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 COURSE: CHEM 102
 MATRIC NO: 17/MH/01/276
 DEPARTMENT: MEDICINE & SURGERY

Give the IUPAC name of the following carboxylic acids:

Answer

- $\text{HCOOH} \longrightarrow$ Methanoic acid
- $\text{HOOC(CH}_2\text{)}_3\text{COOH} \longrightarrow$ Pentan-1,5-dioic acid
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} \longrightarrow$ Butanoic acid
- $\text{HO}_2\text{C}-\text{CO}_2\text{H} \longrightarrow$ Ethane-dioic acid
- $\text{CH}_3(\text{CH}_2)_4\text{COOH} \longrightarrow$ Hexanoic acid
- $\text{CH}_2\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH} \longrightarrow$ Hex-4-enoic acid

Discuss briefly the physical properties of carboxylic acids under the following heads:

Physical properties:

All simple aliphatic carboxylic acids up to C_{10} are liquids at room temperature. Most other carboxylic acids are solids at room temperature. Anhydrous carboxylic acid (acetic acid) are known as glacial & ethanoic acid freezes to an ice like solid at room temperature.

Bolting point

This increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting points than the aliphatic counterparts of comparable relative molecular mass.

Solubility

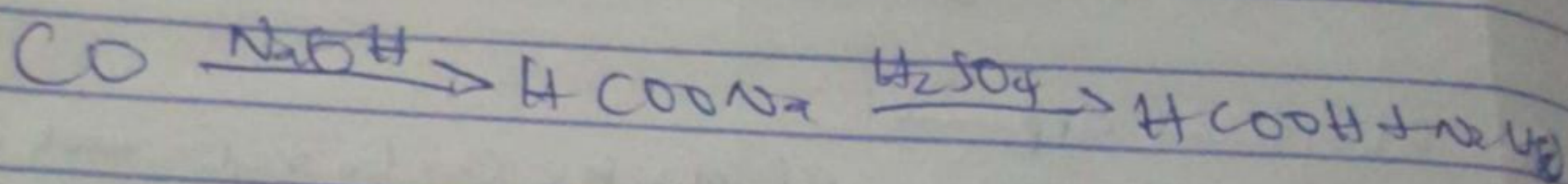
Low molecular mass carboxylic acids like formic to decanoic carbon atoms & their homologues are soluble in water. This is largely due to their ability to form hydrogen bond with water - the water solubility of acids.

decreases as relative molecular mass increases
 is to make the structure become relatively non
 hydrocarbon in nature and to be conductive. as
 carboxylic acids are soluble in organic solvents

2) write two preparations of carboxylic acids

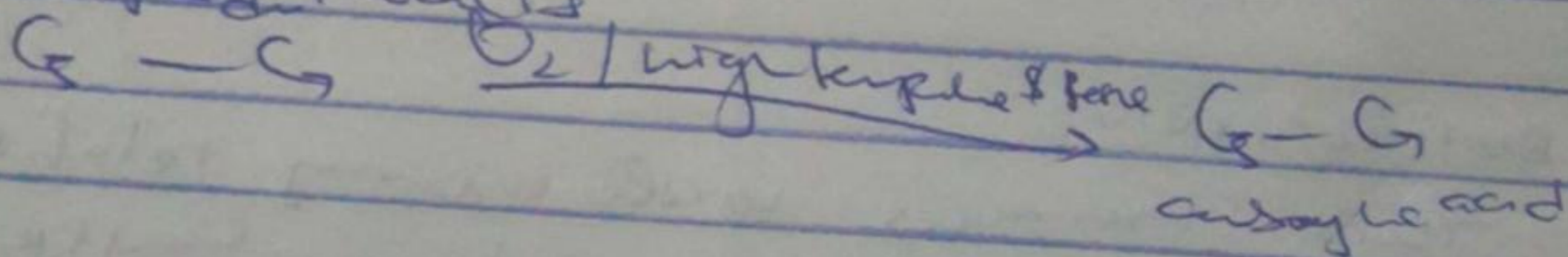
i) from carbon (II) oxide

Methanoic acid is manufactured by adding
 CO to water sodium hydroxide under pressure the
 free carboxylic acid is liberated by addition of
 H_2SO_4



