



# Cambridge IGCSE™

## CHEMISTRY

Paper 1 Multiple Choice (Core)

0620/12

May/June 2025

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)

## INSTRUCTIONS

- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

## INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Any blank pages are indicated.



- 1 Substance L melts at  $-7^{\circ}\text{C}$  and is a brown liquid at room temperature.

What is the boiling point of pure L?

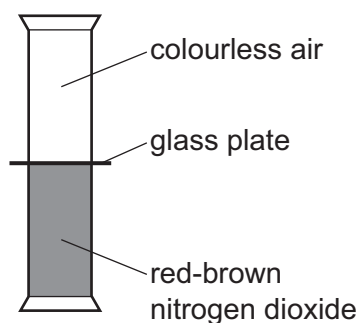
- A  $-77^{\circ}\text{C}$
- B  $-7^{\circ}\text{C}$  to  $+7^{\circ}\text{C}$
- C  $59^{\circ}\text{C}$
- D  $107^{\circ}\text{C}$  to  $117^{\circ}\text{C}$

- 2 Which row describes how the volume of a gas changes when its temperature is increased at constant pressure and when its pressure is increased at constant temperature?

|          | temperature is increased<br>at constant pressure | pressure is increased<br>at constant temperature |
|----------|--------------------------------------------------|--------------------------------------------------|
| <b>A</b> | volume decreases                                 | volume decreases                                 |
| <b>B</b> | volume decreases                                 | volume increases                                 |
| <b>C</b> | volume increases                                 | volume decreases                                 |
| <b>D</b> | volume increases                                 | volume increases                                 |

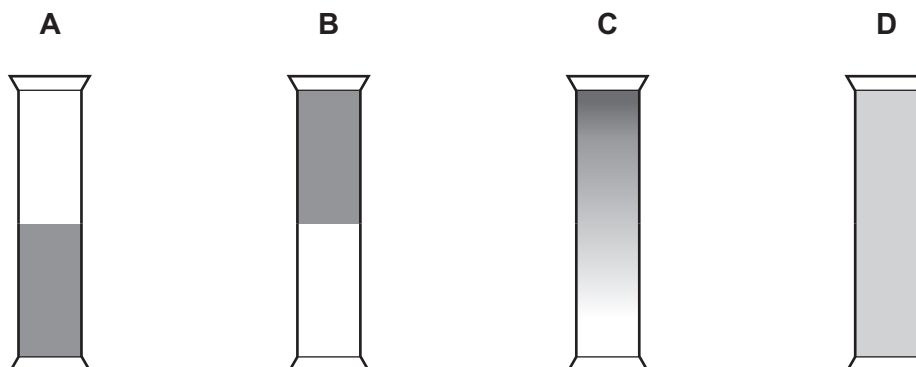
- 3 Nitrogen dioxide is a red-brown gas which is more dense than air.

The diagram shows the arrangement of two gas jars which contain nitrogen dioxide and air separated with a glass plate.



The glass plate is removed, and the gas jars are left for 24 hours.

Which diagram shows the gas jars after 24 hours?



4 Which substance is a mixture of **one** element and **one** compound?

- A aqueous glucose
- B clean, dry air
- C oxygen dissolved in distilled water
- D stainless steel

5 Which statement defines the atomic number of an element?

- A the group number of the element
- B the mass of one atom of the element
- C the number of particles in the nucleus of one atom of the element
- D the number of protons in the nucleus of one atom of the element

6 What is different for isotopes of the same element?

- A nucleon number
- B number of electron shells
- C number of electrons in the outer electron shell
- D proton number

7 When sodium chloride is formed from its elements, each chlorine atom .....1..... one .....2..... .

Which words correctly complete gaps 1 and 2?

|   | 1     | 2        |
|---|-------|----------|
| A | gains | electron |
| B | gains | proton   |
| C | loses | electron |
| D | loses | proton   |

