

WJEC Chemistry GCSE

7: Chemistry of Acids

Practice Questions

England Specification

1. Describe the similarities in the reactions of ethanoic acid and sulfuric acid with metals, carbonates and bases. Describe and explain any differences observed. You should include relevant equations in your answer. [6 QWC]

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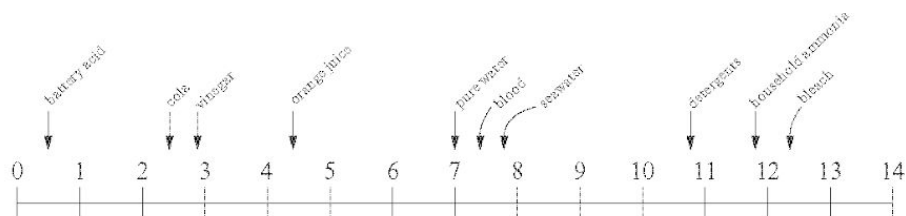
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2. The following diagram shows the pH scale and the pH values of some common substances.



(a) From the substances above, name

(i) the strongest acid, [1]

(ii) the weakest alkali, [1]

(iii) a neutral substance, [1]

(b) John was studying the reactions of acids with three different substances, **A**, **B** and **C**. He recorded his observations and temperature changes in the table shown below.

Substance added to acid	Observations	Temperature change (°C)
A	bubbles of gas produced, gas collected turns limewater milky, substance reacts to produce blue solution	+4
B	no gas produced, substance reacts to produce a blue solution	0
C	no visible change	+8

Identify **A**, **B** and **C** from the substances in the box below.

[3]

copper carbonate copper oxide magnesium
 sodium chloride sodium hydroxide

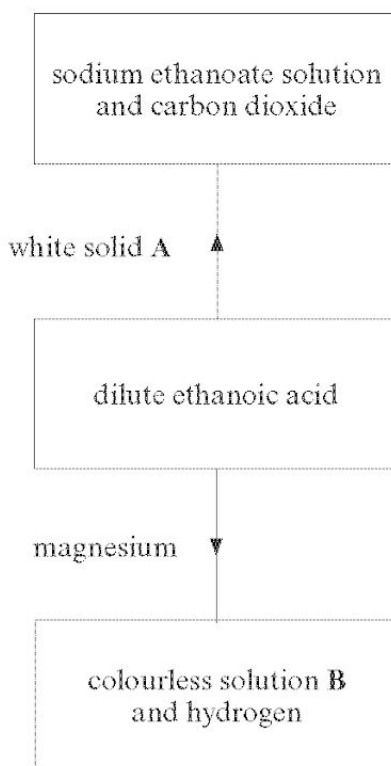
A

B

C

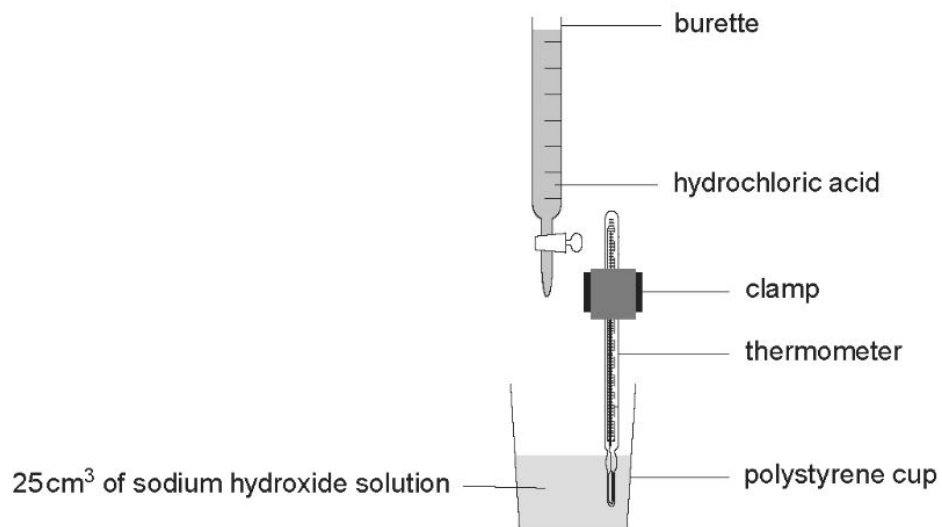
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3. (a) The flow diagram below shows some reactions of ethanoic acid, CH_3COOH .

