

## CHM102(assignment)

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MATRICULATION NUMBER- 19/MHS09/025

DEPARTMENT- DENTISTRY

COLLEGE- MHS

COURSE- CHM102

1.

- HCOOH

Methanoic acid

- HOOCCH<sub>2</sub>CH<sub>2</sub>COOH

Butan-1,4-dioic acid

- CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>COOH

Butanoic acid

- HO<sub>2</sub>CCO<sub>2</sub>H

Ethan-1,2-dioic acid

- CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>COOH

Hexanoic acid

- CH<sub>3</sub>CH=CHCH<sub>2</sub>CH<sub>2</sub>COOH

Hex-2-ene-6-oic acid

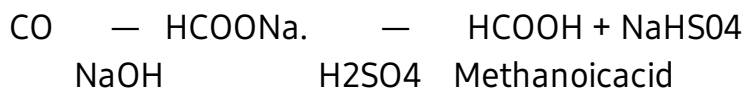
2.

- Physical appearances: All simple aliphatic carboxylic acids up to C<sub>10</sub> are liquids at room temperature. Most other carboxylic acids are solid at room temperature although anhydrous carboxylic acid (acetic acid) also known as glacial ethanol acid freezes to an ice-like solid below the 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 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 the acids decreases as the relative molecular mass increases because the structure becomes relatively more hydrocarbon in nature and hence more covalent. All carboxylic acids are soluble in organic solvents.

### 3. INDUSTRIAL PREPARATIONS OF CARBOXYLIC ACID

- From Carbon(II) oxide

Methanoic acid (formic acid) is manufactured by adding carbon(II) oxide under pressure to a hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetraoxosulphate (VI) acid (H<sub>2</sub>SO<sub>4</sub>).



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



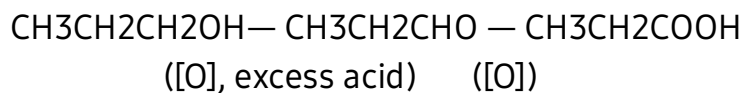
(Dil. H<sub>2</sub>SO<sub>4</sub>/HgSO<sub>4</sub>) (O<sub>2</sub>) (ethanoic acid)

- From petroleum: Liquid phase air oxidation of C5-C7 alkanes, obtainable from petroleum at high temperature and pressure will give C5-C7 carboxylic acids with methanoic, propanoic and butanedioic acids as by-products. (O<sub>2</sub>/High temp. & pressure)

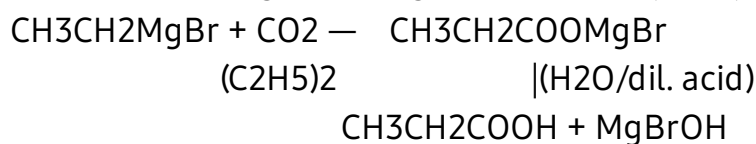
#### 4. SYNTHETIC PREPARATIONS OF CARBOXYLIC

##### ACIDS

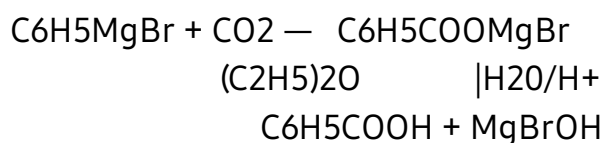
- Oxidation Of Primary Alcohols And Aldehydes: Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents like K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> or KMnO<sub>4</sub> in acidic solution



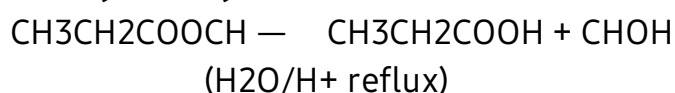
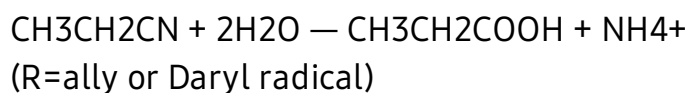
- Carbonation Of Grignard: Aliphatic carboxylic acids are obtained by bubbling carbon (IV) oxide into Grignard reagent and then hydrolysis with dilute acid



In the preparation of benzoic acid, the reagent is added to solid carbon (IV) oxide (dry ice) which also serves as coolant to the reaction mixture.

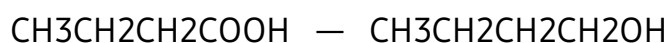
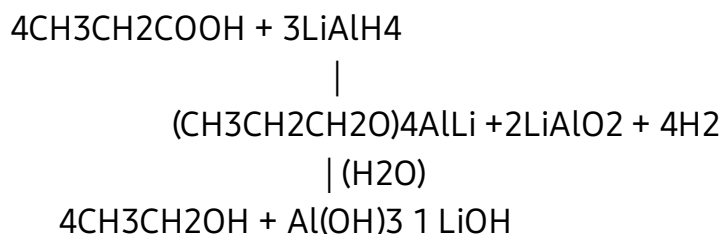


- Hydrolysis Of Nitriles (cyanides) or esters.



5.

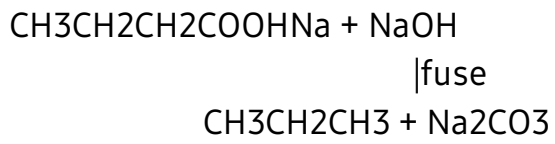
- Reduction of carboxylic acid: Carboxylic acids are very difficult to reduce by catalytic hydrogenation or dissolving metals but lithium tetrahydridoaluminate (III) and diborane form intermediate compounds with the acids which liberate the alcohol on hydrolysis.



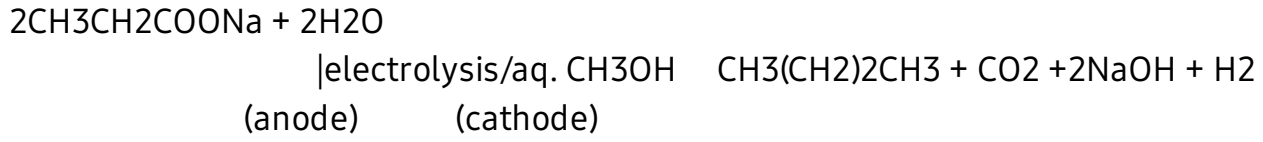
Butanoic acid (LiAlH<sub>4</sub>) Butanol

- Decarboxylation: This involves removal of the carboxyl group from the acid to give a hydrogen or its derivative.

Thermal decarboxylation: Carboxylic acid with strong electron attracting group for example -COOH, -CN, -NO<sub>2</sub>, -C=O decarboxylate readily on heating to 100-150°C while others decarboxylate when their salts are heated with soda lime.



Kobe synthesis



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

