

1 The results of two tests on solid X are shown.

test	observation
aqueous sodium hydroxide added	green precipitate formed
acidified silver nitrate added	yellow precipitate formed

What is X?

- A copper(II) chloride
- B copper(II) iodide
- C iron(II) chloride
- D iron(II) iodide

2 A solution containing substance X was tested. The table shows the results.

test	result
flame test	lilac colour
acidified silver nitrate solution added	yellow precipitate

What is X?

- A lithium bromide
- B lithium iodide
- C potassium bromide
- D potassium iodide

3 A white solid is insoluble in water.

When it is added to hydrochloric acid, bubbles of gas are formed.

Adding aqueous ammonia to the solution formed gives a white precipitate. Adding excess aqueous ammonia causes the precipitate to re-dissolve.

What is the white solid?

- A** aluminium nitrate
- B** ammonium nitrate
- C** calcium carbonate
- D** zinc carbonate

4 An element, X, is a dark grey crystalline solid at room temperature.

It has a melting point of 114°C and a density of 4.9g/cm^3 .

When heated gently it forms a purple vapour.

Where in the Periodic Table is X found?

The diagram shows a simplified periodic table grid. It consists of 5 rows and 18 columns. The grid is divided into three main sections: a small section on the left (2 columns), a large central section (10 columns), and a small section on the right (2 columns). The labels are placed in the following positions:

- A**: Top-right corner of the rightmost section.
- B**: Top-left corner of the leftmost section.
- C**: Middle of the central section.
- D**: Bottom-right corner of the rightmost section.

There is also a small empty square box located above the central section of the grid.

5 Which two compounds give a white precipitate when their aqueous solutions are mixed?

- A** silver nitrate and sodium chloride
- B** silver nitrate and sodium iodide
- C** sodium hydroxide and copper(II) sulfate
- D** sodium hydroxide and iron(II) chloride

6 Two tests are carried out to identify an aqueous solution of X.

test 1 Aqueous sodium hydroxide is added and a blue precipitate is produced.

test 2 Dilute nitric acid is added followed by aqueous silver nitrate and a white precipitate is produced.

What is X?

- A** copper carbonate
- B** copper chloride
- C** iron(III) carbonate
- D** iron(III) chloride

7 Which gas relights a glowing splint?

- A** ammonia
- B** carbon dioxide
- C** hydrogen
- D** oxygen

- 8 Which statement about aqueous sodium hydroxide is correct?
- A** When it is added to a solution containing sulfate ions, a white precipitate is formed.
 - B** When it is added to a solution of copper(II) ions, a blue precipitate is formed which dissolves in excess to give deep blue solution.
 - C** When it is added to a solution of iron(II) ions, a green precipitate is formed which does not dissolve in excess.
 - D** When it is added to ammonium chloride, a gas is produced which turns blue litmus red.

9 Aqueous sodium hydroxide is added to solid X and the mixture is heated.

A green precipitate is formed and an alkaline gas is given off.

Which ions are present in X?

- A** NH_4^+ and Fe^{2+}
 - B** NH_4^+ and Fe^{3+}
 - C** OH^- and Fe^{2+}
 - D** OH^- and Fe^{3+}
- 10 Compound X is tested and the results are shown in the table.

test	result
aqueous sodium hydroxide is added, then heated gently	gas given off which turns damp red litmus paper blue
dilute hydrochloric acid is added	effervescence, gas given off which turns limewater milky

Which ions are present in compound X?

- A** ammonium ions and carbonate ions
- B** ammonium ions and chloride ions
- C** calcium ions and carbonate ions
- D** calcium ions and chloride ions

- 11 The cations shown are identified by the colour of the precipitates formed when an excess of an aqueous solution of X is added.

cations present	effect of adding an excess of aqueous X
iron(II) (Fe^{2+})	green precipitate
copper(II) (Cu^{2+})	light blue precipitate
iron(III) (Fe^{3+})	red-brown precipitate

What is X?

- A** ammonia
- B** limewater
- C** silver nitrate
- D** sodium hydroxide
- 12 Which of these pairs of aqueous ions **both** react with dilute sulfuric acid to give a visible result?
- A** Ba^{2+} and Cl^-
- B** Ba^{2+} and CO_3^{2-}
- C** NH_4^+ and Cl^-
- D** NH_4^+ and CO_3^{2-}
- 13 Element X forms an acidic, covalent oxide.

Which row shows how many electrons there could be in the outer shell of an atom of X?