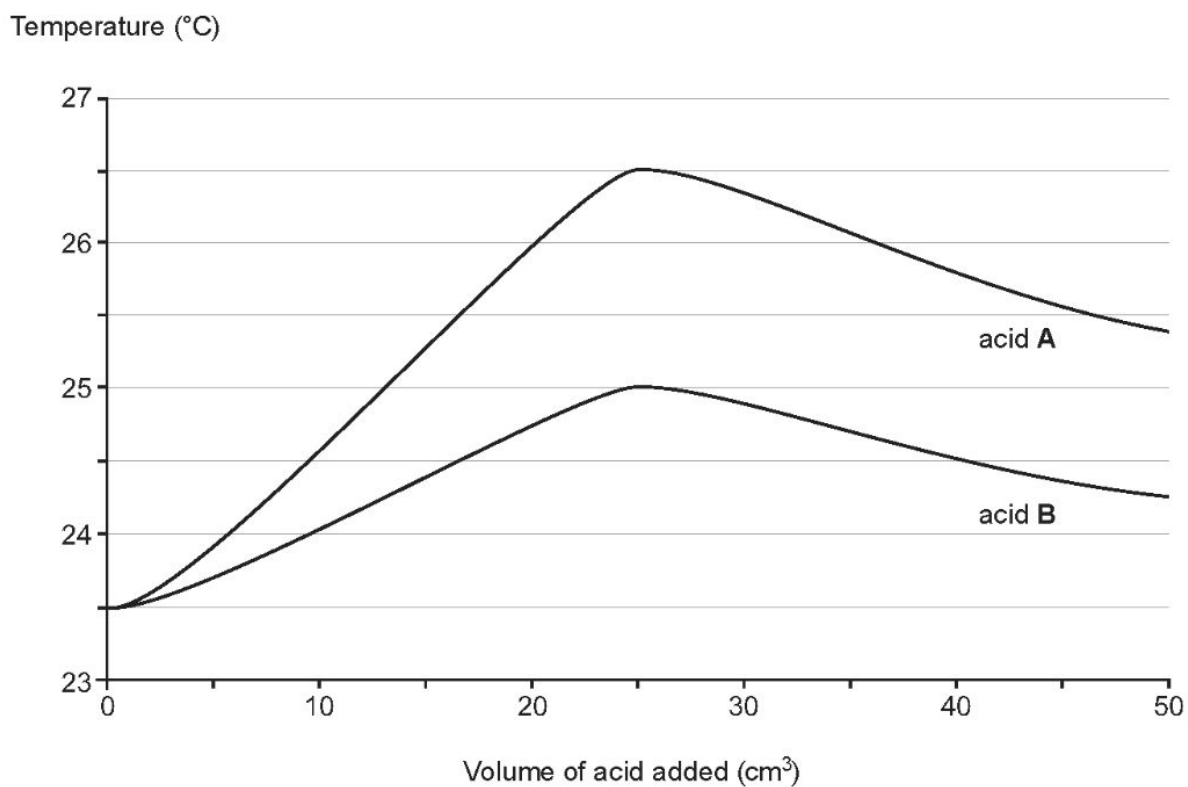


- (i) Name white solid **A**. [1]
- (ii) Name colourless solution **B**. [1]
- (b) Dilute ethanoic acid reacts with magnesium less vigorously than dilute sulfuric acid of equal concentration.
- Give the reason for this difference in behaviour. [1]
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- (c) Ethanoic acid is formed when an alcoholic drink such as wine is left exposed to the air. Give the name of the compound in wine which turns into ethanoic acid. [1]
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4. The apparatus below can be used to measure the temperature as a neutralisation reaction takes place.



The graphs below show how the temperature changes when acids **A** and **B** are added separately to 25 cm³ of sodium hydroxide solution.



(a) Use the graphs opposite to find the
(i) volume of acid required to neutralise the sodium hydroxide solution in both experiments, [1]

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(ii) maximum temperature rise for acid B. [1]

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(b) State which acid, A or B, is stronger and give a reason for your answer. [1]

Stronger acid

Reason

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(c) Describe how an indicator could be used to find the exact volume of acid needed for neutralisation. [3]

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5.

(a) Sulfuric acid is a **strong** acid.

Place a tick (✓) in the box with the pH value of sulfuric acid.

[1]

pH value

1

5

7

9

14

(b) Give the chemical name of an acid other than sulfuric acid.

