

ERADAJAYE VICTOR MUDIAGA

19/MHS01/156

CHM 103 Assignment

1  $\text{HCOOH}$  - Methanoic acid

$\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$  - Pentan-1,5-dioic acid

$\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$  - Butanoic acid

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

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

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

2. Physical appearance

All simple aliphatic carboxylic acid up to  $\text{C}_{10}$  are liquids at room temperature although ~~anhydrous~~ ~~carboxylic~~ most other carboxylic acids are solid at room temp although anhydrous carboxylic acid (acetic acid) also known as glacial ethanoic acid freezes to a ~~ice-like~~ solid below room temperature

Boiling points

Boiling point 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

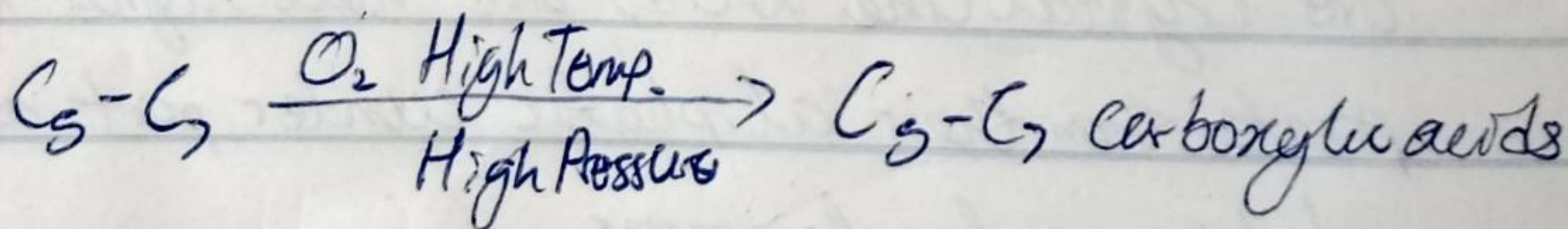
Lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water, this is largely due to their ability to form hydrogen bonds with water molecules. The water solubility of acids decreases as the relative molecular mass increases because the structure becomes relatively more hydrocarbon in nature and hence covalent. All carboxylic acids are soluble in

Organic solvents

## Industrial Preparation

### Ba From Petroleum

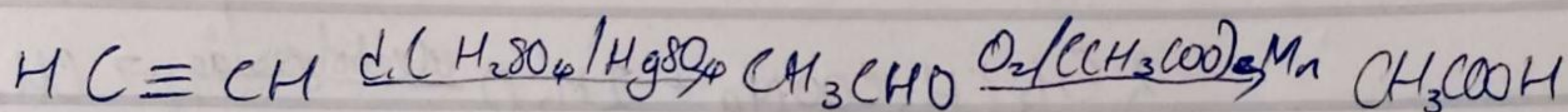
Liquid phase air oxidation of  $C_5-C_7$  alkanes, obtainable from petroleum at high temperatures and pressures will give  $C_5-C_7$  carboxylic acids with methanoic, propanoic and butanedioic acids as by products



b From ethanol

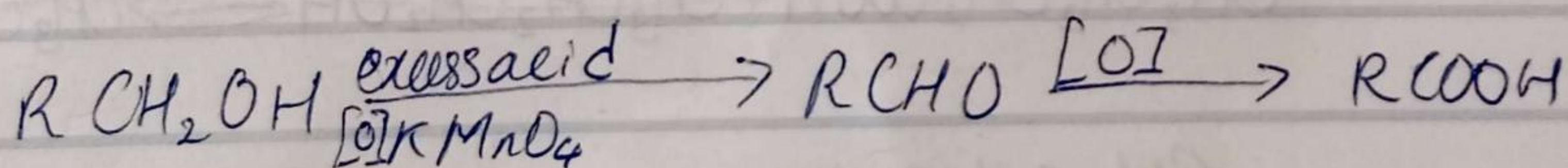
Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanol to ethanoic acid using Manganite (II) ethanoate catalyst.

