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COURSE: CHEMISTRY 102

 1a. Suggest possible formulas for a molecular ion[m/z] of 105. **-**if the mass of the molecular ion is odd, it contains at least one nitrogen atom N.

 **N**= 14amu, 105-14=91

 determine maximum number of carbon atoms, C.

 91/12=7.5 hence, 7 carbon atoms maximum. C7NH7

 add enough H’s to make up the rest of the mass.

 (12x7) + (14x1) + H=105

 84 + 14 + H =105

 98+ H = 105

 H = 105- 98 = 7. 7 H’s gives C7H7N. C7H7N is a possible formula.

add an oxygen atom into the formula (-CH2 when adding O)

 C7NH7 =>C6NOH3

 Therefore, the possible formulas are: C7H7N and C6NOH3

 B. What are the importance of organic compounds.

* DRUGS TO CURE DISEASE: In medicine many drugs used for treatment of diseases are made of organic compounds.
* FOOD: Food materials are solely made of carbon compounds. Vitamins are organic in nature and among beverages alcohol is an organic substance as well.
* CLEANSING AGENTS: In industries and labs, organic solvents are widely used to clear off impurities.
* STERILIZING AGENTS: Most of the sterilizing agents and disinfectants like phenol and formaldehyde are carbon compounds.
* VALUABLES: Diamonds, graphite and petroleum are composed of organic compounds. Interestingly the carbon compounds are found to be highly, valuable and hardest in the world.
* FOR ANALYSIS: Not all organic substances are soluble in water. So they can be analysed by non-aqueous titration. For this they use organic solvents like pyridine, methanol, acetone etc.

C. Differentiate between homocyclic and heterocyclic compounds.

|  |  |
| --- | --- |
| Homocyclic compounds  | Heterocyclic compounds |
| * Homocyclic compounds are cyclic compounds having atoms of the same element as ring members .
 | * Heterocyclic compounds are cyclic compounds having atoms of the different elements as ring members including carbon atoms.
 |
| * They contain atoms of the same element bonded to each other forming a ring.
 | * They contain atoms of at least two different elements bonded to each other forming a ring.
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| * Examples include benzene, cyclohexane, toluene, cyclohexanol.
 | * Examples include pyran, azocine, thiocane etc.
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2a, 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. Distance of solvent front = 12.2cm

 Distance of band A = 2.4 cm

 Distance of band B = 5.6 cm

 Distance of band C = 8.9 cm

Retardation factor of A = $\frac{Distance moved by band A}{Distance moved by solvent front}$

 = $\frac{2.4cm}{12.2cm}$

 = 0.1967

Retardation factor of B = $\frac{Distance moved by band B}{Distance moved by solvent front}$

 = $\frac{5.6cm}{12.2cm}$

 = 0.4590

Retardation factor of C = $\frac{Distance moved by band C}{Distance moved by solvent front}$

 = $\frac{8.9 cm}{12.2cm}$

 = 0.7295

B. Two organic compounds were labelled A and B A gave a positive test result [dark grey precipitate] to Tollens test band B decolourizes bromine water, Suggest the family name to which these organic compounds belong.

A- Aldehyde

B- alkene

C. 2,4-Dinitrophenylhydrazine test is employed for?

It is a red to orange solid that is a substituted hydrazine and is often used to qualitatively test for carbonyl groups associated with aldehydes and ketones. The hydrazine derivatives can also be used as evidence toward the identity of the original compound.

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

* Hydroxyl group – Propanoic acid[CH3CH2COOH] and Ethanol[C2H5OH]
* Carbonyl group – Ethanal[C2H4O] and Propanal [C3H6O]
* Alkanol group-3–methyl pentan-2-ol and 1,2,3-propentriol
* Aldehydes (-CHO)- Propanal and Ethanal
* Alkene – Pentene and Butene
* Ethers-Ethoxyethane and Methoxyethane