

OHIOMORA BRITELLE IJEBOMA

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19/MHS 01/803

1a) HCOOH - Methanoic acid

b) $\text{HOOCCH}_2\text{CH}_2\text{CH}_2\text{COOH}$ - Pentan-1,5-dioic acid

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

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

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

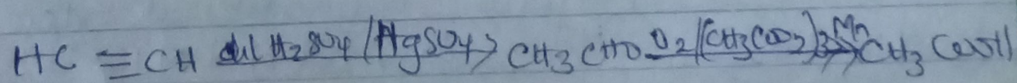
f) $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_2\text{COOH}$ - Hex-4-enoic acid

2i) Physical Properties: All simple aliphatic carboxylic acids up to 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 room temp.

ii) Boiling point: Boiling point increases with increasing molecular mass. Aromatic carboxylic acids are crystalline and have higher melting point 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 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 ~~the~~ relatively more hydrocarbon and hence covalent. All carboxylic acids are soluble in organic solvent.

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

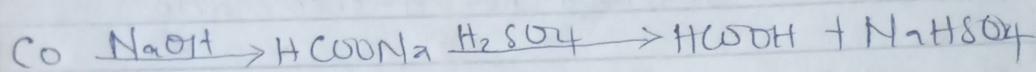


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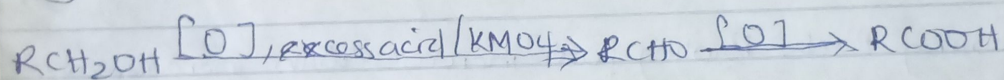
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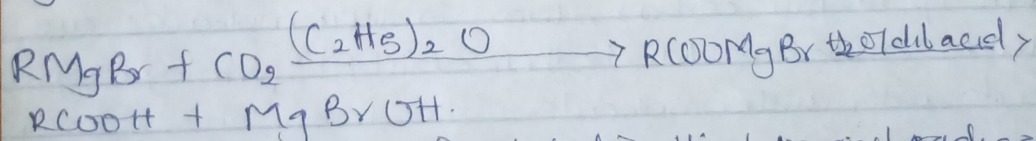
b) Form carbon(II) oxide: Methanoic acid (formic acid) is manufactured by adding carbon(II) oxide under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetraoxosulphate(VI) acid H_2SO_4 .



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

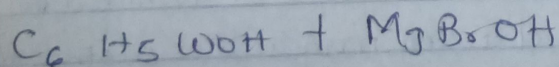
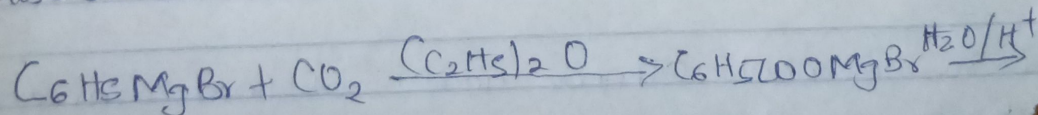


ii) Carboxylation of Grignard Reagent; Aliphatic carboxylic acids are obtained by bubbling carbon(II) oxide into grignard reagent and then hydrolyzed with dilute acid.



R may be 1° , 2° , 3° aliphatic alkyl or aryl radical.

In preparation of benzoic acid, the reagent is added to solid carbon(IV) oxide (dry ice) which also serves as coolant to the reaction mixture.



iii) Hydrolysis of nitriles (cyanides or esters)