ii) from petroleum

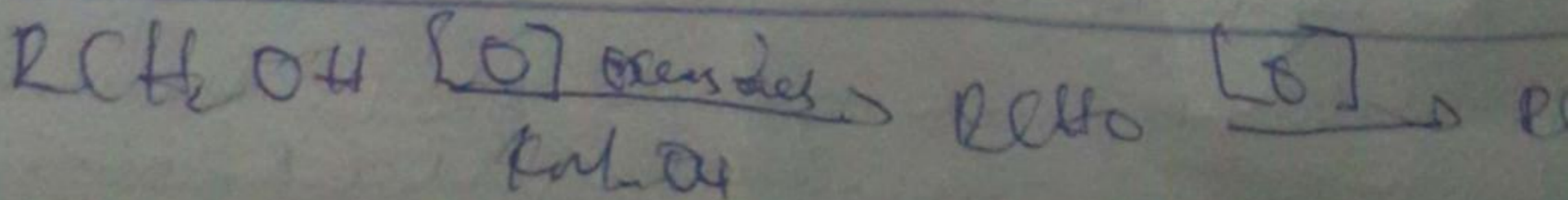
Liquid phase air oxidation of C-C
 alkenes obtainable from petroleum at high temperature
 and pressure with water will give C-C carboxylic acids
 with acetic, propionic and butanoic acids as
 by-products



with equidistant and best explanation discuss the
 synthetic preparation of carboxylic acids

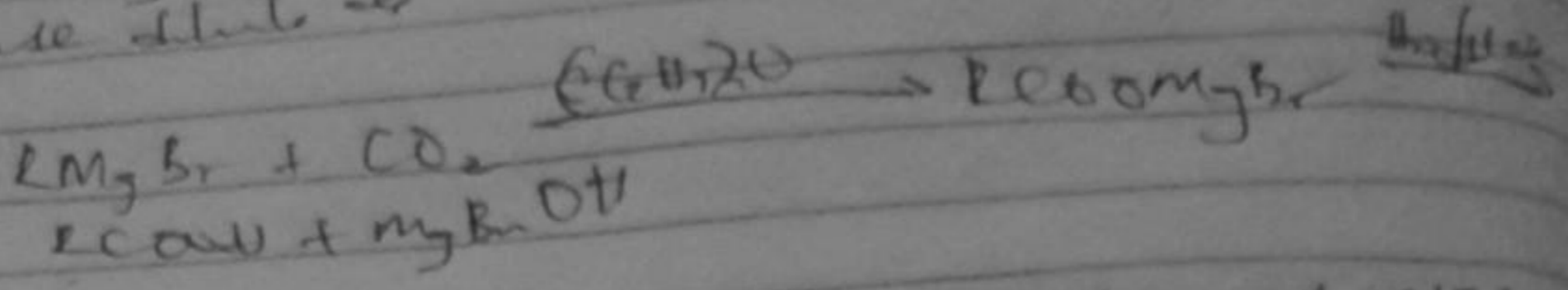
Oxidation of primary alcohols as aldehydes

Oxidation of primary alcohols as aldehydes
 can be used to prepare carboxylic acids using
 oxidizing agents such as $K_2Cr_2O_7$ & $KMnO_4$ in
 acidic solution

