Esters can be cleaved back into a carboxylic acid and an alcohol by reaction with water and a catalytic amount of acid.

**General Reaction**

\[
\text{Ester} + \text{H}_2\text{O} \xrightarrow{\text{H}_3\text{O}^+} \text{Carboxylic Acid} + \text{Alcohol}
\]

**Example 1:**

\[
\text{PhCOOCH}_2\text{CH}_3 + \text{H}_2\text{O} \xrightarrow{\text{H}_3\text{O}^+} \text{PhCOOH} + \text{HOCH}_2\text{CH}_3
\]

**Mechanism**

1) Protonation of the Carbonyl

2) Nucleophilic attack by water

3) Proton transfer
4) Leaving group removal

Esters can be cleaved back into a carboxylic acid and an alcohol by reaction with water and a base.

The reaction is called a saponification from the Latin *sapo* which means soap. The name comes from the fact that soap used to be made by the ester hydrolysis of fats. Due to the basic conditions a carboxylate ion is made rather than a carboxylic acid.

**General reaction**

\[
\text{Ester} + \text{H}_2\text{O} + \text{NaOH} \rightarrow \text{Carboxylate} + \text{Alcohol}
\]

**Example 1:**

\[
\text{C}_{6}\text{H}_{5}\text{COOCH}_3 \rightarrow \text{C}_{6}\text{H}_{5}\text{CO}^- + \text{HOCH}_3
\]

**Mechanism**

1) Nucleophilic attack by hydroxide
2) Leaving group removal

3) Deprotonation

Contributors

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