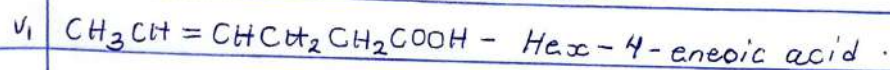
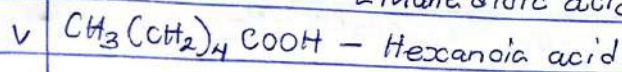
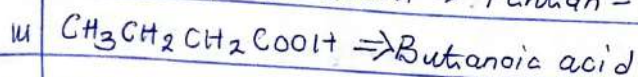
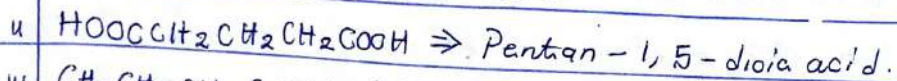


## Assignment 3

1 Give the IUPAC names of the following compounds.



2 Discuss the physical properties of carboxylic acids under the following headings.

i Physical appearance.

A simple aliphatic carboxylic acids up to  $\text{C}_{10}$  are liquids at room temperature. Most others are solids at room temperature. Anhydrous carboxylic acids freeze to an ice-like solid below room temperature.

ii Boiling Points

Boiling points increase with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids have higher melting points than their aliphatic counterparts of comparative molecular mass.

iii Solubility

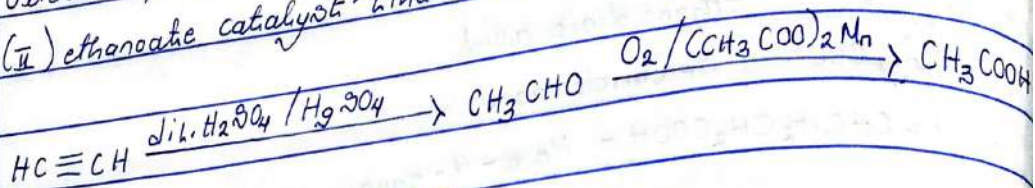
Lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water. The water solubility of the acids decreases as the relative molecular mass increases. All carboxylic acids are soluble in organic solvents.



3 Write 2 industrial preparations of carboxylic acids.

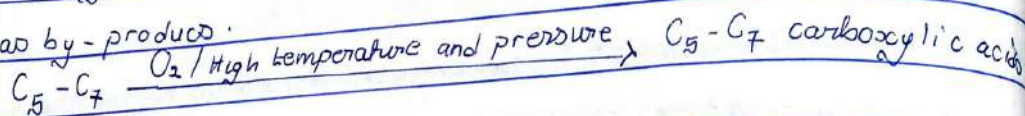
r From Ethanal

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



u From Petroleum

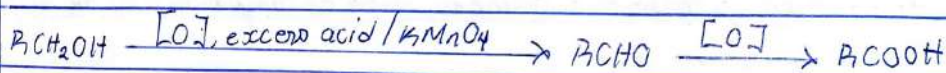
Liquid phase air oxidation of  $\text{C}_5 - \text{C}_7$  alkanes, obtained from petroleum at high temperature and pressure will give  $\text{C}_5 - \text{C}_7$  carboxylic acids with methanoic, propanoic and butanedioic acids as by-products.



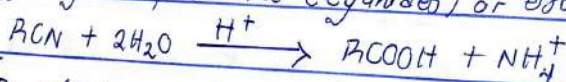
4 Equations / Synthetic Preparations of Carboxylic acids

i Oxidation of primary alcohols and aldehydes

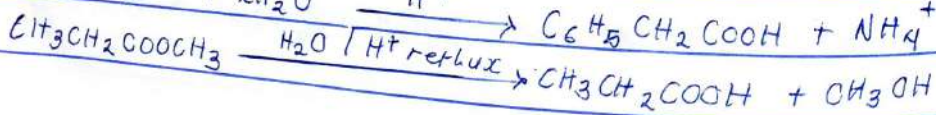
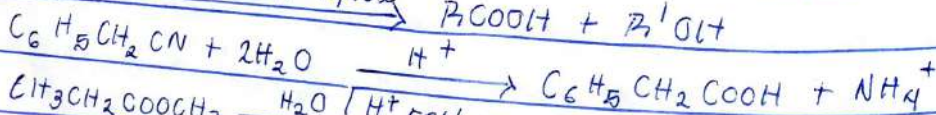
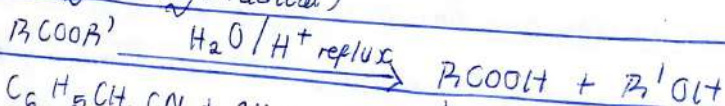
Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents (i.e.  $\text{K}_2\text{Cr}_2\text{O}_7$  or  $\text{KMnO}_4$ ) in acidic solution



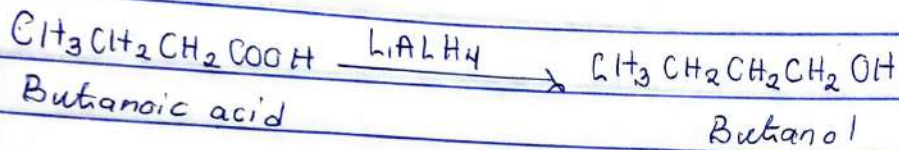
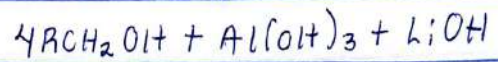
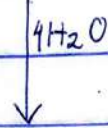
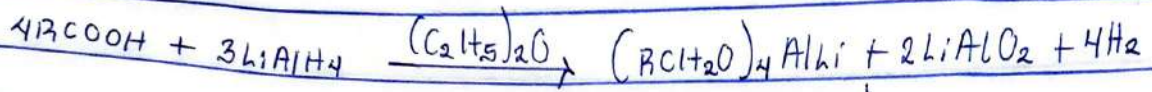
ii Hydrolysis of nitriles (cyanides) or esters



(R = alkyl or aryl radical)



## 5 Reduction

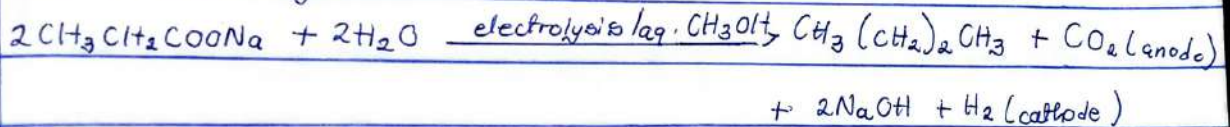


## - Decarboxylation

Thermal decarboxylation



~~via~~ Kolbe synthesis



## - Esterification

