

Ayodeji Mosogbolure Goodness

Computer Engineering

19/ENG 02/006

Chem 102 assignment

1) Give the IUPAC names of the following compounds:

$\text{HCOOH}$  - Methanoic acid

$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$  - Penten-1,5-dioic acid -

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

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

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

$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$  - Hex-4-enenoic acid -

2) Discuss briefly the physical properties of carboxylic acids under the following headings:

i) Physical appearance? Simple aliphatic carboxylic acids up to C<sub>6</sub> are liquids at room temperature, while others except form anhydrous carboxylic acid like acetic acid which freezes to an ice-like solid below room temperature, are solid at room temperature.

ii) Boiling points? The boiling points increase with increasing molecular mass.

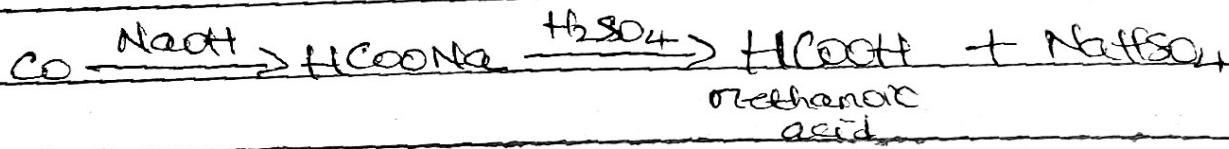
iii) Solubility? Carboxylic acids with up to four carbon atoms in

their molecules are soluble in water due to their ability to form hydrogen bond with water molecules. But as the relative molecular mass increases the water solubility decreases as there is more hydrocarbon in the molecule. All carboxylic acids are soluble in organic solvents.

3) Write two industrial preparations of carboxylic acids.

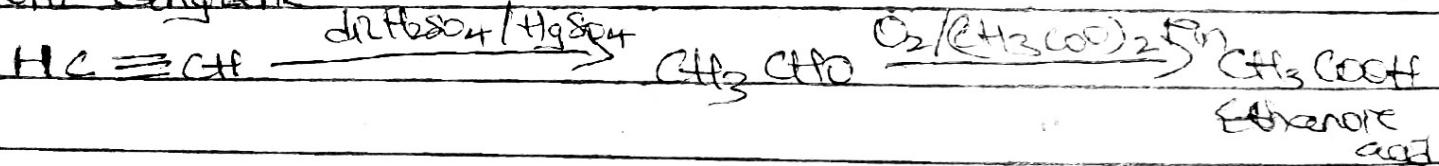
a) From Carbon (IV) oxide:

When Carbon (IV) oxide is added under pressure to hot aqueous solution of sodium hydroxide. It is then carefully reacted with ~~titanium~~ tetrachlorosulphate (VI) acid to yield / liberate Methanecarboxylic acid:



b) From Ethanol:

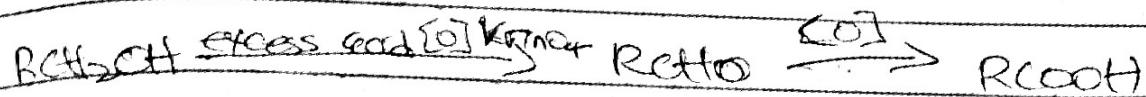
Ethanoic acid is obtained commercially by the liquid phase air oxidation of 5% solution of ethanol to ethanoic acid using manganese (II) ethanoate catalyst. Ethanol itself is obtained from ethylene.



With equations and brief explanation discuss the synthetic preparation of benzoic acid.

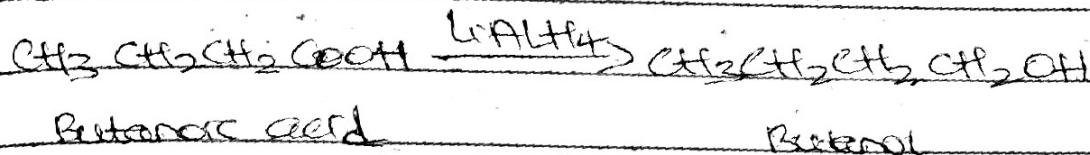
Carboxylic acids can also be synthesized by oxidation of primary alcohols and aldehydes.

Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using  $K_2Cr_2O_7$  or  $KMnO_4$  in acidic solution.

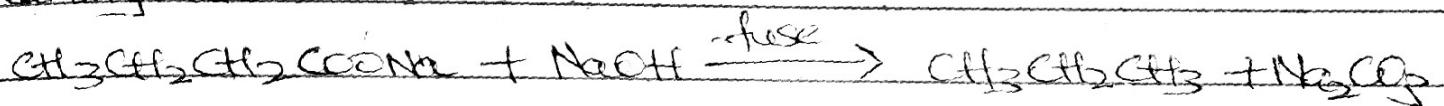


$\rightarrow$  With chemical equation only, outline the reduction, decarboxylation and esterification of carboxylic acid.

Pedestrian



## Decarboxylation



## Constituents