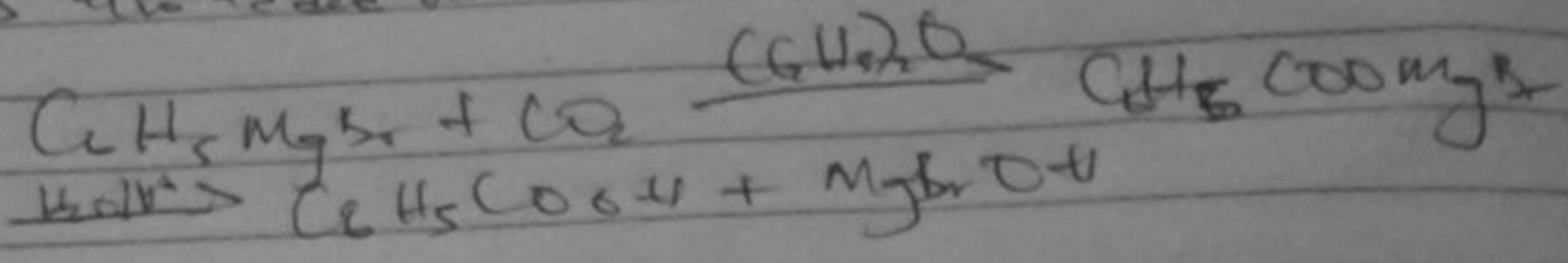


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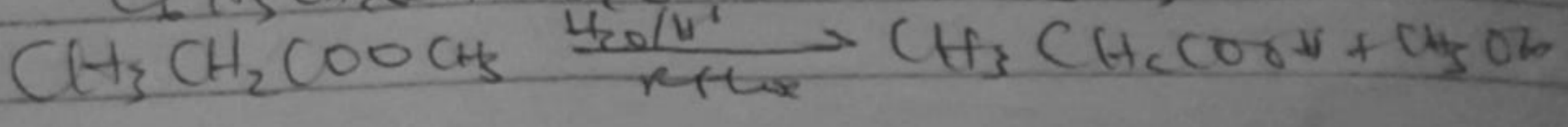
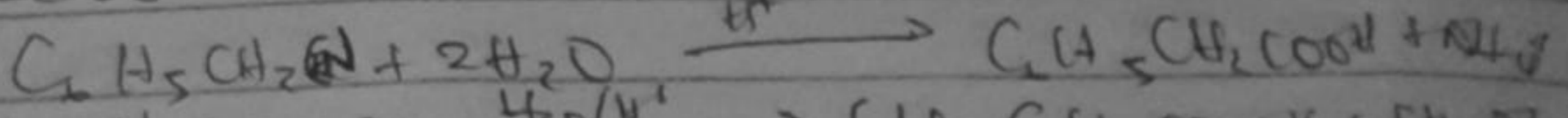
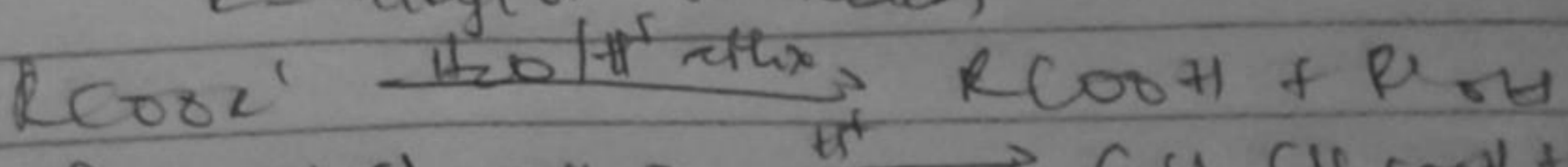
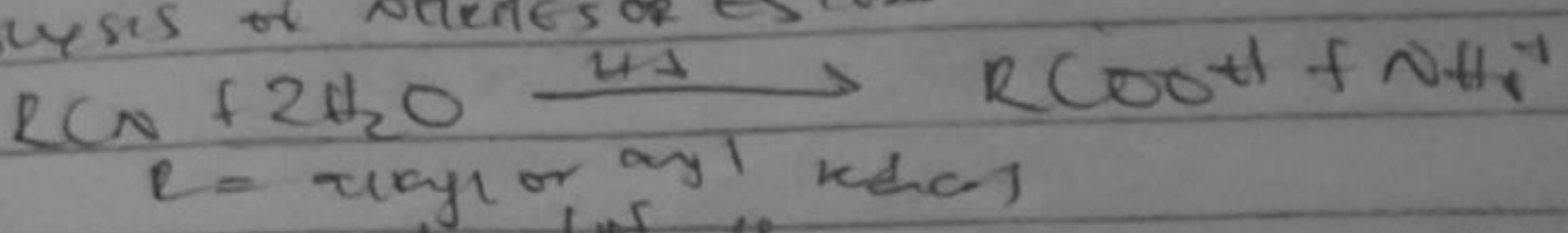
2nd if
 ② Carboxylic acid groups
 Aliphatic Carboxylic acids are obtained by
 adding CO₂ into RMgX and then hydrolysis
 use dilute acid



R may be 1°, 2°, 3° aliphatic or aryl or vinyl radical
 In preparation of benzoic acid R group
 is also added to CO₂ which forms as a carboxyl

