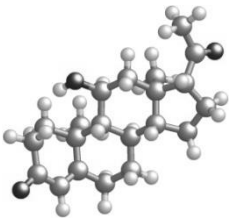

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Class: ……

Date: …… **/** …… **/** ……

Multiple-Choice Questions on Qualitative Analysis – Assignment 7

1. Which reagent could be used to distinguish between dilute nitric acid and dilute hydrochloric acid?

A Aqueous barium chloride

B Aqueous silver nitrate

C Aqueous sodium hydroxide

D Copper(II) carbonate

2. The carbonate of metal **X** is a white solid.

It decomposes when heated to form carbon dioxide and a yellow solid oxide.

What is metal **X**?

A Copper **B** Iron **C** Lead **D** Sodium

3. Substance **Q** is a soluble salt. An aqueous solution of **Q** is tested as shown.

test	observation
warm **Q** with aqueous sodium hydroxide	alkaline gas given off, no precipitate formed
to **Q** add dilute nitric acid and barium nitrate solution	white precipitate forms

What is **Q**?

A Ammonium chloride **B** Ammonium sulfate

C Zinc chloride **D** Zinc sulfate

4. The results of two tests on a solution **X** are shown.

reagent added	a few drops	an excess
aqueous sodium hydroxide	white precipitate	precipitate dissolves
aqueous ammonia	white precipitate	precipitate remains

Which ion is present in solution **X**?

A Al^{3+} **B** Ca^{2+} **C** Cu^{2+} **D** Zn^{2+}

5. Aqueous silver nitrate is added to separate solutions of potassium chloride and sodium iodide.

What are the colours of the precipitates formed?

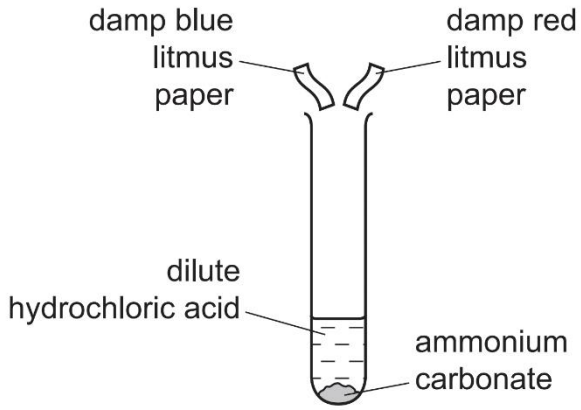
	colour of precipitate formed with chloride	colour of precipitate formed with iodide
A	white	white
B	white	yellow
C	yellow	white
D	yellow	yellow

6. Two experiments were carried out.

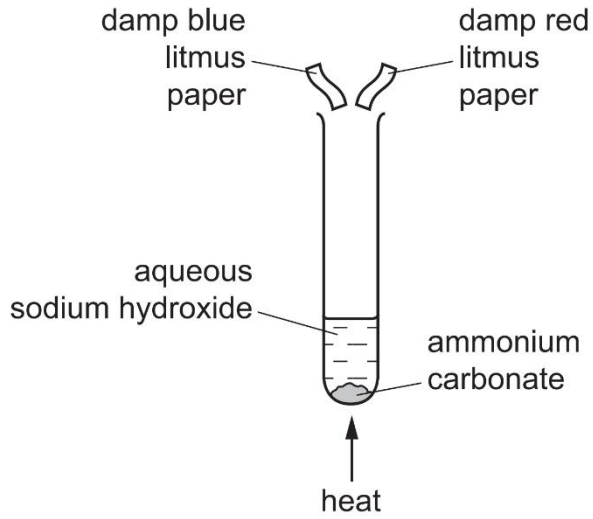
In experiment 1, ammonium carbonate was reacted with dilute hydrochloric acid.

In experiment 2, ammonium carbonate was heated with aqueous sodium hydroxide.

