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Matric No: 19/MHS 04/054

CHM 102 ASSIGNMENT

1 Iupac Names of The following Compounds

i) HCOOH = 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) $\text{HO}_2\text{C}_2\text{O}_2\text{H}$ = Ethanedioic acid

v) $\text{CH}_3\text{C}(\text{OH})_4\text{COOH}$ = Hexanoic acid

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

2 Physical Properties of Carboxylic acids

i) 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.

ii) Boiling Points

The boiling points of carboxylic acids increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

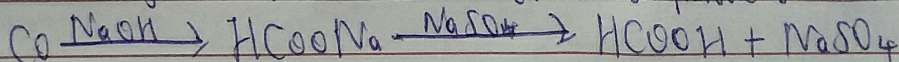
iii) Solubility

Lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water; this largely due to their ability to form hydrogen bonds with water molecules. The water solubility of the acids decreases as the relative molecular mass increases because the structure become relatively more hydrocarbon in nature and hence covalent. All carboxylic acids are soluble in organic solvents.

3 Industrial Preparation of Carboxylic acids

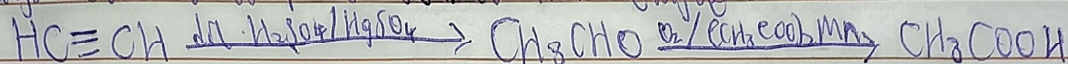
i) From Carbon(II)oxide

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 tetraoxosulphate(VI) acid (H_2SO_4)



D From Ethanal

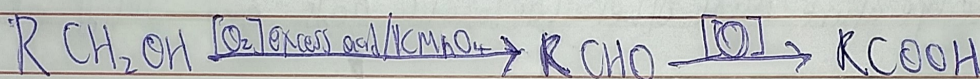
Ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanal to ethanoic acid using manganate(II) ethanoate catalyst. Ethanal itself is obtained from ethylene



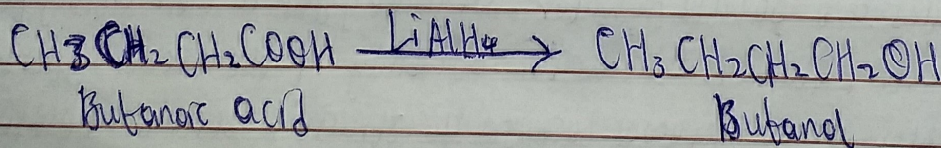
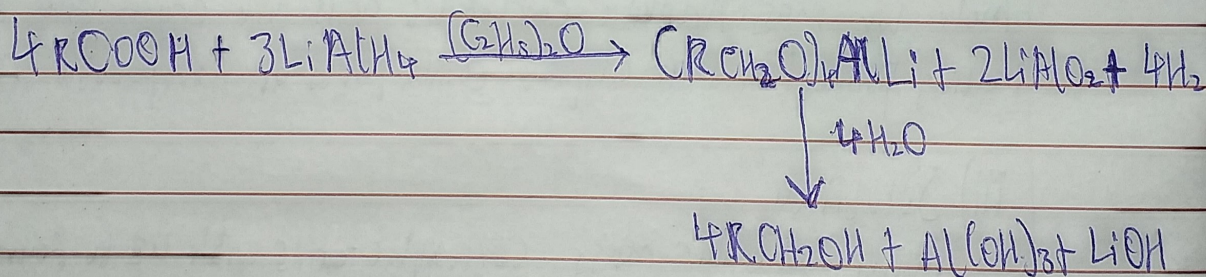
4 Synthetic Preparation of Carboxylic acids

i) Oxidation of primary alcohols and aldehydes

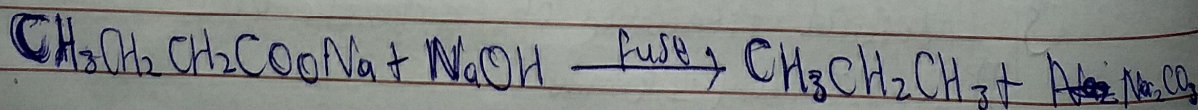
Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidizing agents like $\text{K}_2\text{Cr}_2\text{O}_7$ or KMnO_4 in acidic solution



ii) Reduction of Carboxylic Acid



ii) De-carboxylation of Carboxylic Acid



10) Esterification of Carboxylic acids