	1	2	6	7
A	✓	✓	x	x
B	✓	x	✓	x
C	x	x	✓	✓
D	x	✓	x	✓

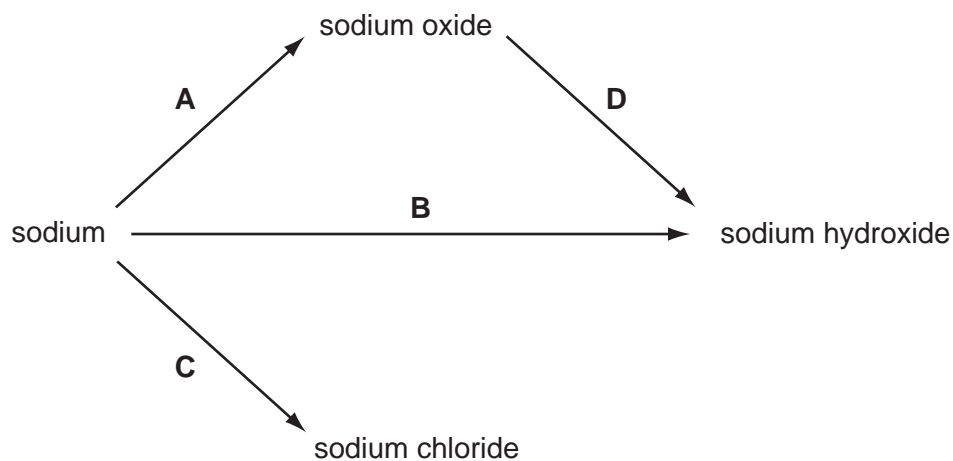
14 Barium hydroxide is an alkali. It reacts with hydrochloric acid.

How does the pH of the hydrochloric acid change as an excess of aqueous barium hydroxide is added?

- A The pH decreases from 14 and becomes constant at 7.
- B The pH decreases from 14 to about 1.
- C The pH increases from 1 and becomes constant at 7.
- D The pH increases from 1 to about 14.

15 Some reactions involving sodium are shown.

Which reaction does **not** involve the formation of a base?



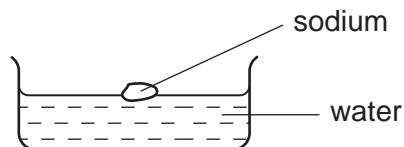
16 The results of three tests on a solution of compound **X** are shown.

test	result
aqueous sodium hydroxide added	white precipitate formed, soluble in excess
aqueous ammonia added	white precipitate formed, soluble in excess
dilute hydrochloric acid added	bubbles of gas

What is compound **X**?

- A** aluminium carbonate
- B** aluminium chloride
- C** zinc carbonate
- D** zinc chloride

17 When sodium reacts with water, a solution and a gas are produced.



The solution is tested with litmus paper and the gas is tested with a splint.

What happens to the litmus paper and to the splint?

	litmus paper	splint
A	blue to red	glowing splint relights
B	blue to red	lighted splint 'pops'
C	red to blue	glowing splint relights
D	red to blue	lighted splint 'pops'

18 A solution contains barium ions and silver ions.

What could the anion be?

- A chloride only
- B nitrate only
- C sulfate only
- D chloride or nitrate or sulfate

19 A mixture containing two anions was tested and the results are shown below.

test	result
dilute nitric acid added	effervescence of a gas which turned limewater milky
dilute nitric acid added, followed by aqueous silver nitrate	yellow precipitate formed

Which anions were present?

- A carbonate and chloride
 - B carbonate and iodide
 - C sulfate and chloride
 - D sulfate and iodide
- 20 Some barium iodide is dissolved in water.

Aqueous lead(II) nitrate is added to the solution until no more precipitate forms.

This precipitate, X, is filtered off.

Dilute sulfuric acid is added to the filtrate and another precipitate, Y, forms.

What are the colours of precipitates X and Y?

	X	Y
A	white	white
B	white	yellow
C	yellow	white
D	yellow	yellow

21 Aqueous sodium hydroxide is added to a solid, X, and the mixture is heated.

A green precipitate is formed and an alkaline gas is given off.

Which ions are present in X?

A NH_4^+ and Fe^{2+}

B NH_4^+ and Fe^{3+}

C OH^- and Fe^{2+}

D OH^- and Fe^{3+}

22 An aqueous solution Y contains both barium ions and silver ions.

In separate experiments, dilute sulfuric acid and dilute hydrochloric acid are added to solution Y.

Which of these acids causes a precipitate to form in solution Y?

	dilute sulfuric acid	dilute hydrochloric acid
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 23 Aqueous sodium hydroxide is added to a solution of a salt. A blue precipitate is formed which does not dissolve in excess.

Aluminium foil is added to the mixture and the mixture is warmed. A gas is produced that turns damp red litmus paper blue.

What is the name of the salt?

- A** ammonium nitrate
 - B** ammonium sulfate
 - C** copper(II) nitrate
 - D** copper(II) sulfate
- 24 An element E is burned in air. A white solid oxide is formed.

The oxide is tested with damp red litmus paper. The paper turns blue.

What is element E?

- A** calcium
- B** carbon
- C** iodine
- D** sulfur