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MATRIC NO: 19/MHS01/367

DEPARTMENT: MBBS

1) 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

• $\text{CH}_3(\text{CH}_2)_4\text{COOH}$ - Hexanoic acid

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

2) i) Physical appearances: All simple aliphatic carboxylic acids up to C_{10} are liquids at room temperature. Most other carboxylic acids are solid at room temperature although anhydrous carboxylic acid (acetic acid) freezes to an ice-like solid below the room temperature.

ii) Boiling point: It increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids & have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

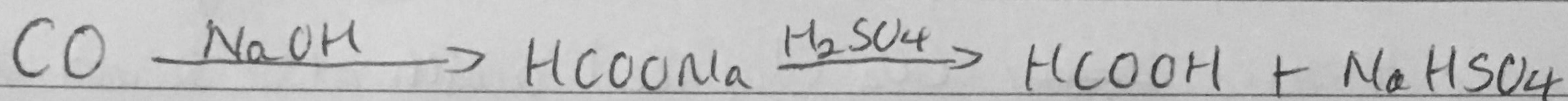
iii) Solubility: Carboxylic acids ~~with~~ ^{of lower} up to ~~four~~ molecular mass with up to four carbon atoms in their molecules are soluble in water due to their ability to form hydrogen bonds with water molecules. Water solubility

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of acid decreases with increase in ~~per~~ relative molecular mass because the structure becomes more hydrocarbon in nature. All carboxylic acids are soluble in organic solvent!

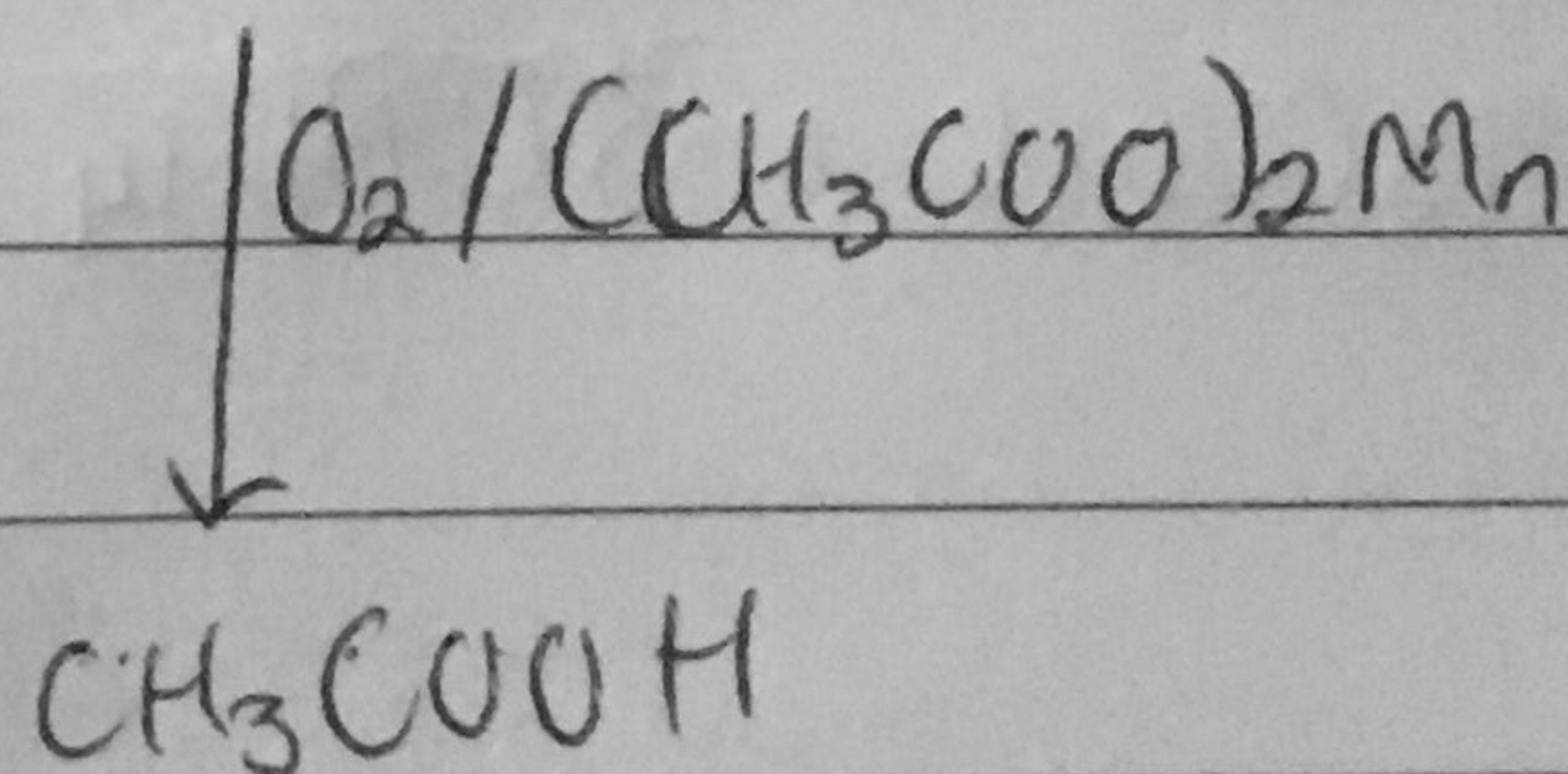
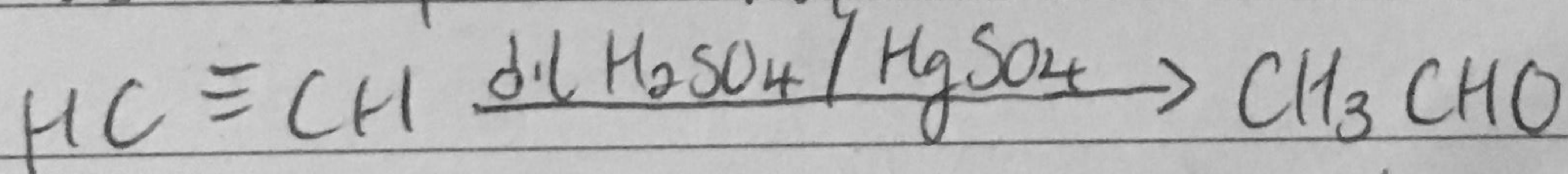
3) - From Carbon(II)oxide

