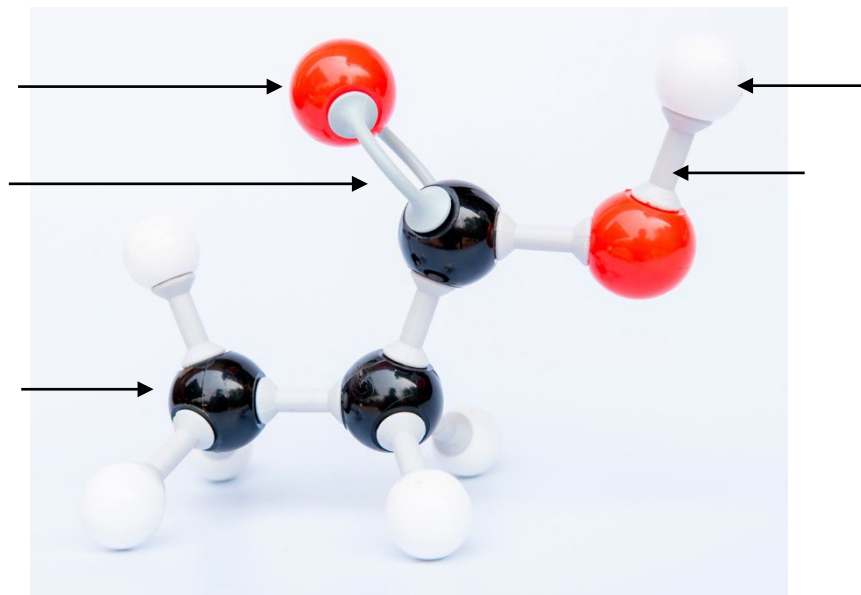


Carboxylic acids: knowledge check

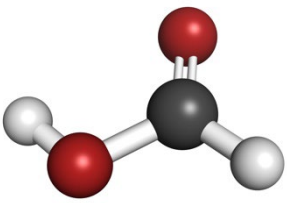
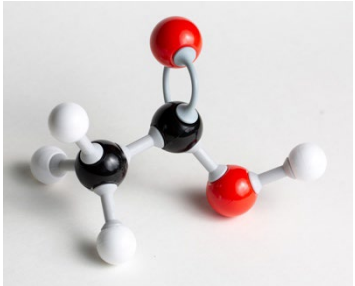
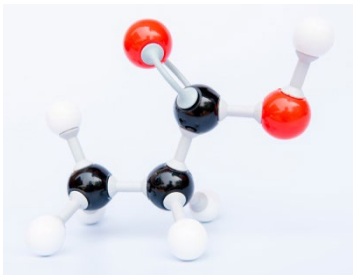
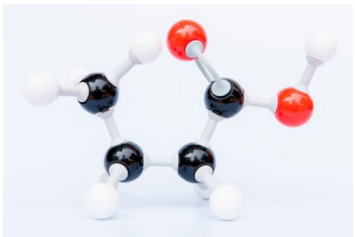
1.1 The image shows a molecular model of a carboxylic acid molecule.

Draw a circle around the carboxylic acid functional group and add labels to identify each part of the molecule indicated on the image.





1.2 The table includes images of molecular models of the first four carboxylic acids. Complete the table by adding the names and molecular formulas for each of the four carboxylic acids.

Molecular model	Name	Molecular formula
		
		
		
		



1.3 Decide whether each of the following statements is true or false and tick the box.

- | | | |
|--|-------------------------------|--------------------------------|
| (a) Carboxylic acid molecules fully ionise in water. | True ☐ | False ☐ |
| (b) Carboxylic acids are weak acids. | True ☐ | False ☐ |
| (c) Solutions of carboxylic acids in water have a pH above 7. | True ☐ | False ☐ |
| (d) The functional group of carboxylic acids is -COO . | True ☐ | False ☐ |
| (e) The general formula for carboxylic acids is $\text{C}_n\text{H}_{2n+1}\text{COOH}$. | True ☐ | False ☐ |
| (f) The molecular formula for pentanoic acid is $\text{C}_5\text{H}_{11}\text{COOH}$. | True ☐ | False ☐ |
| (g) Ethanoic acid is a stronger acid than hydrochloric acid. | True ☐ | False ☐ |

Use the space below to write out the correct version of any statements you think are false.

