

# Weak Acids

## Elect. Stat

(7/Emy 04/017)

- i.  $\text{HCOOH}$  - Methanoic acid
- ii.  $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$  - Pent-1, 5-dioic acid
- iii.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$  - Butanoic acid
- iv.  $\text{HO}_2\text{C}_2\text{H}_4$  - Ethanedioic acid
- v.  $\text{CH}_3(\text{CH}_2)_4\text{COOH}$  - Hexanoic acid
- vi.  $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$  - Hex-5-enoic acid

2. Physical appearances: All simple aliphatic Carboxylic acid up to  $\text{C}_{10}$  are liquid at room temperature but most Carboxylic acids are solid at room temperature.

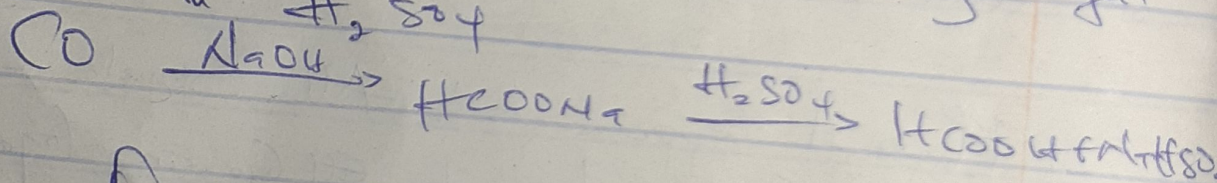
" Boiling point increases with relative molecular mass. Aromatic Carboxylic acid have higher boiling point than aliphatic.

1. Solubility: lower molecular mass Carboxylic acids with up to four carbon atoms in their molecules are soluble in water. largely due to their ability to form hydrogen bonds with water.

## Molecules

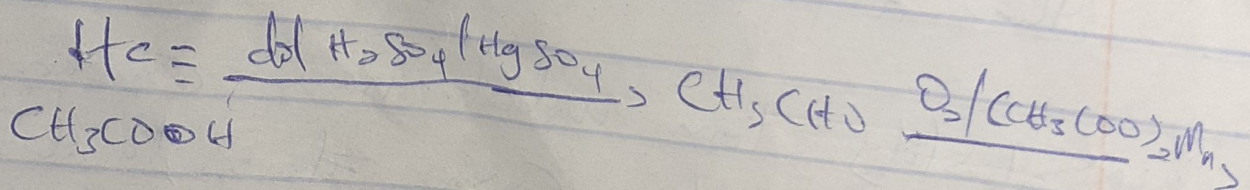
3. From Carbon (II) oxide

Methanoic acid (formic acid) is formed by adding Carbon (II) oxide under pressure to a hot aqueous solution of Sodium hydroxide. The free Carboxylic acid is liberated by careful reaction with  $H_2SO_4$ .



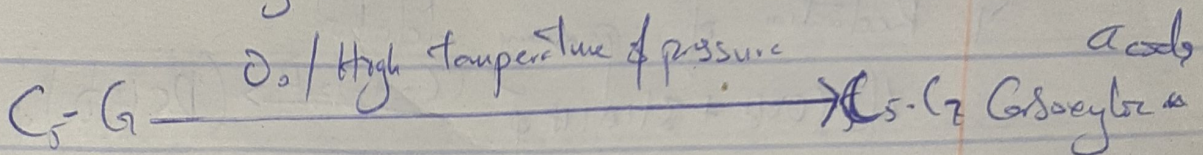
" From ethanol

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



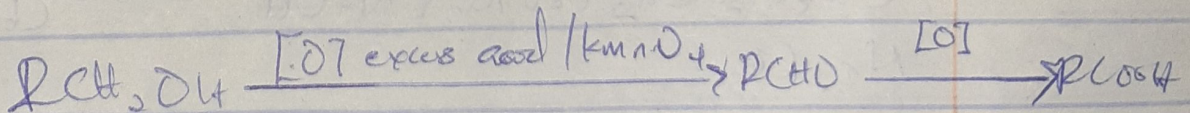
114 From petroleum

by liquid phase air oxidation of C<sub>5</sub>-C<sub>7</sub> alkanes, & ~~obtainable~~ obtainable from petroleum at high temperature and pressure will give C<sub>5</sub>-C<sub>7</sub> carboxylic acids with methanol, propanol and butanol as by product



4. Oxidation of primary alcohols to aldehydes

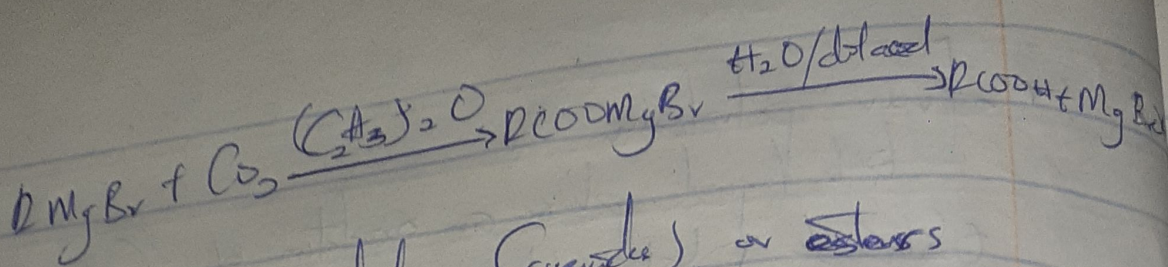
Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents (i.e. K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> or KMnO<sub>4</sub>) in acidic solution



