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 Course: CHM102

Assignment

- 1) $\text{HCOOH} \rightarrow$ methanoic acid
- $\text{HOOCCH}_2(\text{CH}_2)_3\text{COOH} \rightarrow$ pentan-1,5-dioic acid
- $\text{CH}_3(\text{CH}_2)_3\text{COOH} \rightarrow$ butanoic acid
- $\text{HO}_2\text{C}-\text{CO}_2\text{H} \rightarrow$ ethanedioic acid
- $\text{CH}_3(\text{CH}_2)_4\text{COOH} \rightarrow$ hexanoic acid
- $\text{CH}_3\text{CH}=\text{CHCH}_2(\text{CH}_2)_2\text{COOH} \rightarrow$ hex-4-enoic acid

2) i) Physical Appearance

All simple aliphatic carboxylic acids up to C_{10} are liquids at room temperature. Most others are solid at room temperature.

ii) Boiling points

Their boiling points increases with increasing relative molecular mass.

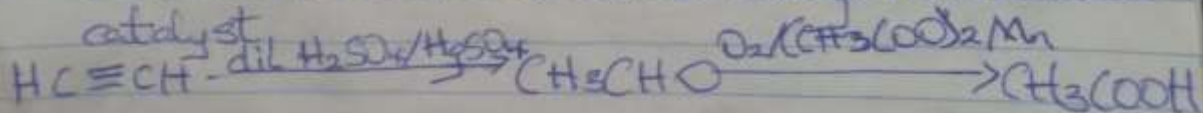
iii) Solubility

Lower molecular mass carboxylic acids with up to four carbon atoms in their molecule are soluble in water. The water solubility of the acids decrease with increase in relative molecular mass. All carboxylic acids are soluble in organic solvent.

3) Industrial Preparations of Carboxylic Acids

i) From Ethanol/Ethanal

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

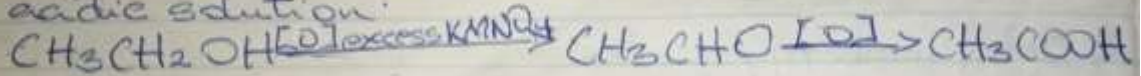


ii) From carbon (II) oxide

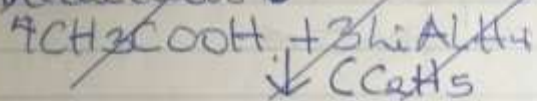
Methanoic acid is manufactured by adding carbon (II) oxide under pressure of hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with H_2SO_4

$$CO + NaOH \rightarrow HCOONa \xrightarrow{H_2SO_4} HCOOH + NaHSO_4$$

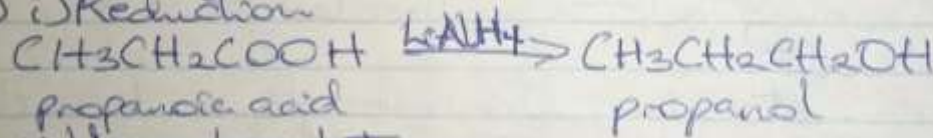
4) Synthetic Preparations of Carboxylic Acid
By Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents in acidic solution.



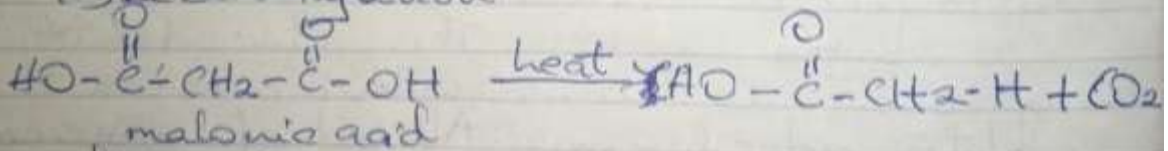
5) Reduction



5) i) Reduction



ii) Decarboxylation



iii) Esterification