Ethanal itself is obtained from ethylene

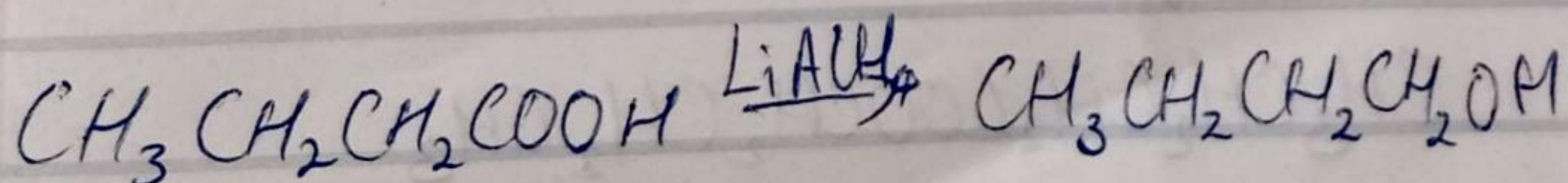


4 Synthetic preparation

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



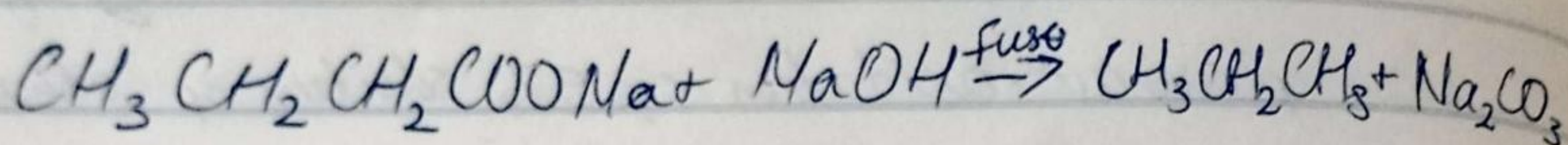
5 Reduction of Carboxylic acid to Primary alcohol



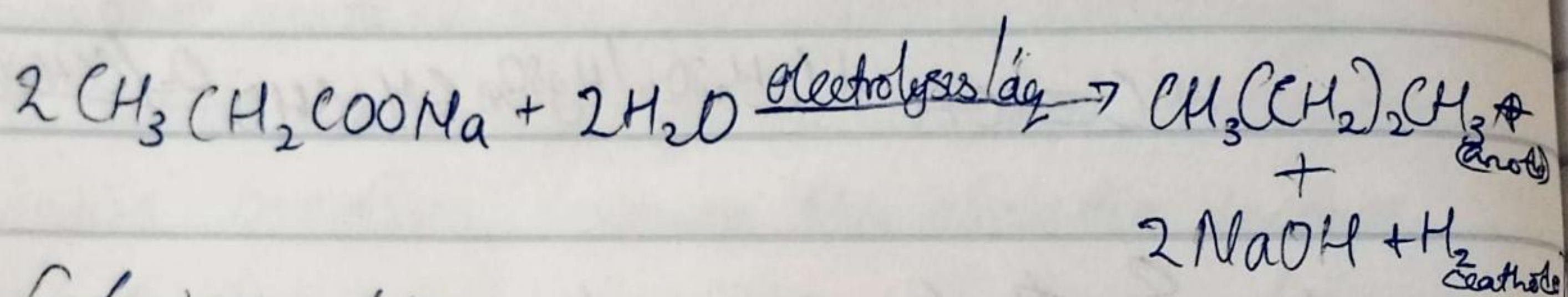
Butanoic acid

Butanol

## b Decarboxylation of Carboxylic acid



## Kolbe synthesis



## c Esterification

In the presence of strong acid catalyst, carboxylic acids react with alcohols to form esters

