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Department: MBBS

Course code : CHEM 102

**Assignment**

1. Give the IUPAC names of the following compounds

HCOOH – Methanoic acid

HOOCCH2CH2CH2COOH- Butane 1,4 dioic acid

CH3CH2CH2COOH- Butanoic acid

HO2C-CO2H – Ethanedioic acid

CH3(CH2)4COOH- Hexanoic acid

CH3CH=CHCH2CH2COOH- Hex-4-eneioic acid

1. Discuss briefly the physical properties of carboxylic acids under the following headings
2. Physical appearance

All aliphatic carboxylic acids up to C10 are liquids at room temperature. Most other carboxylic acids are solid at room temperature although anhydrous carboxylic acid( acetic acid ) freezes to ice like solid below room temperature

1. Boiling point

Aromatic carboxylic acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass

1. Solubility

Solubility of the acids decreases as the relative molecular mass increases because the structure becomes relatively more hydrocarbon in nature and hence covalent. All carboxylic acids are soluble in organic solvents

1. Write two industrial preparations of carboxylic acids
   * From ethanol

Ethanoic acid is obtained commercially by the liquid phase air- oxidation of 5% solution of ethanal to ethanoic acid using manganite (II) ethanoate catalyst.

* + From petroleum

Liquid – phase air oxidation of C5- C7 alkanes, obtainable from petroleum at high temperature and pressure will give C5-C7 carboxylic acids with Methanoic, propanoic and butanedioic acids as by products.

E.g. C5H

1. With equations and brief explanation discuss the synthetic preparation of carboxylic acid
   * The carbonation of Grignard reagents

Grignard reagents react with carbon dioxide to yield acid salts, which, upon acidification, produce carboxylic acids

CO2

C6H5MgBr ------🡪 C6H5COOH + MgBrOH

H3O+

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

**Reduction of carboxylic acids**

Example: Propanoic acid to Propanol

LiAlH4

CH3CH2COOH ------🡪 CH3CH2CH2OH

 . H3O+

 . **Decarboxylation of Carboxylic acids**

CH3COONa + NaOH ----🡪 CH4 + Na2CO3

**Esterification of carboxylic acid**

Example: ethyl ethanoate from ethanoic acid

CH3COOH + CH3CH2OH 🡨 --🡪 CH3COOCH2CH3 + H2O