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MATRIC NO: 19/MH501/384

DEPARTMENT: MBBS

COLLEGE: MHS

1. GIVE THE IUPAC NAMES OF THE FOLLOWING COMPOUNDS

- i.  $\text{HCOOH}$  - Methanoic acid
- ii.  $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$  - Pentan-1,5-dioic acid
- iii.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$  - Butanoic acid
- iv.  $\text{HO}_2\text{C}-\text{CO}_2\text{H}$  - Ethanedioic acid
- v.  $\text{CH}_3(\text{CH}_2)_4\text{COOH}$  - Hexanoic acid
- vi.  $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$

2. Discuss briefly the physical properties of Carboxylic acid under the following headings.

1. PHYSICAL APPEARANCE:

All simple aliphatic Carboxylic acids up to  $\text{C}_6$  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.

## (i) Boiling Point:

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.

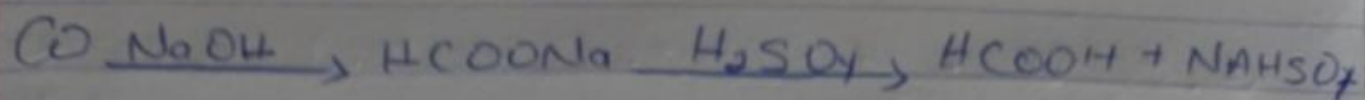
## (ii) SOLUBILITY:

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 ~~at~~ soluble in organic solvents.

3 Write two industrial preparations of Carboxylic Acids.

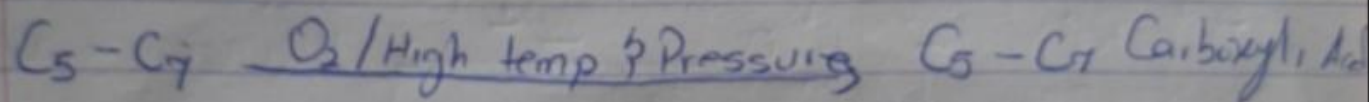
### 1. FROM CARBON(II) OXIDE:

Methanoic acid (formic acid) is manufactured by adding Carbon(II) Oxide under pressure to hot aqueous solution to sodium hydroxide. The free carboxylic acid is liberated by careful reactions with tetraoxosulphate(VI) acid ( $H_2SO_4$ )



### (ii) FROM PETROLEUM:

Liquid Phase Air Oxidation of  $\text{C}_5$ - $\text{C}_7$  alkanes, obtainable from Petroleum at high temperature and Pressure will give  $\text{C}_5$ - $\text{C}_7$  carboxylic acids with methanoic, propanoic acid, butanoic acid as by-products



4 With Equations and brief explanation discuss the synthetic Preparation of Carboxylic acid

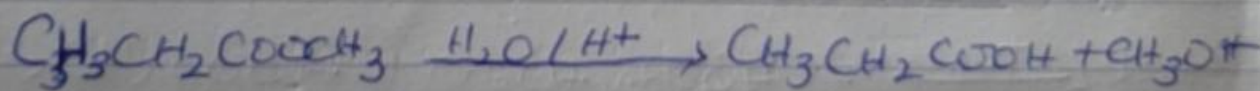
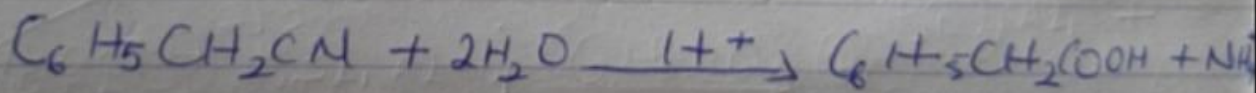
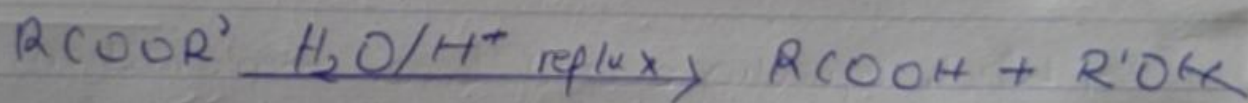
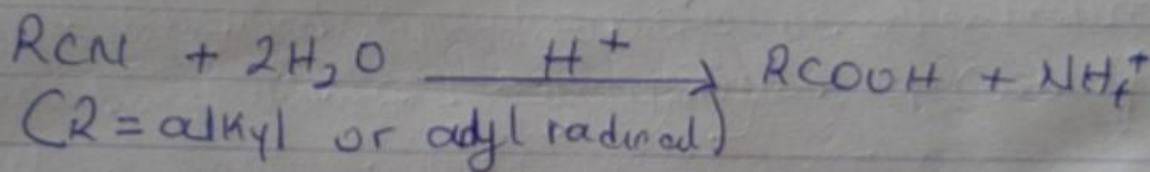
### (ii) OXIDATION OF PRIMARY ALCOHOLS AND ALDEHYDES:

The oxidation of Primary alcohols is a common method for the synthesis of Carboxylic acids. Using the usual oxidizing agents (i.e.  $\text{K}_2\text{Cr}_2\text{O}_7$  or  $\text{KMnO}_4$ ) in acidic solutions



## (a) HYDROLYSIS OF NITRILES (CYANIDES) OR ESTERS

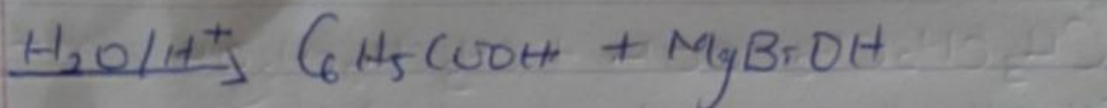
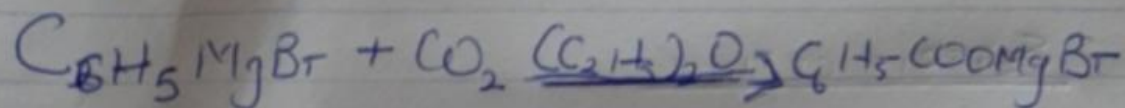
All acid derivatives can be hydrolyzed to yield Carboxylic acids; the conditions required range from mild to severe, depending on the compound involved. Nitriles undergo hydrolysis to form amides. The amides further undergo a reaction in the presence of a catalyst which then to form Carboxylic acids. The catalyst for this reaction is  $H^+$  or  $OH^-$ .



## 3. Carboxylation of Grignard agent:

The Carboxylic acid formation is possible by Grignard reagent's reaction. The reaction of Grignard reagent with crushed dry ice or solid carbon dioxide leads to the formation of salts of Carboxylic acids. Further, the acidification of the salts of a Carboxylic acid with mineral

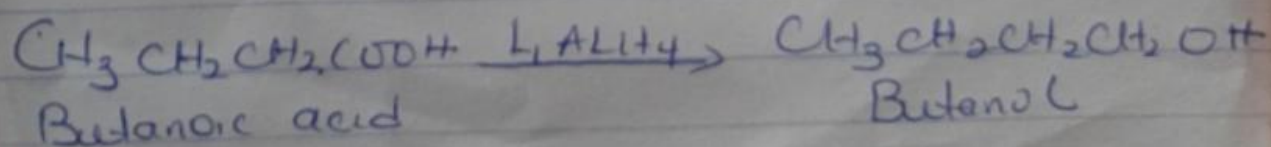
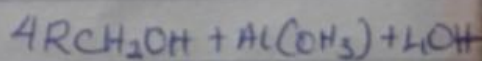
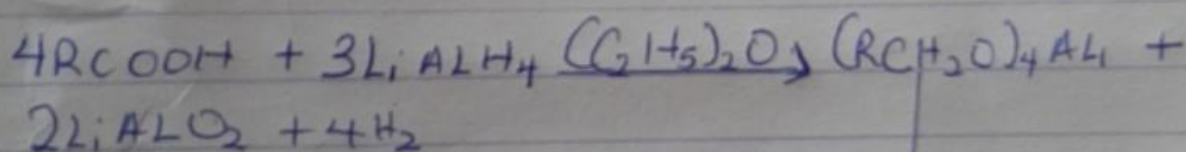
acids leads to the formation of corresponding  
Carboxylic acid



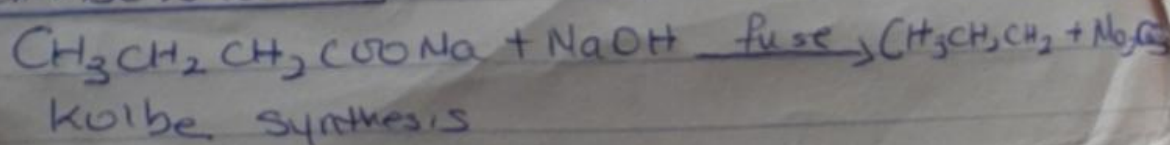
5. With chemical equation outline, the reduction,  
decarboxylation and esterification of Carboxylic  
acid

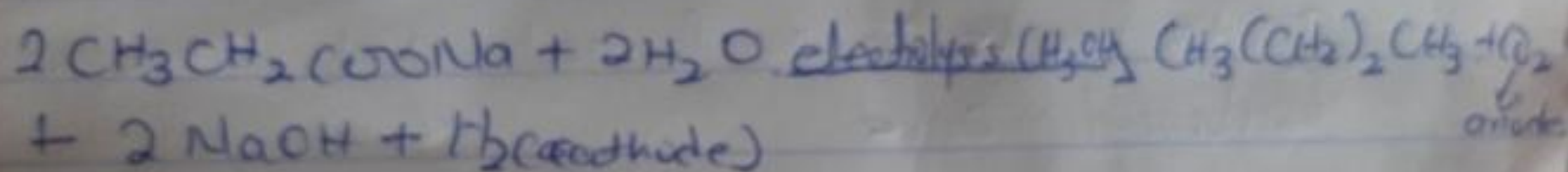
ANSWER

### REDUCTION



### DECARBOXYLATION





### ESTERIFICATION

