

21/04/20 ASSIGNMENT ON CARBOXYLIC ACID

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Dept: Medicine and Surgery

Matric No: 19/MHS01/143

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Answer

1a.  $\text{HCOOH}$  - Methanoic acid

b.  $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$  - Pentane 1,5 dioic 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

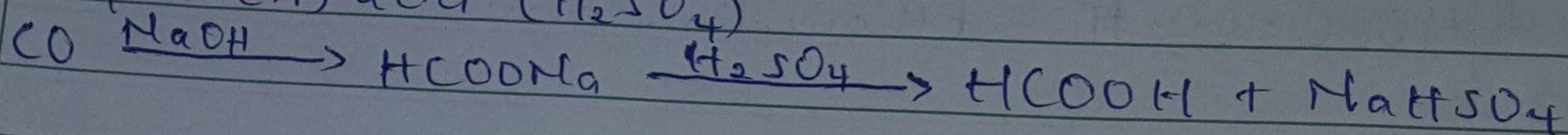
2a. Physical appearance: All simple aliphatic carboxylic acid up to  $\text{C}_{10}$  are liquids at room temperature. Most other carboxylic acids are solid at room temperature although anhydrous carboxylic acid (acetic acid) also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

b. Boiling Points: B.P. increases with increasing relative molecular mass. Aromatic carboxylic acid are crystalline solids and are have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

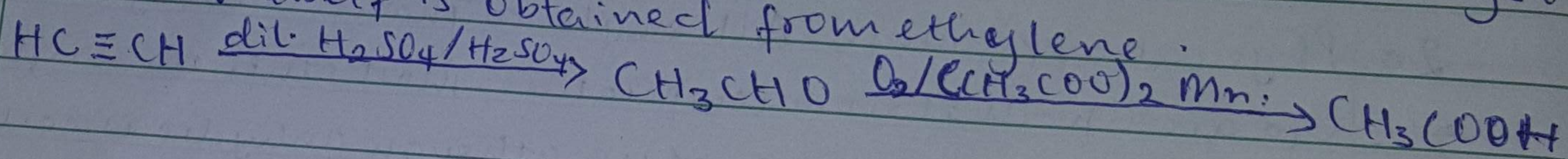
c. Solubility: Lower Molecular Mass carboxylic acids with up to four carbon atoms in their molecules are soluble;

water; this largely due to their ability to form hydrogen bonds with their water molecules. The water solubility of the acids decreases as the relative molecular mass increases because the structure becomes relatively more hydrocarbon in nature and hence <sup>covalent</sup> solvent. All carboxylic acids are soluble in organic solvents.

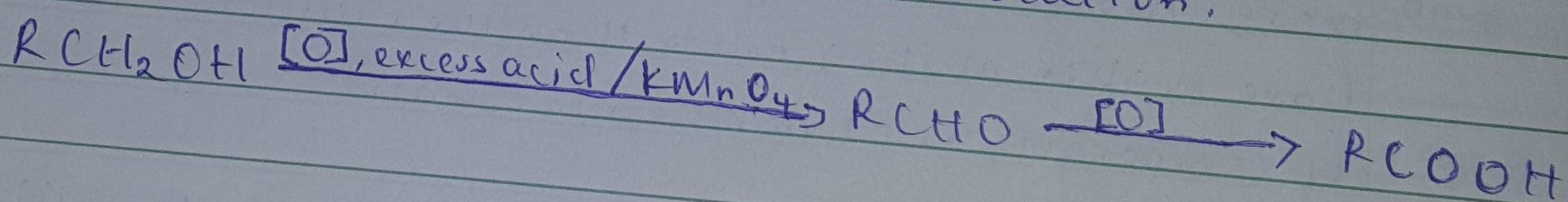
3a. From Carbon(II) oxide: Methanoic acid (formic acid) is manufactured by adding carbon(II) oxide under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetraoxo-sulphur(VI) acid ( $H_2SO_4$ )



