

3) Ethylene oxide is used as a gaseous sterilizing agent.

NAME: ODEWALE DEBORAH AYODELE

MATRIC NO: 19/MHS01/277

DEPARTMENT: M.B.B.S

COURSE: CHM 102

ASSIGNMENT ON CARBOXYLIC ACID

QUESTION

Q) Give the IUPAC names of the following compounds.

a) HCOOH \rightarrow Methanoic acid

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

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

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

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

Q) Discuss briefly the physical properties of carboxylic acids under the following headings.

i. Physical Appearance

All simple aliphatic carboxylic acids up to C_{10} are liquids at room temperature. Most of the other carboxylic acids are solid at room temperature although anhydrous carboxylic acid (acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

(i) Boiling Points

Boiling point increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher ^{melting} boiling points than their aliphatic counterparts of comparable relative molecular mass.

(ii) Solubility

Lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water; this largely due to their ability to form hydrogen bonds with water molecules. The water solubility of the 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.

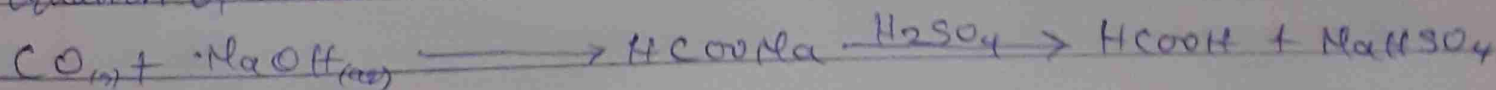
(3) Write two industrial preparations of Carboxylic acids.

i) From Carbon (II) oxide

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

(VI) acid (H_2SO_4)

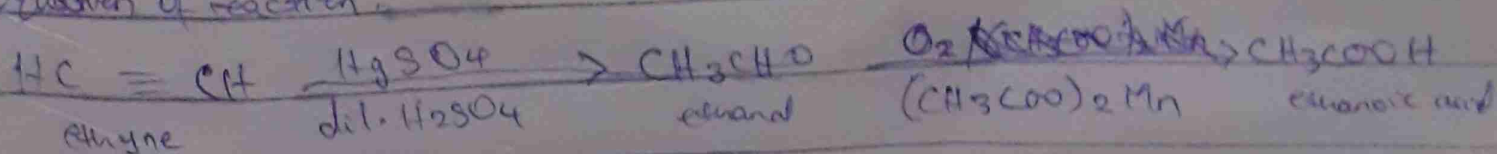
Equation of reaction.



ii) From Ethanal

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

Equation of reaction.

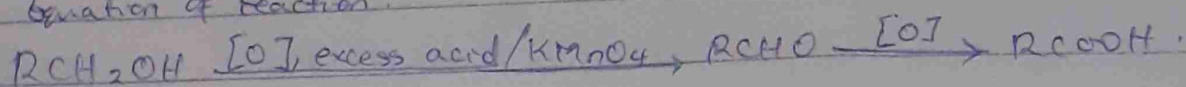


④ Write equations and brief explanation discuss the synthetic preparation of carboxylic acid

→ Oxidation of primary alcohols and aldehydes

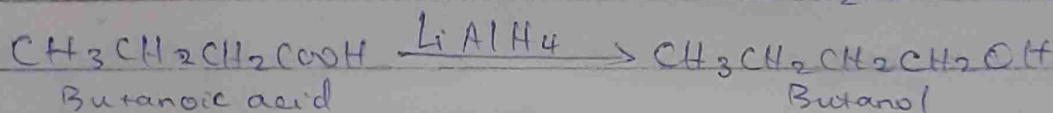
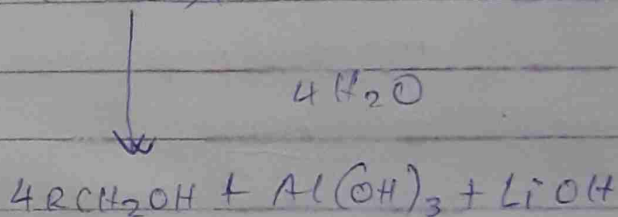
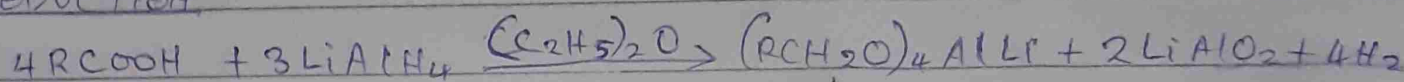
Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents (i.e. $K_2Cr_2O_7$ or $KMnO_4$) in acidic solution.

Equation of reaction.

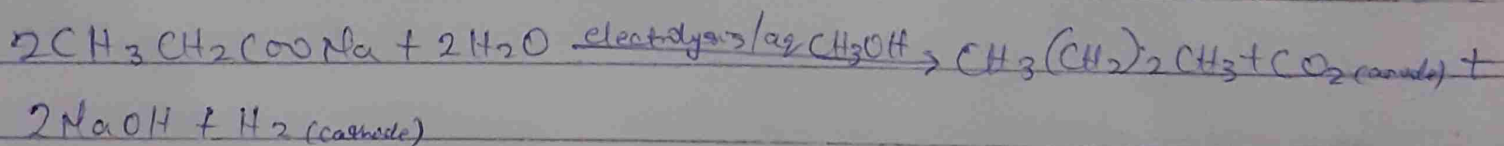
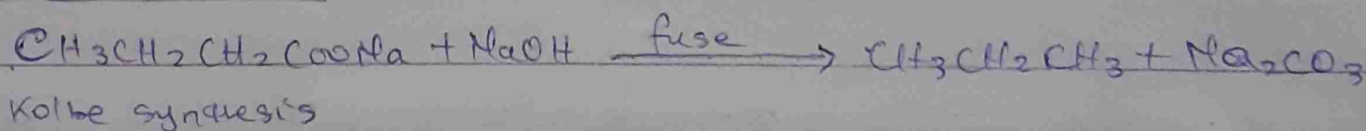


⑤ Write chemical equation only, outline the reduction, decarboxylation and esterification of carboxylic acid.

REDUCTION



→ DECARBOXYLATION



→ ESTERIFICATION

