

Types of Chemical Reactions

1. Neutralisation occurs when acids react with alkalis.

What is the ionic equation for neutralisation?

- A $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
- B $\text{H}^- + \text{OH}^+ \rightarrow \text{H}_2\text{O}$
- C $\text{H}^+ + \text{OH}^+ \rightarrow \text{H}_2\text{O}$
- D $\text{H}^- + \text{OH}^- \rightarrow \text{H}_2\text{O}$

Your answer

[1]

2. Sodium hydroxide reacts with hydrochloric acid. Sodium chloride and water are made.

What is the name of this type of reaction?

- A Neutralisation
- B Oxidation
- C Reduction
- D Thermal decomposition

Your answer

[1]

3. Lemon juice can be described as a weak acid.

What is the pH value for a weak acid?

- A pH 1
- B pH 4
- C pH 7
- D pH 14

Your answer

[1]

4. A student neutralises an alkali with an acid in a titration experiment.

Complete the word equation for the reaction of an acid with an alkali.

acid + alkali → +

[2]

5. Sulfur dioxide is a pollutant found in many large cities.

Sulfur dioxide is an **acidic** gas.

- i. Suggest a value for the pH of sulfur dioxide.

..... [1]

- ii. Describe **one** problem caused by sulfur dioxide.

..... [1]

6 (a). * Potassium chloride is a mineral found in many foods.

A student wants to make a salt called potassium chloride, KCl, by neutralisation of an acid by an alkali.

Describe how to make a pure, dry sample of potassium chloride in a laboratory by neutralisation.

..... [6]

Look at her results.

Metal	Temperature change (°C)		
	Test 1	Test 2	Test 3
Magnesium	10.3	10.5	10.2
Zinc	8.6	8.7	7.6
Iron	5.2	4.9	5.1

- i. One of the student's results is anomalous.

Put a **ring** around the anomalous result in the table.

[1]

- ii. Suggest a reason why the result could be anomalous.

----- [1]

- iii. Calculate the **mean** temperature change for **magnesium**.

Give your answer to **1** decimal place.

Mean temperature change = °C [2]

(b).

- i. The student wants to improve her experiment to get more **accurate** results.

Suggest an improvement to her experiment, which will give more accurate results.

Give a reason for the improvement.

Improvement

Reason

[2]

- ii. The student concludes that the more reactive the metal is, the higher the temperature rise.

Describe further tests the student can do to confirm her conclusion.

----- [2]

8. This question is about the extraction of metals.

When iron oxide is heated with carbon, iron is made.

i. Complete the **word equation** for this reaction.

iron oxide + carbon → + [1]

ii. Iron oxide is **reduced** during this reaction.

Explain how you can tell that iron oxide is reduced.

----- [1]

9. Phil investigates some exothermic and endothermic reactions.

He measures the temperature changes during some chemical reactions.

Look at the table. It shows his results.

Reaction	Temperature at start (°C)	Temperature at end (°C)	Temperature change (°C)
A	15	25	+10
B	15	15	0
C	18	15	-3
D	15	20	+5

What can you conclude about the **type** of energy change in each reaction?

Explain your answer.

----- [4]

10 (a). Look at the data about some hydrocarbons.

Name	Number of carbon atoms in molecule	Molecular formula	Boiling point (°C)
ethane	2	C ₂ H ₆	-88
propane	3	C ₃ H ₈	-42
pentane	5	C ₅ H ₁₂	36
hexane	6	C ₆ H ₁₄	69

Butane contains 4 carbon atoms.

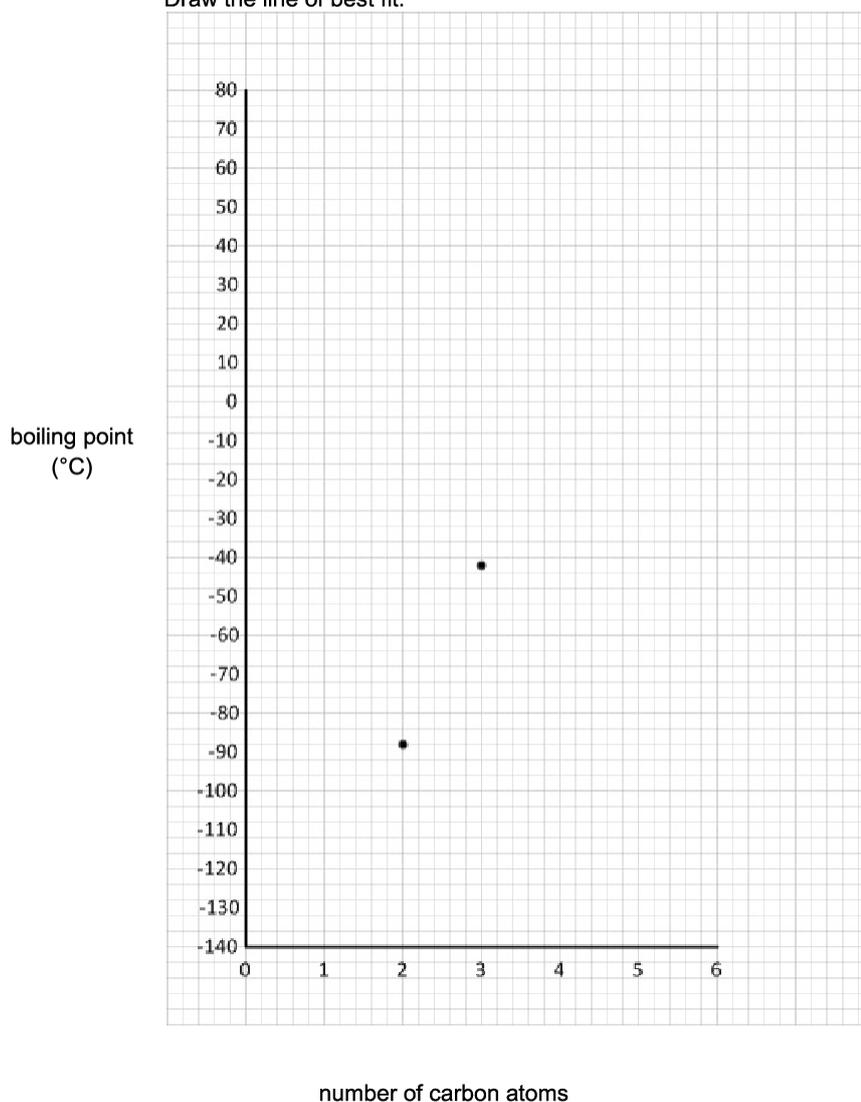
Use the table to suggest the molecular formula of butane.