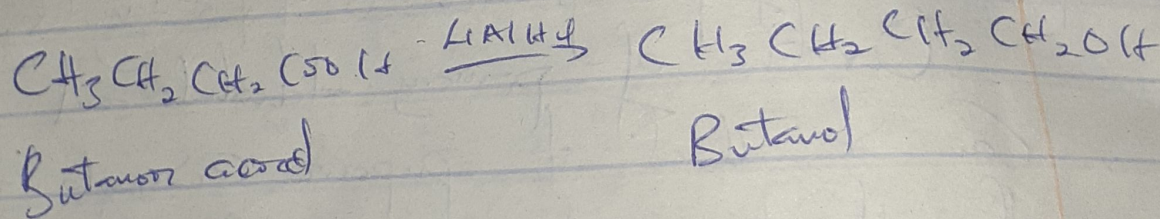
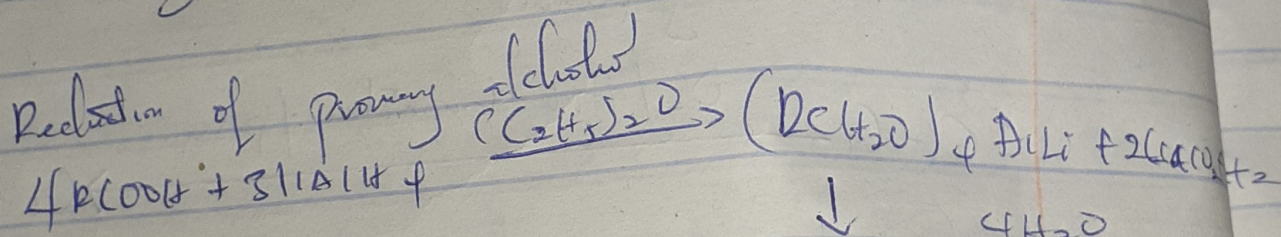
11. Carboxylation of Grignard reagent

Aliphatic Carboxylic acids are obtained by Substituting Carbon

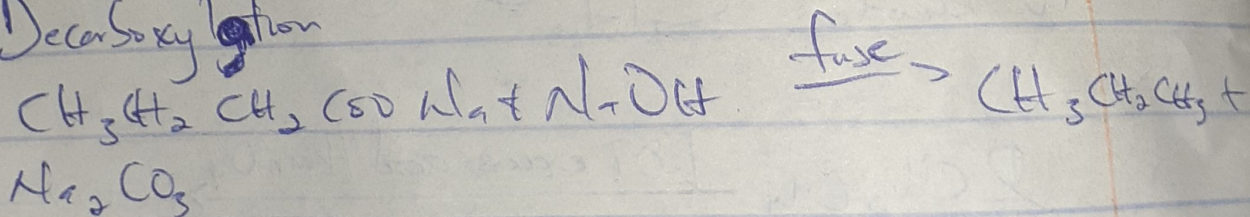
(1) reacts with the Grignard reagent and then by hydrolyzed with dilute acid



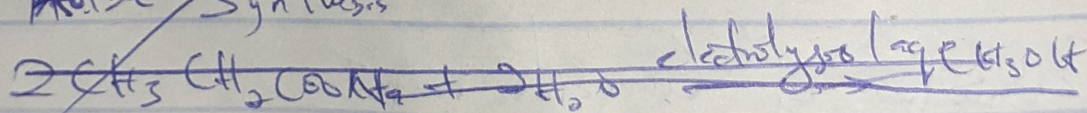
Hydrolysis of nitriles (cyanides) or esters  
 $\text{RCN} + 2\text{H}_2\text{O} \xrightarrow{\text{H}^+} \text{RCOOH} + \text{NH}_4^+$   
 R = aryl or alkyl radical



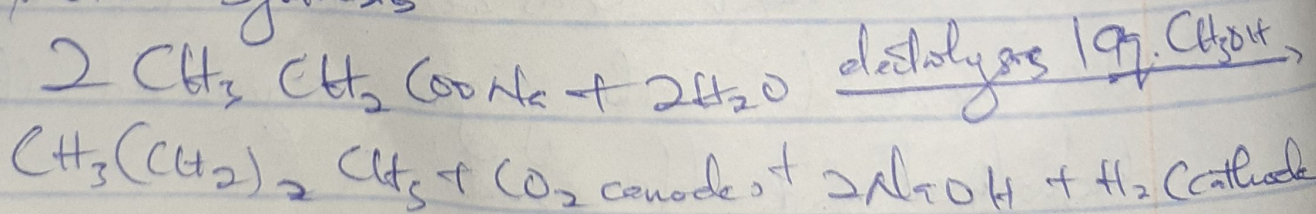
### Decarboxylation



### ~~Kolbe Synthesis~~



### Kolbe Synthesis



~~Estenfor~~ Estenforation