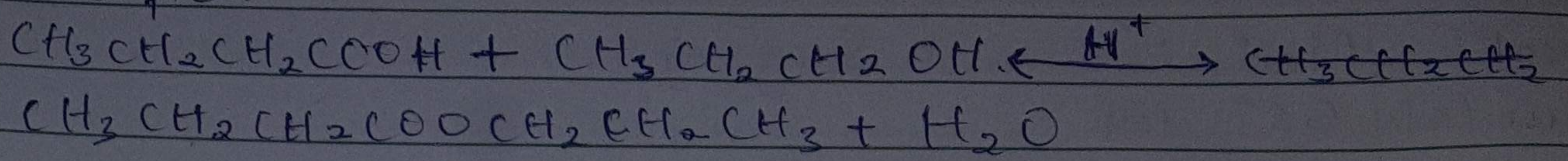
b. From Ethanol: Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanal to ethanoic acid using ~~mg~~ manganite (II) ethanoate catalyst. Ethanal itself is obtained from ethylene.



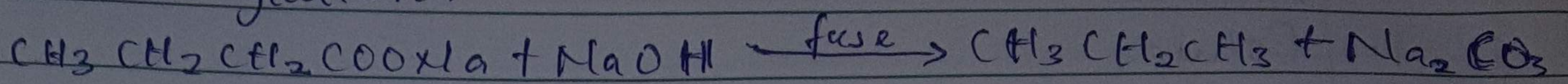
4a. Oxidation of primary alcohols and aldehydes: Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents (i.e.  $K_2Cr_2O_7$  or  $KMnO_4$ ) in acidic solution.



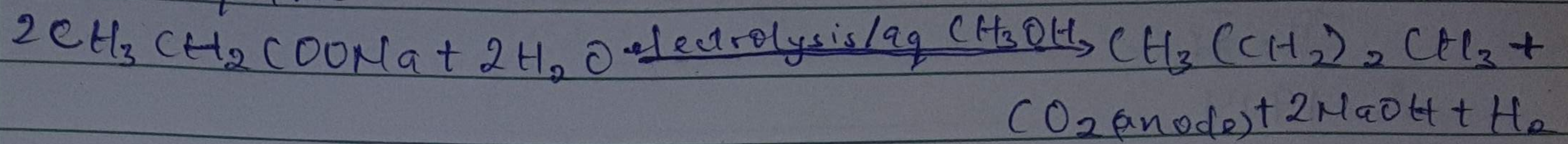
5a. Esterification:



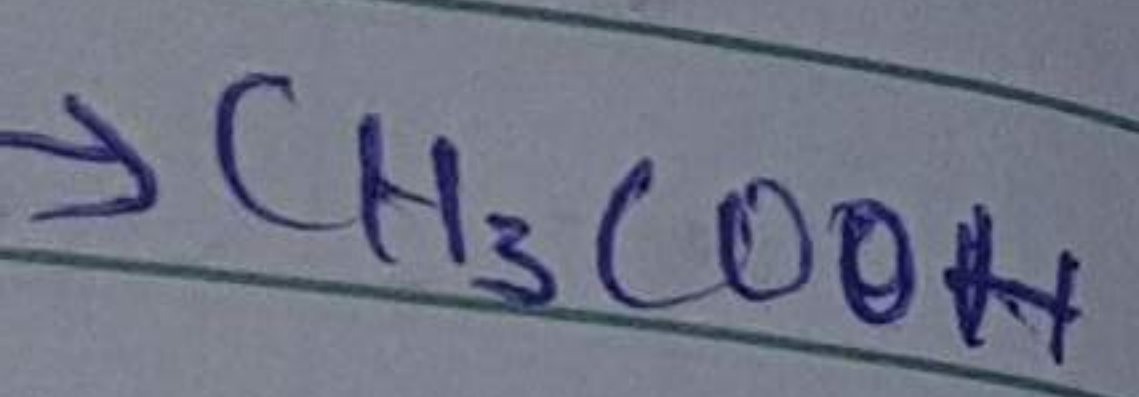
b. Decarboxylation:



Kolbe synthesis:



c. Oxidation:



Oxidation  
to prepare  
acids (i.e.)

