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

Given 105 is odd and it has a nitrogen

N = 14amu

 ∴ 105 -14 = 91

Mass number of carbon: 91 ÷ 12 =7.6

∴ 7 is the number of mole for carbon.

For hydrogen: 7 × 12 = 84,

∴ 91 – 84 = 7

∴ 7 is the number of mole for hydrogen

The formula is C7NH7

To find hydrogen deficiency

= $\frac{2N+2-H }{2}$

= $\frac{2\left(7.6\right) + 2-7 }{2}$

= $\frac{15.2-5 }{2}$

= 5.1

Oxygen was introduced

Taking O=16

 ∴ 105 – 14 = 91 ∴ 91-16=75

Mass number of Oxygen: 75 ÷ 12 = 6.25

∴ 6×12=72

∴ 72 is the number of carbon atom

 = 75 – 72 = 3

∴3 is the number of hydrogen atom

The formula is C6NOH3

To find hydrogen deficiency

= $\frac{2N+2-H }{2}$

= $\frac{2\left(6.5\right) + 2-3 }{2}$

= $\frac{12.5-1 }{2}$

= 5.75

1. **Mention the importance of Organic compounds.**
2. Food materials are created from carbon compounds via carbohydrates, proteins and fats.
3. Hydrocarbons are the primary source of energy for most civilizations
4. Hydrocarbons are used as a source of fuel
5. **Differentiate between homocyclic and heterocyclic compounds**

|  |  |
| --- | --- |
| HOMOCYLIC COMPOUNDS | HETEROCYLIC COMPOUNDS |
| 1. Ring contains atoms of the same element.
 | Ring contains atoms of different elements |
| 1. Examples include benzene, cyclohexane, toluene, cyclohexanol, etc.
 | Examples include pyran, azocine, thiocane, etc. |
| 1. Contains atoms of the same element bonded to each other forming a ring.
 | Contains atoms of at least two different elements bonded to each other forming a ring. |

1. **A. If the distance of the solvent front is 12.2cm. 2.4cm, 5.6cm and 8.9cm are distances of the different bands respectively. Calculate the retardation factor of the available bands.**

**Solution.**

Using the formula:

Retardation Factor = $\frac{Distance moved by substances}{Distance moved by solvent front}$

 To find A =2.4cm, B = 5.6cm and C =8.9cm, given that the solvent front is 12.2cm

To find A = 2.4cm

RF = $\frac{A}{12.2cm}$

 = $\frac{2.4cm}{12.2cm}$

 = 0.20

To find B = 5.6cm

RF = $\frac{B}{12.2cm}$

 = $\frac{5.6}{12.2cm}$

= 0.46

To find C = 8.9cm

RF = $\frac{C}{12.2cm}$

 = $\frac{8.9cm}{12.2cm}$

 = 0.73

 **B**. **Two organic compound were labelled A and B. A gave a positive test result (dark grey precipitate) to tollens test and B decolorizes bromines water. Suggest the family to which these organic compounds belong.**

**Solution**

a = ‘’Aldehydes’’

b = Bromine water is able to be decolorized by unsaturated compounds like ‘’alkenes’’ and ‘’alkynes’’.

1. **2, 4-dinitrophenylhydrazine test is employed for** carbonyl functionality for a ketone or aldehyde functional group.
2. **List 7 functional groups of organic compounds giving two examples of each group.**

|  |  |
| --- | --- |
| FUNCTIONAL GROUP | Examples  |
| -C-H (alkanes) | Methane |
| >C=C< (alkenes) | Ethene |
| -C≡C- (alkynes) | Ethyne |
| -OH (alkanols) | Methanol |
| -COOH (alkanoic acids) | Ethanoic acid |
| CHO (alkanals) | Ethanal  |
| >C=O (alkanones) | Propanone  |