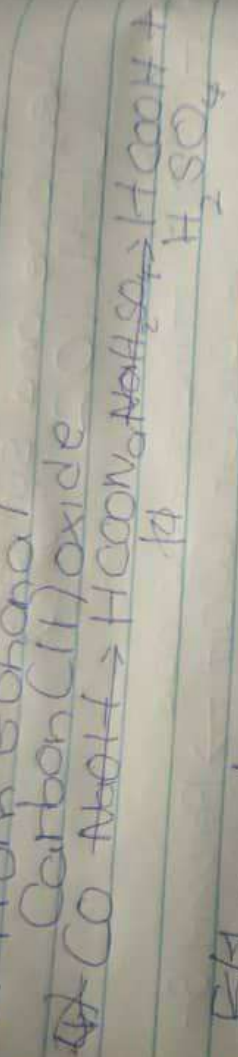
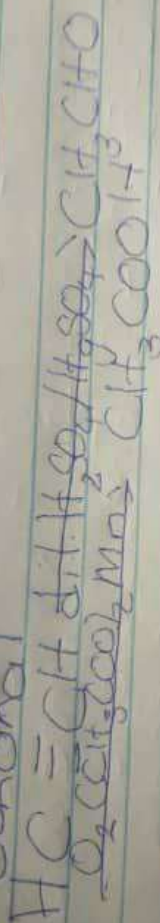


the higher the less soluble.

- 3) 1) From Carbon(II) oxide.
- 2) From Ethanal

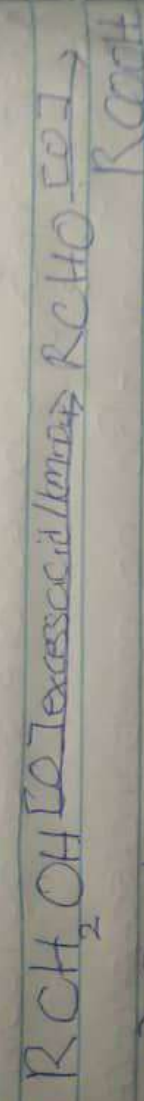


Ethanal

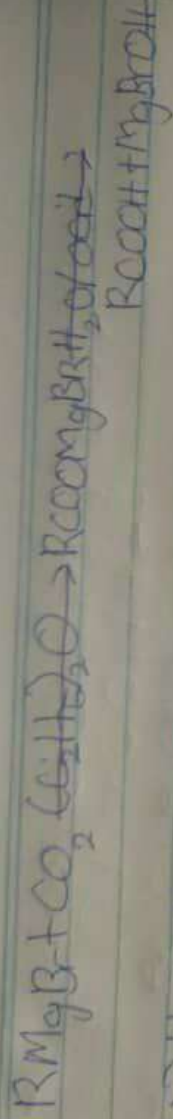


4) Oxidation of primary alcohols
aldehydes

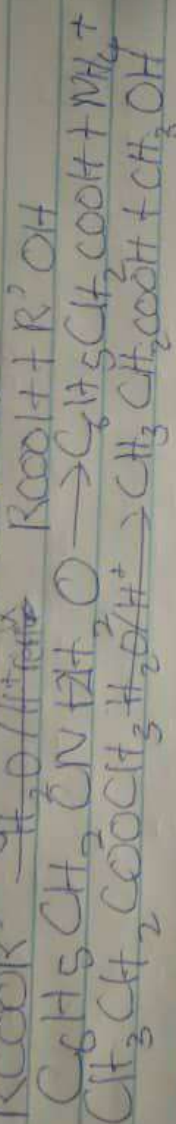
It can be used to prepare carboxylic acids using the usual oxidizing agents like $\text{K}_2\text{Cr}_2\text{O}_7$ or KMnO_4 in acidic solution



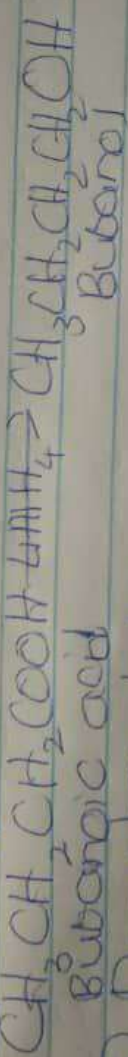
b) Carbonation of Grignard reagent
Aliphatic carboxylic acids are obtained by bubbling CO (Carbon(IV) oxide) into Grignard reagent and hydrolyzed with dilute acid



Hydrolysis of nitriles (Cyanides) or esters
 $\text{RCN} + 2\text{H}_2\text{O} \xrightarrow{\text{H}^+} \text{RCOOH} + \text{NH}_4^+$
 (R = alkyl or aryl radical)



5) a) Reduction
 4RCOOH



b) Decarboxylation



c) Esterification



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- a) HCOOH - methanoic acid
b) $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$ → Pentamethylene dicarboxylic acid
c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ → Butanoic acid
d) $\text{HO}_2\text{C}-\text{CO}_2\text{H}$ - Ethanedioic acid
e) $\text{CH}_3(\text{CH}_2)_4\text{COOH}$ - Hexanoic acid
f) $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$ - Hex-4-eneoic acid.

2. Physical appearance

All simple aliphatic carboxylic acids up to C_{10} are liquids at room temperature. Most other carboxylic acids are solids at room temperature.

- iv) Boiling points: - Boiling points increase with molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting points than aliphatic counterparts.
v) Solubility: - Lower molecular mass carboxylic acids are soluble in water while