Assg

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Level: 200
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No 1

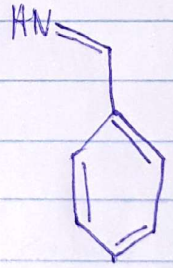
a. Possible formulas for a molecular ion (m/z) of 105.

Step 1: Since it is odd, it contains at least one Nitrogen.
N = 14 amu
∴ 105 − 14 = 91

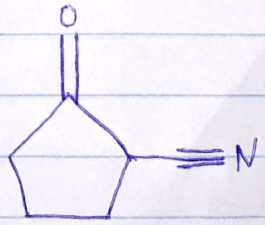
Step 2: Determine more no of Carbons
$\frac{91}{12} = 7.5 \Rightarrow C_7NH?$

Step 3: Add enough Hs to make up the res of the mass
$C_7NH? \not\Rightarrow C_8NH_7$
7 carbon × 12 = 84
1 nitrogen × 14 = 14

105 − (84 + 14) = 7
∴, $C_7NH? \Rightarrow C_7NH_7$



Step 4: Add an O atom
$C_7NH_7 \Rightarrow C_6NOH_3$



∴ possible formulas for m/z of 105 are:
(i) C_7NH_7. (ii) C_6NOH_3.

(b) Importances of organic compounds:

(i) They have versatile bonding patterns with other compounds.

(ii) They are part of all organisms.

(iii) Macromolecules of organic compounds are the basic components of many cycles of the earth, e.g carbon cycle, etc, and ~~other~~ plant and cellular respiration.

(iv) Decomposition of carbon in organic compounds ~~returning~~ returns to soil and is regenerated in new plants.

(v) They decompose to form fossil fuels, petroleum, natural gas, etc.

(vi) They bond to form polymers and well organized rings.

(c)

Homocyclic compounds	Heterocyclic compounds
(i) All the atoms in the ring belong to the same element	(i) Both carbon and other atoms are present in the ring.
(ii) Examples are: benzene, cyclohexane, toluene, cyclohexanol, etc.	(ii) Examples are: pyran, azocine, thiocine, etc.

No 2

(a) Retardation factor, R.f = $\frac{\text{distance moved by the mixture (x)}}{\text{distance moved by the solvent front (y)}}$

$y = 12.2\text{cm}$

(i) For 2-Hexanol,

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

(ii) for 5-6 cm band,

$R_f = \frac{5-6}{12-2} = 0.460$

(iii) for 8-9 cm band,

$R_f = \frac{8-9}{12-2} = 0.730$

(b) A - belongs to Aldehydes.

NB: A can also belong to some alpha hydroxy ketones.

B - belongs to Alkenes, Alkynes and Phenols.

(c) 2,4- Dinitrophenyl hydrazine test is employed for:

(i) Ketones.

(ii) Aldehydes.

(d) 7 functional groups and examples are:

(i) Alkanes - Ethane (C_2H_6) and Octane (C_8H_{20}).

(ii) Alkynes - Methyne (CH_2) and Hexyne (C_5H_{10}).

(iii) Alkyhalides - Iodomethane (CH_3I) and Chloroethane (C_2H_6Cl).

(iv) Alkanones - propanone and butanone.

(v) Esters - methylethanoate and ethyl propanoate.

(vi) Aldehydes - ethanal and propanal.

(vii) ~~Ketone~~ / Amine - ~~propanone~~ and / pentan-2-one.

(viii) Ethers - methoxymethane and dimethyl ether.