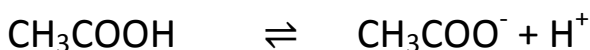


T

Organic acids (carboxylic acids)

An example is ethanoic acid CH_3COOH . Ethanoic acid is formed by the oxidation of ethanol. This is why alcoholic drinks go sour if they are left in the air for a long time. Ethanol can be oxidized more quickly if it is added to acidified (acid added like sulfuric acid) potassium manganate (VII). The potassium manganate (VII) changes colour from purple to colourless. Ethanol is also oxidized to ethanoic acid by heating with a mixture of potassium dichromate VI and sulfuric acid. The solution changes from orange to green.

Carboxylic acids are weak acids, typically solutions are around pH 3 (yellow-orange-pink with universal indicator). This means that they are only partly dissociated into ions in solution. The solutions of ethanoic acid in water conduct electricity because of the ions produced.



Ethanoic acid

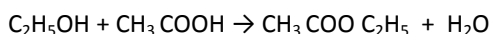
Ethanoate ion

hydrogen ion (proton)

Ethanoic acid (and other carboxylic acids) show the typical acid reactions. They change blue litmus red and they react with:

- **Metals** to form salts and hydrogen e.g.
 - ethanoic acid + magnesium \rightarrow magnesium ethanoate + hydrogen
 - $2\text{CH}_3\text{COOH} + \text{Mg} \rightarrow (\text{CH}_3\text{COO})_2\text{Mg} + \text{H}_2$
- **Alkali bases** to form a carboxylic acid salt and water e.g.
 - ethanoic acid + potassium hydroxide \rightarrow potassium ethanoate + water
 - $\text{CH}_3\text{COOH} + \text{KOH} \rightarrow \text{CH}_3\text{COOK} + \text{H}_2\text{O}$
- **Insoluble bases** to form salt and water e.g.
 - zinc oxide + ethanoic acid \rightarrow zinc ethanoate + water
 - $\text{ZnO} + 2\text{CH}_3\text{COOH} \rightarrow (\text{CH}_3\text{COO})_2\text{Zn} + \text{H}_2\text{O}$
- **Carbonate and hydrogen carbonate bases** to produce a carboxylic acid salt, water and carbon dioxide e.g.
 - ethanoic acid + sodium hydrogen carbonate \rightarrow sodium ethanoate + water + carbon dioxide
 - $\text{CH}_3\text{COOH} + \text{NaHCO}_3 \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O} + \text{CO}_2$
 - OR propanoic acid + sodium carbonate \rightarrow sodium propanoate + water + carbon dioxide
 - $2\text{CH}_3\text{CH}_2\text{COOH} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{CH}_3\text{CH}_2\text{COONa} + \text{H}_2\text{O} + \text{CO}_2$

Carboxylic acids also react with alcohols to form members of another homologous series called **esters**. Concentrated sulfuric acid acts as a catalyst.



Esters are usually sweet smelling and widely used as fragrances (e.g. perfumes) and food flavorings.