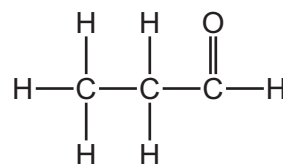
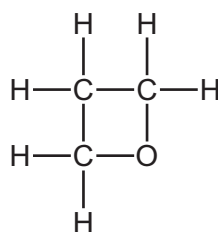
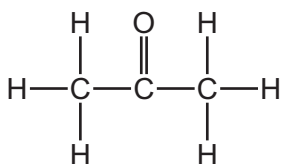
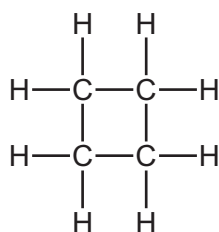
8 In the molecules  $\text{CH}_4$ ,  $\text{HCl}$  and  $\text{H}_2\text{O}$ , which atoms use **all** of their outer shell electrons in bonding?

- A C and Cl
- B C and H
- C Cl and H
- D H and O

9 Which substance has a giant covalent structure?

- A sodium chloride
- B ammonia
- C magnesium chloride
- D graphite

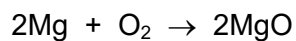
10 The diagrams show the structures of four molecules.



Which statement about these molecules is correct?

- A All four molecules have different molecular formulae.
- B All four molecules have the same molecular formula.
- C Only two molecules have the same molecular formula.
- D Only three molecules have the same molecular formula.

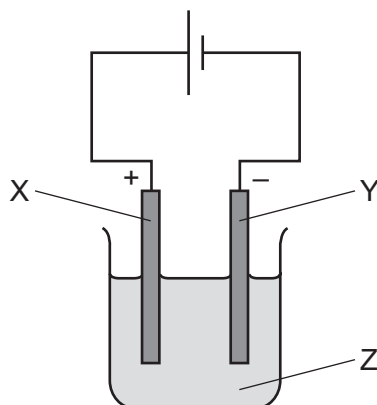
11 The equation for the reaction of magnesium with oxygen is shown.



Which mass of oxygen reacts exactly with 6 g of magnesium?

- A 2 g
- B 4 g
- C 8 g
- D 16 g

12 The diagram shows a simple electrolytic cell for an electrolysis experiment.



Three parts of the electrolytic cell are labelled X, Y and Z.

Which row shows the correct labels to replace X, Y and Z in the diagram?

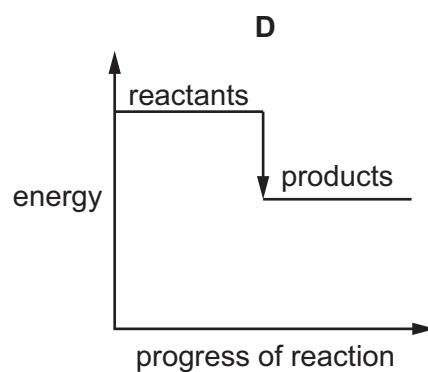
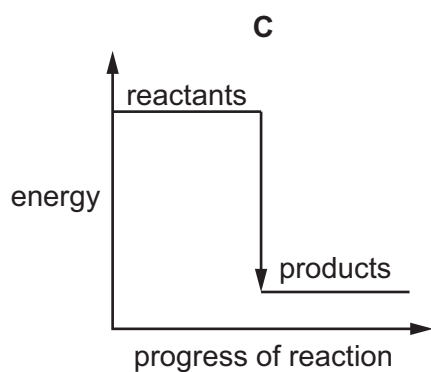
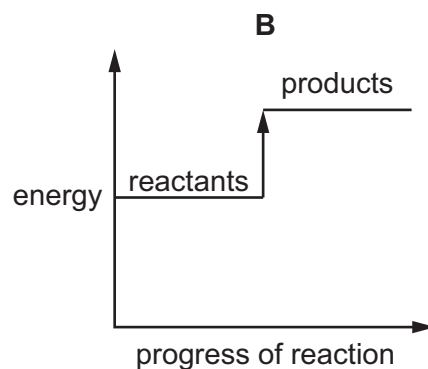
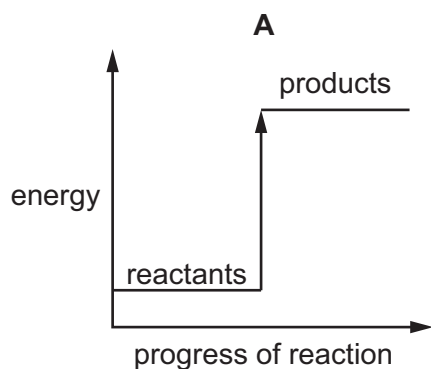
|          | X       | Y       | Z            |
|----------|---------|---------|--------------|
| <b>A</b> | anode   | cathode | aqueous salt |
| <b>B</b> | anode   | cathode | solid salt   |
| <b>C</b> | cathode | anode   | aqueous salt |
| <b>D</b> | cathode | anode   | solid salt   |