1.4 Carboxylic acids have typical acid properties.

Complete the sentences describing the typical chemical reactions of carboxylic acids.

Hydrochloric acid is a strong acid and _____ ionises in water.

Ethanoic acid is a weak acid and _____ ionises in water.

A solution of ethanoic acid has a _____ pH than a solution of hydrochloric acid with the same concentration.

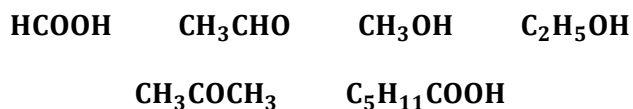
Carboxylic acids react with:

- metals to form _____ and _____ gas
- bases to form _____ and _____
- carbonates to form _____, _____ and _____ gas.



Acids and bases: test myself

2.1 Which **two** formulas represent carboxylic acids?



2.2 Draw the displayed formula for ethanoic acid.

2.3 What type of ions are produced by all carboxylic acids when they ionise?

2.4 Complete the word equations representing the reactions of ethanoic acid.

(a) ethanoic acid + _____ $\rightarrow$ magnesium ethanoate +

(b) ethanoic acid + magnesium oxide $\rightarrow$ _____ +

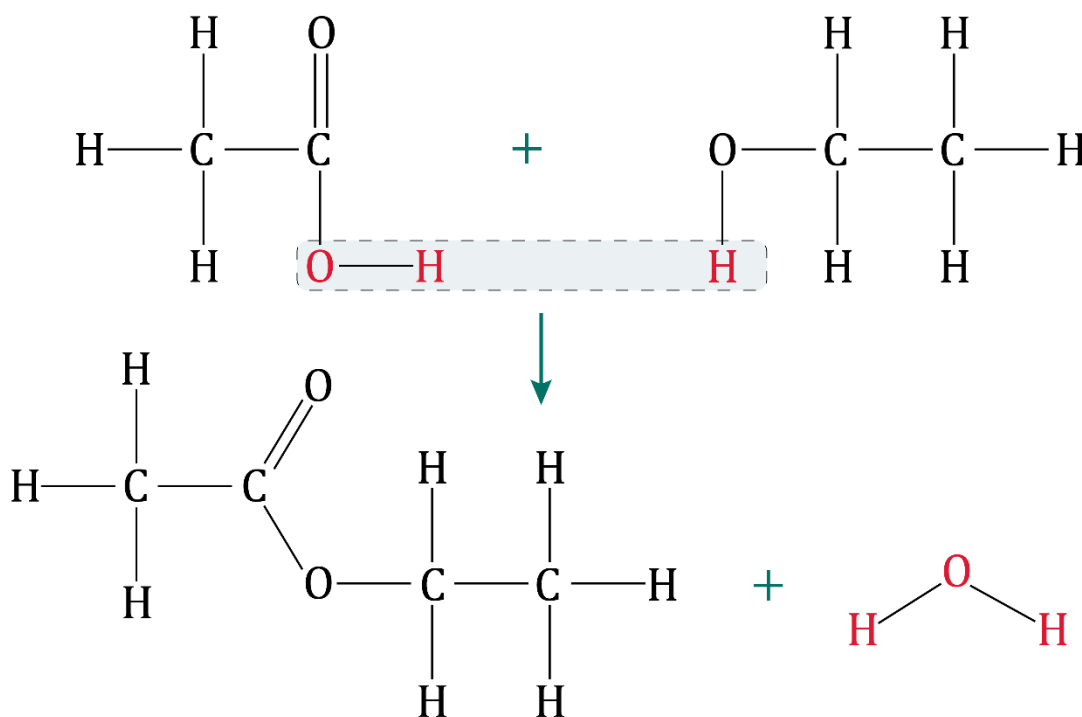
(c) ethanoic acid + magnesium _____ $\rightarrow$ _____
+ _____
+ carbon dioxide gas

2.5 Write a word equation to represent the general reaction between a carboxylic acid and an alcohol.

_____ + _____ $\rightarrow$ _____ + _____

2.6 Esters are a homologous series. What is their functional group?

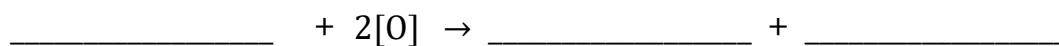
2.7 The image shows the reaction between ethanoic acid and ethanol to form an ester:



Name the ester formed.

