**Assignment Title:** General chemistry II

**Course Title:** General chemistry II

**Course Code:** CHM 102

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**QUESTION**

**QUESTION 1**

1. Suggest possible formulas for a molecular ion (m/z) of 105.
2. What are the importance of organic compounds.
3. Differentiate between homocyclic and heterocyclic compounds.

**QUESTION 2**

1. If the distance of the solvent front is 12.2 cm, 2.4 cm, 5.6 cm and 8.9 cm are distances of the different bands respectively. Calculate the Retardation factor of the available bands.
2. Two organic compounds were labeled A and B. A gave a positive test result (dark grey precipitate) to Tollens test and B decolourizes Bromine water. Suggest.
3. 2,4-Dinitrophenythydrazine test is employed for?
4. List 7 functional groups of organic compounds giving two examples of each group.

**ANSWERS**

1a) M/Z = 105

The mass of the molecular ion is odd, which means it contains at least one Nitrogen with molar mass N = 14 amu

105 -14 = 91

91/12 =7.5, C7NH?

Add enough hydrogen to make up the rest of the mass

7$ ×$ 12 =84, 84 + 14 =98

105 – 98 = 7

i.e C7NH7

In order to find the hydrogen deficiency, formula is given by

Hydrogen deficiency = $\frac{2N+2-N}{2}$

i.e. HD =$\frac{2\left(7.5\right)+ 2-7}{2}$ =5

Next is to add oxygen with molecular mass of : O = 16 amu

Recall N =14 amu

105- N = 105 – 14 = 91

Subtract the molecular mass of oxygen as well

91 – 16 = 75

To find the number of carbons, 75/12 = 6.25

C6NH?O

To find the number of atoms of hydrogen, 6 $×$ 12= 72

75 – 72 =3

C6NH3O

To find hydrogen deficiency, Hydrogen deficiency = $\frac{2N+2-H}{2}$

HD = $\frac{2\left(6.25\right)+ 2-3}{2}$ = 5.75

B. The importance of organic compounds are:

 i) It is used in the production of food

 ii) It is used in the production of medicines

 iii) It is used in the production of cleaning agents

 iv) It is also used to produce sterilizing agent

 v) It is also used to produce valuables

C. Homocyclic compounds are those that have atoms of the same element in the ring while heterocyclic compounds are those that have carbon as well as atoms of other elements in the ring.

2a) RF = $\frac{distance moved by the band}{distance moved bt the solvent front}$

 Distance moved by the solvent front = 12.2 cm

 First band = 2.4cm

 Rf =$\frac{2.4}{12.2}$ = 0.197

 Second band = 5.6 cm

 Rf =$\frac{5.6}{12.2}$ = 0.459

 Third band = 8.9cm

 Rf $\frac{8.9}{12.2}$ = 0.730

b. B is Alkene as it descolourizes bromine water

 A is Aldehyde as it tests positive in tollens test to give dark grey precipitate

c. 2, 4dinitrophenylhydrazine test is employed for ketones and aldehyde.

d. Functional groups are:

 ALKANE: C7H16, C3H8

 ALKENE: C3H6, C5H10

ALKYNE: C2H2, C4H6

ALKANOL: C3H7OH, C6H13OH

 ALKANOIC ACID: C3H7OOH, C6H13OOH

 ALKANONES: CH3COCH3, CH3COH

 AMINO ACID: C2H5NH2, C3H7NH2