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MATIC NO: 191MH501433
DEPT: MEDICINE AND SURGERY
COURSE CODE: CHM 102.

Assignment:

- $\text{HCOOH} \rightarrow$ methanoic acid
- $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH} \rightarrow$ pentan-1,5-dioic acid.
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} \rightarrow$ Butanoic acid
- $\text{HO}_2\text{C}-\text{CO}_2\text{H} \rightarrow$ Ethanoic acid
- $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH} \rightarrow$ Hex-4-enoic acid
- $\text{CH}_3(\text{CH}_2)_4\text{COOH} \rightarrow$ Hexanoic acid.

2a) Physical appearance

All simple aliphatic carboxylic acids up to C_{10} are liquids, are liquids at room temperature. Most other carboxylic acid are solid at room temperature although anhydrous carboxylic acid (acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

b) Boiling point: Boiling point increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solid and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

c) Solubility: Lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water, this is largely due to their ability to form hydrogen bonds with water molecules. All carboxylic acids are soluble in organic solvents.

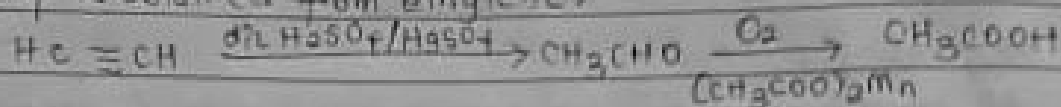
B) a) From carbon (II) oxide

Methanoic acid is manufactured by adding CO under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with H_2SO_4



b) 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.



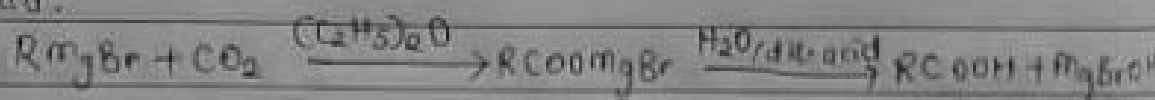
4a) Oxidation of primary alcohol and aldehyde

Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usually oxidizing agent (i.e. $\text{K}_2\text{Cr}_2\text{O}_7$ or KMnO_4) in acidic solution.

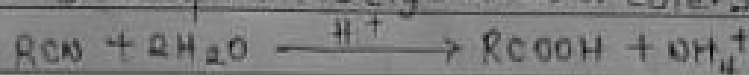


b) Carboxylation of Grignard reagent:

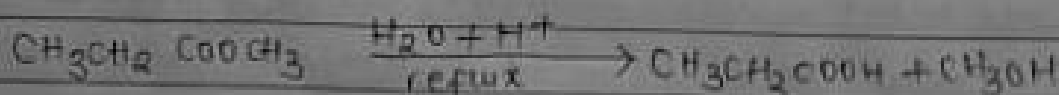
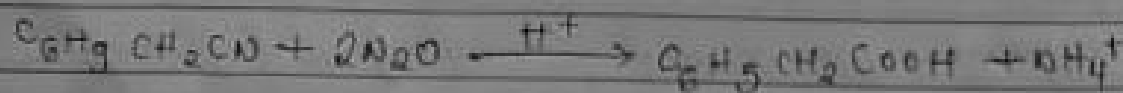
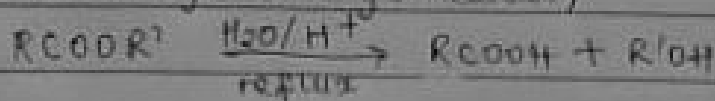
Aliphatic carboxylic acids are obtained by bubbling CO_2 into the Grignard reagent and then hydrolysed with diluted acid.



c) Hydrolysis of nitriles (cyanides) or esters

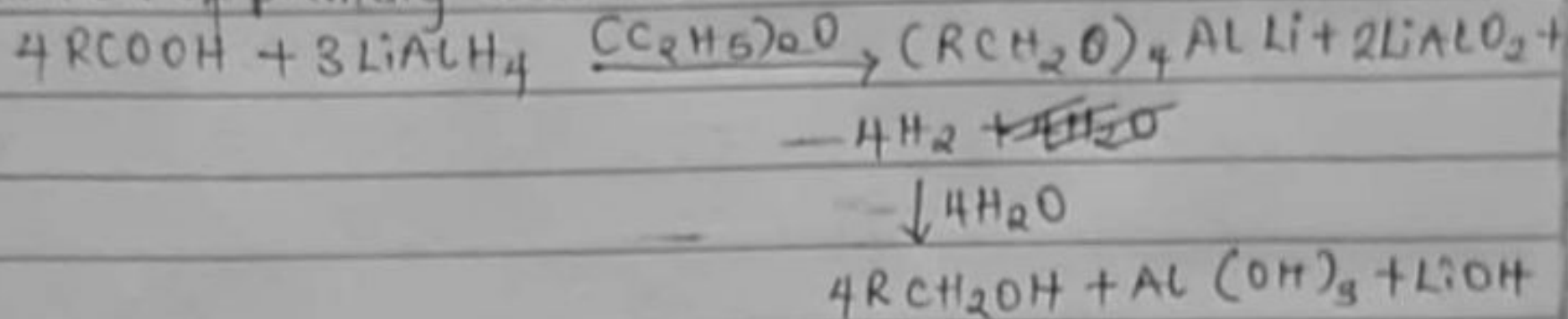


(R = alkyl or aryl radical)

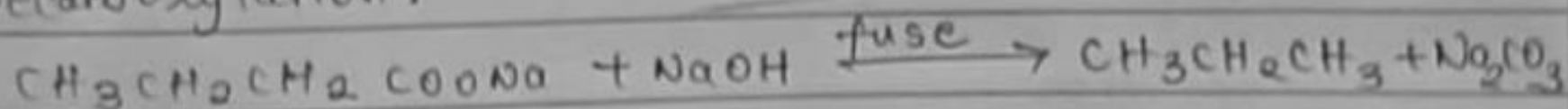


(Chemistry (contd.))

5a) Reduction of primary alcohol:



b.) Decarboxylation:



c.) Esterification!

In the presence

