

Name: Maduka, Maximilian Peter

Level: L00

Department: Medical Laboratory Science

College: MHS

Course code: Chemistry 102

Assignment Title:

Matric no: 19/MHS06/021

1.) Give the IUPAC names of the following compounds

HCOOH - methanoic acid

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

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

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

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

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

i) Physical appearance: Carboxylic acids from C_1 - C_{10} are liquids at room temperature. Other carboxylic acids are solid at room temperature except anhydrous (carboxylic acid (acetic acid) which freezes to an ice-like solid below room temperature.

ii) Boiling point: Boiling point of carboxylic acid increases with molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting points.

iii) Solubility: Carboxylic acids with up to 4 carbon atoms are soluble in water because they can form hydrogen bonds with water molecules. Its solubility however decreases as the relative molecular mass increases. All carboxylic acids are soluble in organic solvents.

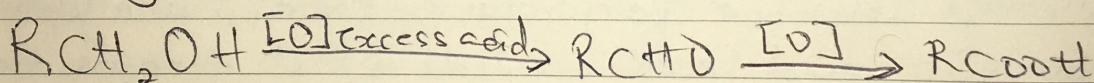
3) Write two industrial preparations of carboxylic acids:

i) From carbon(II) oxide: By methanoic acid is formed by adding carbon(II) oxide under pressure to hot aqueous solution of sodium hydroxide. Methanoic acid is liberated by careful reaction with H_2SO_4 .

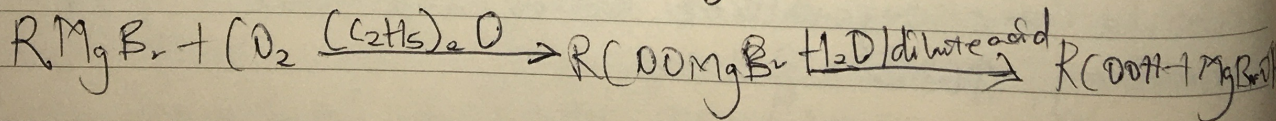
ii) From ethanol: Ethanoic acid is obtained by the liquid phase air-oxidation of 5% solution of ethanol to ethanoic acid using manganese(II) ethanoate catalyst.

4) With equations and brief explanation discuss the synthetic preparation of carboxylic acid.

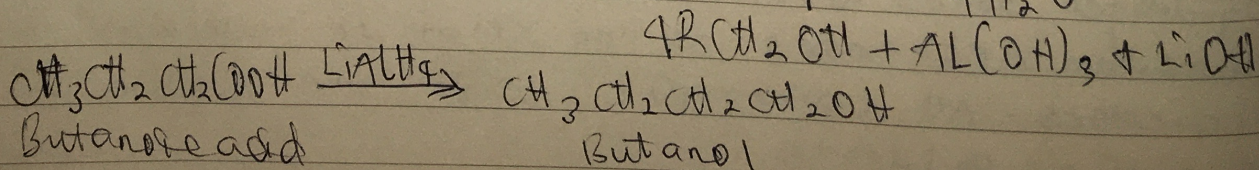
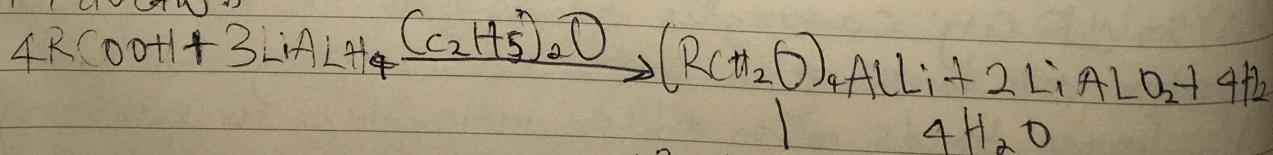
i) Oxidation of primary alcohols and aldehydes: This method can be used to prepare carboxylic acids using the oxidizing agent $K_2Cr_2O_7$ or $KMnO_4$ in acidic solution.



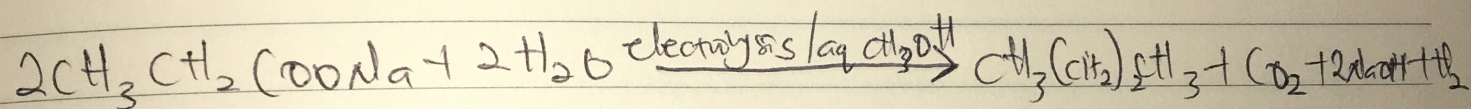
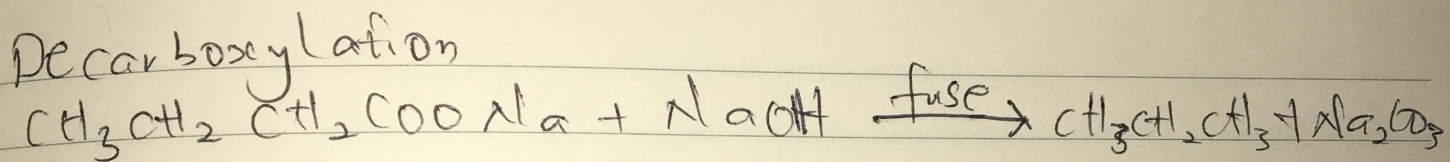
ii) Carbonation of Grignard reagent: Aliphatic carboxylic acids are obtained by carbon(II) oxide into the Grignard reagent and then hydrolyzed with dilute acid.



5) Reduction



Decarboxylation



Esterification

