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**LEVEL: 100L**

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**COURSE: CHM102**

**QUESTION 1**

A.**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**= 14amu

 105-14=91

 **Step 2-** determine maximum number of carbon atoms, C.

 91/12=7.5 hence, 7 carbon atoms maximum. C7NH7

 **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. C7H7N is a possible formula.

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

 C7NH7→C6NOH3

 Therefore, the possible formulas are C7H7N C6NOH3 and

B**. IMPORTANCE OF ORGANIC COMPOUNDS.**

1) Organic compounds have versatile bonding patterns and are part of all organisms.

2) All living organisms (redundant) contain carbon.

C. **DIFFERENCES BETWEEN HOMOCYCLIC AND HETEROCYCLIC COMPOUNDS.**

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| **HOMOCYCLIC COMPOUNDS** | **HETEROCYCLIC COMPOUNDS** |
| The ring of homocyclic compounds is made up of carbon atoms only  | The ring of heterocyclic compounds is made up of more than one kind of atom  |
| Homocyclic compounds 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 |
| Homocyclic compounds are sub divided into alicyclic homocyclic and aromatic homocyclic  | Heterocyclic compounds are sub divided into alicyclic heterocyclic and aromatic heterocyclic  |
| Examples of homocyclic compounds are phenol, toluene, naphthalene, and anthracene | Examples of heterocyclic compounds are tetrahydrofuran, piperidine, furan, and pyrrole |

**QUESTION 2**

a) Retardation factor, *Rf*  = $\frac{migration distance of substace}{migration distace of solvent front}$

 R*f*  of band A= $\frac{2.4cm}{12.2cm}$ = 0.197

 R*f*  of band B = $\frac{5.6cm}{12.2cm}$ = 0.459

 R*f*  of brand C = $\frac{8.9cm}{12.2cm}$ = 0.730

b) A is an **aldehyde**, B is an **alkene**

C) Brady’s test 2, 4-Dinitrophenylhydrazine can be used to qualitatively detect the carbonyl functionality of a ketone or aldehyde functional group. A positive test is signalled by the formation of a yellow, orange or red precipitate (known as dinitrophenylydrazone).

d) **SEVEN FUNCTIONAL GROUPS OF ORGANIC COMPOUNDS WITH TWO EXAMPLES OF EACH GROUP.**

|  |  |
| --- | --- |
| **FUNCTIONAL GROUP** | **EXAMPLES** |
| Alkane | Ethane, 3-methylpentane |
| Alkene | Butene, 2-methyl-2-hexene |
| Alkyne | Propyne, 2,4 pentayne |
| Amine | Propyl amine, dimethyl amine |
| Alcohol | Propan-1-ol, ethanol |
| Ether | Diethyl ether, methyl ethyl ether  |
| Alkyl halide | Methyl chloride, propyl iodide  |