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**COLLEGE: COLLEGE OF SCIENCES**

**DEPT: GEOLOGY**

**COURSE: CHEM 102**

**Question 1:**

1. Suggest possible formulas for a molecular ion (m/z) of 105.

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| M/z= 105. It is odd, therefore, it has Nitrogen  Taking Nitrogen= 14amu  105 – 14= 91  To find the mass number of Carbon  91 ÷ 12= 7.6  Therefore, 7 is the number of mole of carbon  For Hydrogen: 7\*12=84  91 – 84 = 7, therefore, 7 is the number of mole of hydrogen  The formula is C7NH7  Oxygen was introduced: 105 – 14 = 91  Taking O = 16: 91 – 16 = 75  75 ÷ 12 = 6.25  6\*12 = 72  Therefore, 72 is the number of carbon atoms  75 – 72 = 3  Therefore, 3 is the number of hydrogen atoms  The formula is **C6NOH3** | To find hydrogen deficiency:  = (2N + 2 – H)  2  = {2(7.6) + 2 – 7}  2  = 15.2 - 5  2  = 5.1  To find hydrogen deficiency:  = (2N + 2 – H)  2  = {2(6.25) + 2 – 3}  2  = 12.5 – 1    2  = 5.75 |

1. Importance of organic compounds
2. Organic compounds are important in production of drugs.
3. They are used in industries for production of antiseptic.
4. Ethanol is a staple in the beverage industry.
5. They are important constituents of food.
6. They are important constitutes of crude oil used as fuels for automobiles.
7. They are important in making dye.
8. `Differentiate between homocyclic and heterocyclic compounds

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| Homocyclic compounds | Heterocyclic compounds |
| 1. Homocyclic compound rings contain only one kind of atom. | Heterocyclic compound rings contain at least two kinds of atoms including carbon. |
| 1. Contain 100% carbon atom in their ring. | Contain mainly carbon atoms and in addition heteroatom’s such as nitrogen in their ring. |
| 1. Examples are Toluene, Phenol, Benzene. | Examples are Tetrahydrofuran, Pyran, Furan, Axoline. |
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**QUESTION 2:**

1. If the distance of the solvent front is 12.2cm. 2.4cm, 5.6cm and 8.9cm are distances of the different bands respectively. Calculate the retardation factor of the available bands.

Retardation factor= distance of solute ÷ distance of solvent.

For band A=2.4cm, retardation factor= 2.4cm ÷ 12.2cm = 0.20

For band B=5.67m, retardation factor= 5.6cm ÷ 12.2cm = 0.46

For band C=8.9cm, retardation factor= 8.9cm ÷ 12.2cm = 0.73

1. Two organic compounds were labeled A and B. A gave a positive test result (dark grey participate) to Tollens test and B decolorizes Bromine water. Suggest the family to which these organic compounds belong.

Compound A belongs to aldehyde family.

Compound B belongs to alkyne family.

1. 2,4- Dinitrophenylhydrazine test is employed for ………………………….

Aldehyde and Ketones.

1. List 7 functional groups of organic compounds giving two examples of each group.

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| Functional groups | Examples |
| 1. –OH | Methanol, Ethanol |
| 1. –COOH | Ethanoic acid, Propanoic acid |
| 1. –NH2 | Methylamine, Ethylamine |
| 1. –F, -Cl, -Br, -I | Iodomethane, Bromoethane |
| 1. –COH | Methanal, Ethanal |
| 1. –OR | Dimethyl ether, 1Methoxyethane |
| 1. C=C | Ethene, Propene |