13 Which equation represents the overall reaction that produces electricity in a hydrogen–oxygen fuel cell?

- A**  $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}_2$
- B**  $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
- C**  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- D**  $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$

- 14 Which reaction pathway diagram shows the largest increase in the temperature of the surroundings?

(The scale on the y-axis is the same in each diagram.)



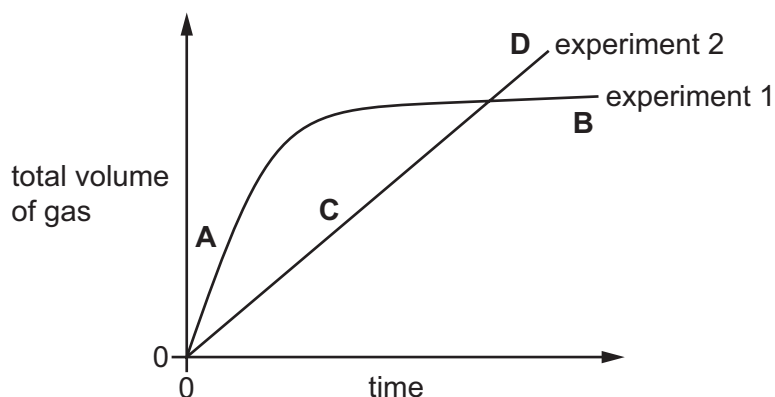
- 15 Which process involves a chemical change?

- A** dissolving copper(II) sulfate
- B** distilling ethanol
- C** freezing water
- D** neutralising copper(II) oxide

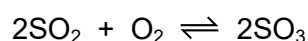
- 16 The total volume of gas produced in two different experiments is measured against time.

A graph of the results of the two experiments is shown.

Which point shows the fastest rate of reaction?



- 17 The equation for the reaction of sulfur dioxide with oxygen is shown.



What is meant by the symbol  $\rightleftharpoons$ ?

- A** redox reaction  
**B** reversible reaction  
**C** displacement reaction  
**D** thermal decomposition reaction
- 18 Which reactions are redox reactions?
- 1 the incomplete combustion of propane
  - 2 the rusting of iron
  - 3 the reaction of aqueous chloride ions with acidified aqueous silver nitrate
  - 4 the thermal decomposition of calcium carbonate
- A** 1 and 2      **B** 1 and 3      **C** 2 and 4      **D** 3 and 4
- 19 Which row describes an aqueous solution for the pH shown?

|          | pH | description                      |
|----------|----|----------------------------------|
| <b>A</b> | 1  | has a very high alkalinity       |
| <b>B</b> | 5  | is neutral                       |
| <b>C</b> | 9  | turns universal indicator yellow |
| <b>D</b> | 14 | contains $\text{OH}^-$ ions      |

20 Which parts of the Periodic Table contain elements that **only** form basic oxides?

- A Group I and Period 3
- B Group I only
- C Group VIII and Period 3
- D Group VIII only

21 Which statement about elements in the Periodic Table is correct?

- A Elements in the same group of the Periodic Table have the same electronic configuration.
- B The atoms of the elements in Group VII form ions with a charge equal to the number of outer shell electrons minus 8.
- C The metallic character of the elements increases from left to right across a period.
- D The Periodic Table is an arrangement of elements in order of increasing nucleon number.

