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**DEPT: CIVIL ENGINEERING**

**MATRIC NO: 19/ENG03/007**

**CHM 102**

1. HCOOH ---- methanoic acid

CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>COOH----- Butanoic acid

CH<sub>3</sub>(CH<sub>2</sub>)<sub>4</sub>COOH----- Hexanoic acid

HOOCCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>COOH ---- Pentan- 1, 5-dioic acid

HO<sub>2</sub>C-CO<sub>2</sub>H ---- Ethanedioic acid

CH<sub>3</sub>CH=CHCH<sub>2</sub>CH<sub>2</sub>COOH ----- Hex-4-eneoic acid

2. I) physical appearance

All simple aliphatic carboxylic acids up to C<sub>10</sub> 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 room temperature.

ii) Boiling points

boiling point increases with increasing with 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

3. I) from carbon(ii)oxide

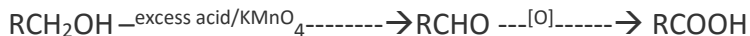
Methanoic acid is manufactured by adding carbon(ii)oxide under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetraoxosulphate(vi) acid (H<sub>2</sub>SO<sub>4</sub>)

ii) from ethanol

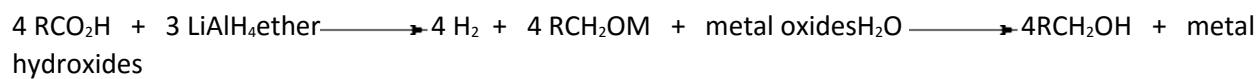
ethanoic acid is obtained commercially by the liquid phase air-oxidation of 5% solution of ethanol to ethanoic acid using manganite(II) ethanoate catalyst. Ethanol itself is obtained from ethylene.

4. Oxidation of primary alcohols and aldehydes

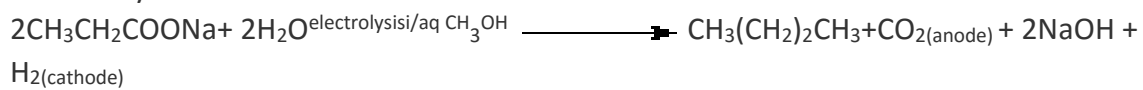
It can be used to prepare carboxylic acids using the usual oxidizing agents (K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>) in acidic solution.



5. Reduction to primary



#### Decarboxylation



#### Esterification

