

ORKAA SAMUEL TERUNGWA

19/MHS01/358

CHEMISTRY ASSIGNMENT 3 (CARBOXYLIC ACIDS)

MBBS

1. Give the IUPAC names of the following compounds.

a) $\text{HCOOH} \longrightarrow$ Methanoic acid

b) $\text{HCOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH} \longrightarrow$ Pentan-1,5-dioic acid

c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} \longrightarrow$ Butanoic acid

d) $\text{HO}_2\text{C}-\text{CO}_2\text{H} \longrightarrow$ Ethanedioic acid

e) $\text{CH}_3(\text{CH}_2)_4\text{COOH} \longrightarrow$ Hexanoic acid

f) $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH} \longrightarrow$ Hex-4-enoic acid

2. Discuss briefly the physical properties of Carboxylic acids under the following headings; Physical appearance, Boiling point and Solubility.

Physical Appearance.

All simple aliphatic carboxylic acids up to C_{10} are liquids of room temperature. Most other carboxylic acids are solids at room temperature although anhydrous carboxylic acid (acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

BOILING POINT.

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

SOLUBILITY.

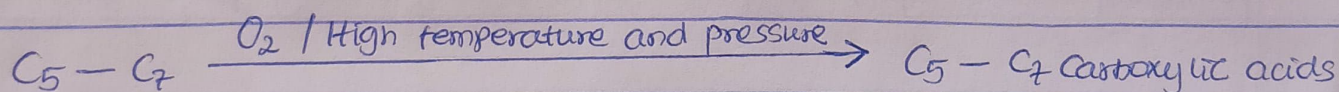
Lower molecule mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water; this is largely due to their ability to form hydrogen bonds with water molecules.

The Water 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.

3. Write two Industrial preparation of Carboxylic acids.

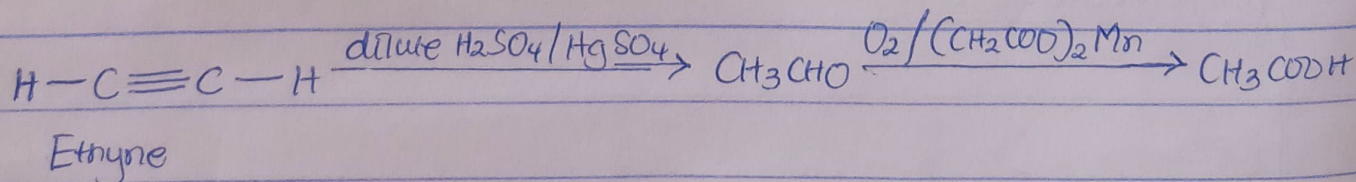
a) Preparation from petroleum.

Liquid phase air oxidation of $C_5 - C_7$ alkanes, obtainable from petroleum at high temperature and pressure will give $C_5 - C_7$ carboxylic acids with methanoic, propanoic and butanedioic acids as products.



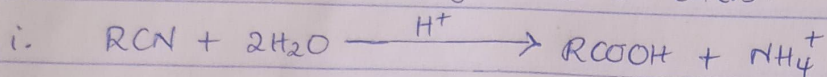
b) From ethanal.

Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanal to ethanoic acid using manganese(II) ethanoate as catalyst. Ethanal itself is obtained from ethylene.

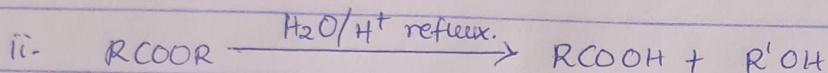
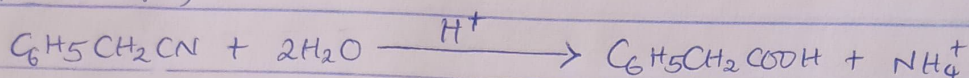


4. With equation and brief explanation, discuss the synthetic preparation of Carboxylic acid-

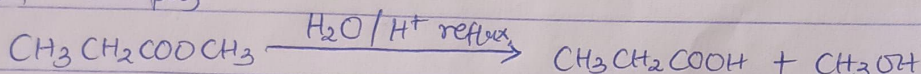
Hydrolysis of nitriles (cyanides) or esters.



Specific example,

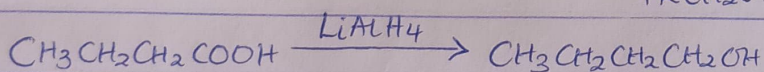
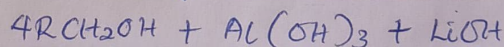
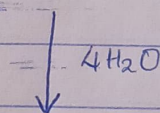
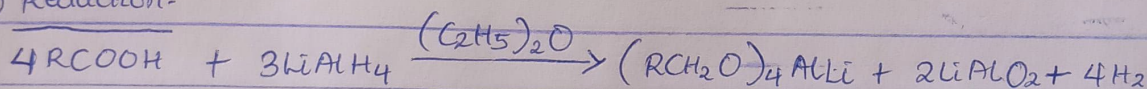


Specific example,



5. With Chemical equation only, Outline the reduction, decarboxylation and esterification of Carboxylic acid-

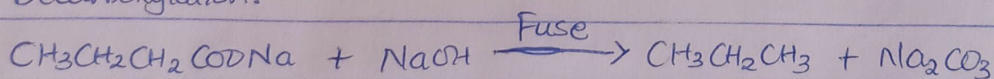
a) Reduction-



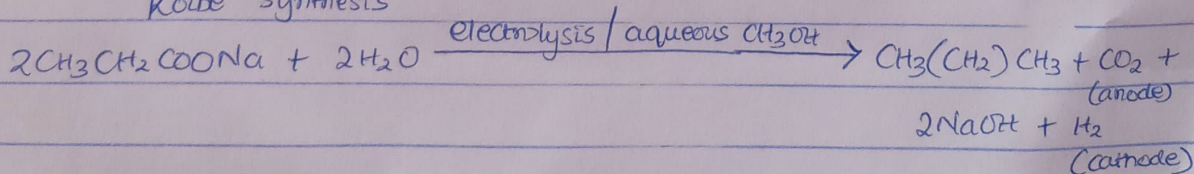
Butanoic acid

Butanol

b) Decarboxylation.



Kolbe Synthesis



c) Esterification-

