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QUESTION 1

1. The rule of 13 states that the formula of a compound is a multiple ‘n’ of 13 (the molar mass of CH) plus a remainder ‘r’. CnHn+1. If you have heteroatoms, you can adjust the formula. Example for nitrogen (N), add N and subtract CH2 and for oxygen (O), add O and subtract CH4.

In essence, 105/13 gives 8 remainder 1

CnHn+1=C8H8+1=C8H9. Possible formulas for the molecular ion (m/z) of 105 are;

For O, we have C7H5O

For O2, we have C6HO2

For N, we have C7H7N

For N2, we have C6H5N2

For N3, we have C5H3N3

For N4, we have C4HN4

For NO, we have C6H3NO

1. -Organic compounds are important because they serve as the basis of all carbon-based life on Earth, an element that all living organisms contain.

-They also create energy production in biological life, depletion of the atmosphere and release energy from hydrocarbons.

- HCs form the amino acids and the DNA which are necessary to maintain various biological processes such as metabolism, respiration and circulation in the blood.

-Ancient life forms buried beneath the surface of the earth and transformed into hydrocarbons form the basis of all mankind's mechanical energy consumption.

-Organic compounds released into the atmosphere deplete ozone levels and cause smog. These

compounds are residual products of manufacture and burning.

1. The key difference between homocyclic compounds and heterocyclic compounds is that, the ring of homocyclic compounds is made up carbon atoms only, whereas that of heterocyclic compounds is made up of more than one kind of atoms (including a carbon atom).

QUESTION 2

1. R for the first band= 2.4/12.2 =0.197

R for the second band= 5.6/12.2= 0.459

R for the third band= 8.9/12.2 =0.730

1. Organic compound A is an aldehyde. Compound B is an alkyne.
2. 2,4-Dinitrophenylhydrazine test is employed for qualitative detection of the carbonyl functionality of a ketone or aldehyde functional group.
3. -Alkanes e.g. pentane and octane.

-Alkenes and alkynes e.g. ethene and ethyne.

-Halo alkane or alkyl halides e.g. bromoethane and trichloromethane.

-Alcohols e.g. methanol and phenol.

-Ethers e.g. alkoxy alkanes and alkoxy alkenes.

-Amines e.g. diphenylamine and dimethylamine.

-Aldehyde e.g. vanillin and Tolualdehyde.