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COURSE CODE: CHM 102

1. The question was solved using the rule of 13 which states that the formula of a compound is a multiple “n” of 13(the molar mass of CH) plus a remainder “r”. I.e. n= molecular ion÷13.

CnHn+R

If heteroatoms are present, the formula will then be adjusted as follow;

* For oxygen, add O and subtract CH4
* For nitrogen, add N and subtract CH2
* For chlorine, add Cl and subtract C2H11

 Molecular ion = 105

 According to the rule of 13; 105÷13 = 8 R 1. n=8, r=1

 CnHn+r = C8H9

* C7H5O
* C6HO2
* C7H7N
* C6H9N2
* C5H3N3
* C4HN4
* C6H3NO

B. Carbohydrate is a biological molecule consisting of carbon, hydrogen and oxygen and it plays an important role in living organisms, such as provision of energy.

Hydrocarbons are the primary source of energy for most countries today. The prominent use of hydrocarbon is as a source of fuel. In solid form, hydrocarbons can take the form of asphalt.

Organic compounds are used to produce household and other common materials such as; detergents, cosmetics, perfumes, plastic, leather, inks, paints, resins, photographic films etc.

Organic compounds can be used to produce explosives such as nitro-glycerine and nitrocellulose.

Organic compounds make up a large portion of the human diet and are found in all food consumed by an individual. It requires a large number of organic molecules needed to keep cells and tissues healthy.

The clothes industry uses organic compounds to produce cotton, silk, wool, nylon etc.

C.

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| HOMOCYCLIC COMPOUNDS  | HETEROCYCLIC COMPOUNDS |
| Their ring contains only one type of atom. | Their ring contains at least two different types of atoms, carbon inclusive. |
| They have 100% carbon atoms in their ring. | They have mainly carbon and in addition, hetero-atoms such as Nitrogen, Oxygen, and Sulphur are found in their ring. |
| Their sub-division includes; Alicyclic homocyclic and Aromatic homocyclic. | Theirs include; Alicyclic heterocyclic and Aromatic heterocyclic. |
| Examples include; Phenol, Toluene, Naphthalene and Anthracene. | Examples include; Tetrahydrofuran, Piperidine, Pyridine, Furan and Pyrrole. |

2. Retardation factor = (dist. moved by substance) ÷ (dist. moved by the solvent front)

Rf1= (2.4) ÷ (12.2)

 =0.197

Rf2= (5.6) ÷ (12.2)

 =0.459

Rf3= (8.9) ÷ (12.2)

 =0.730

B. A belongs to the ketone family

B belongs to the alkene or alkyne family

C. ketone and aldehyde

D.

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| Functional group | Examples |
| Alkane | Methane, Ethane |
| Alkene | Propene, Butene |
| Ketone | Butane-2-one, Hexane-1,2-di-one  |
| Aldehyde | Methanal, Propanal |
| Carboxylic acid | Propanoic acid, butanoic acid |
| Alkyne | Methyne, Octyne |
| Alkanol | Ethanol, Pentanol |