----- [1]

(b). The data for ethane and propane have been plotted on the grid.

i. Plot the data for pentane and hexane on the grid.

Draw the line of best fit.



[2]

- ii. Use your graph to estimate the boiling point of butane.

answer:..... °C [1]

- iii. Describe the relationship between the number of carbon atoms in the molecule and its boiling point.

Use ideas about forces between molecules to explain your answer.

----- [2]

11. Magnesium oxide reacts with water to make an alkaline solution.

Describe how you would measure the pH of the magnesium hydroxide solution.

A pH meter is **not** available.

----- [3]

12.

- i. Zinc nitrate, $\text{Zn}(\text{NO}_3)_2$, can be made by reacting zinc oxide, ZnO , with nitric acid, HNO_3 .

Water, H_2O , is also made.

Write a **balanced symbol** equation for this reaction.

----- [2]

- ii. Paul suggests this method for preparing zinc nitrate.

- | |
|---|
| <ol style="list-style-type: none">1. Measure 50 cm³ of dilute nitric acid into a beaker.2. Add 1 spatulaful of zinc oxide.3. Heat the mixture until crystals of zinc nitrate are made. |
|---|

Paul's method will not make a pure dry sample of zinc nitrate.

What improvements should Paul make to the method to make sure that:

4. the reaction is complete
5. the zinc nitrate can be separated from the nitric acid and the zinc oxide?

Explain your answer.

[4]

13. Ammonium sulphate is a salt.

It is manufactured using the reaction between the alkali ammonia and sulphuric acid.

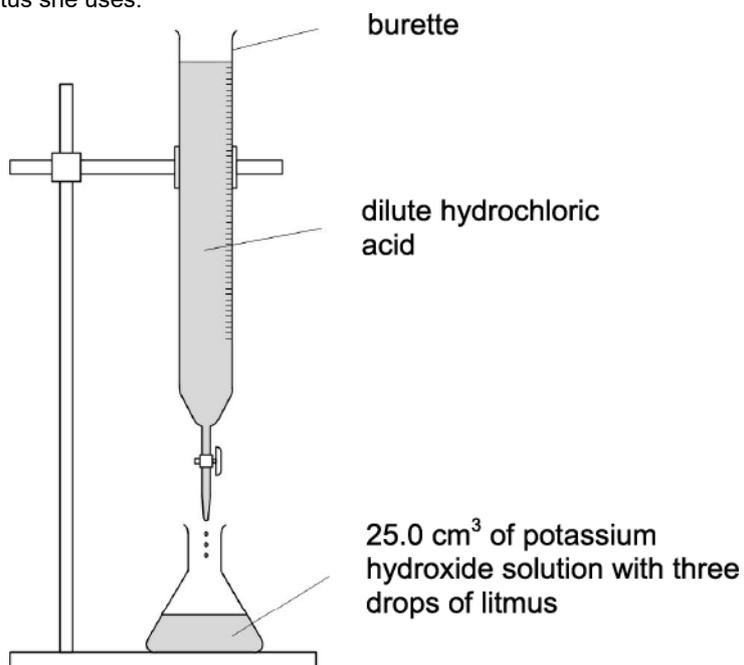


What type of reaction is this?

[1]

14 (a). Sarah does three titrations with dilute hydrochloric acid and potassium hydroxide solution.

Look at the apparatus she uses.



In her first titration Sarah measures the initial volume of hydrochloric acid in the burette.

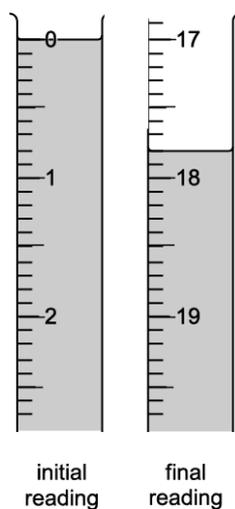
She slowly adds the acid until the potassium hydroxide is just neutralised.

She then measures the volume of the hydrochloric acid again.

Describe how Sarah can tell when the potassium hydroxide solution is just neutralised.

[2]

- (b). Look at the diagrams. They show parts of the burette during the first titration.



Here is Sarah's results table.

Titration number	1	2	3
final reading in cm ³		37.5	32.1
initial reading in cm ³		20.4	15.0
titre (volume of acid added) in cm ³		17.1	17.1

- i. Complete the table by reading the burette readings from the diagrams.

[2]

- ii. Sarah thinks the mean titre is 17.1 cm³.

Is she correct?

Explain your answer.

----- [1]

