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Electrical/Electronics

19/EN 904 1002.

CHM 102.

1) HCOOH - Methanoic acid

$\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$ - Pent-1,5-dioic acid

$\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ - Butanoic acid

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

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

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

2) Physical appearances

All simple aliphatic carboxylic acids up to C_{10} are liquids at room temperature. Most others carboxylic acids are solids at room temperature although anhydrous carboxylic acid also known as glacial ethanoic acid freezes to an ice-like solid below the room temperature.

ii) Boiling Points

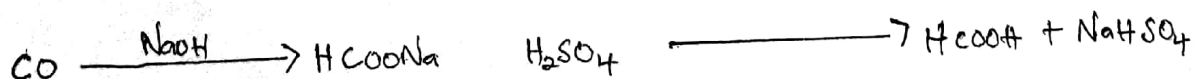
Boiling Point increases with increasing relative molecular mass. Aromatic carboxylic acids are crystalline solids and have higher melting points than their aliphatic counterparts of comparable relative molecular mass.

iii) Solubility

Lower molecules 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) From Carbon (II) oxide

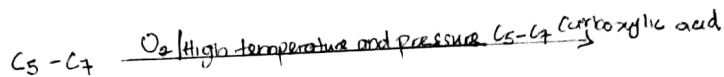
Methanoic acid (formic acid) is manufactured by adding carbon (II) oxide under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetrasulphate (VI) acid (H_2SO_4)



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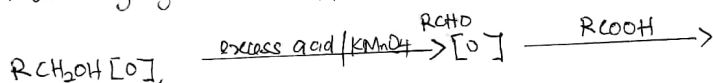
2 From Petroleum

Liquid phase air oxidation of C₅-C₇ alkanes, obtainable from petroleum at high temperature and pressure gives C₅-C₇ carboxylic acids with methanoic, propenoic and butanoic acids as by-products



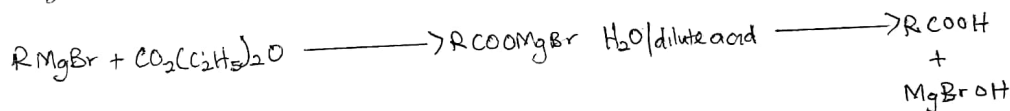
4. i) Oxidation of Primary Alcohol and aldehydes

Oxidation of primary alcohols and aldehydes can be used to prepare carboxylic acids using the usual oxidising agents (K₂Cr₂O₇ / KMnO₄) in acidic solution.

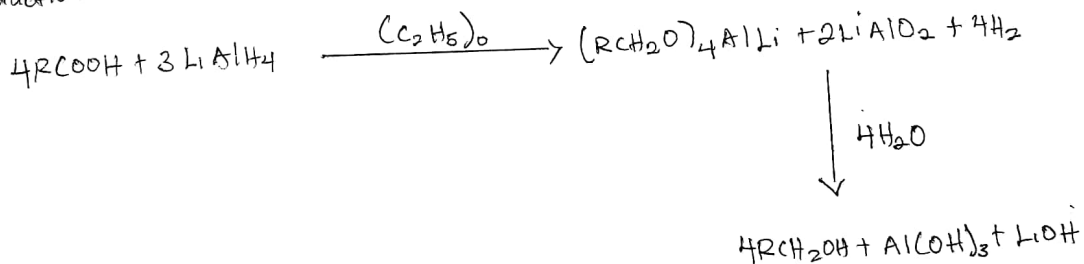


ii) Carbonation of Grignard reagent

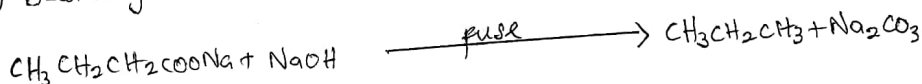
Aliphatic carboxylic acids are obtained by bubbling carbon (IV) oxide into the Grignard reagent and then hydrolyzed with dilute acid.



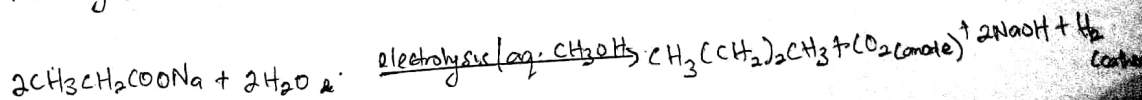
5. i) Reduction



ii) Decarboxylation



• Kolbe synthesis



... and aldehydes can be used to prepare carboxylic acids using the usual oxidising agents ($K_2Cr_2O_7 / KMnO_4$) in acidic solution.

3) Esterification