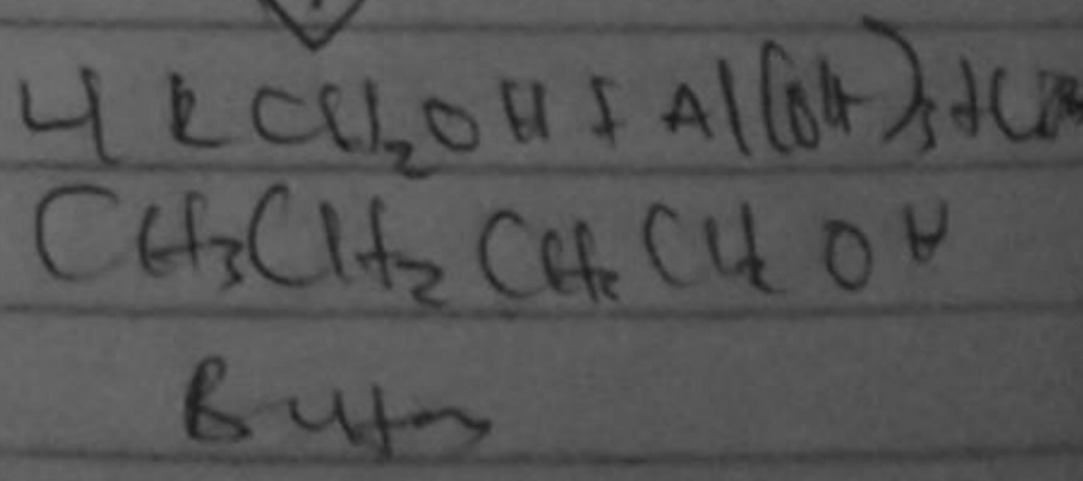
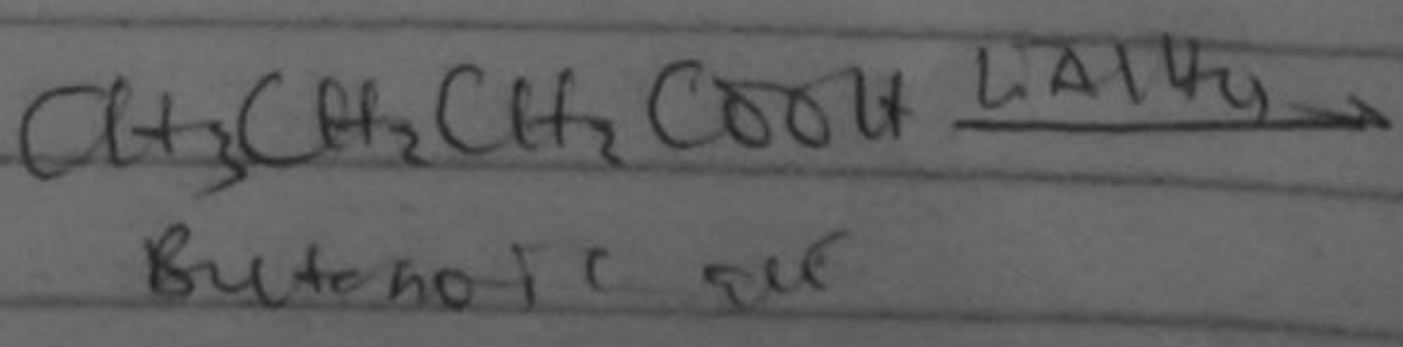
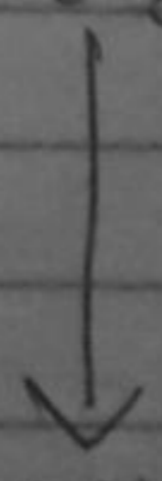
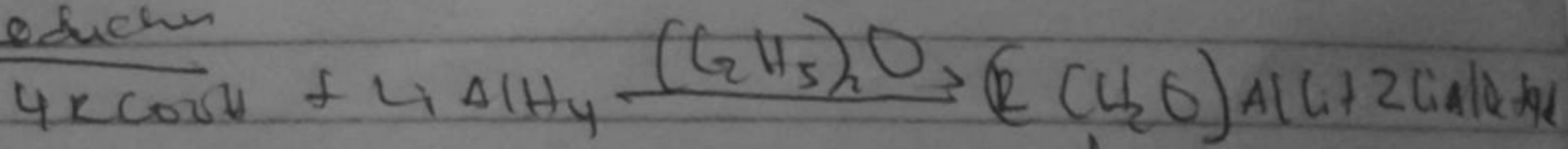


Hydrolysis of nitriles or esters



3) Both chemical equations only outline the reactions
 mechanism, de-carboxylation and esterification of carboxylic acid
 Auher

Reduction



1. $\text{CH}_3\text{COOH} + \text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COOCH}_2\text{COCH}_3 + \text{H}_2\text{O}$

2. $\text{CH}_3\text{COOH} + \text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COOCH}_2\text{COCH}_3 + \text{H}_2\text{O}$

3. $\text{CH}_3\text{COOH} + \text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COOCH}_2\text{COCH}_3 + \text{H}_2\text{O}$

Exercises

$\text{CH}_3\text{COOH} + \text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COOCH}_2\text{COCH}_3 + \text{H}_2\text{O}$

$\text{CH}_3\text{COOH} + \text{H}_2\text{O} \rightleftharpoons \text{CH}_3\text{COOH}_2^+ + \text{OH}^-$