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Matric No: 121MHS01B31  
Department: MBBS  
Course code: Chem 102 (Fourth year)

1) Give the IUPAC name of the following compound

a)  $\text{HCOOH} \rightarrow$  Methanoic acid

b)  $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH} \rightarrow$  Pentan-1,5-dioic acid

c)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH} \rightarrow$  Butanoic acid

d)  $\text{HO}_2\text{C}-\text{CO}_2\text{H} \rightarrow$  Ethanedioic acid

e)  $\text{CH}_3(\text{CH}_2)_4\text{COOH} \rightarrow$  Hexanoic acid

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

2) physical appearance

All simple aliphatic carboxylic acid up to  $\text{C}_{10}$  are liquid 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.

Boiling point

The increases with increasing relative molecular mass. Aromatic <sup>Carbon</sup> compounds <sup>Carb</sup>oxylic acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

Solubility

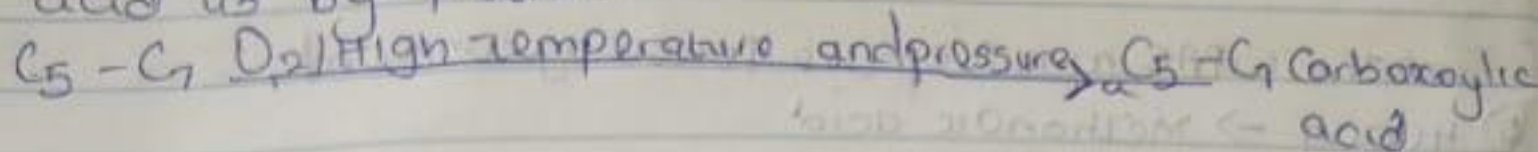
Lower molecular mass carboxylic acid with up to four carbon atom in the molecules are soluble in water. This largely due to their ability to form hydrogen bond with water molecules. The water solubility of the acid decreases as the relative molecular mass increases because the structure becomes relatively more hydrocarbon in nature and hence non-polar. All carboxylic acid are soluble in organic solvent.



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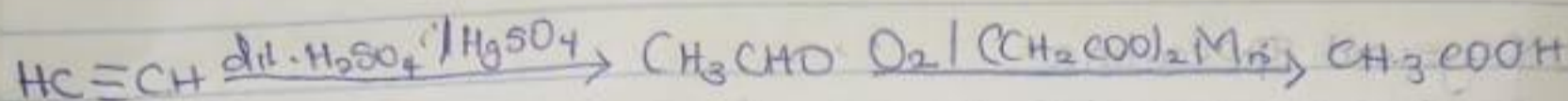
3) From petroleum

Liquid phase air oxidation of C<sub>5</sub>-C<sub>7</sub> alkanes, obtainable from petroleum of high temperature and pressure will give C<sub>5</sub>-C<sub>7</sub> Carboxylic acids with methanoic, propanoic and butanoic acid as by-products.

