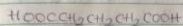


Revision - Wednesday  
Assignment

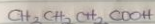
Give the IUPAC names of the following compounds.



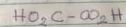
Formic acid



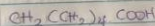
Pentan-1,5-dioic acid



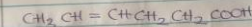
Butanoic acid



Ethanedioic acid



Hexanoic acid



Hex-1-enoic acid

2) Discuss briefly the physical properties of carboxylic acids under the following headings:

a) Physical appearance

b) Boiling point

c) Solubility

PHYSICAL APPEARANCE

All simple aliphatic carboxylic acids up to  $\text{C}_6$  are liquids at room temperature. Most other carboxylic acids are solid at room temperature. Although anhydrous carboxylic acid (acetic

acid) also known as glacial acetic acid freezes to an ice-like solid below the room temperature.

BOILING POINT

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.

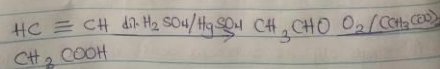
SOLUBILITY

Lower molecular mass carboxylic acids with up to four carbon atoms in their molecules are soluble in water. This is 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 less covalent. All carboxylic acids are soluble in organic solvents.

3) Write two industrial preparations of carboxylic acids.  
Industrial preparations of carboxylic acids:

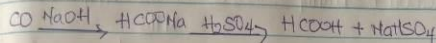
(i) From ethanol

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



(ii) From carbon (II) oxide

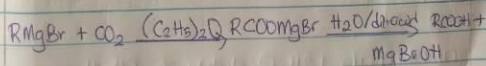
Formic acid (formic acid) is manufactured by adding carbon(II) oxide under pressure to hot aqueous solution of sodium hydroxide. The free carboxylic acid is liberated by careful reaction with tetraoxosulphate (VI) acid ( $\text{H}_2\text{SO}_4$ )



4) Write equations and brief explanation discuss the synthetic preparation of carboxylic acid.

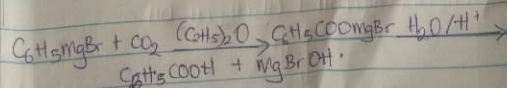
(a) Carbonation of Grignard reagent:

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



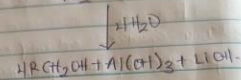
R may be 1°, 2°, 3° aliphatic alkyl or aryl radical.

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

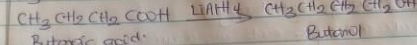


(b) Write chemical equation only, outline the reduction, decarboxylation and esterification of carboxylic acids.

(i) Reduction of carboxylic acid



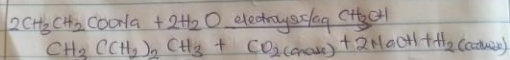
e.g



Butanoic acid

Butanol

(ii) Decarboxylation



(iii) Esterification

