Esters
Esters

- What are esters?
- Uses of esters
- How esters are made
- Summary activities
What are esters?

Esters are volatile compounds, meaning that they evaporate easily, and they have characteristic smells.

For example:

- propyl ethanoate smells of pears
- butyl butanoate smells of pineapple
- methyl butanoate smells of apple.
**Esters**

Esters have this function group:

\[ \text{–COO–} \]  
...which is written as –COO–.

Esters are made from the reaction of a **carboxylic acid** with an **alcohol**:

**carboxylic acid** + **alcohol** → **ester** + **water**

**ethanoic acid** + **ethanol** → **ethyl ethanoate** + **water**

\[
\text{CH}_3\text{COOH} \quad + \quad \text{C}_2\text{H}_5\text{OH} \quad \rightarrow \quad \text{CH}_3\text{COO}\text{C}_2\text{H}_5 \quad + \quad \text{H}_2\text{O}
\]
Esters are named after the alcohol and the carboxylic acid from which they are made. The alcohol gives the first part of the name, and the carboxylic acid gives the second. Esters always end in “–anoate”.

For example:
### Matching carboxylic acids to their esters

<table>
<thead>
<tr>
<th>Carboxylic Acid</th>
<th>Ester</th>
</tr>
</thead>
<tbody>
<tr>
<td>butanoic acid</td>
<td>ethyl butanoate</td>
</tr>
<tr>
<td>methanoic acid</td>
<td>methyl propanoate</td>
</tr>
<tr>
<td>propanoic acid</td>
<td>hexyl methanoate</td>
</tr>
<tr>
<td>hexanoic acid</td>
<td>propyl hexanoate</td>
</tr>
<tr>
<td>pentanoic acid</td>
<td>decyl pentanoate</td>
</tr>
<tr>
<td>ethanoic acid</td>
<td>ethyl ethanoate</td>
</tr>
</tbody>
</table>
## Practising naming esters

### Fill in the missing information in the table

<table>
<thead>
<tr>
<th>Carboxylic Acid</th>
<th>Alcohol</th>
<th>Ester</th>
</tr>
</thead>
<tbody>
<tr>
<td>propanoic acid</td>
<td>?</td>
<td>ethyl propanoate</td>
</tr>
<tr>
<td>?</td>
<td>methanol</td>
<td>methyl ethanoate</td>
</tr>
<tr>
<td>?</td>
<td>propanol</td>
<td>propyl methanoate</td>
</tr>
<tr>
<td>decanoic acid</td>
<td>?</td>
<td>methyl decanoate</td>
</tr>
<tr>
<td>butanoic acid</td>
<td>propanol</td>
<td>?</td>
</tr>
<tr>
<td>ethanoic acid</td>
<td>ethanol</td>
<td>?</td>
</tr>
</tbody>
</table>

**ethanoic acid**
Differentiating between substances

Ethanol, ethanoic acid and ethyl ethanoate: what are the expected reactions?

<table>
<thead>
<tr>
<th>Substance</th>
<th>Test Substance Added...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Universal Indicator</td>
</tr>
<tr>
<td>Ethyl Ethanoate</td>
<td>▼</td>
</tr>
<tr>
<td>Ethanol</td>
<td>▼</td>
</tr>
<tr>
<td>Ethanoic Acid</td>
<td>▼</td>
</tr>
</tbody>
</table>
Esters

What are esters?

Uses of esters

How esters are made

Summary activities
Why are esters useful?

Esters have many uses:

- as food flavourings and perfumes because they are volatile and smell pleasant

- as plastic packaging because polyesters are lightweight, durable and moisture-proof

- to make fleece clothing, which is often made from recycled polyester bottles

- as solvents and plasticizers.
Using esters as fragrance

"Artificial fragrance causes allergies in many people. It is unnecessary and used by companies to hook consumers on their products, and should be banned."

"Artificial fragrance is important in our industry. Most people like to have their laundry smelling fresh, and the fresh smell keeps them buying our products. We do offer fragrance free options."

-5 -4 -3 -2 -1 0 1 2 3 4 5

against

next

for
Esters

- What are esters?
- Uses of esters
- How esters are made
- Summary activities
How are esters made?

Esters are made by reacting a carboxylic acid with an alcohol.

However, the reaction is very slow at room temperature.

How could you speed it up?

- The reactants could be heated in order to make the reaction faster.

- A strong acid **catalyst** such as sulfuric acid could be added.
What are the characteristic smells of esters?

- carboxylic acids: ethanoic acid, butanoic acid

Press on the names of a carboxylic acid and alcohol to test.

- alcohols: octanol, butanol, ethanol, methanol
What are the stages in making an ester?

What are the steps involved in making an ester?

Press "play" to find out.
Esters

What are esters?

Uses of esters

How esters are made

Summary activities
Glossary of keywords: esters

**alcohol** – An organic compound containing the group –OH.

**carboxylic acid** – A compound containing the group –COOH.

**catalyst** – A substance that increases the rate of a chemical reaction.
Anagrams relating to esters

How quickly can you unscramble words about esters?

Press start to begin.

start
Can you smell success in this quiz about esters?

Press "start" to begin.