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MARTIC NO: 17/MHS01/070

DEPARTMENT: MEDICINE AND SURGERY

COURSE CODE: CHM 102

QUESTION 1

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

STEP 1- if the mass of the molecular ion is odd it contains at least one N

N = 14amu 105-14 = 91

STEP 2 – determine maximum number of carbon atoms

91/12 = 7.5 C_7NH_x

STEP 3 – add enough H's to make up the rest of the mass

C_7NH_x

7*12 = 84

1*14 = 14

105-(84+14) = 7

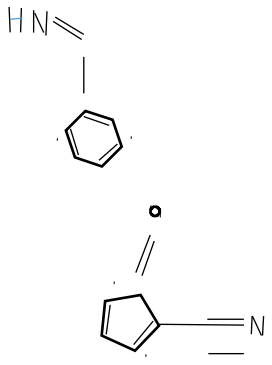
7H's gives C_7NH_7

(2(7.5) +2-7)/2 = 5

STEP 4 – add an O atom

$C_7NH_7 \rightarrow C_6NOH_3$

(2(6.5) +2-3)/2 = 6



b) What are the importance of organic compounds?

1. Organic compounds have versatile bonding patterns and are part of all organisms.
2. They are used in the pharmaceutical companies in the production of medicine like iodoform, aspirin, etc.
3. They are essential component of food e.g. carbohydrate, proteins etc.
4. Used in the production of explosives (nitroglycerine, nitrocellulose) and insecticides
5. It is also used in the textile industries.

a) Differentiate between homocyclic and heterocyclic compounds

Homocyclic Compounds	Heterocyclic Compounds
Are cyclic compounds having atoms of the same element as ring member	Are cyclic compounds having atoms of different elements as ring members including carbon atoms
Ring contains atoms of the same element	Ring contains atoms of different elements

Contain atoms of the same element bonded to each other forming a ring	Contain atoms of at least two different elements bonded to each other forming a ring
Examples include benzene, cyclohexane, toluene, cyclohexanol, etc.	Examples include pyran, azocine, thiocane, etc.

QUESTION 2

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.

RF= distance moved by substance/ distance moved by solvent front

For band A (2.4cm) = 2.4cm/12.2cm= 0.197

For band B (5.6cm) = 5.6cm/12.2cm= 0.459

For band C (8.9cm) = 8.9cm/12.2cm= 0 729

b) Two organic compounds were labelled A and B. A gave a positive test result (dark grey precipitate) to Tollens test and B decolourizes bromine water. Suggest the family to which these organic compounds belong.

Organic compound A belongs to aldehyde class of organic compound

Organic compound B belongs to alkene group.

c) 2,4-Dinitrophenylhydrazine test is employed for <u>test for aldehydes and ketones</u>

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

1. Alkanol- examples ethanol(CH_3CH_2OH), pentanol($CH_3CH_2CH_2CH_2CH_2OH$)
2. Aldehyde- examples ethanal(CH_3CHO), propanal(CH_3CH_2CHO)
3. Ketone- examples methyl ethyl ketone($CH_3COCH_2CH_3$), ethyl ketone(C_2H_5CO)
4. Carboxylic acid- examples acetic acid(CH_3COOH), pentanoic acid($CH_3CH_2CH_2CH_2COOH$)
5. Amides- examples acetamide(CH_3CONH_2), hexanamide($C_5H_{11}CONH_2$)
6. Amines- examples ethylamine($C_2H_5NH_2$), propylamine($C_3H_7NH_2$)
7. Esters - examples ethyl acetate($CH_3CO_2CH_2CH_3$), methyl propanoate($C_3H_7CO_2CH_3$)