22 Which row identifies the trends in properties of the elements lithium to sodium to potassium?

|   | melting point | density    | reactivity |
|---|---------------|------------|------------|
| A | decreasing    | increasing | increasing |
| B | increasing    | increasing | decreasing |
| C | increasing    | decreasing | increasing |
| D | decreasing    | decreasing | increasing |

23 Which statements about the halogens are correct?

- 1 They are all diatomic molecules.
- 2 They are all gases at room temperature and pressure.
- 3 The density of the elements increases down the group.
- 4 The reactivity of the elements increases down the group.

- A 1 and 2      B 1 and 3      C 2 and 4      D 3 and 4

24 Zirconium is a transition element.

What is a property of zirconium?

- A high density
- B does **not** conduct heat
- C forms white compounds only
- D low melting point

- 25** Some gases exist as single atoms, are unreactive and have eight electrons in their outer electron shell.

Which gases fit this description?

- 1 helium
- 2 argon
- 3 oxygen
- 4 krypton

**A** 1, 2 and 4      **B** 1 and 3      **C** 2 and 4 only      **D** 3 only

- 26** Which statements about metals are correct?

- 1 Calcium reacts faster than magnesium with cold water.
- 2 Aluminium is more easily extracted than iron from its ore.
- 3 Copper reacts faster than iron with dilute hydrochloric acid.
- 4 Potassium and silver are both good conductors of electricity.

**A** 1 and 2      **B** 1 and 4      **C** 2 and 3      **D** 3 and 4

- 27** Four metals, P, Q, R and S, are separately reacted with dilute hydrochloric acid.

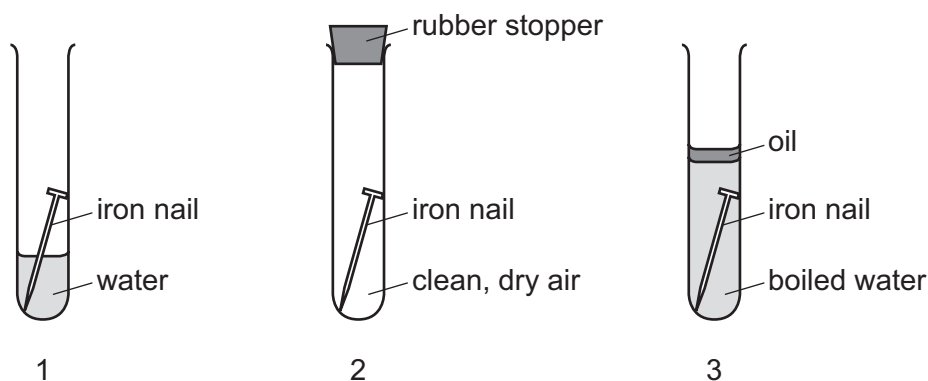
The table shows the observation for each metal.

| metal | observation               |
|-------|---------------------------|
| P     | lots of bubbles produced  |
| Q     | few bubbles produced      |
| R     | no bubbles produced       |
| S     | very few bubbles produced |

What is the order of reactivity of these four metals, from most reactive to least reactive?

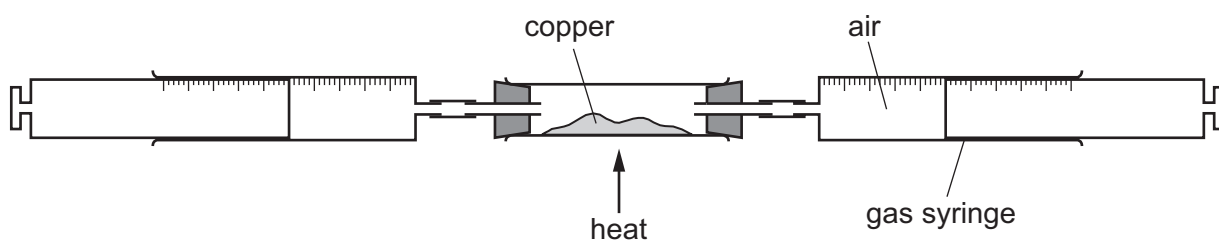
- A**  $R \rightarrow S \rightarrow Q \rightarrow P$
- B**  $P \rightarrow S \rightarrow Q \rightarrow R$
- C**  $P \rightarrow Q \rightarrow S \rightarrow R$
- D**  $Q \rightarrow R \rightarrow P \rightarrow S$

- 28 The diagram shows iron nails which are left for one week in separate test-tubes with the conditions shown.



