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DEPARTMENT; AERONAUTICAL ENGINEERING, COURSE: CHM 102 GENERAL
CHEMISTRY II, ASSIGNMENT ON CARBOXYLIC ACID

NAME: OJO-ONI DANIEL OLUWASEGUN DATE 17/04/20
DEPT: AERONAUTICAL ENGINEERING. COURSE: CHM 102
GENERAL CHEMISTRY ASSIGNMENT ON CARBOXYLIC ACIDS
MATRIC No: 19/ENG09/016.

ANSWERS:

1) Give the IUPAC names of the following
Compounds:

Ans:

- a) $\text{HCOOH} \rightarrow$ Methanoic acid.
- b) $\text{HOOCCH}_2\text{CH}_2\text{COOH} \rightarrow$ Pentan-1,5-dioic acid
- c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} \rightarrow$ Butanoic acid.
- d) $\text{HO}_2\text{C}-\text{CO}_2\text{H} \rightarrow$ Ethanedioic acid.
- e) $\text{CH}_3(\text{CH}_2)_4\text{COOH} \rightarrow$ Hexanoic acid.
- f) $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH} \rightarrow$ Hex-4-enoic acid.

2) Discuss briefly the physical properties of
Carboxylic acids under the following heading
physical appearance, Boiling point and solubility.

Ans:

3) Physical appearance: All simple aliphatic
carboxylic acids up to C_{10} are liquids at
room temperature. Most of the carboxylic acid
(acetic acid) also known as glacial ethanoic
acid freezes to an ice-like solid below

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the room temperature.

b) Boiling point: This 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.

c) 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 of the structure being relatively more hydrocarbon in nature and hence covalent. All Carboxylic Acids are soluble in organic solvents.

3) Write two industrial preparation of Carboxylic acids.

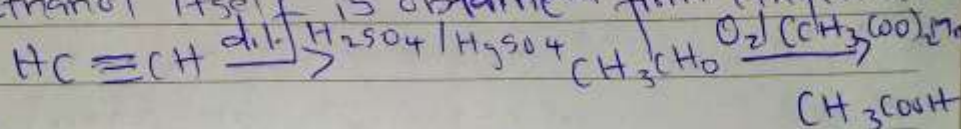
Answer:

a) From ethanol: Ethanoic acid is obtained commercially by the liquid phase air-oxidation.

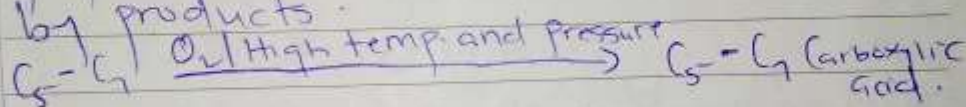
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on of 5% solution of ethanol to ethanoic acid using manganate (II) ethanoate catalyst. Ethanol itself is obtained from ethylene.



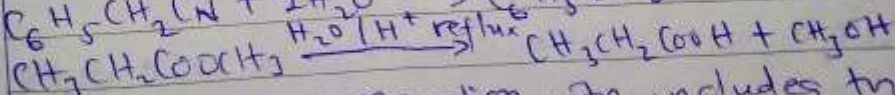
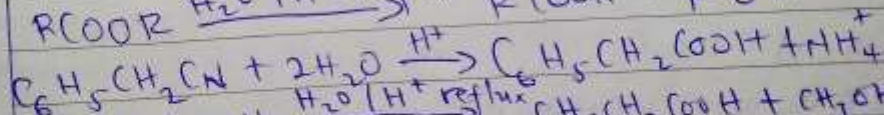
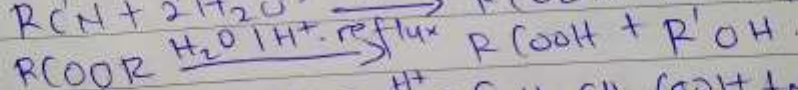
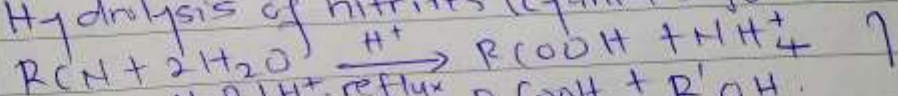
b) From Petroleum: liquid phase air oxidation of $\text{C}_5 - \text{C}_7$ alkanes, obtainable from petroleum at high temperature and pressure will give $\text{C}_5 - \text{C}_7$ carboxylic acid with methanoic, propanoic and butanedioic acids as by products.



a) With equations and brief explanation, discuss the synthetic properties of Carboxylic acid.

Answer

Hydrolysis of nitriles (cyanides) or esters



In the above equation with includes the

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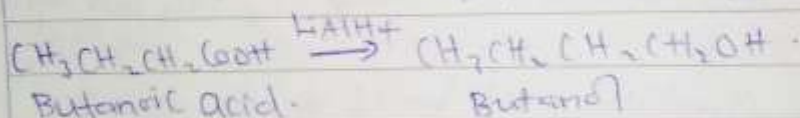
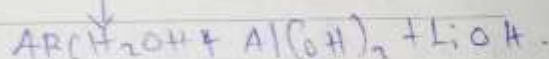
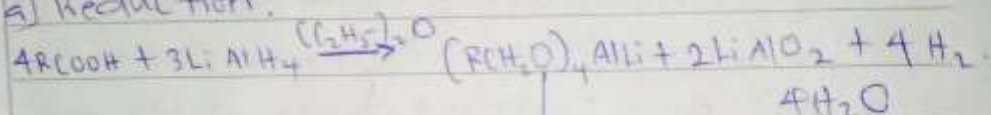
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hydrolysis of nitriles / Goxides, R denotes an alkyl or aryl radical.

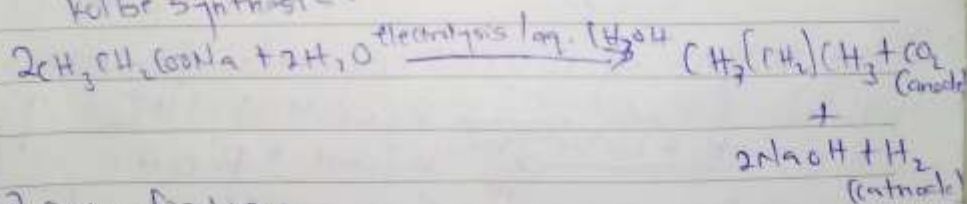
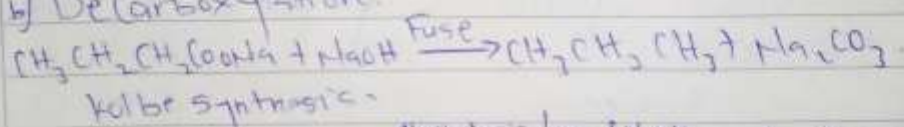
5] With chemical equation only, outline the reduction, decarboxylation and esterification of carboxylic acid.

Answer:

a) Reduction:



b) DeCarboxylation:



c) Esterification:

