

A close-up photograph of an ant on a green leaf, used as a background for the title. The ant is positioned on the left side of the frame, facing right. The leaf is bright green and has some water droplets on it.

CARBOXYLIC ACIDS

REACTIONS AND PROPERTIES

Answer all the questions below then check your answers

1. Fill in the Gaps.

The functional group of a carboxylic acid is written as _____

2. The general formula for a carboxylic acid is

3. The ending of the name for a carboxylic acid is

4. Describe the solubility of carboxylic acids in water.

5. Write the balanced chemical equation for the reaction of ethanoic acid with water.

6. What is the name of the type of reaction that occurs between a carboxylic acid and a carbonate?

7. Which of the following is NOT a property of carboxylic acids?

a) They have a sour taste.

b) They turn blue litmus paper red.

c) They dissolve fully in water.

d) They are weak acids.

8. When ethanoic acid reacts with calcium carbonate, one of the products is:
- a) Hydrogen gas
 - b) Chlorine gas
 - c) Carbon dioxide gas
 - d) Oxygen gas
9. The carboxylic acid found in vinegar is:
- a) Methanoic acid
 - b) Ethanoic acid
 - c) Propanoic acid
 - d) Butanoic acid
10. Carboxylic acids are considered weak acids because:
- a) They fully ionize in water
 - b) They partially ionize in water
 - c) They do not react with water
 - d) They only react with strong bases

11. Match the carboxylic acid with its common source:

<i>Carboxylic Acid</i>
<i>Methanoic acid</i>
<i>Ethanoic acid</i>
<i>Citric acid</i>

<i>Source</i>
<i>Ant stings/nettle stings</i>
<i>Vinegar</i>
<i>Citrus fruits</i>

12. Design an experiment to investigate the rate of reaction between calcium carbonate chips and ethanoic acid of varying concentrations. Outline the variables you would control, the variable you would change, and the measurements you would take.

Answers

1. Fill in the Gaps (1 mark each)

The functional group of a carboxylic acid is written as _____ *-COOH*.

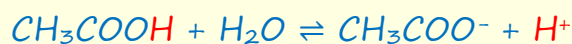
2. The general formula for a carboxylic acid is $C_nH_{2n+1}COOH$

3. The ending of the name for a carboxylic acid is *-oic acid*.

4. Describe the solubility of carboxylic acids in water.

Carboxylic acids with less than 6 carbon atoms are soluble in water.

5. Write the balanced chemical equation for the reaction of ethanoic acid with water.



6. What is the name of the type of reaction that occurs between a carboxylic acid and a carbonate?

Neutralisation reaction

7. Which of the following is NOT a property of carboxylic acids?

- a) They have a sour taste.
- b) They turn blue litmus paper red.
- c) They dissolve fully in water.
- d) They are weak acids.

Answer: c - carboxylic acids are weak acids so they only partly dissolve in water.

8. When ethanoic acid reacts with calcium carbonate, one of the products is:

- a) Hydrogen gas
- b) Chlorine gas
- c) Carbon dioxide gas
- d) Oxygen gas

Answer: c, carboxylic acids react with metal carbonates to release carbon dioxide gas.

9. The carboxylic acid found in vinegar is:

- a) Methanoic acid
- b) Ethanoic acid
- c) Propanoic acid
- d) Butanoic acid

Answer: b ethanoic acid

10. Carboxylic acids are considered weak acids because:

- a) They fully ionize in water
- b) They partially ionize in water
- c) They do not react with water
- d) They only react with strong bases

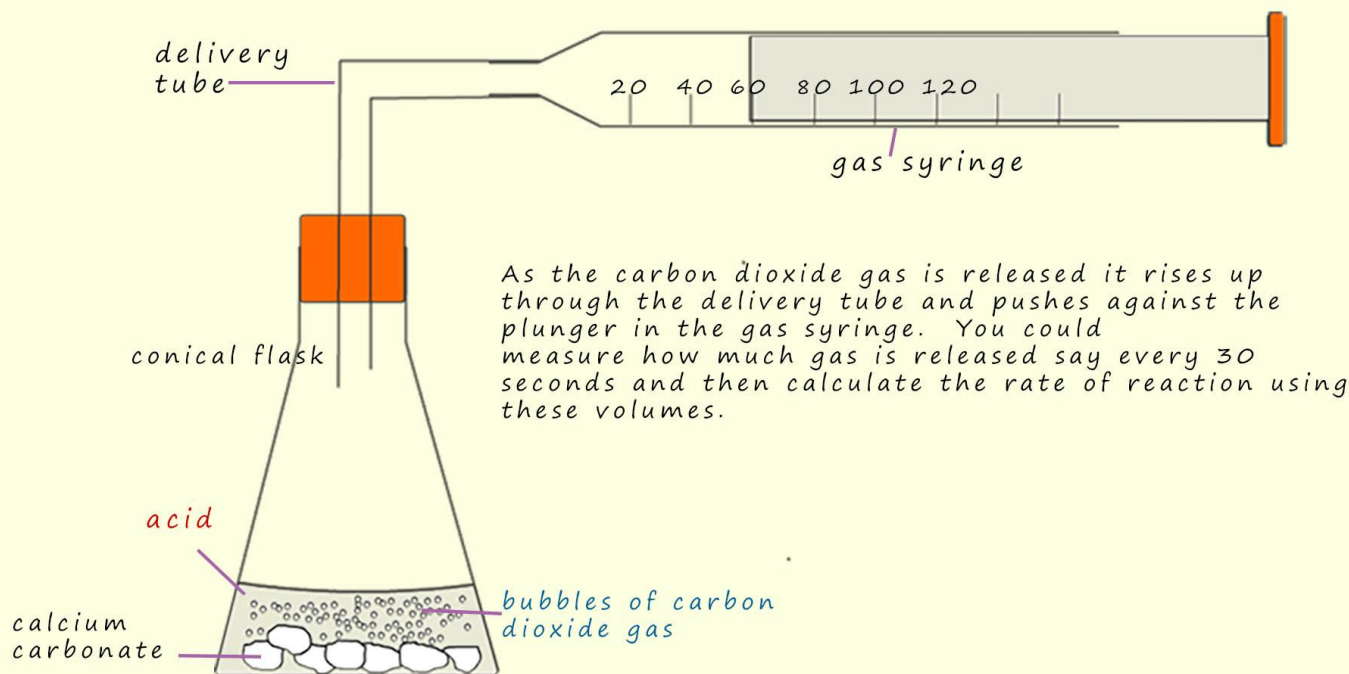
Answer: b, they only partly ionise in water

11. Match the carboxylic acid with its common source:

Carboxylic Acid	Source
Methanoic acid _____	Ant stings/nettle stings
Ethanoic acid _____	Vinegar
Citric acid _____	Citrus fruits

12. Design an experiment to investigate the rate of reaction between calcium carbonate chips and ethanoic acid of varying concentrations. Outline the variables you would control, the variable you would change, and the measurements you would take.

You could set-up the apparatus shown below to measure the volume of CO₂ released every 30s



- *Control Variables: Temperature, mass of calcium carbonate chips, surface area of calcium carbonate chips*
- *Independent Variable: Concentration of ethanoic acid*
- *Dependent Variable: Rate of carbon dioxide production (could be measured by timing how long it takes for a certain volume of gas to be produced, or by measuring the mass loss over time)*