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**MATRIC NO: 18/MHS07/037**

**PHARMACY**

**CHM102**

1. Give the IUPAC name of the following compounds
2. HCOOH – Methanoic acid
3. HOOCCH2CH2CH2COOH – Petan-1,5-diotic acid
4. CH3CH2­CH2COOH – Butanoic acid
5. HO2C-CO2H – Ethanedioic acid
6. CH3(CH2)4COOH – Hexanoic acid
7. CH3CH=CHCH2CH2COOH – Hex-4-eneoic acid
8. Discuss briefly the physical properties of carboxylic acid under the following headings
9. Physical appearance
10. Boiling point
11. Solubility
12. Physical appearance: All simple aliphatic acids up to C10 are liquids at room temperature. Most other carboxylic acids are solid at room temperature although anhydroyus carboxylic acid (acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below room temperature.
13. Boiling point: Boiling points increase with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher boiling point than their aliphatic counterpart of comparable relative molecular mass.
14. Solubility: Lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water; this is largely due to their ability to form hydrogen bond with water molecules. The water solubility of the acids decreases as the relative molecular mass increases because the structure becomes more relative hydrocarbon in nature and hence covalent. All carboxylic acids are soluble in organic solvents.
15. Write two industrial preparations of carboxylic acid
16. From carbon(II)oxide

Methanoic acid (formic acid) is manufactured by adding carbon(II)oxide under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetraoxosulphate(VI)acid (H2­SO­4).

NaOH H2SO4

CO ----------> HCOONA -----------> HCOOH + NAHSO4

1. From Petroleum: Liquid phase air oxidation of C5-C7 alkanes, obtained from petroleum at high temperature and pressure will give C5-C7 carboxylic acids with methanoic, propanoic and butanedioic acids as by products.

C­5-C7 O2/ High temperature and pressure C5-C7 carboxylic acids

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1. Write equations and brief explanation discuss the synthetic preparation of carboxylic acid
2. Oxidation of primary alcohols and aldehydes

Oxidation of primary alcohols and aldehyde can be used to prepare carboxylic acids with the usual oxidizing agents (i.e K2Cr2O7 or KMnO4) in acidic solution.

RCH2OH [O] excess acid /KMnO4 RCHO [O] RCOOH

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1. Carbonation of Grignard reagent:

Aliphatic carboxylic acids are obtained by bubbling carbon(IV)oxide into the gringard reagent and then hydrolyzed with dilute acid

RMgBr + CO2(C2H3)2O RCOOMgBr H2O/dil.acid RCOOH + MgBrOH

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R may be 10, 20, 30 aliphatic akyl or aryl radical.

1. Hydrolysis of nitriles( cyanides) or esters

RCN + 2H2O H+  RCOOH + NH4+

(R= alkyl or arly radical)

RCOOR’ H2O/H+ reflux RCOOH + R’OH

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C6H5CH2CN + 2H2O H+ C6H5CH2COOH + NH4+

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CH3CH2COOCH3 H2O/H+ reflux CH3CH2COOH + CH3OH

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1. With chemical equation only, outline the reduction, decarboxylation and esterification of catrboxylic acid.

REDUCTION:

( C₂H₅)₂ O 4H₂O

4RCOOH + 3LiAlH₄––––––> ( RCH₂O)₄AlLi + 2LiAlO₂ + 4H₂ –––––> 4RCH₂OH + Al(OH)₃ LiOH

DECARBOXYLATION:

fuse

CH₃CH₂CH₂COONa + NaOH ––––––> CH₃CH₂CH₃ + NaCO₃

Kolbe synthesis:

Electrolysis/ aqCH₃OH

2CH₃CH₂OONa + 2H₂O –––––––––––––––––> CH₃(CH₂)₂CH₃ + (O₂ canoed) + 2NaOH + H₂ (cathode)

ESTERIFICATION:

H⁺

CH₃CH₂CH₂COOH + CH₃CH₂CH₂OH <––––>CH₃CH₂CH₂COOCH₂CH₂CH₂CH₃ + H₂O