

NAME: SHOWARI OYIODESI PASCHIELIA  
MATRIC NO: PM/MSD01/299  
DEPARTMENT: MEDICINE AND SURGERY  
CHEM 102 ASSIGNMENT

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

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

$$\text{Mass total} - \text{Nitrogen} = \text{Mass of Carbon \& Hydrogen}$$
$$105 - 14 = 91$$

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

We have 7 Carbon atoms, 7 Hydrogen atoms and 1 Nitrogen atom

$\therefore$  possible molecular formula is  $C_7H_7N$

Assuming Oxygen is present

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

$$\text{Mass total} - (\text{Mass of nitrogen} + \text{Mass of Oxygen}) = \text{Mass of Carbon \& Hydrogen}$$

$$105 - 30 = 75$$

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

$\therefore$  the possible molecular formula is  $C_6H_3ON$

b. What are the Importance of Organic Compounds

- Organic molecules make up a large portion of the human diet
- It is used in the production of fuel
- It is used in the production of medicines
- Insecticides are produced from organic compounds
- It is used in the production of explosives.

c. Differentiate between homocyclic and heterocyclic compounds.

	Homocyclic Compounds	Heterocyclic Compounds.
i	Homocyclic compound rings contain only one type of atom	Heterocyclic compound rings contain at least two different types of atoms including Carbon
ii	They have 100% Carbon atoms in their rings	They have mainly Carbon and in addition, heteroatoms such as Nitrogen, oxygen and sulfur are found in their rings
iii	They are subdivided into alicyclic and	They are subdivided into alicyclic heterocyclic

aromatic homocyclic

and aromatic heterocyclic

iv Example is Phenol

Example is furan.

2a. 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 amicable bands

Sol

i 2.4 cm.  $R_f = \frac{\text{distance of the bands}}{\text{distance of the solvent front}} = \frac{2.4 \text{ cm}}{12.2 \text{ cm}} = 0.197$

ii 5.6 cm.  $R_f = \frac{5.6 \text{ cm}}{12.2 \text{ cm}} = 0.460$

iii 8.9 cm  $R_f = \frac{8.9 \text{ cm}}{12.2 \text{ cm}} = 0.705$

b. Two organic compounds were labelled A & B. A gave a positive test result (dark grey precipitate) to Tollen's test and B decolorises Bromine water. Suggest the family to which these organic compounds belong.

A belongs to Aldehyde group

B belongs to Alkene group.

c. 2,4-Dinitrophenylhydrazine test is employed for ketones & Aldehydes.

d. List 7 functional groups of organic compounds giving 2 examples of each.

Class	Functional group	Examples
1. Alkane	$-\overset{\text{H}}{\underset{\text{H}}{\text{C}}}-$	Methane ( $\text{CH}_4$ ), Ethane ( $\text{C}_2\text{H}_6$ )
2. Alkene	$\text{C}=\text{C}$	Ethene ( $\text{C}_2\text{H}_4$ ), Propene ( $\text{C}_3\text{H}_6$ )
3. Alkyne	$-\text{C}\equiv\text{C}-$	Butyne ( $\text{C}_4\text{H}_6$ ), Ethyne ( $\text{C}_2\text{H}_2$ )

	Class	Functional group	Examples
4.	Ketones	$\begin{array}{c} \diagup \\ \text{C}=\text{O} \\ \diagdown \end{array}$	Propanone ( $\text{CH}_3\text{COCH}_3$ ), Butan-2-one ( $\text{C}_4\text{H}_8\text{O}$ )
5.	Aldehyde	$-\text{CHO}$	Propanal ( $\text{CH}_3\text{CH}_2\text{CHO}$ ), butanal ( $\text{C}_4\text{H}_8\text{O}$ )
6.	Alkanoic Acid	$-\text{COOH}$	Propanoic acid ( $\text{C}_3\text{H}_6\text{O}_2$ ), Methanoic acid ( $\text{HCOOH}$ )
7.	Alkanoates	$-\text{COOR}$	Ethyl ethanoate ( $\text{C}_4\text{H}_8\text{O}_2$ ), Ethyl butanoate ( $\text{C}_6\text{H}_{12}\text{O}_2$ )