In each experiment, the gas evolved was tested with damp blue litmus paper and damp red litmus paper.



experiment 1



experiment 2

Which row correctly shows the colour of both the pieces of litmus paper at the end of each experiment?

	experiment 1	experiment 2
A	blue	blue
B	blue	red
C	red	blue
D	red	red

7. Which compound when in aqueous solution will produce a red / brown precipitate on the addition of an aqueous solution of Fe^{3+} ions?

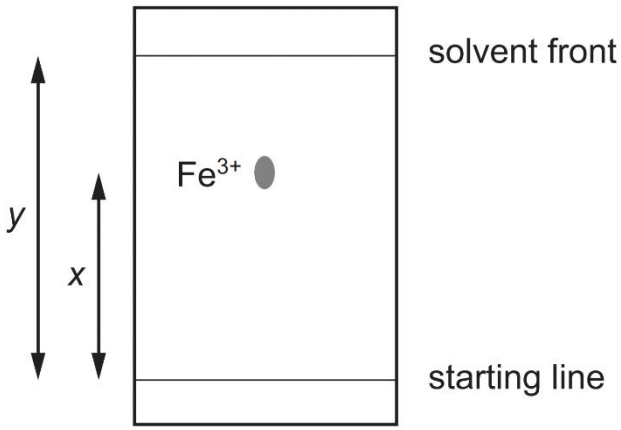
A Hydrogen chloride

B Sodium chloride

C Sodium hydroxide

D Sulfur trioxide

8. A paper chromatography experiment is carried out to find an R_f value for $Fe^{3+}(aq)$. The result is shown.



To make the spot containing $Fe^{3+}(aq)$ more visible, the paper is sprayed with aqueous sodium hydroxide so that a precipitate of iron(III) hydroxide forms.

Under the conditions of the experiment, the R_f of $Fe^{3+}(aq)$ is given by ...1... and the colour of the precipitate is ...2... .

Which row correctly completes gaps 1 and 2?

	gap 1	gap 2
A	$x \div y$	red-brown
B	$x \div y$	green
C	$y \div x$	red-brown
D	$y \div x$	green

9. The results of two tests on solution **Z** are shown.

reagent added	observation on adding a few drops of reagent	observation on adding an excess of reagent
aqueous sodium hydroxide	white precipitate	precipitate dissolves
aqueous ammonia	white precipitate	precipitate dissolves

Which ion is present in solution **Z**?

A Al^{3+} **B** Ca^{2+} **C** Pb^{2+} **D** Zn^{2+}

10. A substance dissolves in water to form a colourless solution. This solution reacts with aqueous silver nitrate in the presence of dilute nitric acid to give a yellow precipitate.

What is the possible identity of the substance?

A Calcium iodide

B Copper(II) chloride

C Iron(II) iodide

D Sodium chloride

11. In which reaction is a white precipitate present when the reaction is complete?

A Excess aqueous barium nitrate is added to aqueous sodium chloride.

B Excess aqueous sodium hydroxide is added to aqueous aluminium chloride.

C Excess aqueous sodium hydroxide is added to aqueous iron(II) sulfate.

D Excess hydrochloric acid is added to aqueous silver nitrate.

12. Compound **X** is a crystalline solid at room temperature and pressure. An aqueous solution of **X** is tested as shown.

test	test result
acidify with dilute nitric acid, then add aqueous barium nitrate	no visible change
add aqueous ammonia	white precipitate, soluble in excess

What could be the identity of **X**?

A Ammonium carbonate

B Sodium sulfate

C Calcium nitrate

D Zinc chloride

13. A compound **X**, when heated with an aqueous solution of compound **Y**, produces a gas that turns red litmus blue.

1 **Y** could be potassium hydroxide.

2 **X** is an acid.

3 **X** could be an ammonium salt.

4 **X** could be sodium nitrate.

Which statements are correct?

A 1, 2 and 3 **B** 1 and 3 only

C 3 only **D** 2 and 4 only

14. An aqueous solution of zinc chloride is tested by adding reagents.

Which observation is correct?

	reagent added to zinc chloride (aq)	observations
A	acidified aqueous barium nitrate	forms a white precipitate
B	aqueous ammonia	forms a white precipitate, soluble in excess of the reagent
C	aqueous sodium hydroxide	forms a white precipitate, insoluble in excess of the reagent
D	powdered copper	forms a grey precipitate

15. A coin is analysed by dissolving it in nitric acid. To the resulting solution an excess of aqueous ammonia is added and the mixture is filtered.