[1]

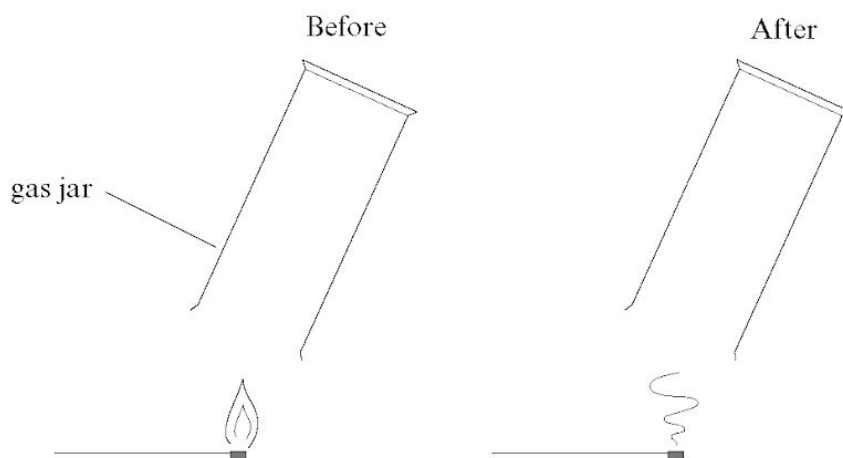
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(c) Name the gas given off when dilute sulfuric acid reacts with sodium carbonate.

[1]

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(d) The gas given off in part (c) was collected in a gas jar. The gas jar was turned upside down over a burning splint as shown in the diagrams below.



Suggest **two** properties of this gas that are shown by this experiment.

[2]

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6.

The following table shows the pH of some common substances.

Substance	pH
limewater	10.5
saliva	6.4
lemon juice	2.2
orange juice	2.6
milk of magnesia	10.0

(a) Use only information from the table to answer parts (i) and (ii).

(i) Name the strongest acid. [1]

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(ii) Name the substance closest to being neutral. [1]

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(b) Milk of magnesia is used to treat indigestion. It contains magnesium hydroxide which reacts with excess hydrochloric acid in the stomach.

(i) Complete the following word equation to show the products formed. [2]

magnesium hydroxide + hydrochloric acid \longrightarrow +

(ii) Another indigestion remedy contains calcium carbonate. Name the gas produced when calcium carbonate reacts with hydrochloric acid and state how this gas can be identified. [2]

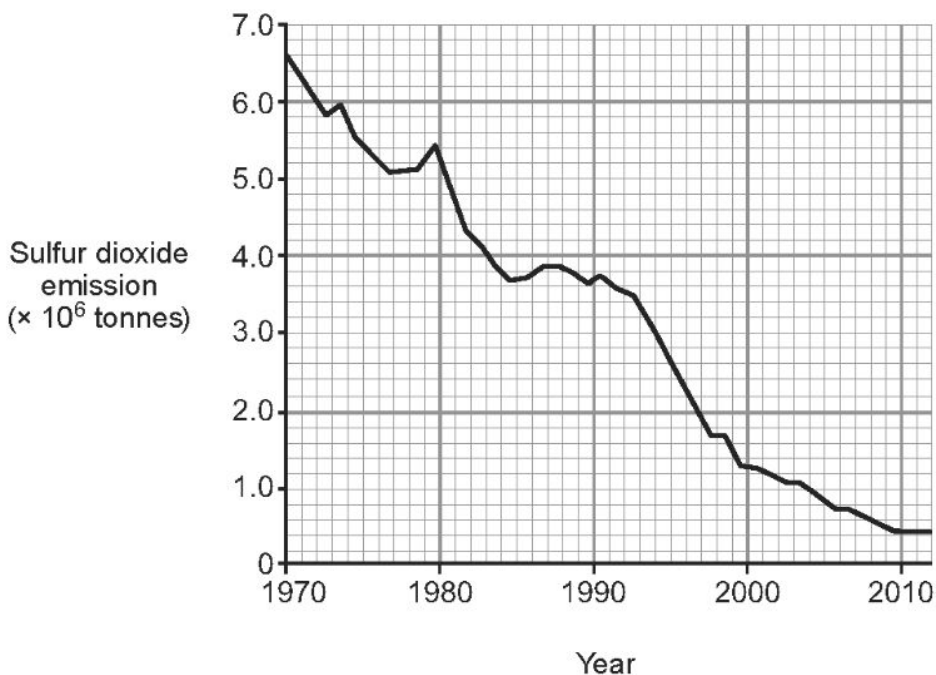
Gas produced

How this gas can be identified

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7. (a) The graph below shows the total sulfur dioxide emissions in the UK between 1970 and 2012.



