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DEPARTMENT: MEDICINE AND SURGERY

1a. Step 1-If the mass of the molecular ion is odd it contains atleast one N

N=14amu,105-14= 91

Step 2-Determine the maximum numbers of C’s

91/12= 7.58

Taking the whole number before the decimal without approximating, this implies that the formula will be I the form C7NHm where m is the number of moles of hydrogen.

Therefore, m=105-(12\*7) + (1\*14)

=105-98

=7

IHD= where n is the number of moles of carbon

=

=

=5

Hence the first formula is C7NH7 and IHD=5

Repeating the same procedure but oxygen would be introduced

O=16, 105-(16+14) =75

Dividing by 12 in order to determine the maximum number of carbon atoms, we have

75/12=6.25

The new formula is C6NOHm

M=105-((12\*6) +14+16)

=105-102

=3

IHD=

=

=

=5.75

Hence the second formula is C6NOH3 and IHD=5.75

### b. 1- In nucleic acids

Nucleic acids are essential biopolymers for all life forms (DNA is included in this category).

They are composed of many elements but mainly coal and hydrogen, although there are also oxygen atoms in their sugars.

Nucleic acids are the most important of all biomolecules. They are found in abundance in all living things, where their function is to create and encode, and then to store information in the nucleus of all living cells of all living organisms on Earth.

**2- In carbohydrates**

A carbohydrate is a biological molecule consisting of carbon, hydrogen, and oxygen. In biochemistry, the term is synonymous with a group of elements that may include sugars, celluloses and starch.

Carbohydrates play an important role in living organisms. Polysaccharides serve to store energy and as structural components in plants and arthropods, for example. A type of saccharide is important in the molecules that make up the DNA.

In general, saccharides and their derivatives include many other important biomolecules that play primordial roles in the immune system, in fertilization, in blood clotting, and in the prevention of pathogenesis.

In food science, the term carbohydrate can be used to define any food that is rich in complex carbohydrate starches such as cereals, pasta, bread, or rich in simple carbohydrates such as candies or sweets.

**3- As the basis of food**

Food materials are created from carbon compounds via carbohydrates, proteins and fats. All the food we consume is reconstituted material and extracts of plants or animals.

Organic molecules make up a large portion of the human diet and are found in all food consumed by an individual.

It requires a large number of organic molecules needed to keep cells and tissues healthy.

**4- In lipids**

A  Lipid Is a term used to define substances of biological origin that are soluble in solvents.

It consists of a group of molecules that occur in nature like fats, waxes, sterols, monoglycerides and triglycerides, among others.

The main functions of lipids include storing energy, signaling lipid and acting as a structural component of cell membranes.

Lipids have applications in the cosmetics industry and in the food industry, as well as nanotechnology.

**5- In metabolism**

The three main purposes of metabolism are energy / fuel conversion as energy for cellular processes, energy / fuel conversion to build blocks for proteins, lipids, nucleic acids, and some carbohydrates, as well as the elimination of nitrogenous waste.

These reactions allow organisms to grow and reproduce, maintain their structures, and respond to the environment.

Metabolism is usually divided into two categories: catabolism, which is the decomposition of organic matter and the breakdown of glucose by cellular respiration; And in anabolism, which is the construction of components of cells such as proteins and nucleic acids.

**6. Cleansing agents**- In industries and labs, organic solvents are widely used to clear off impurities. For example in drug extraction from plants, the fatty matter from the pulp is removed using petroleum ether. Thus organic chemistry through its knowledge of polarity,solubility,partition factors uses solvents to separate components for better use.

c.

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| --- | --- |
| **HOMOCYCLIC COMPOUNDS** | **HETEROCYCLIC COMPOUNDS** |
| Homocyclic compound are compounds having atoms of the same element as ring members. | Heterocyclic compound are compounds having atoms of the different elements as ring members including carbon atoms. |
| Homocyclic cmpounds have 100% carbon atoms in their ring. | Heterocyclic compounds have mainly carbon and in addition, heteroatoms such as nitrogen, oxygen, and Sulphur are found in their ring. |
| Sub divided into Alicyclic homocyclic and Aromatic homocyclic. | Sub divided into Alicyclic heterocyclic and Aromatic heterocyclic. |
| Examples are Phenol, Toluene, Naphthalene, and Anthracene. | Examples are Tetrahydrofuran, Piperidine, Pyridine, Furan and Pyrrole. |
| Contains atoms of the same element bonded to each other forming a ring. | Contains atoms of atleast two different elements bonded to each other forming a ring. |

2a. - = 0.197

- = 0.459

- = 0.730

b. Organic Compound, A, belongs to the family of **ALDEHYDES.**

Organic Compound, B, belongs to the family of **ALKENES.**

c. 2,4-Dinitrophenylhydrazine test is employed for **ALDEHYDES AND KETONES**.

d. **ALKANES**- Methane and Ethane

**ALKENES**- Ethene and Propene

**ALKYNES**- Ethyne and Propyne

**ALKANOLS**- Ethanol and Propanol

**ALKANOIC ACIDS**- Butanoic Acid and Propanoic Acid

**ALDEHYDES**- Ethanal and Butanal

**KETONES**- Acetone and Phenylethanone