

- i. HCOOH - Formic acid / Methanoic acid
- ii. $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$ - Pentan-1,5-dioic acid
- iii. $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ - Butanoic acid
- iv. $\text{CH}_3(\text{CH}_2)_4\text{COOH}$ - Hexanoic acid
- v. $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$ - Hex-4-enoic acid

2. Physical appearance.

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 freezes to an ice-like solid below the room temperature.

ii. Boiling point

Boiling point increases relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

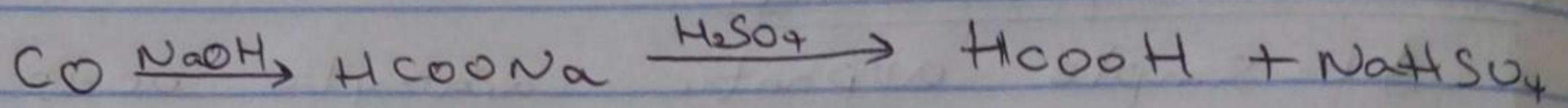
iii. Solubility

Carboxylic acids are soluble in water.

They do not dimerise in water, but form hydrogen bonds with water. Carboxylic acids are polar and due to the presence of the hydroxyl in the carboxyl group, they are able to form hydrogen bonds with water molecules.

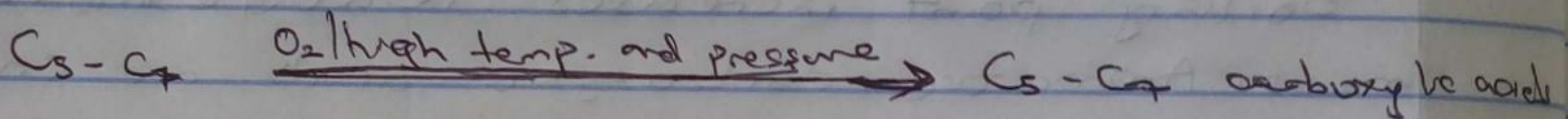
3:1 From Carbon (II) oxide.

Methanoic acid is manufactured by the addition of 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.



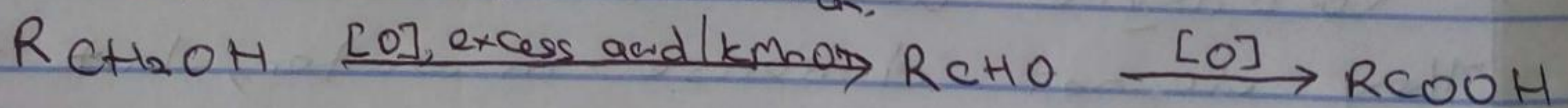
ii: From petroleum

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 butanoic acids as by products.



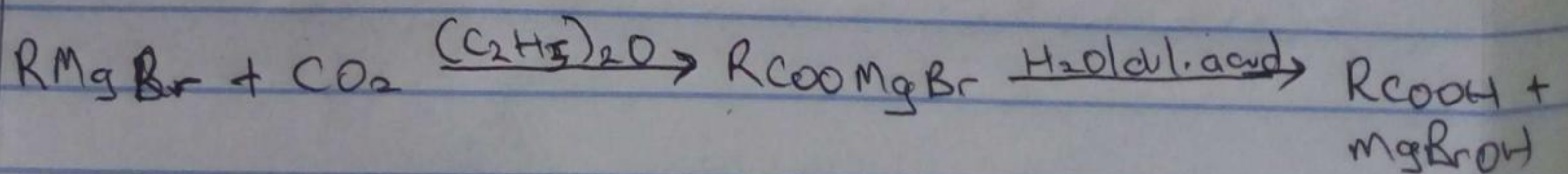
4: Oxidation of primary alcohols and aldehydes.

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.



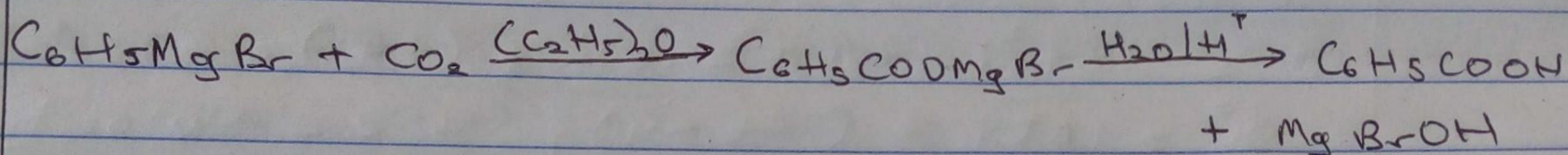
ii: Carboxylation of Grignard reagent.

Aliphatic carboxylic acids are obtained by bubbling carbon (IV) oxide into the Grignard reagent and then hydrolyzed with dilute acid.

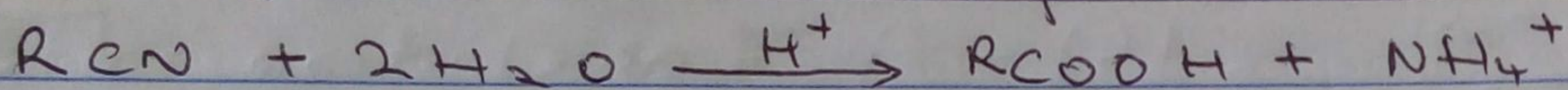


R may be 1°, 2°, 3°, aliphatic alkyl or aryl radical

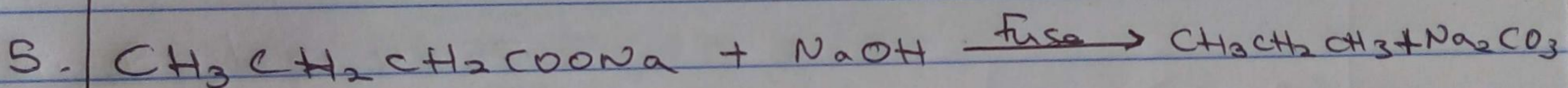
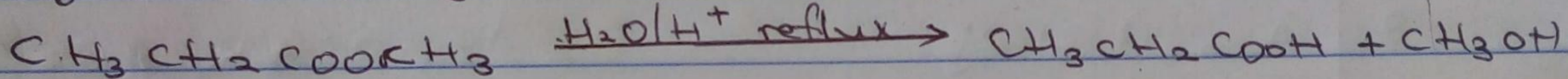
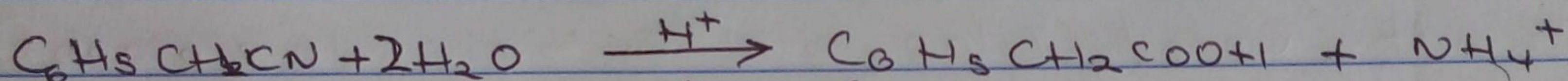
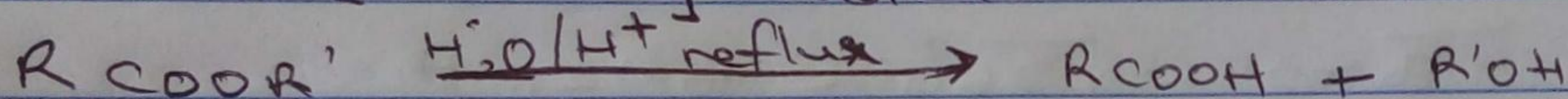
In the preparation of benzoic acid, the reagent is added to solid carbon (iv) oxide which also serves as coolant to the reaction mixture.



iii Hydrolysis of nitriles (cyanides) or esters



CR = alkyl or aryl radical



esterification