A brown precipitate remains in the filter paper and a deep blue solution is obtained as the filtrate. Which metals does the coin contain?

A Aluminium and copper

B Copper and iron

C Iron and lead

D Lead and zinc

16. Solid **Y** is insoluble in water. It gives off a gas when heated and also when reacted with dilute sulfuric acid. What is **Y**?

A Copper(II) carbonate **B** Sodium carbonate

C Sodium nitrate **D** Zinc oxide

17. A student tested a solution by adding aqueous sodium hydroxide. A precipitate was not seen because the reagent was added too quickly.

What could **not** have been present in the solution?

A Al^{3+} **B** Ca^{2+} **C** NH_4^+ **D** Zn^{2+}

18. Which equation shows the most suitable reaction for preparing lead(II) sulfate?

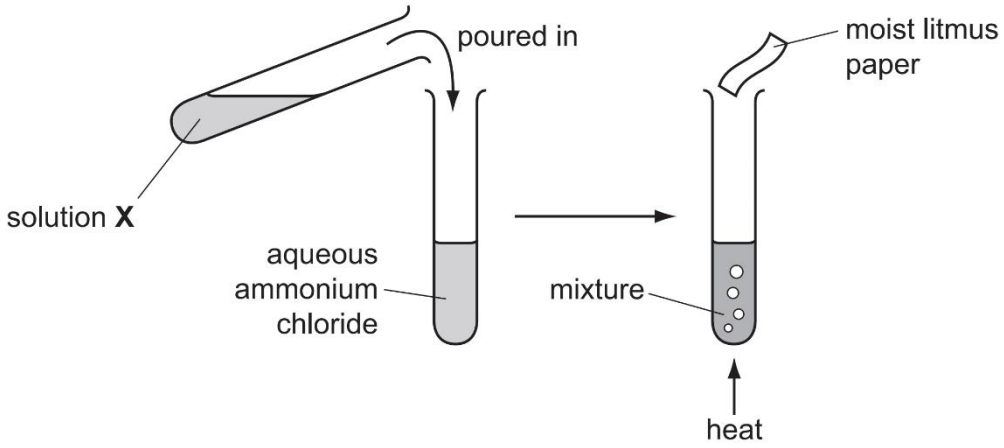
A $Pb + H_2SO_4 \rightarrow PbSO_4 + H_2$

