



Cambridge (CIE) A Level Chemistry



Esters

Contents

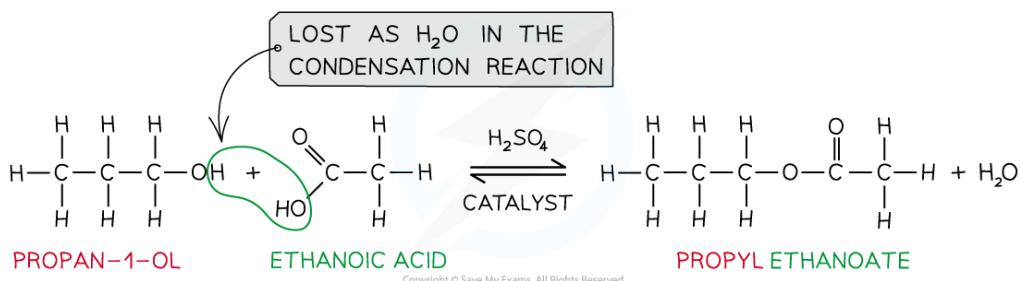
* Esters



Production of Esters

- Esters are compounds with an -COOR functional group and are characterised by their **sweet** and **fruity** smells
- They are prepared from the **condensation** reaction between a **carboxylic acid** and **alcohol** with **concentrated H₂SO₄** as **catalyst**
 - This is also called **esterification**
- The first part of the ester's name comes from the alcohol and the second part of the name comes from the carboxylic acid
 - E.g. Propanol and ethanoic acid will give the ester propyl ethanoate

Example esterification reaction

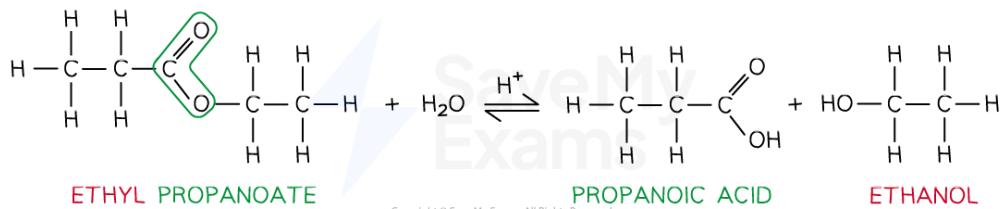


Esters are formed from the condensation reaction between carboxylic acids and alcohols

Hydrolysis of Esters

- Esters can be **hydrolysed** to reform the carboxylic acid and alcohol by either **dilute acid** or **dilute alkali** and **heat**
- When an ester is **heated under reflux** with **dilute acid** (eg. sulfuric acid) an equilibrium mixture is established as the reaction is **reversible**

Example acid hydrolysis of an ester

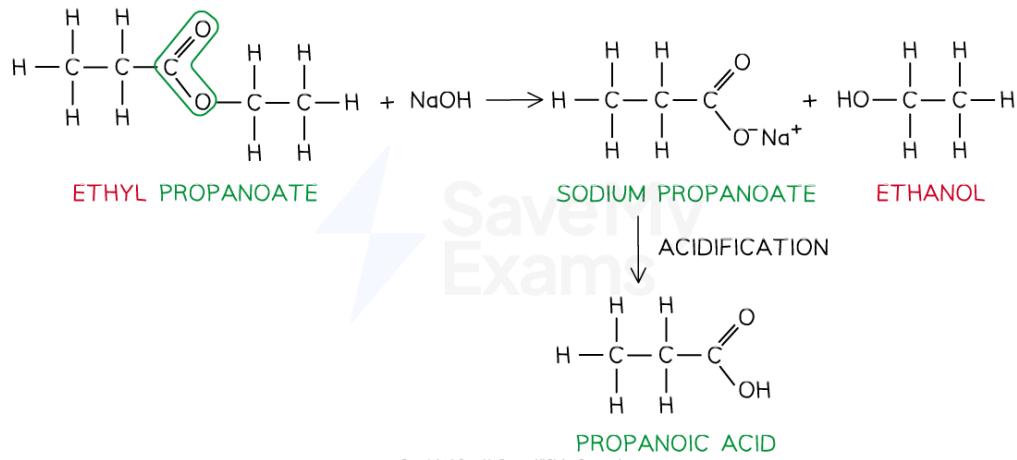


Ester hydrolysis by dilute acid is a reversible reaction forming carboxylic acid and alcohol

- However, **heating** the ester **under reflux** with **dilute alkali** (eg. sodium hydroxide) is an **irreversible** reaction as the ester is fully hydrolysed
- This results in the formation of a **sodium carboxylate** salt which needs further **acidification** to turn into a **carboxylic acid**
 - The sodium carboxylate ($-COO^-$) ion needs to get protonated by an acid (such as HCl) to form the carboxylic acid ($-COOH$)



Example alkaline hydrolysis of an ester



Ester hydrolysis by dilute alkali is an irreversible reaction forming a sodium carboxylate salt and alcohol