

- 1a) Methanoic acid
- b) Pentan- 1,5- dioic acid
- c) Butanoic acid
- d) Ethanedioic acid
- e) Hexanoic acid
- f) Hex-4-eneoic acid.

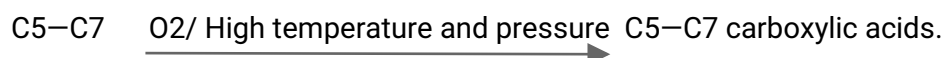
2a) Physical Appearances; All simple aliphatic carboxylic acids up to C10 are liquids at room temperature. Most other carboxylic acids are solid at room temperature although anhydrous carboxylic acid(acetic acid) also known as glacial ethanoic acid freezes to an ice solid below the room temperature...

b) Boiling point; it increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting point 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 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 becomes relatively more hydrocarbon in nature and hence covalent. All carboxylic acids are soluble in organic solvents.

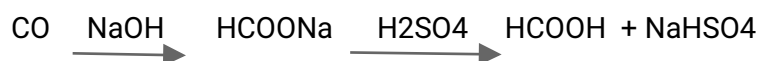
### 3a) From petroleum

Liquid phase air oxidation of C5–C7 alkanes, obtainable from petroleum at high temperature and pressure will give C5–C7 carboxylic acids with methanoic, propanoic and butanedioic acids as by products.



### b) From Carbon(II) oxide

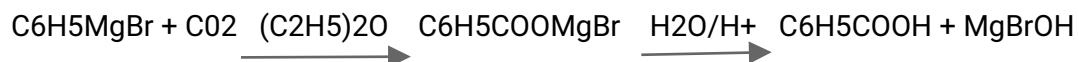
Methanoic acid( formic acid) is manufactured by adding carbon (II) oxide under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetraoxosulphate(vi) acid and(H2SO4).



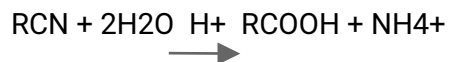
### 4a) Preparation from Grignard Reagents

The carboxylic acid formation is possible by Grignard reagents reaction. The reaction of Grignard reagents with crushed dry ice or solid carbon dioxide leads to the formation of salts of

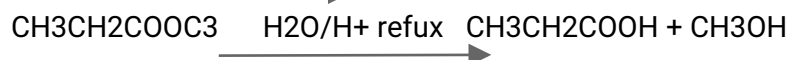
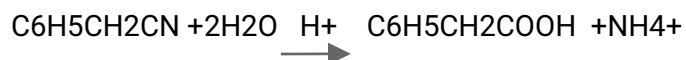
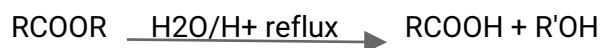
carboxylic acids.



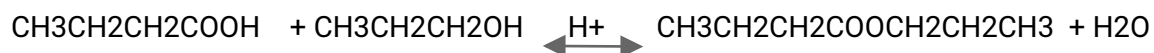
b) Hydrolysis of nitriles (Cyanide's) or esters



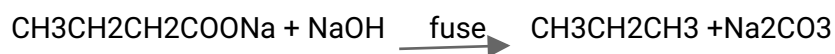
R= (alkyl or aryl radical)



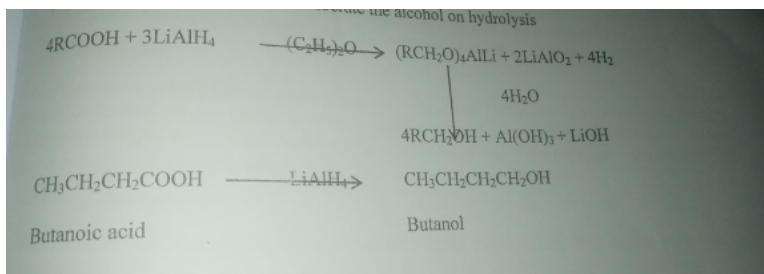
5a) Esterification;



b) Decarboxylation



c) Reduction



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