Which test-tubes show evidence of rusting after one week?

- A 1 and 3      B 1 only      C 2 and 3      D 2 only
- 29 Pure metals can be combined to make alloys.
- Why are the alloys sometimes used rather than the metals they are made from?
- A Alloys are easier to extract and cheaper.  
 B Alloys are easier to hammer into different shapes.  
 C Alloys are harder and keep their shape better.  
 D Alloys contain only atoms of the same size but pure metals do **not**.
- 30 In the experiment shown,  $100\text{ cm}^3$  of clean, dry air is passed backwards and forwards through a tube containing heated copper until there is no further decrease in the volume of the air.



All of the gas is pushed into **one** syringe.

What is the final reading on this gas syringe?

- A  $0\text{ cm}^3$       B  $21\text{ cm}^3$       C  $79\text{ cm}^3$       D  $100\text{ cm}^3$

- 31** Sulfur dioxide, carbon monoxide and oxides of nitrogen are gaseous pollutants found in the air.

Which pollutants contribute to acid rain?

- A** carbon monoxide and sulfur dioxide
- B** oxides of nitrogen and sulfur dioxide
- C** oxides of nitrogen only
- D** sulfur dioxide only

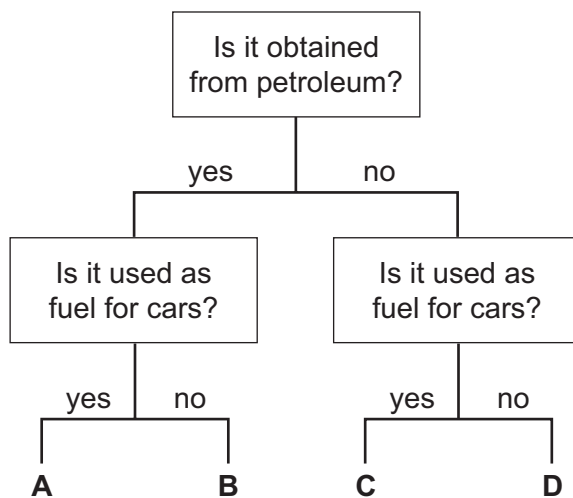
- 32** The formulae for three organic compounds are listed.

- 1  $\text{C}_2\text{H}_4$
- 2  $\text{C}_4\text{H}_8$
- 3  $\text{C}_4\text{H}_{10}$

Which compounds belong to the same homologous series?

- A** 1, 2 and 3      **B** 1 and 2 only      **C** 1 and 3 only      **D** 2 and 3 only

- 33** Which fuel could be gasoline?



34 Three hydrocarbons are separately mixed with aqueous bromine.

Which row gives the correct observation for each hydrocarbon?

|          | $\begin{array}{c} \text{H} \\   \\ \text{H}-\text{C}-\text{H} \\   \\ \text{H} \end{array}$ | $\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$ | $\begin{array}{c} \text{H} \quad \quad \text{H} \\ \diagdown \quad \diagup \\ \text{C}=\text{C} \\ \diagup \quad \diagdown \\ \text{H} \quad \quad \text{H} \end{array}$ |
|----------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A</b> | colour changes from orange to colourless                                                    | colour stays unchanged                                                                                                                             | colour changes from orange to colourless                                                                                                                                 |
| <b>B</b> | colour changes from orange to colourless                                                    | colour changes from orange to colourless                                                                                                           | colour stays unchanged                                                                                                                                                   |
| <b>C</b> | colour stays unchanged                                                                      | colour stays unchanged                                                                                                                             | colour changes from orange to colourless                                                                                                                                 |
| <b>D</b> | colour stays unchanged                                                                      | colour changes from orange to colourless                                                                                                           | colour stays unchanged                                                                                                                                                   |

35 Which compound is formed when ethene reacts with steam?

- A** ethane
- B** ethanoic acid
- C** ethanol
- D** poly(ethene)

