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**DEPARTMENT:** MEDICINE AND SURGERY

CHM 102 ASSIGNMENT

**QUESTION 1**

1. 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 numbers of C’s

91/12=7.5

Taking the whole number before the decimal without approximating, this implies that the formula will be in the form C7NHm where m is the number of moles of hydrogen.

Therefore, m= 105-((12x7)+(1x14))

 =105-98

 =7

IHD=$ \frac{2n+2-m}{2}$ where n is the number of moles of carbon.

 =$\frac{2\left(7.5\right)+2-7}{2}$

 =$\frac{10}{2}$

 =5

**Hence the first formula is C7NH7 and IHD=5**

Repeating the same procedure but now we introduce oxygen:

O=16, 105-(16+14)=75

Dividing by 12 in order to determine the maximum number of carbon atoms, we have:

75/12= 6.25

Our new formula is in the form C6NOHm.

m=105-((12x6) +14+16)

 =105-102

 =3

IHD=$\frac{2n+2-m}{2}$

 =$\frac{2\left(6.25\right)+2-3}{2}$

 =$\frac{11.5}{2}$

 =5.75

**Hence the second formula is C6NOH3 and IHD=5.75**

1. **Importance of organic compounds**

Organic compounds have versatile bonding patterns and are part of all organisms.

1. **Medicine**: Medicine is the prime store of organic compounds though not all but many medicines are made of organic substances. Like antibiotics, anticancer drugs, painkillers, anti-depressant, anaesthetics etc. But organic chemistry can be studied in three parts in medicine as.

1. **Drugs to cure disease**: As said before many drugs used for treatment of diseases are made of organic compounds. Hence they are water insoluble, bitter in taste and also easily movable in the body tissues. Further drug delivery is an option to deliver the drug to deeper body location needs enhancement of lipid solubility and minimize water solubility. Then change in organic ration i.e. the amount of carbon content will give the desired effect.  Hence the organic chemistry, studies the chemistry of the drug and tries to enhance their efficiency, reach-ability to the target organs and also ensure safe metabolism to eliminate from the body (to remove toxicity). Further organic compounds though having same chemical structure still have varying effect in the body due to stereo isomerism. The Cis and Trans isomers play a vital role. If one can notice anit-parkinson medicine L-DOPA or the antibiotic Levofloxacin, you can find both having L-configuration (-). They are levo isomers of the same substance but levo form are more effective than the dextro forms (+).
2. **Pathophysiology of the diseases**: The study of disease is well supported by organic chemistry. Most diseases in humans have some course or pathway before complete death ensues. Ex: In gout there is disturbance in the purine metabolism, uric acid formed does not break into Urea and gets accumulated. This causes gout. This can be studies by checking the levels of uric acid with that of normal condition. Similarly in infections there is damage to some biochemical components in the body. For example in malaria. The parasites damages the haemoglobin content of the blood. In that case the haemoglobin levels go down. This can be recognized by the organic functional groups change in the normal and diseased condition. Thus change in the organic components helps us to study the course and severity of the disease.
3. **To diagnose the disease**: Here organic chemistry uses some diagnosing aids to detect the organic part of the deficiency or disturbed substance. In diabetics, there is an increased sugar level and in severe cases even the ketone levels. Sugars have aldehyde groups (CHO) and ketones (C=O) groups. These groups are the targets in analysis. The more these groups during estimation, the more is the sugar levels and vice-verse. So organic chemistry in diagnosis aims to check for the organic functional group levels as a parameter of the disturbed substance in the body. In heart patients, the cholesterol levels from blood are estimated using study of ester and carboxylic acid groups.

2. **Food**: Food materials are solely made of carbon compounds viz. carbohydrates (CHO), proteins (NH2-CH-COOH), and fats (CH-COO-CH). Even vitamins are organic in nature. Study of the requirement of body for various purposes like pregnancy, disease condition, body fitness etc. experts’ advice use of vitamins (FOLIC acid in pregnancy), fat (minimize in heart diseases) and (protein rich diet for body building). Among beverages alcohol is an organic substance

3. **Cleansing agents:**In industries and labs, organic solvents are widely used to clear of impurities. For example in drug extraction from plants, the fatty matter from the pulp is removed using petroleum ether. Thus organic chemistry through its knowledge of polarity, solubility, partition factors uses solvents to separate components for better use.

**4. Sterilizing agents**: Most of the sterilizing agents and disinfectants like phenol, formaldehyde etc are carbon compounds. Due to their properties like solubility, pH they can kill microbes and even human body cells. These kill the bacteria and other microbes due to either dissolving the microbe cell wall or damaging the protein layer etc. Their efficiency is enhanced by making small tweaks in the chemistry. Besides these solvents there are gases like ethylene oxide which are used for sterilization of drugs and manufactured substances.

**5.** **Analytic substances**: Most substances we use like drugs, pesticides etc, are analyzed qualitatively and quantitatively using different types of titrations, chromatography techniques, and spectrophotometry.  Here the reagent use like acids or bases or oxidative reductive species is organic in nature. Further the end point indicators in titration are developed by organic chemistry.

6.**Valuables**: Diamonds, graphite, petroleum. Interestingly the carbon compounds are found to be highly valuable, durable and hardest in the world. Diamond and graphite are both pure carbon alone compound without any other elements inside. They are both highly used and expensive. Their properties are studies in organic chemistry. Petroleum is the other most valued resources on the earth for fuels needs in the world. These petroleum products are further diversified for various uses. And petroleum is one of the factors which influence the world economy.

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| **Homocyclic compounds** | **Heterocyclic compounds** |
| These are cyclic compounds having atoms of the same element as ring members. | These are cyclic compounds having atoms of the different elements as ring members including carbon atoms.  |
| Contains atoms of the same element bonded to each other forming a ring.  | Contains atoms of at least two different elements bonded to each other forming a ring. |
| They have 100% carbon atoms in their rings. | They have mainly carbon in addition to heteroatoms such as nitrogen, oxygen, and sulphur in their rings. |
| Sub divided into alicyclic homocyclic and aromatic homocyclic. | Sub divided into alicyclic heterocyclic and aromatic heterocyclic. |
| Examples are phenol, toluene and anthracene. | Examples are tetrahydrofuran, furan and pyridine. |

**QUESTION 2**

1. Rf=$\frac{Distance travelled by the substance}{Distance travelled by the solvent}$
* $\frac{2.4cm}{12.2cm}=0.197$
* $\frac{5.6cm}{12.2cm}=0.459$
* $\frac{8.9cm}{12.2cm}=0.730$
1. Compound A is an aldehyde and compound B is an alkene.
2. 2, 4-DNPH test is employed for aldehydes and ketones.
3. **Alkanes** –methane and ethane

**Alkenes**-ethene and butene

**Alkynes**-ethyne and butyne

**Alcohol/alkanols**-ethanol and butanol

**Aldehyde**-propanol and butanol

**Alkanoate/carboxylic acid**-propanoic acid and butanoic acid

**Esters**-methyl propanoate and methyl butanoate