

- 1) HCOOH - Methanoic acid
 $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$ - Pentan-4,5-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
 $\text{CH}_3(\text{CH}_2)_4\text{COOH}$ - Hexanoic acid
 $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$ - Hex-4-enoic acid

2) Physical Properties of Alkanoic acid

a) Physical appearances - All simple aliphatic carboxylic acids up to ten carbon atoms are colourless liquids at room temperature. The higher acids are waxy like solids due to their low volatility.

b) Boiling point - As molecular mass increases, boiling point of carboxylic acid also increases. They have much boiling points than their aliphatic counterparts of similar molecular weight.

c) Solubility: Simple aliphatic carboxylic acids having up to four carbon atoms are miscible in water due to the formation of hydrogen bonds with water. The solubility decreases with increasing number of

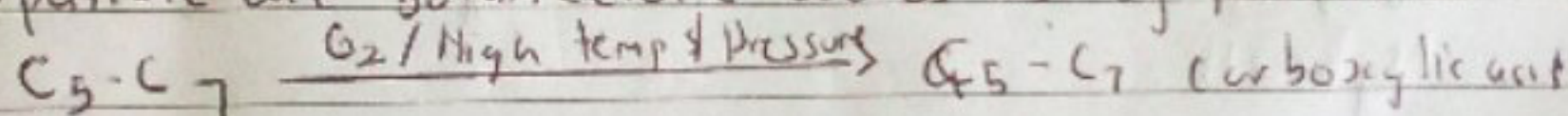
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carbon atoms due to the increased hydrophobic interaction of hydrocarbon part. Carboxylic acids are also soluble in less polar organic solvents. Like benzene, ether, alcohol, chloroform, etc

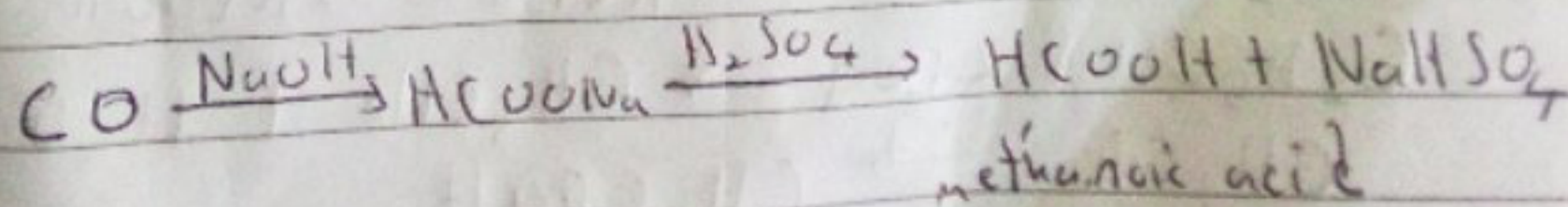
Question Three

1) 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.



2) From carbon(II)oxide - Methanoic acid is manufactured by adding carbon(II)oxide under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetraoxosulphate(VI) acid (H₂SO₄)



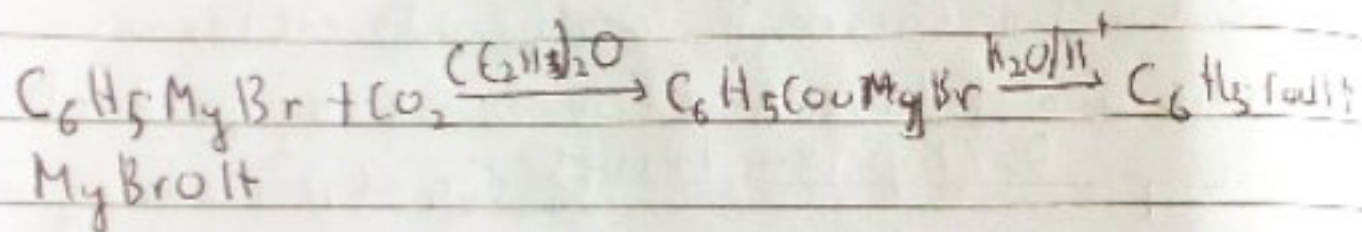
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Question four