2.8 Ethanol, CH₃CH₂OH, reacts with an oxidising agent to produce ethanoic acid and a second product.

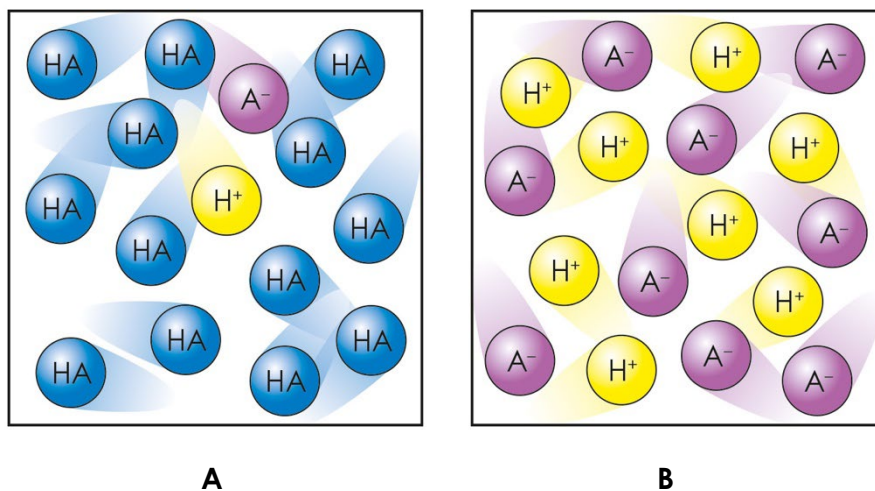
Complete the balanced symbol equation representing this reaction.



Carboxylic acids: feeling confident?

3.1 Diagrams **A** and **B** represent two different acids.

The formula HA is used to represent the acid molecule in diagram **A**.



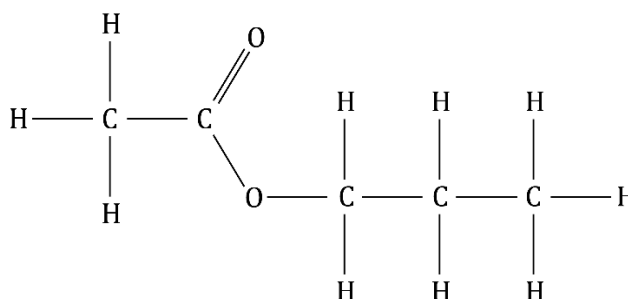
(a) What does the H⁺ in each diagram represent?

(b) Which diagram represents the acid that would react the fastest with magnesium ribbon?



- (c) Which diagram represents ethanoic acid and which represents hydrochloric acid? Explain how you made your conclusion.

- 3.2** The diagram shows the displayed formula of an ester. Use this image to answer the questions.



- (a) Name the carboxylic acid used to make this ester.

- (b) Name the alcohol used to form this ester.

- (c) Name the ester shown.



Carboxylic acids: what do I understand?

Think about your answers and confidence level for each mini-topic. Decide whether you understand it well, are unsure or need more help. Tick the appropriate column.

Mini-topic	I understand this well	I think I understand this	I need more help
I can identify the functional group and general formula of carboxylic acids.			
I can write the molecular formulae and draw the displayed formulas of the first four carboxylic acids.			
I know that carboxylic acids are weak acids.			
I can describe the reactions of carboxylic acids with metals, bases and carbonates.			
I can describe the reactions of carboxylic acids with alcohols to produce esters and identify the functional group of an ester.			
I can name an ester and identify the displayed formula of ethyl ethanoate.			
I can write an equation for the reaction between ethanol and an oxidising agent.			
Feeling confident? topics	I understand this well	I think I understand this	I need more help
I can describe the difference between strong and weak acids.			
I can name esters.			