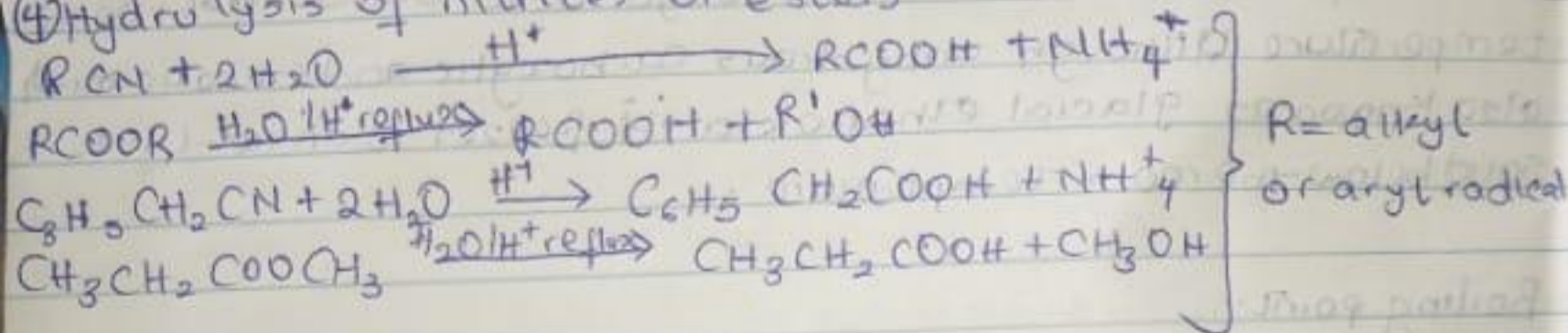


b from ethanal

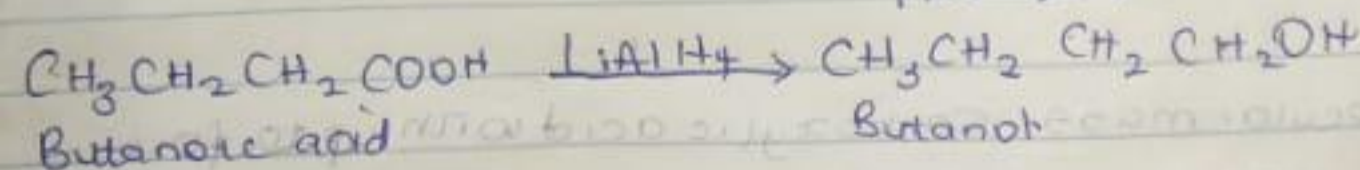
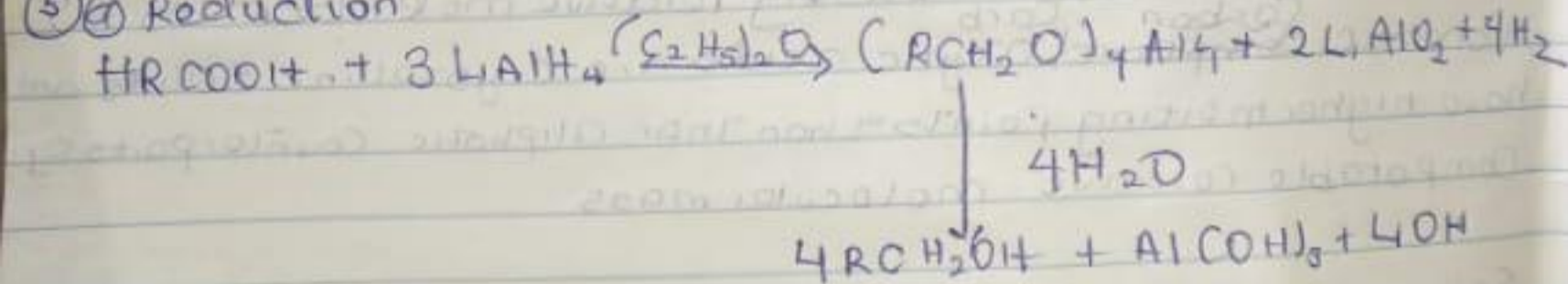
Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanol to ethanoic acid using manganese (II) ethanoate catalyst. Ethanal itself is obtained from ethylene



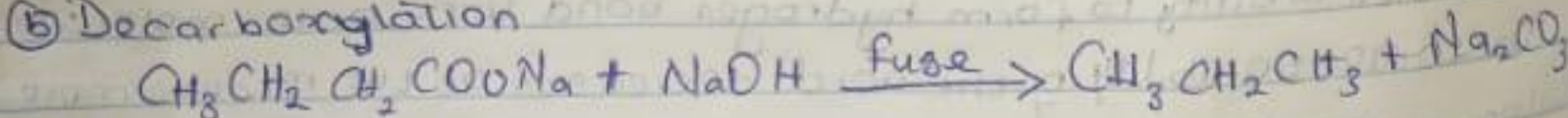
④ Hydrolysis of nitriles or esters



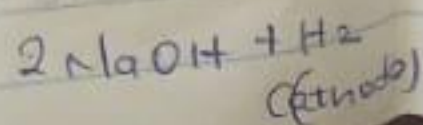
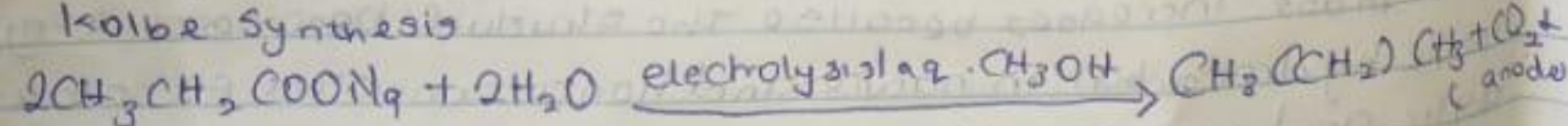
⑤ Reduction



⑥ Decarboxylation



Kolbe synthesis



1.91 M HSO<sub>1</sub> (33)

o Esterification