Synthetic Preparation of Carboxylic Acid

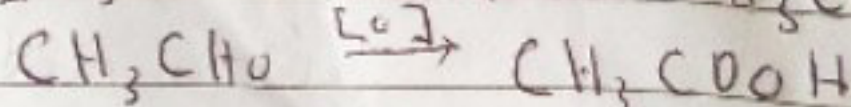
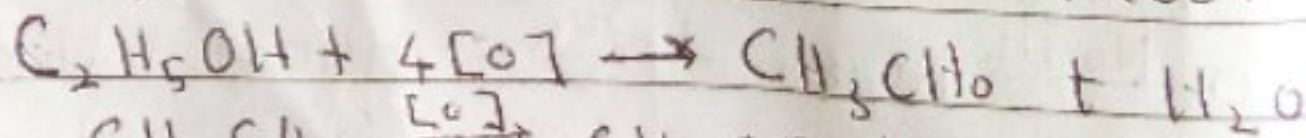
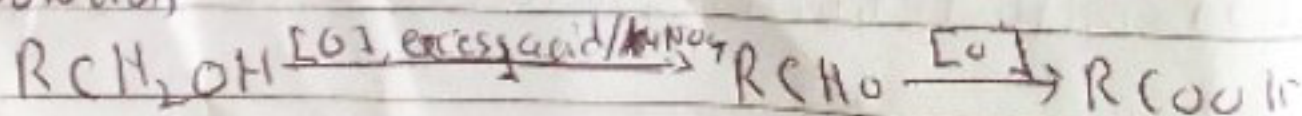
1) Preparation from Grignard Reagents

The reaction of Grignard reagents with crushed dry ice or solid carbondioxide leads to the formation of salts of carboxylic acids. Further, the acidification of the salts of a carboxylic acid with mineral acids leads to the formation of corresponding carboxylic acids.



2) Preparation from oxidation of primary alcohols and aldehydes

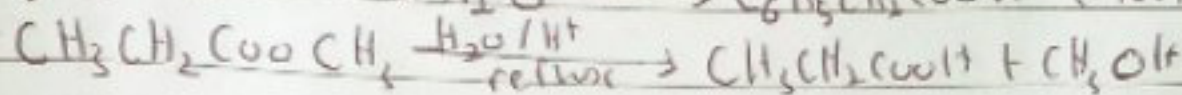
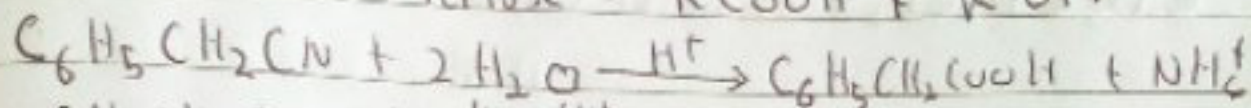
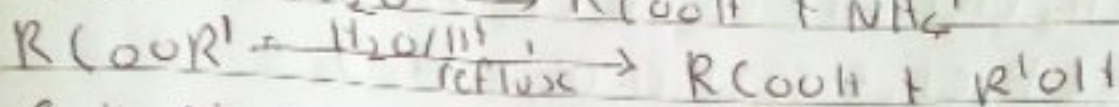
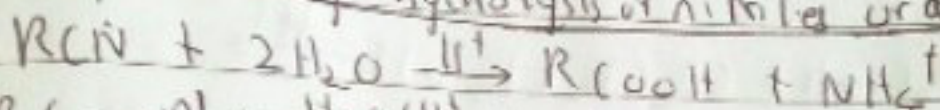
Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents ($\text{K}_2\text{Cr}_2\text{O}_7$ or KMnO_4) in acidic solution.



ethanoic acid.

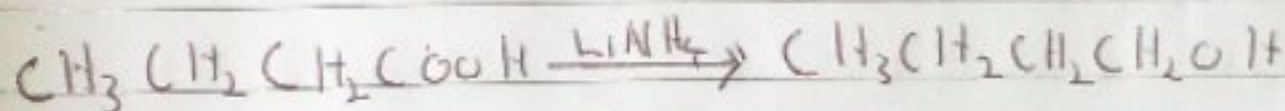
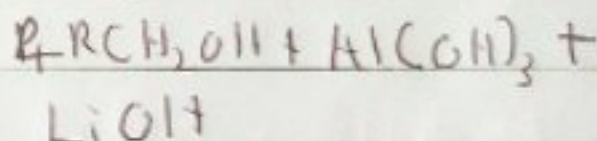
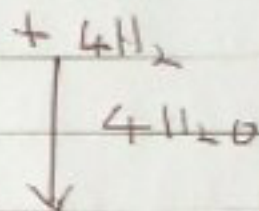
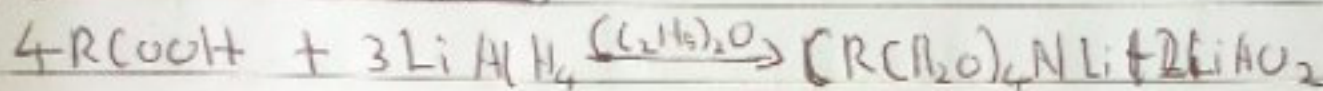
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3) Preparation By hydrolysis of nitriles or esters



