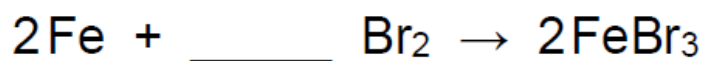


Reactions of acids, bases and salts – GCSE Chemistry

1. No.1.7

Balance the equation for the reaction between iron and bromine.

[1 mark]

2. No.7

This question is about acids, bases and salts.

Zinc nitrate is a salt.

A student produces zinc nitrate using an acid and a base.

Which acid should the student use to produce zinc nitrate?

[1 mark]Tick (✓) **one** box.

Hydrochloric acid

☐

Nitric acid

☐

Sulfuric acid

☐

Which is a base the student could use to produce zinc nitrate?

[1 mark]

Tick (✓) **one** box.

Zinc chloride

☐

Zinc oxide

☐

Zinc sulfate

☐

Name the salt with the formula MgBr_2

[1 mark]

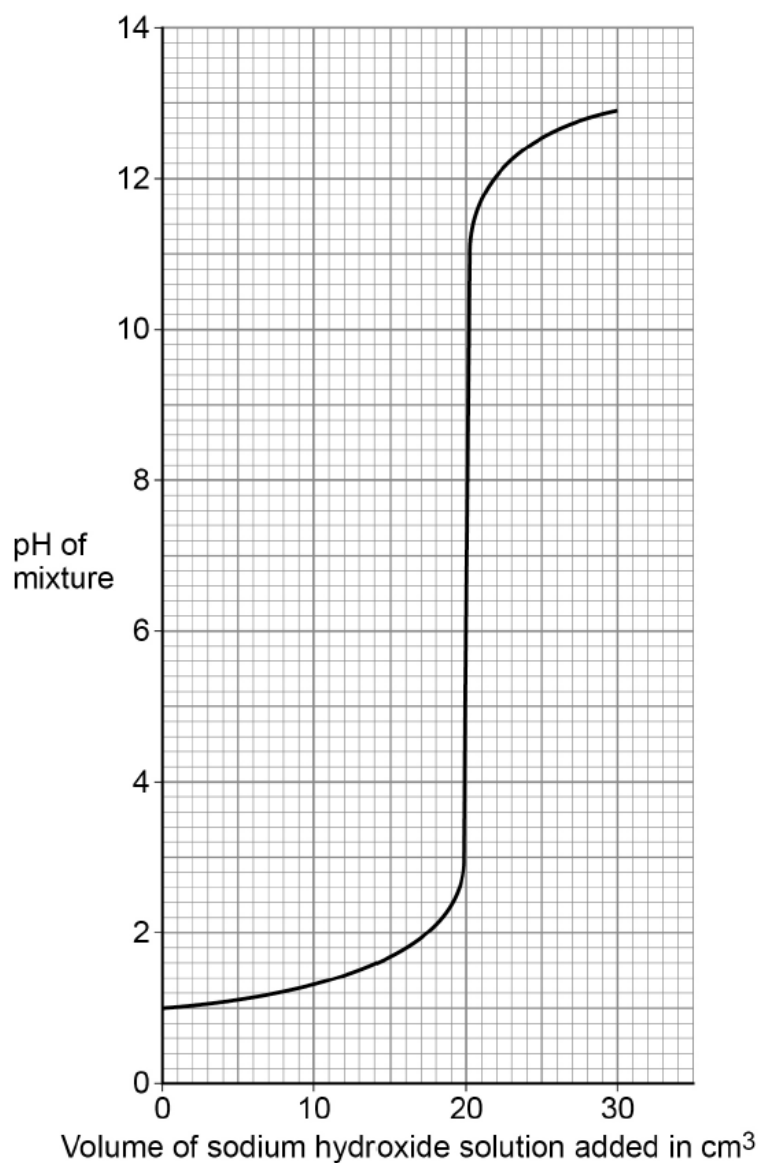
A student investigated how pH changes during a titration.

This is the method used.

1. Pour 25.0 cm^3 of hydrochloric acid into a beaker.
2. Measure the pH of the hydrochloric acid with a pH probe.
3. Add 1.0 cm^3 of sodium hydroxide solution from a burette.
4. Swirl the mixture.
5. Measure the pH of the mixture.
6. Repeat steps 3 to 5 until a total of 30.0 cm^3 of sodium hydroxide solution has been added.

Figure 10 shows the student's results.

Figure 10



Describe how the pH of the mixture changes as sodium hydroxide solution is added to hydrochloric acid.

Use data from **Figure 10** in your answer.

[3 marks]

What volume of sodium hydroxide solution is needed to neutralise 25.0 cm³ of hydrochloric acid?

Use **Figure 10**.

[1 mark]

Volume = _____ cm³

Figure 11 shows the colour of universal indicator at different pH values.

Figure 11

← Red			→ Orange		→ Yellow		→ Green		→ Blue		→ Purple →			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

The student could have used universal indicator instead of a pH probe.

Determine the colour of universal indicator when 10.0 cm³ of sodium hydroxide solution has been added to 25.0 cm³ of hydrochloric acid.

Use **Figure 10** and **Figure 11**.

[1 mark]

Colour = _____

The student used a pipette to measure 25.0 cm^3 of hydrochloric acid.

Figure 12 shows a pipette.

Figure 12



The pipette is labelled $25.0 \pm 0.06 \text{ cm}^3$

Calculate the percentage uncertainty in the volume measured using this pipette.

Use the equation:

$$\text{percentage uncertainty} = \frac{\text{uncertainty}}{\text{volume measured}} \times 100$$

[2 marks]

Percentage uncertainty = _____ %

Give **one** advantage of using a pipette rather than using a measuring cylinder to measure the volume of hydrochloric acid.

[1 mark]

3. No.10

A student investigated the law of conservation of mass.

This is the method used.

1. Pour silver nitrate solution into a beaker labelled **A**.
2. Pour sodium iodide solution into a beaker labelled **B**.
3. Measure the masses of both beakers and their contents.
4. Pour the solution from beaker **B** into beaker **A**.
5. Measure the masses of both beakers and their contents again.

Table 7 shows the student's results.

Table 7

	Mass before mixing in g	Mass after mixing in g
Beaker A and contents	78.26	108.22
Beaker B and contents	78.50	48.54

Explain how the results demonstrate the law of conservation of mass.

You should use data from **Table 7** in your answer.

[2 marks]

Suggest how the student could separate the insoluble silver iodide from the mixture at the end of the reaction.

[1 mark]

The student purified the separated silver iodide.

This is the method used.

1. Rinse the silver iodide with distilled water.
2. Warm the silver iodide.

Suggest **one** impurity that was removed by rinsing with water.

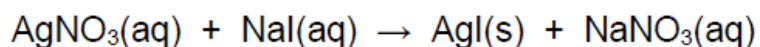
[1 mark]

Suggest why the student warmed the silver iodide.

[1 mark]

Calculate the percentage atom economy for the production of silver iodide in this reaction.

The equation for the reaction is:



Give your answer to 3 significant figures.

Relative formula masses (M_r): $\text{AgNO}_3 = 170$ $\text{NaI} = 150$ $\text{AgI} = 235$ $\text{NaNO}_3 = 85$

[4 marks]

Percentage atom economy (3 significant figures) = _____ %

Give **one** reason why reactions with a high atom economy are used in industry.

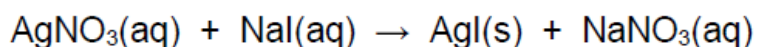
[1 mark]

4. No.3

This question is about silver iodide.

Silver iodide is produced in the reaction between silver nitrate solution and sodium iodide solution.

The equation for the reaction is:



A student investigated the law of conservation of mass.

This is the method used.

1. Pour silver nitrate solution into a beaker labelled **A**.
2. Pour sodium iodide solution into a beaker labelled **B**.
3. Measure the masses of both beakers and their contents.
4. Pour the solution from beaker **B** into beaker **A**.
5. Measure the masses of both beakers and their contents again.

Table 3 shows the student's results.

Table 3

	Mass before mixing in g	Mass after mixing in g
Beaker A and contents	78.26	108.22
Beaker B and contents	78.50	48.54

Explain how the results demonstrate the law of conservation of mass.

You should use data from **Table 3** in your answer.

[2 marks]

Suggest how the student could separate the insoluble silver iodide from the mixture at the end of the reaction.

[1 mark]

The student purified the separated silver iodide.

This is the method used.

1. Rinse the silver iodide with distilled water.

2. Warm the silver iodide.

Suggest **one** impurity that was removed by rinsing with water.

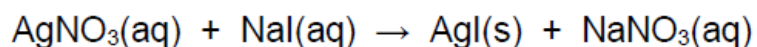
[1 mark]

Suggest why the student warmed the silver iodide.

[1 mark]

Calculate the percentage atom economy for the production of silver iodide in this reaction.

The equation for the reaction is:



Give your answer to 3 significant figures.

Relative formula masses (M_r): $\text{AgNO}_3 = 170$ $\text{NaI} = 150$ $\text{AgI} = 235$ $\text{NaNO}_3 = 85$

[4 marks]

Percentage atom economy (3 significant figures) = _____ %

Give **one** reason why reactions with a high atom economy are used in industry.

[1 mark]

5. No.9

This question is about acids and alkalis.

Which ion do all acids produce in aqueous solution?

[1 mark]

Tick (✓) **one** box.

H⁺

☐

H⁻

☐

O²⁻

☐

OH⁻

☐

Calcium hydroxide solution reacts with an acid to form calcium chloride.

Complete the word equation for the reaction.

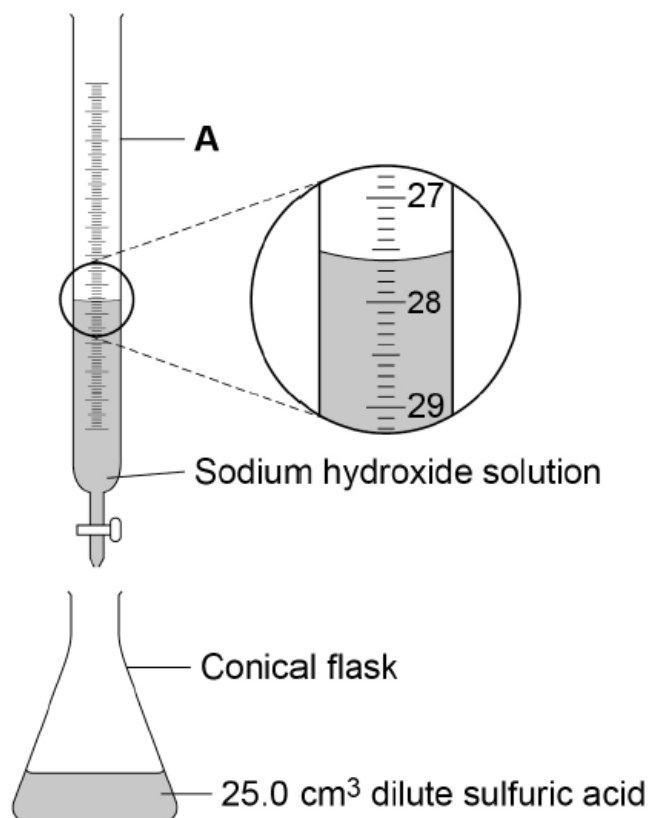
[2 marks]

calcium hydroxide + _____ acid → calcium chloride + _____

A student investigates the volume of sodium hydroxide solution that reacts with 25.0 cm^3 of dilute sulfuric acid.

Figure 12 shows the apparatus the student uses.

Figure 12



Use **Figure 12** to answer Questions **09.3** and **09.4**

Name apparatus **A**.

[1 mark]

What is the reading on apparatus **A**?

[1 mark]

_____ cm³

The higher the concentration of a sample of dilute sulfuric acid, the greater the volume of sodium hydroxide needed to neutralise the acid.

[6 marks]

[illegible]

6. No.2

This question is about acids and alkalis.

Which ion do all acids produce in aqueous solution?

[1 mark]

Tick (✓) **one** box.

H^+

☐

H^-

☐

O^{2-}

☐

OH^-

☐

Calcium hydroxide solution reacts with an acid to form calcium chloride.

Complete the word equation for the reaction.

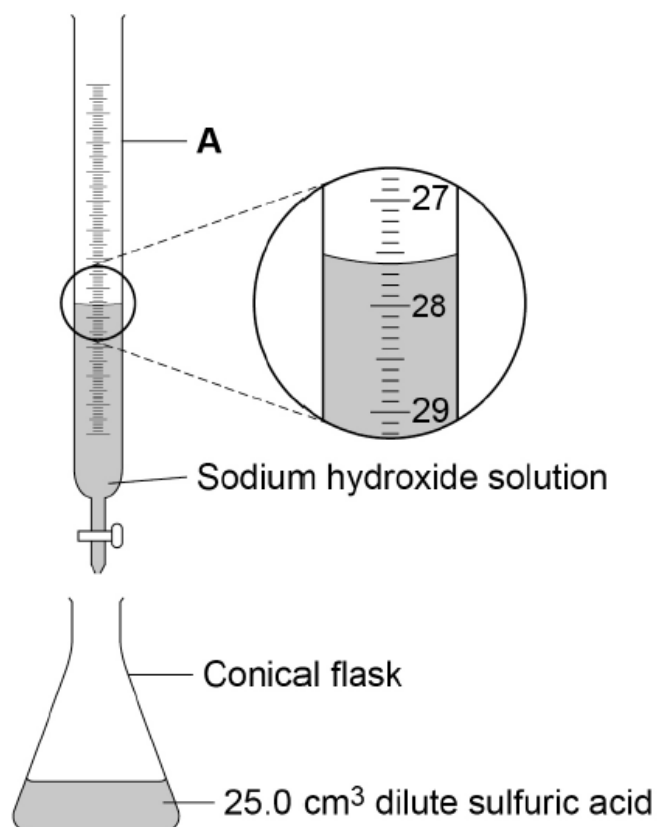
[2 marks]

calcium hydroxide + _____ acid → calcium chloride + _____

A student investigates the volume of sodium hydroxide solution that reacts with 25.0 cm^3 of dilute sulfuric acid.

Figure 2 shows the apparatus the student uses.

Figure 2



Use **Figure 2** to answer Questions **02.3** and **02.4**

Name apparatus **A**.

[1 mark]

What is the reading on apparatus **A**?

[1 mark]

_____ cm³

The higher the concentration of a sample of dilute sulfuric acid, the greater the volume of sodium hydroxide needed to neutralise the acid.