B $PbCl_2 + H_2SO_4 \rightarrow PbSO_4 + 2HCl$

C $PbCO_3 + H_2SO_4 \rightarrow PbSO_4 + H_2O + CO_2$

D $Pb(NO_3)_2 + H_2SO_4 \rightarrow PbSO_4 + 2HNO_3$

19. The diagrams show an experiment with aqueous ammonium chloride.

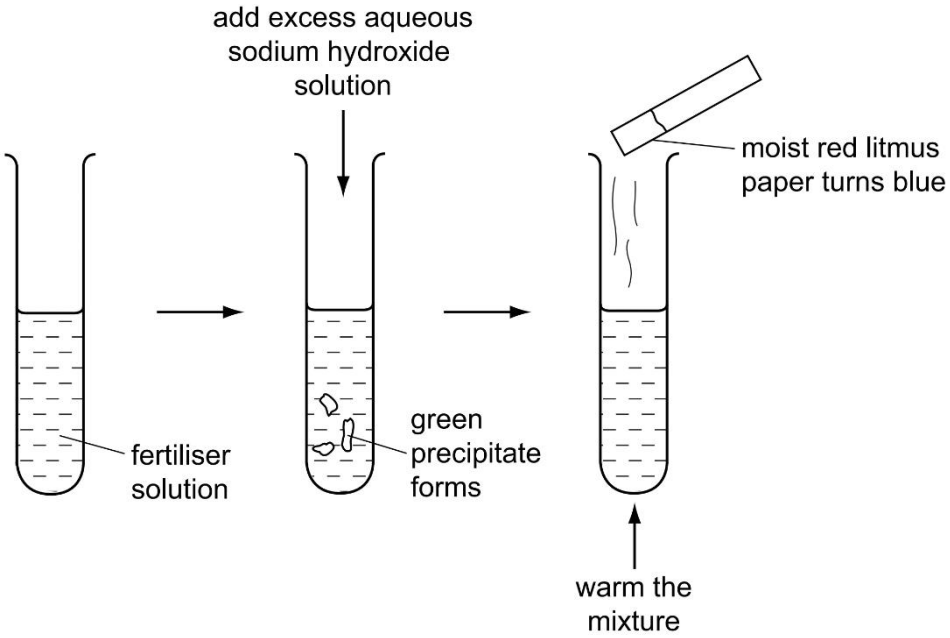


A gas, **Y**, is produced and the litmus paper changes colour.

What are solution **X** and gas **Y**?

	solution **X**	gas **Y**
A	aqueous sodium hydroxide	ammonia
B	aqueous sodium hydroxide	chlorine
C	dilute sulfuric acid	ammonia
D	dilute sulfuric acid	chlorine

20. A solution of fertiliser was tested as shown.



Which ions must be present in the fertiliser?

A Fe^{2+} and SO_4^{2-}

B Fe^{2+} and NO_3^-

C NH_4^+ and Fe^{2+}

D NH_4^+ and NO_3^-

21. Which pair of aqueous solutions produce a precipitate when they are mixed?

A Barium nitrate and silver nitrate

B Calcium nitrate and sodium chloride

C Silver nitrate and sodium iodide

D Sodium sulfate and hydrochloric acid

22. Which pair of aqueous cations initially give a white precipitate with aqueous sodium hydroxide, the white precipitate then dissolving in excess reagent to produce a colourless solution?

A Al^{3+} and Ca^{2+} **B** Al^{3+} and Pb^{2+}

C Ca^{2+} and Pb^{2+} **D** Ca^{2+} and Fe^{2+}

23. The table shows the results of tests carried out on compound **X**.

test	test result
dilute hydrochloric acid added	gas given off which gave a white precipitate with limewater
warm with aqueous sodium hydroxide	gas given off which turned damp red litmus blue

What is compound **X**?

A Ammonium carbonate

B Ammonium nitrate

C Calcium carbonate

D Calcium nitrate

24. Which ion reacts with aqueous ammonia to give a precipitate that dissolves in an excess of ammonia?

A $Al^{3+}(aq)$ **B** $Fe^{2+}(aq)$ **C** $Fe^{3+}(aq)$ **D** $Zn^{2+}(aq)$

25. The addition of dilute acid to a solution containing the anion **Q** and the subsequent use of limewater can be used to identify the anion **Q**.

What is **Q**?

A Carbonate **B** Chloride **C** Iodide **D** Sulfate

26. Which statement about aqueous sodium chloride is correct?

A It contains sodium atoms.

B It contains two different types of molecules.

C It does not conduct electricity.

D It forms a white precipitate when added to aqueous silver nitrate.

27. The table shows the solubility of some compounds of metal **Q** in cold water.

salt	solubility in cold water
carbonate	insoluble
chloride	soluble
sulfate	insoluble

What is metal **Q**?

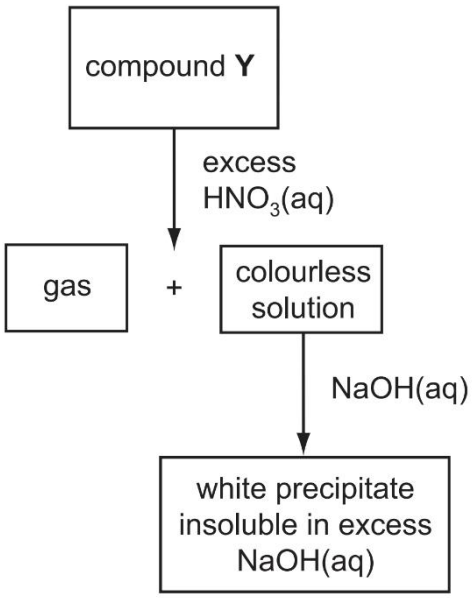
A Barium **B** Lead **C** Sodium **D** Magnesium

28. A metal **M** forms a chloride which dissolves in cold water and has an oxide which dissolves in both strong acids and strong alkalis.