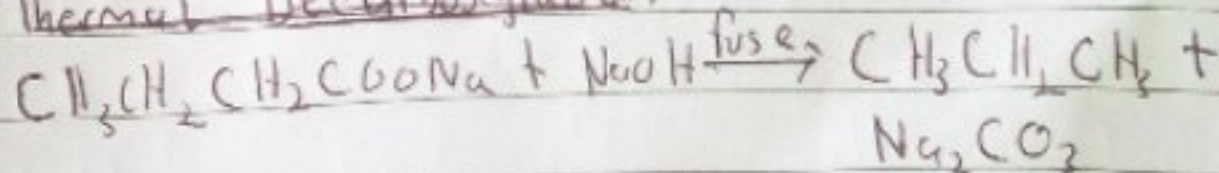
Question Five

1) Reduction Reaction

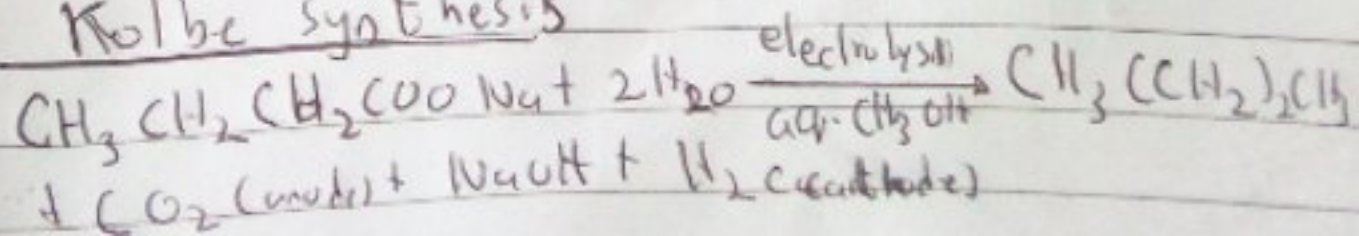


2) Decarboxylation

a) Thermal Decarboxylation

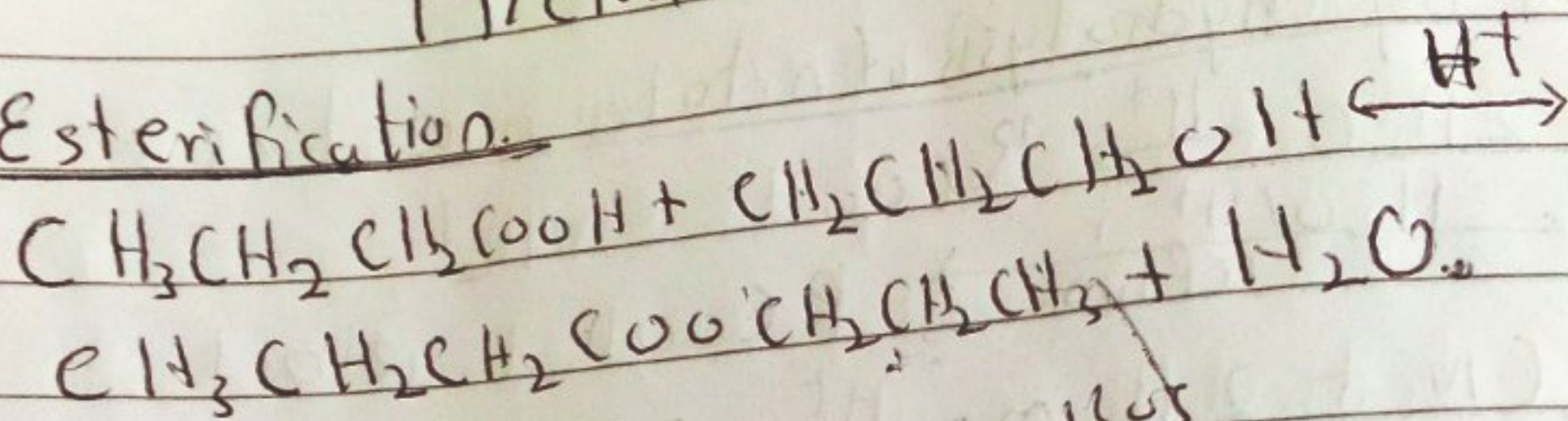


b) Kolbe synthesis



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• Esterification.



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