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17/ENG04/065

ELECT/ELECT ENGR

**QUESTION 1**

 A).



Fragment at m/z =105
Step1: If the mass of the molecular ion is odd it contains at least

 one nitrogen N= 14 atoms
 105-14=91
Step2: Determine max NC’S
 = 7.5 C7HN?

Step3: Add enough H’s to make up the rest of the mad
 7×12=84
 1×14=14
 105-(84+14) =7
 7H’S gives C7NH7 (2n+2-7)/2= 2(7.5) +2-7/2 =5.25
Step4: Add an O atom

 C7NH9 →C6H3NO

 C7H7N - Azocine
 C6H3NO - Pyran-3-carbonitrile

 = 5.5 ~ 6

Other formula include;

C8H9 – 2-Phenylethyl.

B). Organic compounds are important because;

i). They serve as the basis for all carbon-based life on Earth.

ii). They create energy production in biological life.

iii). They cause atmospheric depletion.

iv). They release hydrocarbon energy.

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| **HOMOCYCLIC COMPOUNDS** | **HETEROCYCLIC COMPOUNDS** |
| Homocyclic Compound ring contains only one types of atom(carbon). | Heterocyclic Compound ring contains at least two different types of atoms including carbon. |
| 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. |
| Examples: Phenol, Toluene, Naphthalene, and Anthracene. | Examples: Tetrahydrofuran, Piperidine, Pyridine, Furan, and Pyrrole |

C).

**QUESTION 2:**

A). Retardation Factor, Rf **=**  Distance moved by substance

 Distance moved by the solvent front

For Distance moved in 2.4cm, **Rf =**=0.197

For Distance moved in 5.6cm, **Rf =** =0.459

 For Distance moved in 8.9cm, **Rf** == 0. 729

B). Two organic compounds were labelled A and B. A gave a positive

test result (dark grey precipitate) to Tollen’s test and B decolorizes

Bromine water. Suggest the family to which these organic

compounds belong.

*Compound A – Aldehydes, Ketones and Terminal Alkynes*

*Compound B –* *Unsaturated compound i.e. Alkene (Alkynes does not react with bromine water)*

1. *2, 4-Dinitrophenylhydrazine* test is employed for the qualitative test for [carbonyl groups](https://en.wikipedia.org/wiki/Carbonyl_group%22%20%5Co%20%22Carbonyl%20group) associated with ***[aldehydes](https://en.wikipedia.org/wiki/Aldehyde%22%20%5Co%20%22Aldehyde) and [ketones](https://en.wikipedia.org/wiki/Ketone%22%20%5Co%20%22Ketone).***
*2,4-Dinitrophenylhydrazine* is the [chemical compound](https://en.wikipedia.org/wiki/Chemical_compound%22%20%5Co%20%22Chemical%20compound) C6H3(NO2)2NHNH2. *2,4-Dinitrophenylhydrazine* is a red to orange solid. 2, 4-Dinitrophenylhydrazine is commercially available usually as a wet powder and is often used to qualitatively test for [carbonyl groups](https://en.wikipedia.org/wiki/Carbonyl_group%22%20%5Co%20%22Carbonyl%20group) associated with [aldehydes](https://en.wikipedia.org/wiki/Aldehyde%22%20%5Co%20%22Aldehyde) and [ketones](https://en.wikipedia.org/wiki/Ketone%22%20%5Co%20%22Ketone). *2, 4-Dinitrophenylhydrazine* can be used to qualitatively [detect](https://en.wikipedia.org/wiki/Chemical_test%22%20%5Co%20%22Chemical%20test) the carbonyl functionality of a [ketone](https://en.wikipedia.org/wiki/Ketone%22%20%5Co%20%22Ketone) or [aldehyde](https://en.wikipedia.org/wiki/Aldehyde%22%20%5Co%20%22Aldehyde) functional group. A positive test is signaled by the formation of a yellow, orange or red [precipitate](https://en.wikipedia.org/wiki/Precipitate%22%20%5Co%20%22Precipitate) (known as a [dinitrophenylhydrazone](https://en.wikipedia.org/w/index.php?title=Dinitrophenylhydrazone&action=edit&redlink=1" \o "Dinitrophenylhydrazone (page does not exist))). If the carbonyl compound is **aromatic**, then the precipitate will be red; if **aliphatic**, then the precipitate will have a more yellow color.

D).

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| Functional Group | General Formula | Examples |
| Alkanoic Acid  | R-COOH  | – Ethanoic Acid Butanoic Acid |
| Alkanol  | R-OH | MethanolEthanol |
| Alkyl-Halide | RX(**X** includes the halides such as Fluorine, Chlorine, and Bromine etc.) | ChloromethaneBromopropane |
| Alkanal | R-COH | EthanalPropanal |
| Esters | R-COOR | Methylpropanoate Ethylbutanoate |
| Ketones/Alkanones  | R-C=OR |  Propan-2-one Ethanone |
| Amides  | R-CONH2 |  – AcetamidePropanamide |