- (i) Use the graph to calculate the decrease in sulfur dioxide emissions in tonnes between 1994 and 2004. [1]

Decrease in sulfur dioxide emissions = tonnes

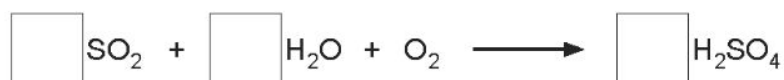
- (ii) Suggest and explain a possible reason for the trend shown in the graph. [2]

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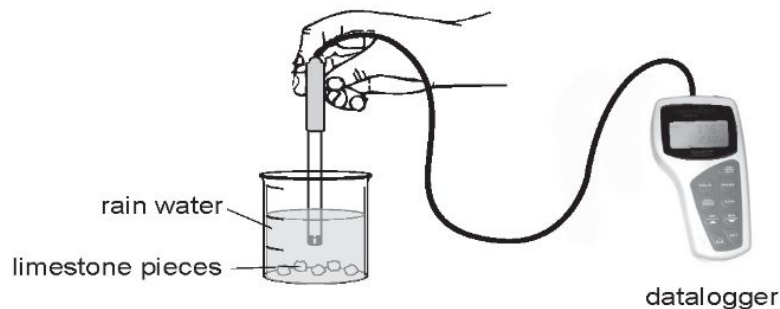
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- (iii) Balance the symbol equation below which shows a reaction that can lead to the formation of sulfuric acid in the atmosphere. [1]



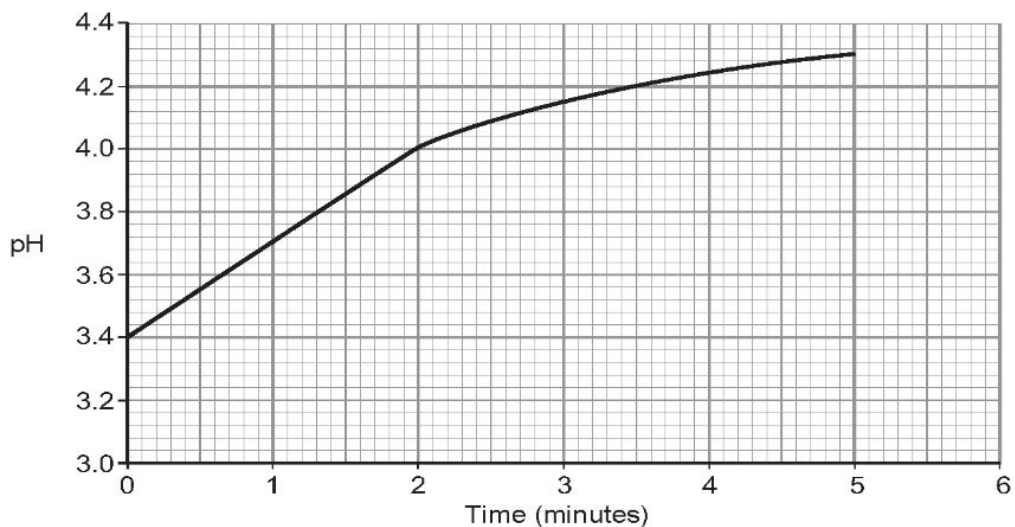
- (b) A group of pupils investigated the pH change which occurs when limestone reacts with acid rain. The group collected rain water during a rain shower.

They used the apparatus shown below.



They added limestone pieces to the rain water and recorded the pH of the mixture for 5 minutes. The data collected was then downloaded to a computer.

The graph below shows the results recorded.



- (i) Name the type of reaction taking place. [1]

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- (ii) Limestone affects the acidity of acid rain. Describe how the graph supports this statement. [2]

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- (iii) Apart from destroying limestone buildings and statues, give **one other** problem associated with acid rain. [1]

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8. An analytical chemist was asked to check the amount of vitamin C in a tablet. Vitamin C tablets contain ascorbic acid, $C_6H_8O_6$, and a starch "filler" which holds them together.

Ascorbic acid reacts with sodium hydroxide solution according to the equation below:



To determine how much vitamin C is present, a tablet was dissolved in water and titrated with sodium hydroxide solution of concentration 0.10 mol/dm^3 . The endpoint was determined using the indicator phenolphthalein. The procedure was repeated three times and the mean value of sodium hydroxide solution needed to neutralise a vitamin C tablet was found to be 17.5 cm^3 .

- (a) Calculate the number of moles of sodium hydroxide in 17.5 cm^3 of the 0.10 mol/dm^3 solution. [2]

Number of moles = mol

- (b) Calculate the relative molecular mass, M_r , of ascorbic acid, $C_6H_8O_6$. [1]

$$A_r(\text{H}) = 1 \quad A_r(\text{O}) = 16 \quad A_r(\text{C}) = 12$$

$M_r = \dots\dots\dots$

- (c) The label on the bottle states that each tablet contains 300 mg (0.3 g) of vitamin C. Using your answers to parts (a) and (b) show whether this statement is correct. [2]

9. Sodium chloride is made when sodium hydroxide solution reacts with dilute hydrochloric acid.



Describe a laboratory method for making crystals of pure sodium chloride from sodium hydroxide solution and dilute hydrochloric acid. [6 QWC]

Diagrams may be used as part of your answer.

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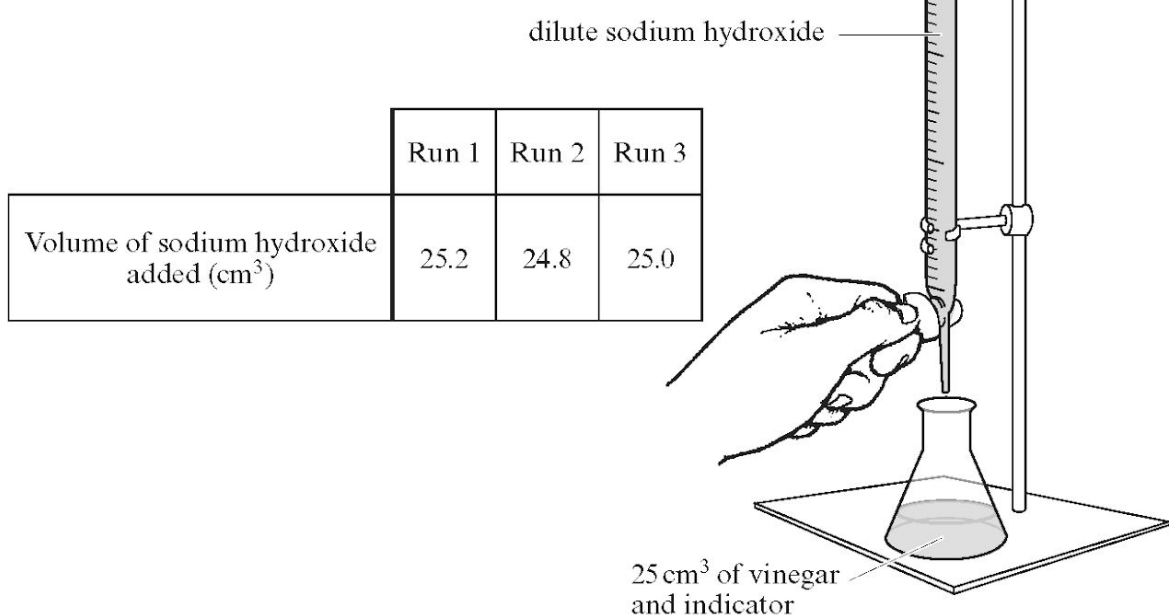
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10.

A food scientist was asked to check the quality of a bottle of vinegar. Vinegar contains ethanoic acid, CH_3COOH .

The apparatus shown was used to find the concentration of ethanoic acid in the vinegar.

Dilute sodium hydroxide of concentration 0.1 mol/dm^3 was added a little at a time to 25 cm^3 of vinegar until the indicator changed colour. The procedure was carried out three times.



(a) Calculate the mean volume of sodium hydroxide needed to neutralise 25 cm^3 of vinegar. [1]

(b) Ethanoic acid reacts with sodium hydroxide solution according to the equation below.



Using the mean volume of sodium hydroxide from part (a), calculate the concentration of the ethanoic acid in mol/dm³. [3]

Concentration of ethanoic acid = mol/dm³

(c) The label on the vinegar bottle states that it contains 5 g of ethanoic acid, CH₃COOH, in 100 cm³ vinegar.

$$A_r(\text{H}) = 1 \quad A_r(\text{C}) = 12 \quad A_r(\text{O}) = 16$$

(i) Calculate the relative molecular mass, M_r , of ethanoic acid. [1]

$$M_r = \dots\dots\dots$$

(ii) Using your answers to parts (b) and (c)(i) show whether the information on the label is correct. [2]

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