

Name: D Sealitka Miracle

Matric no 191ENG021057

Department: Computer Engineering | Course: CHM 102

Assignment

1) The IUPAC name of the following

a. $\text{HCOOH} \longrightarrow$ Methanoic acid

b. $\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH} \longrightarrow$ Butanoic acid

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

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

e. $\text{CH}_3(\text{CH}_2)_4\text{COOH} \longrightarrow$ Hexanoic acid

f. $\text{CH}_2=\text{CH}-\text{CH}_2\text{CH}_2\text{COOH} \longrightarrow$ Hex-4-enoic acid

2) Properties of carboxylic acids.

i) Physical appearances: All simple ~~aliphatic~~ ^{aliphatic} acids up to C_{10} are liquids at room temperature. Most 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.

ii) Boiling points: 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.

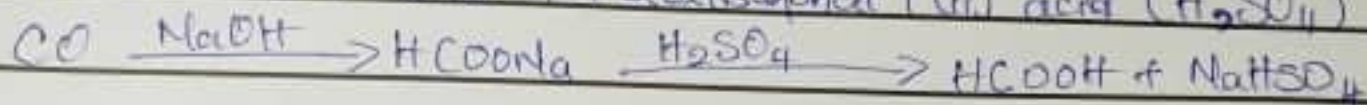
iii) Solubility: Lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water; this largely due to their ability to form hydrogen bonds with water molecules. The water solubility of the acids decreases as the relative molecular mass increases because the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

soluble in organic solvents. 191676021057

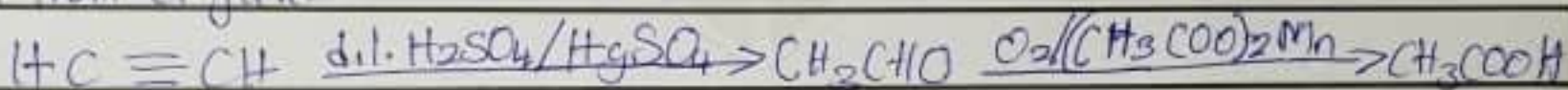
3) Industrial preparation of carboxylic acids.

i) From carbon(II) oxide.

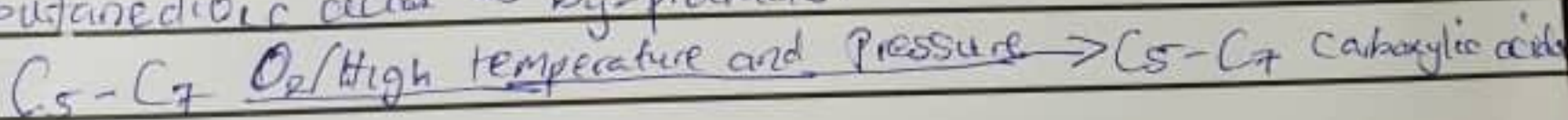
Methanoic acid (formic acid) is manufactured by adding carbon(II) oxide under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetraoxosulphur(VI) acid (H_2SO_4)



ii) 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.

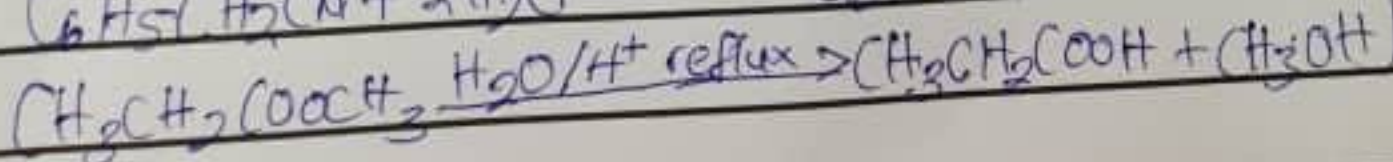
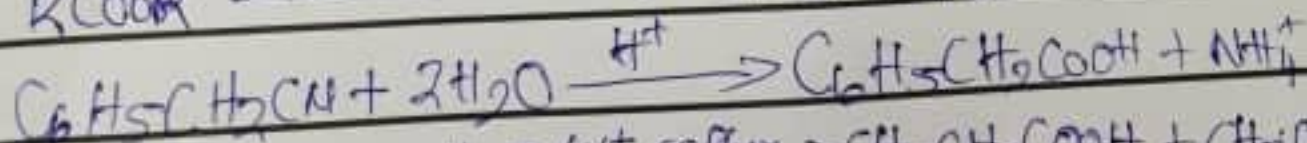
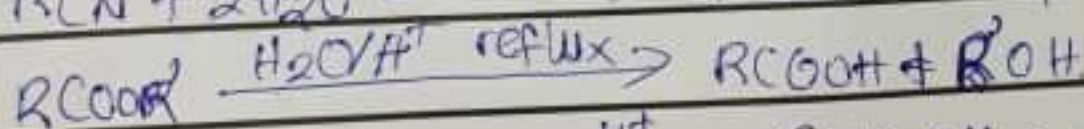
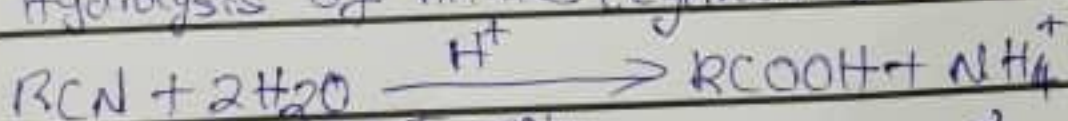


iii) From petroleum: Liquid phase air oxidation of C_5-C_7 alkanes, obtainable from petroleum at high temperature and pressure will give C_5-C_7 carboxylic acids with methanoic, propanoic and butanedioic acid as by-products.



