by peptide bond between amino and carboxylic group. There are two kinds of amino acids.

Essential amino acids are obtained by living organism along with food.

Non-essential amino acids can be prepared by our body from raw materials.



For Quick Revision and Smart Practice

Biological macromolecules

There are three main types of biological macromolecules, according to mammalian systems:

- Carbohydrates
- Nucleic acids
- Proteins
- Lipids

Carbohydrates: Carbohydrates are polymers of carbon, hydrogen and oxygen. They can be classified as monosaccharides, disaccharides and polysaccharides. Carbohydrates are found in starch, fruits, vegetables, milk and sugars. They are an important source of a healthy diet.

Nucleic Acids: The nucleic acids include DNA and RNA that are the polymers of nucleotides. Nucleotides comprise a pentose group, a phosphate group, and a nitrogenous base group. All the hereditary information is stored in the DNA. The DNA synthesized into RNA and proteins.

Proteins: Proteins are the polymers of amino acids. These include the carboxylic and the amino group. There would be no lipids or carbohydrates without proteins because the enzymes used for their synthesis are proteins themselves.

Lipids: Lipids are a hydrophobic set of macromolecules, i.e., they do not dissolve in water. These involve triglycerides, carotenoids, phospholipids, and steroids. They help in the formation of the cell membrane, formation of hormones and in the and as stored fuel.

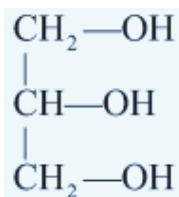
Fatty Acids & Saturated

With single bonds in carbon chain, e.g., Palmitic acid, butyric acid.

Unsaturated

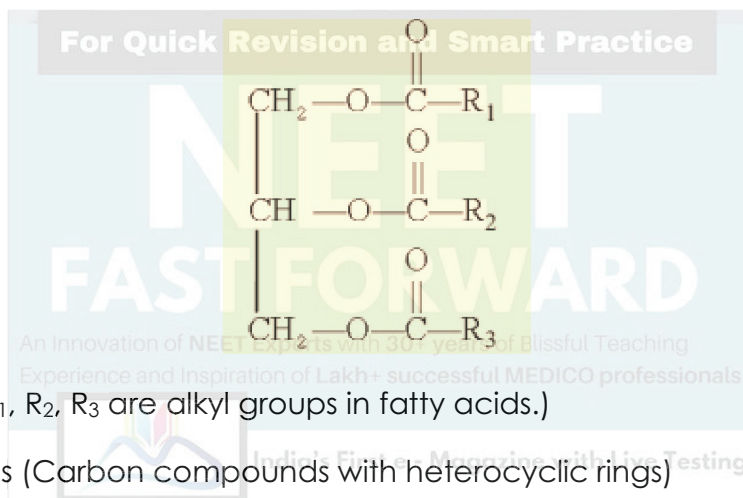
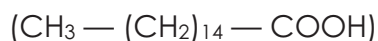
With one or more double bonds, e.g., oleic acid, linoleic acid.

Glycerol



A simple lipid, is trihydroxy propane.

Some lipid have fatty acids esterified with glycerol. Example of fatty acid (Palmitic acid)



Triglyceride (R_1, R_2, R_3 are alkyl groups in fatty acids.)

Nitrogen bases (Carbon compounds with heterocyclic rings)

Purine: Adenine, Guanine,

Pyrimidine: Cytosine, Uracil, Thymine.

Nucleoside: Nitrogenous base + Sugar e.g., Adenosine, guanosine.

Nucleotide: Nitrogenous base + Sugar + Phosphate group. e.g. Adenylic acid, Guanylic acid. Thymidylic acid.

Nucleic acids: Deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).

Examples of Macromolecules:

Synthetic Fibres

- Nylon, rayon and spandex consist entirely of macromolecules. These are created in certain steps:
- The monomers are reacted to make prepolymers or a liquid, primitive



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