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17/MHS01/136

Medicine and Health Sciences

Medicine and Surgery

CHM 102 Assignment

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

$$\text{Mass total} = 105$$

$$\text{Mass total} - \text{Nitrogen} = \text{Mass of carbon and hydrogen}$$

$$105 - 14 = 91$$

$$\frac{91}{12} = 7 \text{ remainder } 7$$

we have 7 carbon atoms, 7 hydrogen atoms and 1 nitrogen atom.

∴ The possible molecular formula is  $C_7H_7N$

Assuming oxygen is present

$$\text{Mass total} = 105$$

$$\text{Mass total} - \text{Mass of nitrogen} + \text{mass of oxygen} = \text{mass of carbon and hydrogen}$$

$$105 - 30 = 75$$

$$\frac{75}{12} = 6 \text{ remainder } 3$$

∴  $C_6H_3ON$  is the possible molecular formula

b. What are the importances of organic compounds

1. Organic molecules make up a large portion of the human diet.
2. It is used in production of fuel.
3. Organic compounds are used in the production of medicine.
4. Organic compounds are used in the production of dyes
5. Insecticides are produced from organic compounds
6. Organic compounds are used in the production of explosives
7. It is used in the production of clothes

c. Differentiate between homocyclic and heterocyclic compounds.

Homocyclic compounds

Heterocyclic compounds

1. homocyclic compound ring contains only one type of atom.

heterocyclic compound ring contains at least two different types of atoms including carbon.

2. 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.

3. homocyclic compounds are subdivided into alicyclic and aromatic homocyclic.

heterocyclic compounds are sub-divided into alicyclic heterocyclic and aromatic heterocyclic.

4. example is Phenol

example is Furan.

2a. 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.

$$R_f = \frac{\text{distance of the bands}}{\text{distance of the solvent front}}$$

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

$$= 0.197$$

$$R_f = \frac{\text{distance of the bands}}{\text{distance of solvent front}}$$

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

$$= 0.460$$

$$R_f = \frac{\text{distance of the bands}}{\text{distance of solvent front}}$$

$$= \frac{3.6 \text{ cm}}{5.2 \text{ cm}}$$

$$= 0.705$$

b. Two organic compounds were labelled A and B. A gave a positive test result (dark grey precipitate) to Tollens test and B decolorizes Bromine water. Suggest the family to which these organic compounds belong.  
 A belongs to the functional group aldehyde.  
 B belongs to the functional group alkene.

c. 2,4-Dinitrophenylhydrazine test is employed for ketones and aldehydes.

d. List 7 functional groups of organic compounds giving two examples of each group.

	Functional group	Example-
1.	$\text{-C-C-}$	methane ( $\text{CH}_4$ ), ethane ( $\text{C}_2\text{H}_6$ )
2.	$\text{-C=C-}$	ethene ( $\text{C}_2\text{H}_4$ ), propene ( $\text{C}_3\text{H}_6$ )
3.	$\text{-C}\equiv\text{C-}$	butyne ( $\text{C}_4\text{H}_6$ ), ethyne ( $\text{C}_2\text{H}_2$ )
4.	$\begin{array}{c} \diagup \\ \text{C}=\text{O} \\ \diagdown \end{array}$	propanone ( $\text{CH}_3\text{COCH}_3$ ), butanone ( $\text{C}_4\text{H}_8\text{O}$ )
5.	$\text{-CHO}$	propanal ( $\text{CH}_3\text{CH}_2\text{CHO}$ ), butanal ( $\text{C}_4\text{H}_8\text{O}$ )
6.	$\text{-COOH}$	propanoic acid ( $\text{C}_3\text{H}_6\text{O}_2$ ), methanoic acid ( $\text{HCOOH}$ )
7.	$\text{-COOR}$	ethyl ethanoate ( $\text{C}_4\text{H}_8\text{O}_2$ ), ethyl butanoate ( $\text{C}_6\text{H}_{12}\text{O}_2$ )