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Course: CHM 102

Dept: Nursing

Matric no: 19/MHS 02/025

Assignment on Carboxylic Acid.

1. Give the IUPAC name of the following compound.

a) HCOOH - Methanoic acid

b) $\text{HOOC(CH}_2)_3\text{COOH}$ - Pentan-1, 5-

c) $\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$ - Butanoic acid

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

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

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

2) Discuss briefly the physical properties of carboxylic acid under the following;

i) Physical properties: All simple aliphatic carboxylic acid up to C_{10} are liquid at room temperature. Most other carboxylic acid are solid at room temperature although anhydrous carboxylic acid also known as glycol ethanoic acid freezes to an ice like solid below the room temperature.

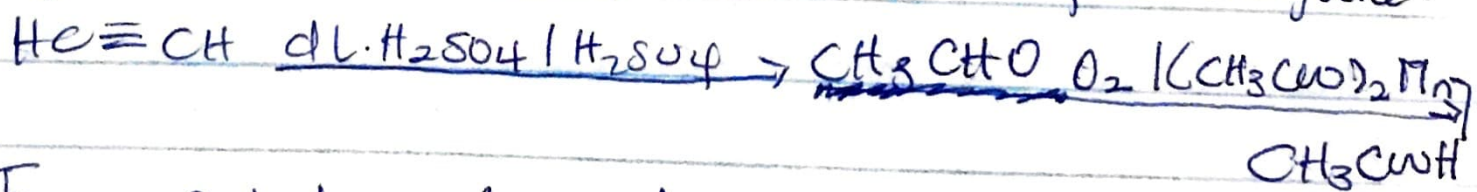
ii) Boiling points: It increases with increasing relative molecular mass. Aromatic carboxylic acid are

Crystallize solid and have higher melting point than their aliphatic counterparts of comparable relative molecular mass.

ii) Solubility: Lower molecular mass carboxylic acid with up to four carbon atoms in their molecules are soluble in water; ^{This is} ~~this~~ largely due to their ability to form hydrogen bonds with water molecules. All carboxylic acid are soluble in organic solvent.

3. Write two Industrial Preparation of carboxylic acid.

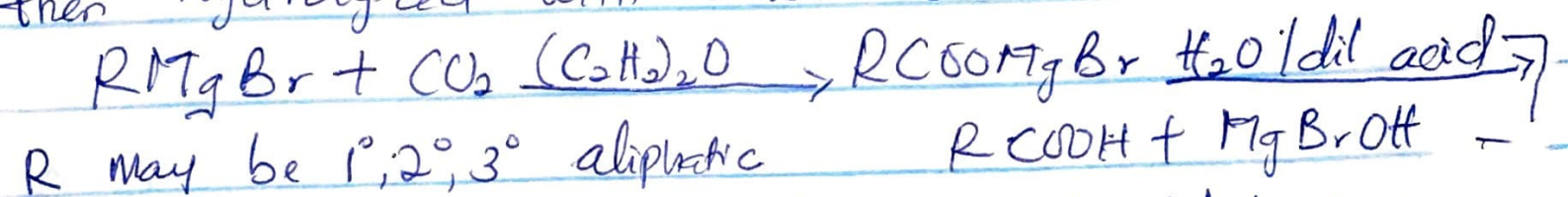
a) From ethanol: Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanol is ethanoic using magnetic (iv) ethanol catalyst. Ethanal itself is obtained from ethylene.



b) From petroleum: Liquid phase air oxidation of C₅-C₂ alkanes, obtainable from petroleum at high temperature and pressure will give C₅-C₂ carboxylic acid with methanoic, propanoic and butanedioic acid as by-products.

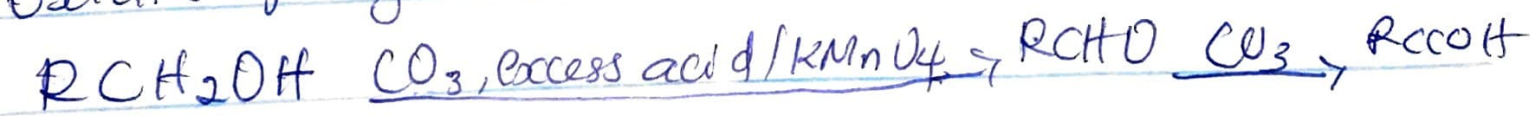
4. → With equation and brief explanation discuss the synthetic preparation of carboxylic acid.

i) Carbonation of Grignard reagent: They are obtained by bubbling carbon dioxide into the Grignard reagent and then hydrolyzed with dilute acid



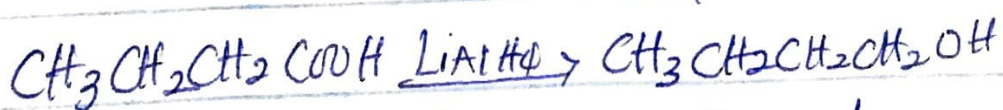
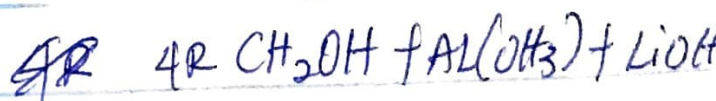
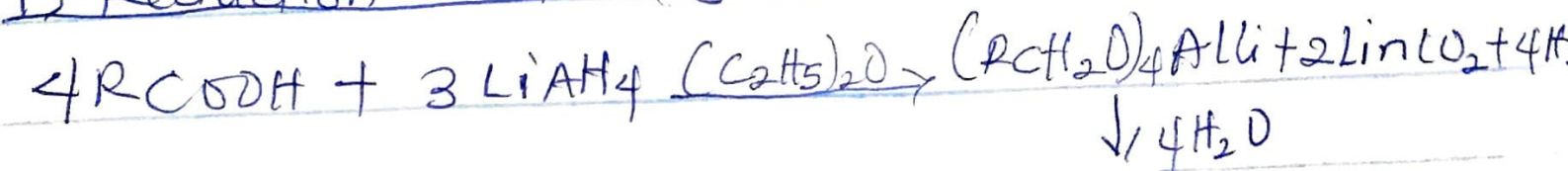
ii) Oxidation of Primary alcohol and aldehydes:

oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the Went oxidizing agents in acidic solution.



5. → With chemical equation only outlined the reaction decarboxylation and esterification of carboxylic acid.

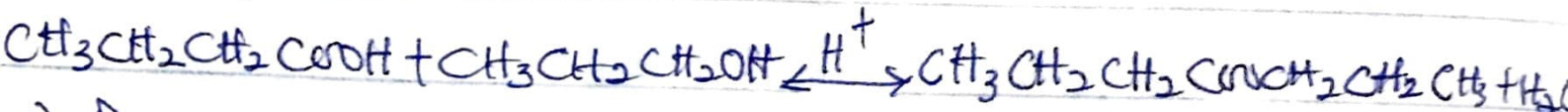
i) Reduction to Primary alcohol:



Butanoic acid.

Butanol

i) Esterification



ii) Decarboxylation

* Thermal decarboxylation.



* Kolbe Synthesis

