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**QUESTION 1**

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

Solution

M/z = 105

If the mass of the molecular ion is odd, it contains at least one N where N stand for nitrogen with molar mass N = 14 amu

i.e 105-14=91

91/12 =7.5, C7NH?

Add enough hydrogen to make up the rest of the mass

7 x 12 =84, 84+14= 98

105-98= 7

i.e C7NH7

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

Hydrogen deficiency=

i.e. HD = = 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 x 12= 72

75-72= 3

˜ C6NH3O

To find hydrogen deficiency, Hydrogen deficiency=

HD= = 5.75

NOTE- the hydrogen deficiency is solved for in order to know the number of double bonds, triple bond or rings in a compound.

THEREFORE, the chemical compounds formed are as follows:

* C7NH7
* C6NH3O

b. What are the importance of organic compounds?

* 1. Medicine- Medicine is the prime store of organic compounds. Though not all but many medicines are made of organic substances. Like antibiotics, anticancer drugs, painkillers, anti depressants, anesthetics etc
  2. Food- food materials are solely made of carbon compounds. Carbohydrates, proteins, fats. Even vitamins are organic in nature. Study of the requirement of body for various purposes like pregnancy, disease condition, body fitness etc. experts advice use of vitamins( Folic acid in pregnancy), fat (minimize in heart diseases) and protein (rich diet for body building).
  3. Cleaning agents- Organic solvents are used to clear impurities e.g. fatty matter from pulp is used in removing petroleum ether

4. Sterilizing agents- most sterilizing agents such as phenol, formaldehyde and the likes are carbon compounds and as a result of their solubility’s, PH they call microbes and even human body cells

5. Valuables- carbon compounds are found to be highly valuable, durable and hardest in the world e.g Diamond and graphite which are carbon compounds, both are expensive especially Diamond and are highly used in making jewelry

c. Difference between homocyclic and heterocyclic compounds

Homocyclic compounds are cyclic compounds having atoms of the same element as ring members while heterocyclic compounds are cyclic compounds having atoms of different elements as ring members including carbon atoms.

QUESTION 2

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

SOLUTION

Rf =

Distance of the solvent front= 12.2 cm

* Band 1 = 2.4cm

Rf1= 0.197

* Band 2= 5.6cm

Rf2=

* Band 3 = 8.9cm

Rf3=

1. Two organic compounds were labeled 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.

B is Alkene as it decolorizes bromine water

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

1. 2,4dinitrophenylhydrazine test is employed for? Testing aldehydes and ketones
2. List 7 functional groups of organic compounds giving two examples of each group
   1. Alkane – C2H6, C3H8
   2. Alkene - C2H4, C3H6
   3. Alkyne - C2H2, C3H4
   4. Alkanol - CH3OH, CH3CH2OH
   5. Aldehyde- CH3CHO, CH3CH2CHO
   6. Ether - CH3OCH3, CH3OC2H5
   7. Halide – C2H5Br, C6H13I