

3. Various industrial preparations for carboxylic acid

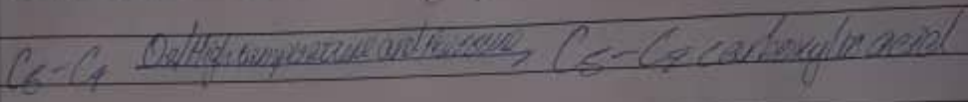
I. From Carbon(II) oxide

Methanoic acid is manufactured by the dissolution of carbon(II) oxide under pressure in an aqueous solution of sodium hydroxide. The free carboxylic acid is produced by reaction with acetic anhydride/acid



II. From benzene

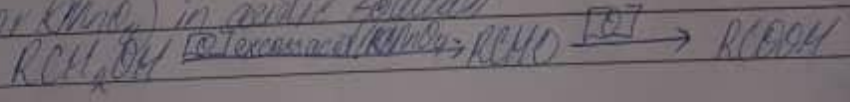
Liquid phase air oxidation of C₆-C₆ alkanes obtainable from petroleum at high temperature and pressure will give C₆-C₆ carboxylic acids with methanoic, propanoic and butanoic acid as by products



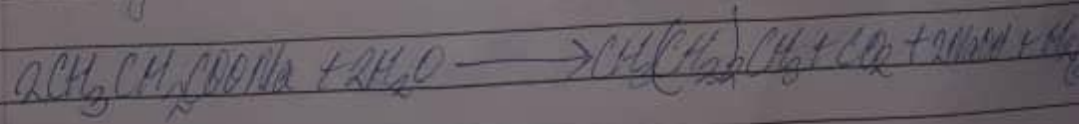
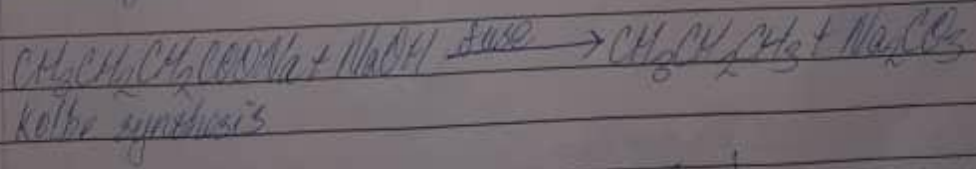
4. Much examples and brief explanation discuss the synthetic preparation of carboxylic acid.

I. Oxidation of primary alcohols and aldehydes

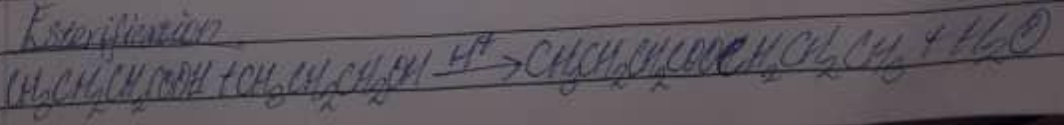
Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents (i.e. K₂Cr₂O₇ or KMnO₄) in acidic solution



II. Decarboxylation



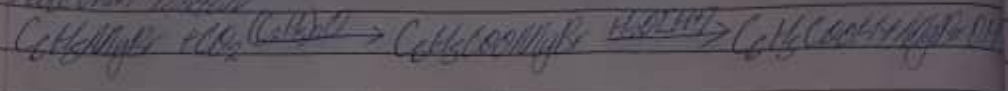
Eschweiler



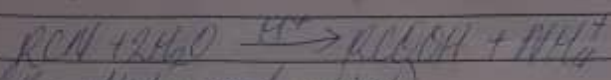
Condensation of Carboxylic acids
 The ester carboxylic acids are obtained by building carbon
 the oxide ions also Carboxylic acid also hydrolyzed with
 dilute acid



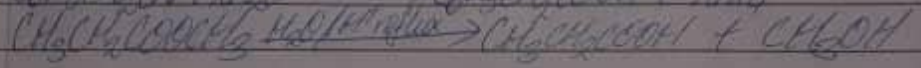
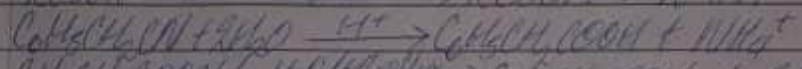
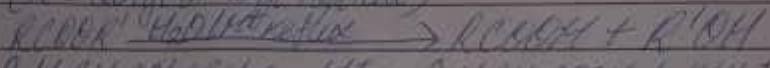
R may be 1° 2° 3° aliphatic alkyl or aryl or radical is added to
 solid metal(oxide) (dry) which also serves as catalyst in the
 reaction above



(iii) Hydrolysis of nitriles (cyanides) or esters



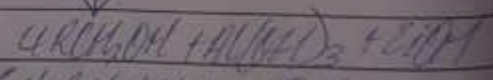
(R = alkyl or aryl radical)



Write chemical equations only. Outline the reaction about-oxidation
 and condensation of carboxylic acid

Answer

REDUCTION



Butanoic acid

Butanol

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Give the IUPAC name of the following compounds

- HCOOH → Methanoic acid
- $\text{H}_3\text{COCH}_2\text{CH}_2\text{COOH}$ → Propanoic acid
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ → Butanoic acid
- $\text{HOOC}-\text{COOH}$ → Ethanedioic acid
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ → Propanoic acid
- $\text{CH}_3\text{CH}=\text{CHCH}_2\text{COOH}$ → Hex-4-enoic acid

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

i. PHYSICAL STATE

All simple aliphatic carboxylic acids up to C_4 are liquids at room temperature. Most other carboxylic acids are solids at room temperature although adipic acid (hexanoic acid) also known as glacial adipic acid freezes to an ice-like solid below room temperature.

ii. MELTING POINTS

Melting points increase with increasing relative molecular mass. For most carboxylic acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

iii. SOLUBILITY

Lower molecular mass carboxylic acid with up to four carbon atoms in their molecules are soluble in water, due largely due to their hydrogen bonds with water. The water solubility of these decreases as the relative molecular mass increases because the steric hindrance increases. In practice, we have considered carboxylic acids are soluble in organic solvents.

3. Name the following
 1. From Carbon (II) Methanoic acid
 (II) such as butanoic acid. The reaction with CO and H_2

11. From Methanoic liquid phase from pentanoic give C_5-C_7 Propanoic C_5-C_7 Esters

11. Most common preparation

1. Oxidation of alcohols of carboxylic acid or aldehydes RCH_2OH

11. Decarboxylation CH_3COCH_3 Kolbe's reaction

$\text{RCH}_2\text{COCH}_3$ Friedlander's $\text{CH}_3\text{COCH}_2\text{COOH}$