What is **M**?

A Iron **B** Lead **C** Sodium **D** Zinc

29. The scheme shows a sequence of reactions starting from compound **Y**.



What could the compound **Y** be?

A Aluminium sulfate **B** Calcium carbonate

C Copper(II) carbonate **D** Zinc carbonate

30. After acidification with dilute nitric acid, a colourless solution of **X** reacts with aqueous silver nitrate to give a white precipitate.

What could **X** be?

A Calcium iodide **B** Copper(II) chloride

C Lead(II) iodide **D** Sodium chloride

31. The table shows the results of two reactions of an aqueous solution of a salt.

reagents	final observation
excess aqueous sodium hydroxide	white precipitate
dilute nitric acid and aqueous silver nitrate	white precipitate

What is the name of the salt?

A Calcium chloride **B** Calcium iodide

C Zinc chloride **D** Zinc iodide

32. Gas **X** has the following properties.

1 Colourless

2 No effect on either red or blue litmus papers

3 No effect on limewater

4 Flammable

What is gas **X**?

A Ammonia **B** Chlorine **C** Hydrogen **D** Oxygen

33. Tests were carried out on an aqueous solution of an unknown compound, **P**.

The observations are recorded in the table.

test	observation
aqueous sodium hydroxide added	green precipitate, soluble in excess giving a green solution
dilute nitric acid added then aqueous barium nitrate	white precipitate
dilute nitric acid added then aqueous silver nitrate	no precipitate

Which ions are present in **P**?

A Cr^{3+} and Cl^- **B** Cr^{3+} and SO_4^{2-} **C** Fe^{2+} and Cl^- **D** Fe^{2+} and SO_4^{2-}

34. Which row gives the correct tests to identify both ammonia and sulfur dioxide?

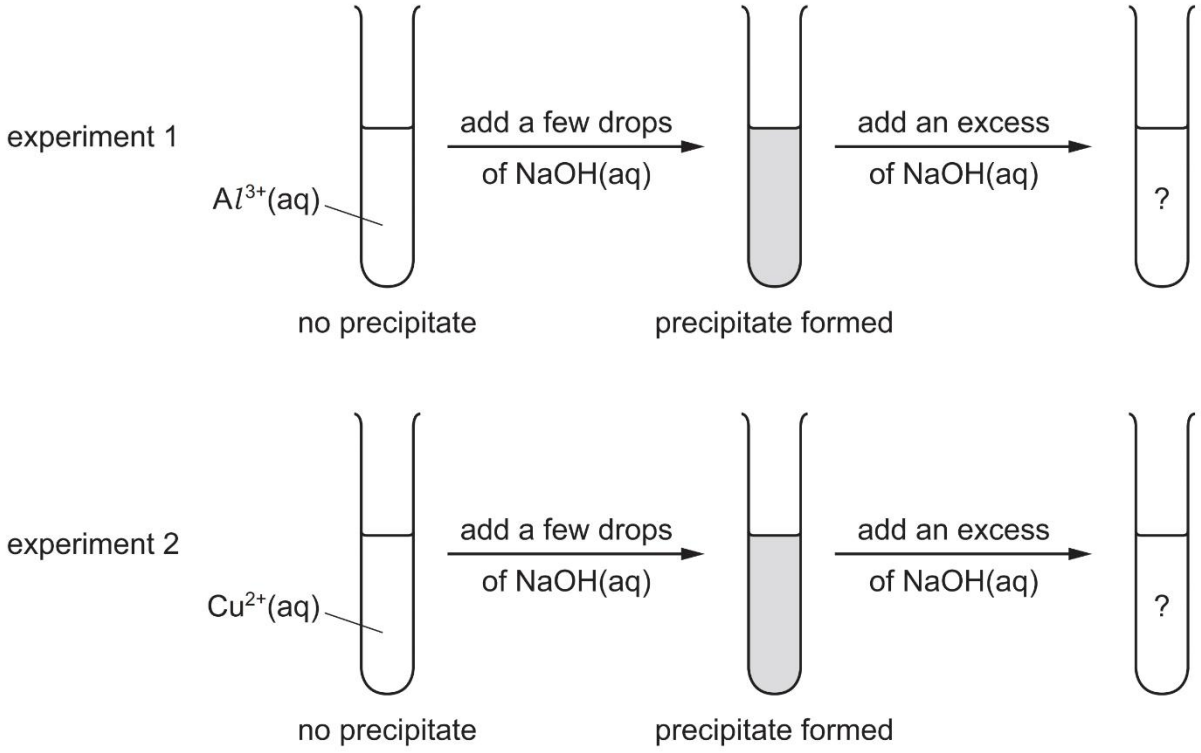
	test to identify ammonia	test to identify sulfur dioxide
A	damp blue litmus paper	acidified potassium manganate(VII)
B	damp blue litmus paper	damp red litmus paper
C	damp red litmus paper	acidified potassium manganate(VII)
D	damp red litmus paper	damp blue litmus paper