36 Which statements about ethanoic acid are correct?

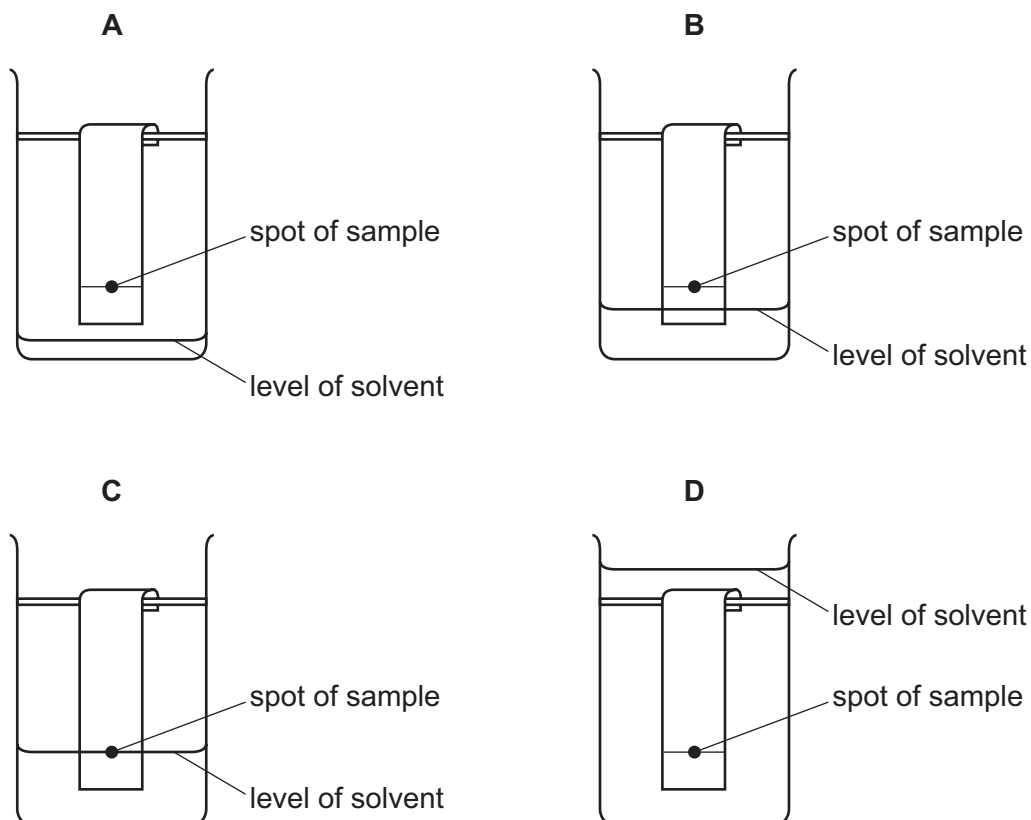
- 1 Its aqueous solution has a pH value of 10.
- 2 It reacts with metal carbonates to produce carbon dioxide gas.
- 3 It reacts with magnesium metal to produce hydrogen gas.

- A** 1, 2 and 3      **B** 1 and 2 only      **C** 1 and 3 only      **D** 2 and 3 only

37 Which statement explains why plastic bags made from poly(ethene) accumulate in oceans?

- A** Poly(ethene) is a saturated molecule.
- B** Poly(ethene) is made from hydrocarbon monomers.
- C** Poly(ethene) reacts with water.
- D** Poly(ethene) does **not** decompose in water.

38 Which diagram shows the correct level of solvent at the start of a chromatography experiment?



39 Which process is used to separate a mixture of liquids with different boiling points?

- A dissolving
- B crystallisation
- C filtration
- D fractional distillation

40 Four different colourless solutions are each tested separately with aqueous sodium hydroxide and with acidified aqueous silver nitrate.

Which row shows the results for sodium chloride?

|   | aqueous sodium hydroxide | acidified aqueous silver nitrate |
|---|--------------------------|----------------------------------|
| A | no visible reaction      | white precipitate                |
| B | no visible reaction      | no visible reaction              |
| C | white precipitate        | no visible reaction              |
| D | white precipitate        | white precipitate                |

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