Methanoic acid is produced by adding CO under pressure to hot aqueous solution of NaOH. The free carboxylic acid is liberated by careful reaction with tetraoxosulphate(VI) acid.



- From ethanal

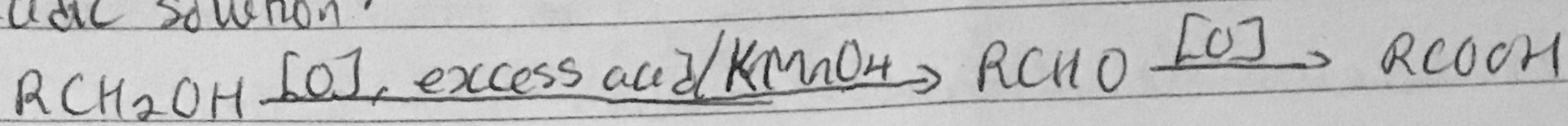
Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanal to ethanoic acid using manganite(II) ethanoate catalyst. Ethanal itself is obtained from ethylene.



4) a) Oxidation of primary alcohols and aldehydes

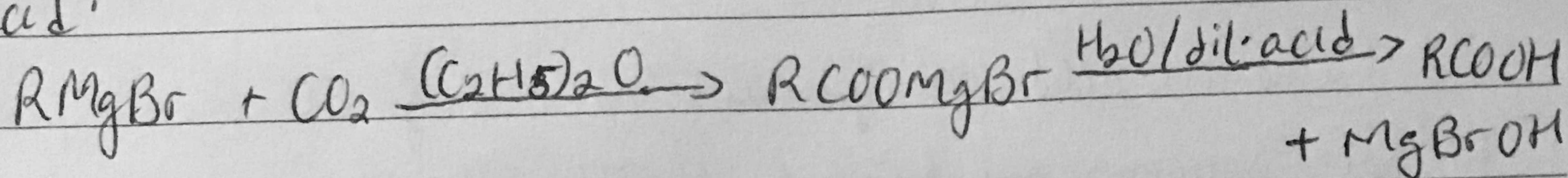
Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents (ie $\text{K}_2\text{Cr}_2\text{O}_7$ and KMnO_4) in

acidic solution.



