**CHM 102 ASSIGNMENT**

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**MATRIC NO.: 17/MHS01/257**

**COLLEGE: MEDICINE AND HEALTH SCIENCES**

**DEPARTMENT: MEDICINE AND SURGERY**

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

 **ANSWER:**

The rule of 13 states that the formula of a compound is a multiple  **n** of 13( the molar mass of CH) + a remainder  **r.**

 ***According to the rule of 13; n= molecular ion / 13.***

 **CnHn + r**

If you have heteroatoms, you adjust the formula;

* For O, add O and subtract CH4
* For N, add N and subtract CH2
* For Cl, add Cl and subtract C2H11

**a) Molecular ion= 105**

 **According to the rule of 13;**

 **105 / 13 = 8 R 1. ( 8 remainder 1).**

 **n =8 , r=1**

 **Using CnHn  + r = C8H9 -------------(1)**

* **C7H5O ----------------------(2)**
* **C6HO2  ----------------------(3)**
* **C7H7N ----------------------(4)**
* **C6H9N2  -----------------------(5)**
* **C5H3N3 -----------------------(6)**
* **C4HN4 -----------------------(7)**
* **C6H3NO -----------------------(8).**

**1b) Importance of organic compounds includes**:

* Organic compounds serve as the basis of all carbon based life on earth, an element that all living organisms contain.
* They create energy production in biological life, depletion of the atmosphere and release energy from hydrocarbons.
* The clothe industry uses organic compounds to produce cotton, silk, wool and nylon.
* Organic compounds are used to produce household and other common materials such as detergents, cosmetics, perfumes, plastics, leather, inks, resins, etc.
* They are used to produce explosives such as nitroglycerine, nitrocellulose, etc.
* A type of organic compound called the NUCLEOTIDE forms the amino acid and DNA which are necessary to maintain various biological processes such as metabolism, respiration and circulation of blood.
* Some organic compounds are used in the production of fuel, kerosene, etc.

**1c)** Differentiate between homocyclic and heterocyclic compounds.

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| --- | --- |
| **HOMOCYCLIC COMPOUNDS** | **HETEROCYCLIC COMPOUNDS** |
| * Ring of homocyclic compound is made up of only one type of atom.
 | Ring of heterocyclic compounds is made up of at least two different types of atoms (including carbon). |
| * They are ring compounds with alternating single or double bonds.
 | They are ring compounds composed of different elements. |
| * They have 100% carbon atoms in their rings.
 | They have mainly carbon, and in addition, hetero atoms such as nitrogen, oxygen and sulphur are found in their rings. |
| * Examples are: Toluene, Phenol, Naphthalene and Anthracene.
 | Examples include: Tetrahydrofuran, Piperidine, Pyridine, Furan and Pyrrole.  |

**2a)** If the distance of the silver front is 12.2cm. 2.4cm, 5.6cm and 8.9cm are the distances of the different bands respectively. Calculate the retardation factor of the available bands.

**ANSWER**:

***Retardation factor, Rf = Distance moved by substance / Distance moved by solvent front.***

 ***Rf = x / y***

Solvent front, y= 12.2cm x1=2.4cm x2=5.6cm x3= 8.9cm

* Rf for band x1 = x1 / y = 2.4cm / 12.2cm = **0.2.**
* Rf for band x2 = x2 / y = 5.6cm / 12.2cm = **0.5.**
* Rf for band x3 = x3 / y = 8.9cm / 12.2cm = **0.7.**

**2b)** Two organic compounds were labelled A and B. A gave a positive test result to( dark gray precipitate) to tollens test and B decolourizes Bromine water. Suggest the family to which these organic compounds belong.

**ANSWER:**

* Organic compound A belongs to **Aldehyde family**.
* Organic compound B belongs to **Alkene family.**

**2c)** 2,4-dinitrophenylhydrazine test is employed for : **Testing for aldehydes and ketones** with the positive result being the formation of yellow to orange precipitate.

**2d)** List 7 functional groups of organic compounds giving two examples of each group:

|  |  |  |
| --- | --- | --- |
| **FUNCTIONAL GROUPS** | **CLASS OF ORGANIC COMPOUNDS** | **EXAMPLES** |
| 1. -OH
 | Alkanols/ Alcohols | * Ethanol
* 3-methylpentan-2-ol
 |
| 1. -COH
 | Aldehyde/ Alkanal | * Methanal
* 2-methyl-3-hexene-1-al
 |
| 1. –C=O
 | Ketones / alkanones | * Pentanone
* 4-hydroxyl-2-heptanone
 |
| 1. -COOH
 | Carboxylic acid / Alkanoic acid | * Propanoic acid
* 3-amino-1-pentanoic acid
 |
| 1. RCOOR1
 | Esters/ Alkanoates | * Ethyl ethanoate
* pentanoate
 |
| 1. RX
 | Haloalkane/ alkylhalides | * 1-bromoethane
* 2-chloropropane
 |
| 1. RNH2
 | Amines | * Amino acid
* 2-aminopropane
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