

Identification of Ions and Gases

Question Paper 1

Level	IGCSE
Subject	Chemistry (0620/0971)
Exam Board	Cambridge International Examinations (CIE)
Topic	Acids, bases and salts
Sub-Topic	Identification of ions and gases
Booklet	Question Paper 1

Time Allowed: 34 minutes

Score: /28

Percentage: /100

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>85%	75%	68%	60%	53%	48%	40%	33%	<25%

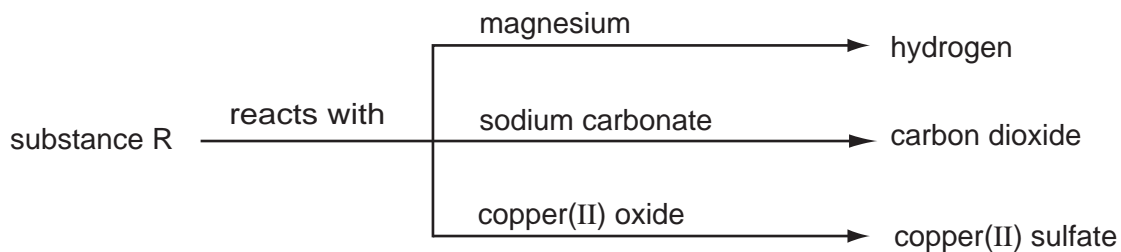
1. An aqueous solution Y contains both barium ions and silver ions.

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

2. Some reactions of a substance, R, are shown in the diagram.

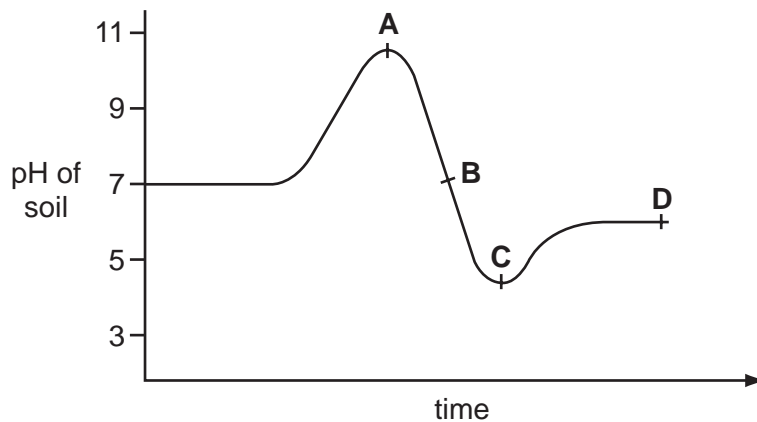


What type of substance is R?

- A** an acid
- B** a base
- C** an element
- D** a salt

3. The graph shows how the pH of soil in a field changed over time.

At which point was the soil neutral?



4. 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

5. 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

6. Which is **not** a typical property of an acid?

- A They react with alkalis producing water.
- B They react with all metals producing hydrogen.
- C They react with carbonates producing carbon dioxide.
- D They turn litmus paper red.

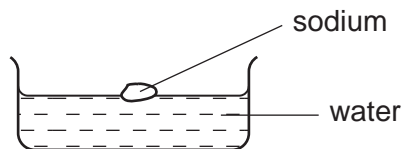
7. The results of three tests on a solution of compound **X** are shown.

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

8. 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'

9. 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

10. 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

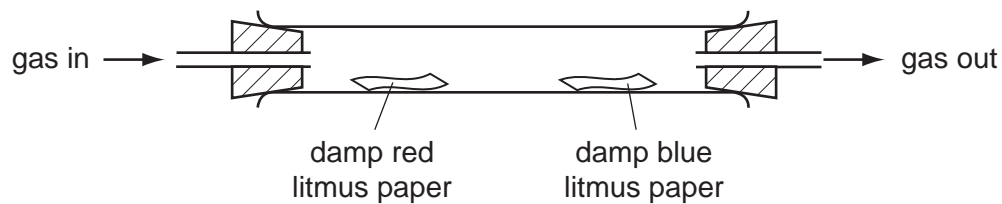
11. The results of three tests on a solution of compound X are shown in the table.

test	result
aqueous sodium hydroxide added	white precipitate formed, soluble in excess
aqueous ammonia added	white precipitate formed, insoluble in excess
acidified silver nitrate added	white precipitate formed

What is compound X?

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

12. Four different gases are passed through the apparatus shown.



Which gas has no effect on either piece of litmus paper?

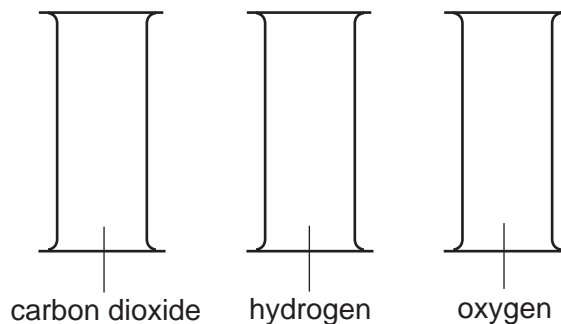
- A ammonia
- B carbon dioxide
- C chlorine
- D hydrogen

13. Aqueous potassium iodide is added to aqueous silver nitrate.

What are the colours of the final precipitate and solution?

	precipitate	solution
A	brown	colourless
B	white	yellow
C	yellow	colourless
D	yellow	white

14. Three gas jars contain carbon dioxide, hydrogen and oxygen, as shown.



Which one of the following tests could be used to discover which gas is in each jar?

- A** a glowing splint
- B** a lighted splint
- C** damp blue litmus paper
- D** limewater

15. 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

16. 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
17. 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+}

20. 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

21. 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

22. Which gas relights a glowing splint?

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

23. 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.

24. 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

25. The following tests are carried out on an aqueous solution of salt X.

test	observation
sodium hydroxide solution is added	a green precipitate is formed which dissolves in excess
a small piece of aluminium foil is then added to the mixture and the mixture is heated	a gas is given off which turns damp, red litmus paper blue

What is X?

- A** aluminium nitrate
- B** ammonium sulfate
- C** chromium(III) nitrate
- D** iron(II) nitrate

26. 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
27. Methyl orange turns red in the solution formed when substance R reacts with water.

What is R?

- A calcium oxide
 - B potassium oxide
 - C sodium oxide
 - D sulfur dioxide
28. A substance is heated with aluminium foil in aqueous sodium hydroxide. A gas is produced which turns damp, red litmus paper blue.

Which anion is present in the substance?

- A carbonate
- B iodide
- C nitrate
- D sulfate