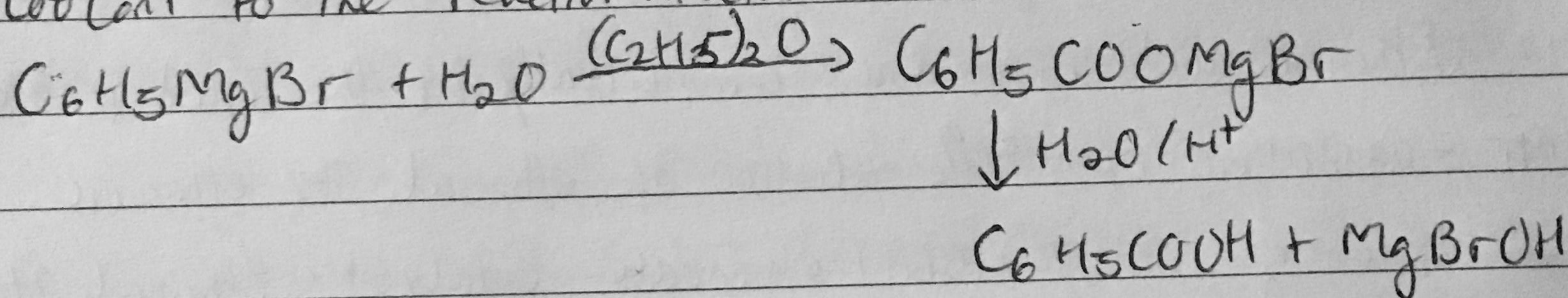
b) Carbonation of Grignard

Aliphatic carboxylic acids are obtained by bubbling CO_2 into the Grignard reagent and then hydrolyzed with dilute acid.

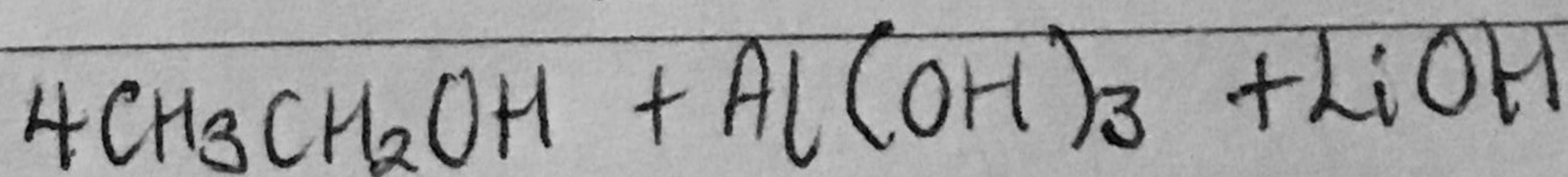
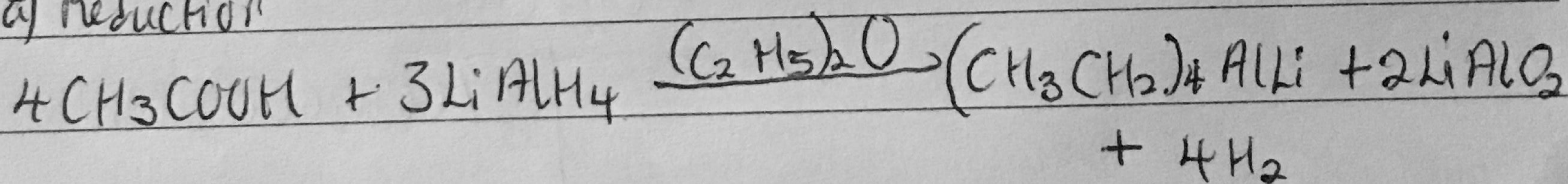


R may be $1^\circ, 2^\circ, 3^\circ$ aliphatic alkyl or aryl radical.

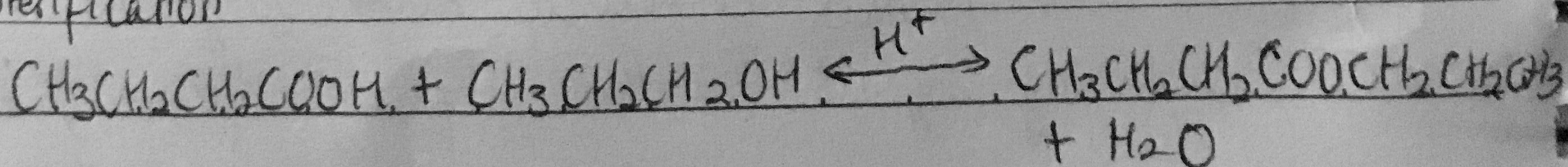
In preparation of benzoic acid, the reagent is added to solid ~~water~~ CO_2 (dry ice) which also serves as coolant to the reaction mixture.



5) a) Reduction

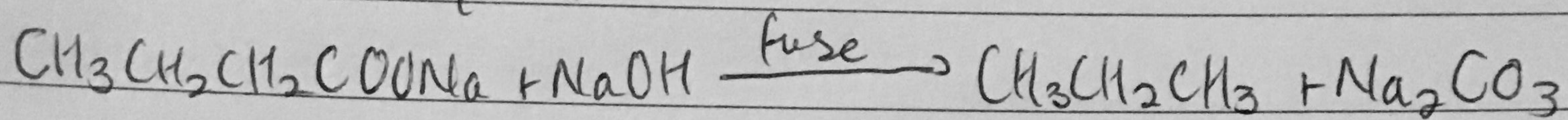


b) Esterification



Q. Decarboxylation

- Thermal decarboxylation



- Kolbe synthesis