35. Aluminium chloride is dissolved in water and the resulting solution is divided between three test-tubes.

Which row gives the reagents for three tests which could be used to confirm the presence of aluminium chloride?

	test-tube 1	test-tube 2	test-tube 3
A	aqueous sodium hydroxide	aqueous ammonia	dilute hydrochloric acid and aqueous silver nitrate
B	aqueous sodium hydroxide	dilute nitric acid and aqueous silver nitrate	dilute hydrochloric acid
C	aqueous ammonia	dilute nitric acid and aqueous silver nitrate	nitric acid and barium nitrate
D	aqueous sodium hydroxide	aqueous ammonia	dilute nitric acid and aqueous silver nitrate

36. The diagram shows two experiments.



What are the results of adding an excess of NaOH(aq) in each experiment?

	experiment 1	experiment 2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

Key:

✓ = precipitate remains

✗ = precipitate dissolves

37. **P** is a hydrated metal salt with a blue colour. When **P** is heated, water is given off, leaving solid **Q**.

R is a hydrated metal salt with a pink colour. When **R** is heated, water is given off, leaving solid **S**.

Which row gives the name of **P** and the colour of **S**?

	name of **P**	colour of **S**
A	hydrated cobalt(II) chloride	blue
B	hydrated cobalt(II) chloride	white
C	hydrated copper(II) chloride	blue
D	hydrated copper(II) chloride	white

38. When aqueous sodium hydroxide is added to a solution of a metal ion, a grey-green precipitate forms, which dissolves in excess to form a dark green solution.

What is the identity of the metal ion?

A Chromium(III) **B** Iron(II)

C Iron(III) **D** Copper(II)

39. **J** is an aqueous solution.

On addition of aqueous sodium hydroxide to **J** a green precipitate is formed. The resulting mixture is heated and no gas is formed.

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

Which ions could be present in **J**?

A Fe^{3+} and NH_4^+ **B** Fe^{3+} and NO_3^-

C Fe^{2+} and NH_4^+ **D** Fe^{2+} and NO_3^-

40. A student wants to test an unknown chemical to see if it is zinc sulfate. Which reagents will the student need in order to successfully identify the presence of Zn^{2+} and SO_4^{2-} ions in solution?

	reagent 1	reagent 2	reagent 3
A	aqueous ammonia	dilute nitric acid	aqueous barium nitrate
B	aqueous ammonia	dilute sulfuric acid	aqueous silver nitrate
C	aqueous sodium hydroxide	dilute nitric acid	aqueous silver nitrate
D	aqueous sodium hydroxide	dilute sulfuric acid	aqueous barium nitrate

- Scan the QR Code below to view the answers to this assignment.

http://www.chemist.sg/qualitative_analysis/qa_assignment_7_ans.pdf