4) Synthetic preparation of carboxylic acid

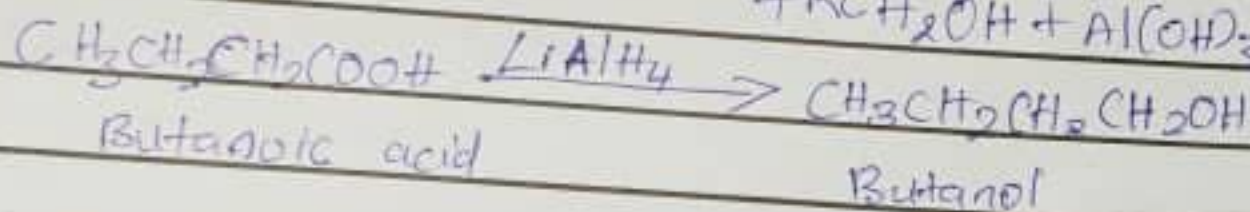
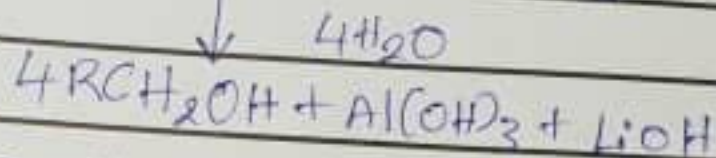
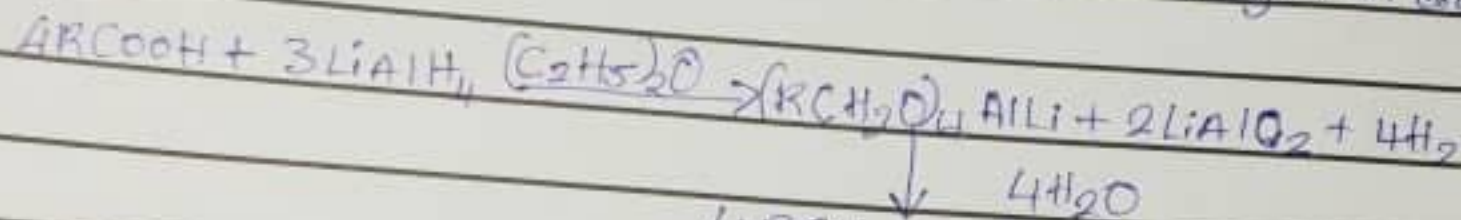
Hydrolysis of nitriles (cyanides) or esters.



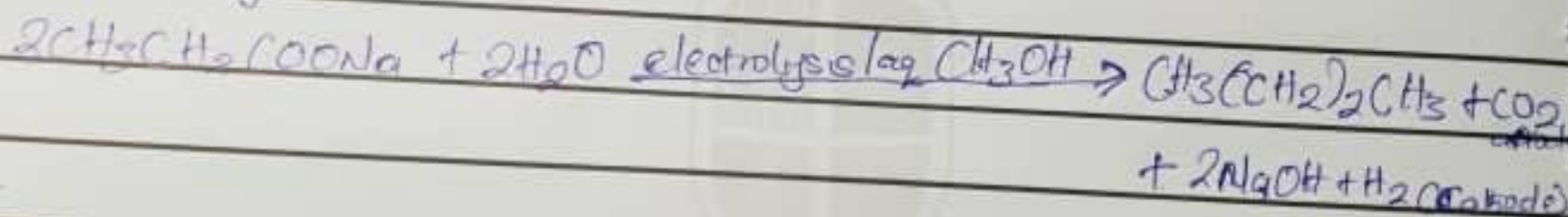
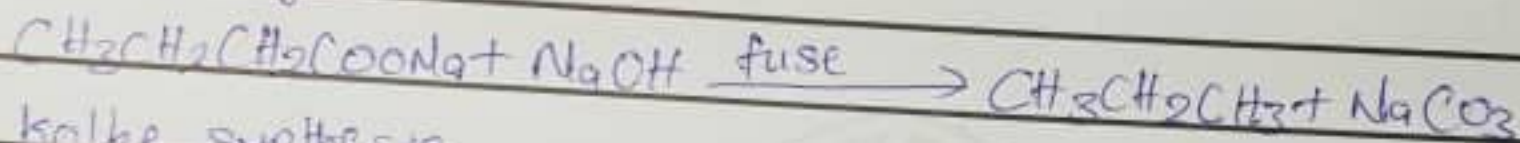
(R = alkyl or aryl radical)

② Write chemical equation outline reduction, decarboxylation and esterification
 19/05/2021/057

i) Reduction



ii) Decarboxylation



iii) Esterification

