

Get Ready to Crack CSIR-NET 2021

(Short Notes on Chemistry of
Natural Products)

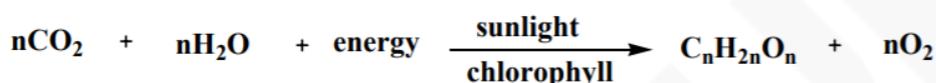


Chemistry of Natural Products

A natural product is defined as a chemical compound or substance produced by a living organism - found in nature. Natural products play an important role to study as they are useful for commercial purposes and dietary supplements

Carbohydrates

Carbohydrates are naturally occurring organic substances which are primarily produced by plants. The most common examples are cane sugar, glucose, starch, etc. are polyhydroxy aldehydes or ketones. The general molecular formula is $C_n(H_2O)_n$ which makes them appear to be hydrates of carbon, $C_n(H_2O)_n$. Carbohydrates are formed in the plants by photosynthesis from carbon dioxide and water in the presence of sunlight.

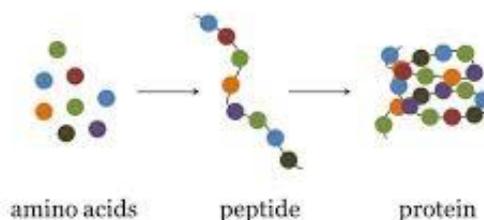


They are the storage house of chemical energy (glucose, starch, glycogen). They act as components of supportive structures in plants (cellulose), crustacean shells (chitin), and connective tissues in animals (acidic polysaccharides); and are essential components of nucleic acids (D-ribose and 2-deoxy-D-ribose)

Proteins and Peptides

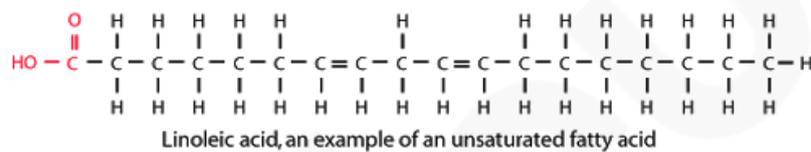
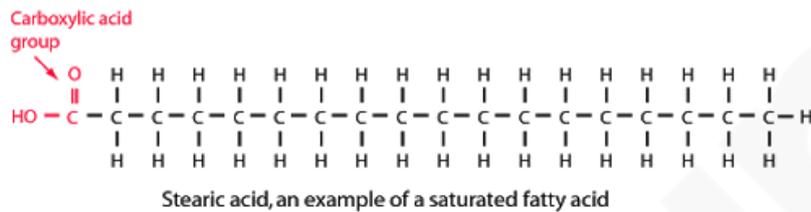
Proteins consist of one or more polypeptides, which is a single linear polymer chain of amino acids bonded together by peptide bonds between the carboxyl and amino groups of adjacent amino acid residues. These are biochemical compounds and are essential parts of organisms. They are involved in the transportation of particles ranging from electrons to macromolecules. For example, Iron is transported by transferrin, oxygen via haemoglobin and some proteins act as carriers of ions through membranes by forming pores.

Peptides are composed of small units of amino acid monomers that are bonded together. These are distinguished from proteins by their size (typically containing fewer than 50 monomer units). Peptides help in the development of antibodies of a particular region of a protein without the need of purifying the protein. Peptides are used in clinical research to examine the inhibition of cancer proteins and other diseases.



Fatty Acids

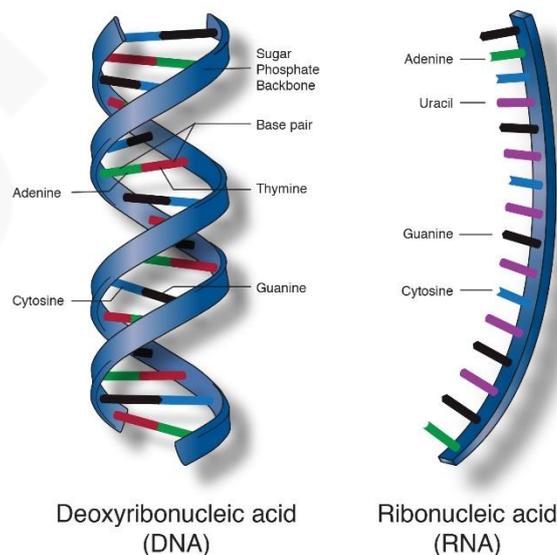
Fatty Acids are carboxylic acids with long aliphatic chains which may be straight or branched, saturated or unsaturated. They are an important component of lipids in plants, animals, and microorganisms. They play an important role in biological functions, structural and functional roles, and are an important source of energy. Some of the essential fatty acids are linoleic acid (LA), an omega-6 fatty acid, and α -linolenic acid (ALA), an omega-3 fatty acid.



Nucleic acids

Nucleic acids are macromolecules which are composed of nucleotides. These are the main information-carrying molecules of the cell and they determine the inherited characteristics of every living thing.

They are classified in two ways : deoxyribonucleic acid (DNA) and ribonucleic acid (RNA). DNA is the genetic material found in living organisms. DNA constitutes the genetic material in all free-living organisms and most viruses. RNA is the genetic material of certain viruses and also in all living cells, where it plays an important role in making of proteins.



Steroids and alkaloids

Steroids fall under the category of cyclic organic compounds. In steroidal structure, seventeen carbon atoms are arranged in a four ring structure linked together from three 6-carbon rings which is followed by a 5-carbon ring and a side chain comprising eight carbons. Some important steroids are cholesterol, sex hormones, and bile acids.

Alkaloids are class of basic, naturally occurring chemical compounds that contain mostly nitrogen atoms. They are also known as toxic amines produced by plants to protect themselves against herbivores. These are classified as true alkaloids, protoalkaloids, polyamine alkaloids, peptide and cyclopeptide alkaloids, and pseudalkaloids.

Alkaloids are used as local anesthetic, stimulant, anticancer, psychedelic, analgesic, antibacterial, antiasthma, antihypertensive, pain killer, anticholinergic, vasodilator, antiarrhythmia, cholinomimetic, antimalarial and psychoactive drugs

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