Ethanoic acid (Acetic acid) CH_3COOH:

Ethanoic acid is most commonly known as acetic acid. Its dilute solution in water (5-8%) is known as vinegar, which is used for preserving food-sausage, pickles etc.

Physical properties :

(i) Ethanoic acid is vinegar smelling liquid. The lower carboxylic acids are liquids whereas higher ones are solids.

(ii) Ethanoic acid is sour in taste. Other lower carboxylic acids are also sour in taste.

(iii) Ethanoic acid has boiling point 391 K. Carboxylic acids have higher boiling points than corresponding alcohols, aldehydes and ketones.

(iv) Acetic acid is soluble in water, i.e., it is miscible with water in all proportions. The lower carboxylic acids are soluble in water but solubility in water decreases with increase in molecular weight.

(v) Acetic acid freezes at 290 K. Thus, in cold weather crystallization of acetic acid may take place that is why pure acetic acid is called glacial acetic acid.

Chemical Properties :

(i) Ethanoic acid is weak acid but it turns blue litmus red.

(ii) Reaction with Metale. Ethanoic acid reacts with metals like Na, K, Zn etc. to form metal ethanoates and hydrogen gas.

$$2CH_3COOH + 2Na \rightarrow \underset{\text{Sodium ethanoate}}{2CH_3COONa} + H_2$$

$$\underset{\text{Ethanoicacid}}{2CH_3COOH} + Zn \rightarrow \underset{\text{Zincethanoate}}{(CH_3COO)_2Zn} + H_2$$

(iii) Reaction with Carbonates. Ethanoic acid reacts with bicarbonates and carbonates and produces brisk effervescence due to formation of carbon dioxide.

$$CH_3COOH + \underset{\substack{\text{Sodium bicarbonate}\\(\text{Sodiumhydrogen}\\\text{carbonate})}}{NaHCO_3} \longrightarrow \underset{\text{Sodium ethanoate}}{CH_3COONa} + H_2O + CO_2$$

(iv) Reaction with Base. Ethanoic acid reacts with sodium hydroxide to form sodium ethanoate and water

$$\underset{\text{Ethanoicacid}}{CH_3COOH} + \underset{\text{Sodium hydroxide}}{NaOH} \longrightarrow \underset{\text{Sodium ethanoate}}{CH_3COONa} + \underset{\text{Water}}{H_2O}$$

(v) Decarboxylation (Removal of CO_2). When sodium salt of ethanoic acid, i.e., sodium ethanoate is heated with soda lime (3 parts of NaOH and 1 part of CaO), methane gas is formed.

$$\underset{\text{Sodium ethanoate}}{CH_3COONa} + \underset{\text{Soda lime}}{NaOH(CaO)} \xrightarrow{\text{Heat}} CH_4 + Na_2CO_3$$

This reaction is known as decarboxylation because a molecule of CO_2 is removed from a molecule of acid

Uses of Ethanoic acid :

(i) It is used for making vinegar

(ii) It is used as a laboratory reagent

(iii) It is used for preparation of white lead [$2PbCO_3.Pb(OH)_2$] which is used in white paints.

(iv) It is used for coagulation of rubber from latex and casein (protein) from milk

(v) It is used in preparation of acetone, ethyl acetate, acetic anhydride, aspirin which is used in medicines.

(vi) It is used in preparation of cellulose acetate which is used for making photographic film.

(vii) Its esters are used in artificial flavors in perfumes.

(viii) Its 5% solution is bactericidal (destroys bacteria)

(ix) Its compound basic copper acetate (verdigris) is used as green pigment.

(x)Aluminum acetate and chromium acetate are used as mordants in dyeing and