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19/mhsc01/127 m13135

- 1a  $\text{HCOOH}$  - Methanoic acid
- b  $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$  - Pentan-1,5-dioic acid
- c  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$  - Butanoic acid
- d.  $\text{CH}_3(\text{CH}_2)_4\text{COOH}$  - Hexanoic acid
- e  $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$  - Hex-4-eneoic acid

## 2: Physical appearance

All simple aliphatic carboxylic acids up to  $\text{C}_{10}$  are liquid at room temperature. Most other carboxylic acid are solid at room temperature although anhydrous carboxylic acid freezes to an ice like solid below room temperature

## ii Boiling point

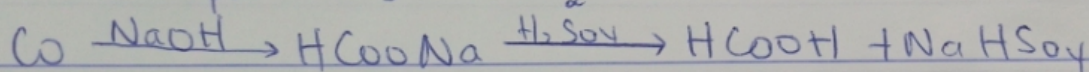
Boiling point increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solid and have higher melting points than their aliphatic counterparts with same molecular mass.

## 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 decrease as the relative molecular mass increase because the structure becomes relatively more hydrocarbon in nature and hence 'covalent'

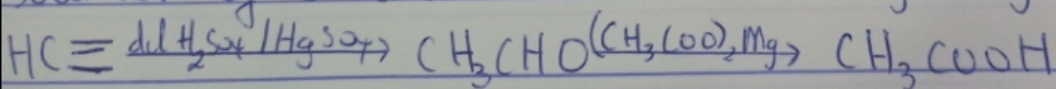
3: From Carbon(II)oxide

CO is added under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by reaction with tetraoxosulphate(VI) acid ( $H_2SO_4$ )



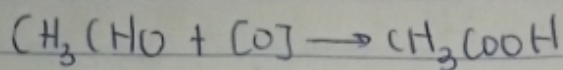
From ethanal:

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



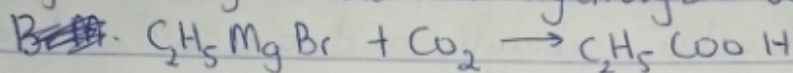
4i Oxidation of primary alcohol and aldehydes.

Oxidation of primary alcohols and aldehyde can be used to prepare carboxylic acids using the usual oxidizing agent in acidic solution

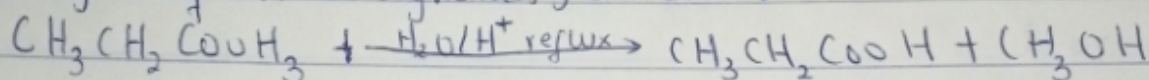


ii Carbonation of Grignard reagent

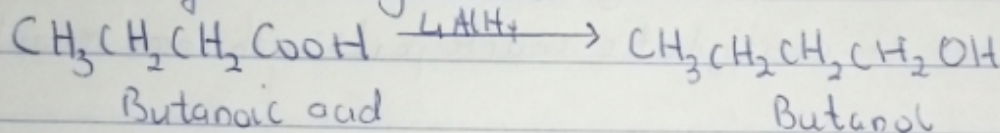
Aliphatic carboxylic are obtained by carbon(IV)oxide into the Grignard reagent and then hydrolyzed with dilute acid.



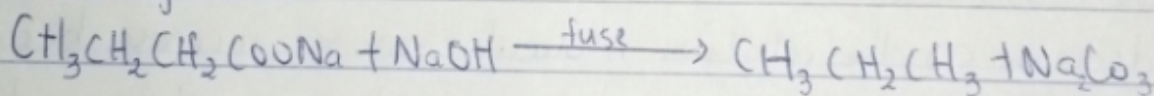
iii Hydrolysis of nitriles (cyanides) or esters.



5i Reduction of carboxylic acid



ii Decarboxylation



iii Esterification

