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 1a) Fragment at m/z = 105

 Step 1: if the mass of molecular ion is odd, it contains at least one nitrogen [N=14atoms]

 105-14=91

 Step 2: determine maximum NCs

 91/12=7.58

 C7NHX

 Step 3: add enough H to make it up to the rest of the equation

 7x12=84

 1x14=14

 105-[84+14] = 105-98

 =7

 Therefore the number of hydrogen atom is 7

 IHD= [2n+2-m]/2=2(7.58) +2-7/2= 5.08

 Step 4: add an oxygen atom

 C7NH7=C6NOH3

 IHD= 2(6)+ 2-3/2=11/2

 =5.5

 1b) Organic compounds are used as cleansing agents in industries.

 Used as sterilizing agents and disinfectants e.g. phenol.

 Used as valuables such as diamonds, petroleum.

 Used as energy source e.g. petroleum.

 Used in making dyes (indigo, alizarin), insecticides (DDT), explosives (nitroglycerine).

 Used for plastics, rubber, detergents and other household articles.

 Used for making drugs for fighting diseases.

 Fibres which are in food and used for making clothes we wear are made of organic compounds.

 Organic compounds are important because they have versatile bonding patterns and are a part of

 all organisms.

 1c)

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| HOMOCYCLIC COMPOUNDS | HETEROCYCLIC COMPOUNDS |
| Its ring contains only one type of atom i.e.carbon  | Its ring contains at least two different kinds of atom including carbon |
| It has 100% carbon in its ring | It has mainly carbon and additional heteroatoms such as nitrogen, oxygen and sulphur in its ring |
| Examples include benzene, cyclohexane, toluene and cyclohexanol. | Examples include pyran, azocibe and thiocane. |

2a) Rf= distance moved by substance/distance moved by solvent front

RfA= 2.4cm/12.2cm

 =0.1967=0.197

RfB= 5.6cm/12.2cm

 =0.459

RfC= 8.9cm/12.2cm

 =0.730

2b) A→ Alkanal/aldehyde

 B→ Alkene

2c) This test is employed for aldehyde and ketone to test its carbonyl functionality.

2d)

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| Functional group | Examples  |
|  -C-C single bond | Methane, octane. |
|  C=C double bond | Propene, ethane. |
|  C≡C triple bond | Ethyne, propyne. |
|  -OH hydroxyl group | Ethanol, methanol. |
|  -NH2 amino group | Methylamine, ethylamine. |
|  -COH formyl group | Methanol, propanal. |
|  -C=O I OHCarboxyl group |  |