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DEPARTMENT: MEDICINE AND SURGERY

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**QUESTION ONE (1)**

1. Suggest possible formulas for a molecular ion (m/z) of 105

**Step 1** – If the mass of the molecular ion is odd, it contains at least one nitrogen atom N.

N = 14 amu

105 – 14 = 91

**Step 2** – Determine maximum number of carbon atoms, C.

= 7.5 Hence, 7 carbons maximum. C7NH?

**Step 3** – Add enough H’s to make up the rest of the mass.

(12x7) + (14x1) + H = 105

84 + 14 + H = 105

98 + H = 105

H = 105 – 98 = 7. 7 H’s gives C7H7N. C7H7Nis a possible formula.

**Step 4** – Add an Oxygen atom into the formula (-CH4 when adding O)

C7NH7 ⇒ C6NOH3

Therefore, the possible formulas are: **C7H7N** and **C6NOH3**

1. Importance of Organic Compounds
2. **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 carbon and hydrogen, although there 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.
3. **Hydrocarbons:** Hydrocarbons are organic compounds that are made up entirely of hydrogen and carbon. Most of the hydrocarbons found on Earth occur naturally in the [Crude oil](https://www.lifepersona.com/the-10-most-important-petroleum-characteristics), Where the decomposed organic matter provides an abundance of coal and hydrogen, which, when joined, can be chained to form unlimited chains. Hydrocarbons are the primary source of energy for most civilizations today. The prominent use of hydrocarbons is as a source of fuel. In their solid form hydrocarbons can take the form of asphalt.
4. **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.
5. **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.
6. **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.
7. Differences between homocyclic and heterocyclic compounds

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|  | **Homocyclic compounds** | **Heterocyclic compounds** |
| Atomic composition of the ring. | They have 100% carbon atoms in their ring. | They have mainly carbon, in addition, heteroatoms such as nitrogen, oxygen, and sulphur are found in their ring. |
| Sub-Division | Alicyclic and aromatic homocyclics | Alicyclic and aromatic heterocyclics |
| Examples | Phenol, Toluene, Naphthalene etc. | Pyrolle, Furan, Pyran etc. |

**QUESTION TWO (2)**

1. Retardation factor, *Rf*  =

Rf of band A = = 0.197

Rf of band B = = 0.459

Rf of band C = = 0.730

1. **A** is an **aldehyde**, **B** is an **alkene**.
2. Ketones and Aldehydes.
3. Seven functional groups and two examples each

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| **S/N** | **Functional groups** | **Examples** |
| (i) | Ketone / Alkanone | Propanone (CH3COCH3), Butanone (C4H8O) |
| (ii) | Aldehyde / Alkanal | Ethanal (CH­3CHO), Propanal (CH3­CH2CHO) |
| (iii) | Alkanol | Ethanol (CH3CH2OH), Propanol (CH3CH2CH2OH) |
| (iv) | Amide | Ethanamide (CH3CONH2), Methanamide (HCONH2) |
| (v) | Amine | Methylamine (CH3NH2), Propylamine (CH3CH2CH2NH2) |
| (vi) | Carboxylic acid / Alkanoic acid | Ethanoic acid (CH3COOH), Butanoic acid (C3H7COOH) |
| (vii) | Ester / Alkanoate | Methylethanoate (CH3COOCH3), Ethylmethanoate (HCOOC2H5) |