YUYING SECONDARY SCHOOL
WEIGHTED ASSESSMENT (TERM 1)
Secondary 4

NAME _____

CLASS _____ **REG. NO** _____

6092

CHEMISTRY

11 February 2025
50 minutes
Setter: Miss Ng Yun Xuan

Candidates answer on the Question Paper.
Additional Materials: Nil.

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A
There are ten questions in this section. 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 the spaces provided on the question paper.
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Section B
Answer all questions.
Write your answers in the spaces provided on the question paper.

The use of an approved calculator is expected, where appropriate.
You may lose marks if you do not show your working or if you do not use appropriate units.
A copy of the Periodic Table is printed on page 11.

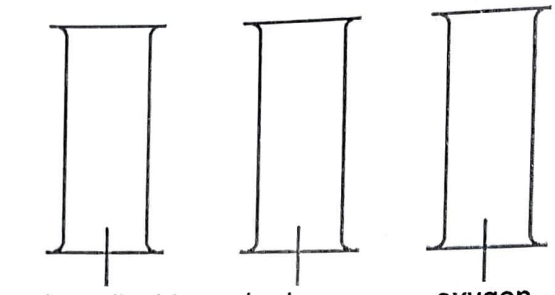
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiners' Use	
Total	/40

Section A

Answer **all** the questions in this section.
The total mark for this section is 10.

1 The gas jars shown below contain the gases carbon dioxide, hydrogen and oxygen.



Which of the following can be used to identify the gases in each jar?

A Universal Indicator
B a lighted splint
C aqueous calcium hydroxide
D moist blue litmus paper

2 Aqueous ammonia is added in excess to a solution containing a mixture of calcium chloride and copper(II) chloride.
What will be observed?

A A blue precipitate forms in a colourless solution.
B A white precipitate forms in a dark blue solution.
C A mixture of blue and white precipitates form.
D The solution turns dark blue.

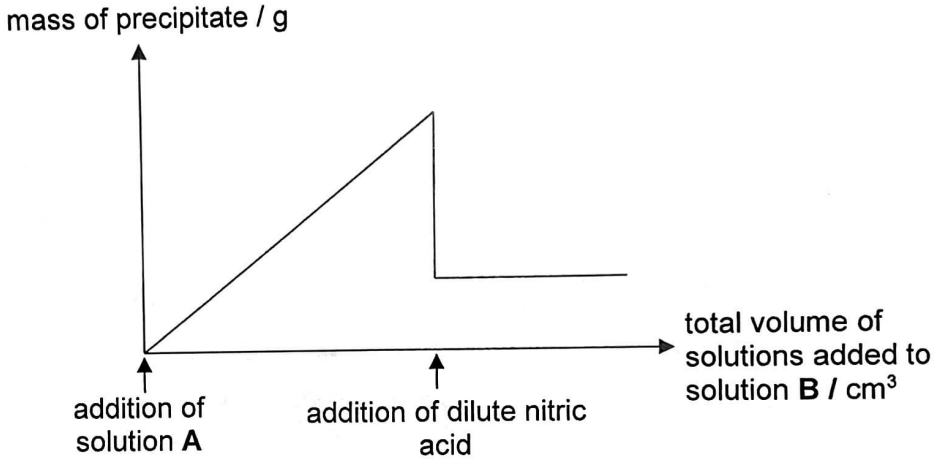
3 When testing for a sulfate ion using barium nitrate, the solution must be acidified with dilute nitric acid.
What is the purpose of the nitric acid?

A to act as a catalyst
B to oxidise the sulfate ion
C to prevent the precipitation of barium carbonate
D to prevent the decomposition of any barium sulfate formed

4 An excess of sodium hydroxide is added to an aqueous solution of salt **X** and boiled. No observable change seen. However, ammonia gas is only given off after aluminium foil is added to the hot solution.
What could salt **X** be?

A ammonium nitrate
B sodium nitrate
C calcium chloride
D ammonium chloride

5 In an experiment, solution **A** was added to solution **B**, followed by dilute nitric acid. The graph below shows how the mass of precipitate formed changes with the addition of the different solutions.



Which of the following would produce the graph shown?

	solution **A**	ions present in solution **B**
A	aqueous silver nitrate	sulfate and carbonate ions
B	aqueous silver nitrate	sulfate ions only
C	aqueous barium nitrate	sulfate and carbonate ions
D	aqueous barium nitrate	sulfate ions only

6 Which of the following salts could be prepared by the titration method?

A sodium sulfate
B copper(II) chloride
C lithium nitrate
D zinc sulfate

7 The table shows the solubility of three unknown salts in cold water.

salt	solubility in cold water
M carbonate	soluble
M chloride	soluble
M sulfate	soluble

What could substance **M** be?

A aluminium
B ammonium
C barium
D calcium

8 Which of the following salts is best prepared using the reagents listed?

	name of salt	reagents used
A	potassium nitrate	potassium hydroxide + dilute nitric acid
B	calcium sulfate	calcium carbonate + dilute sulfuric acid
C	lead(II) chloride	lead(II) sulfate + dilute hydrochloric acid
D	sodium sulfate	sodium metal + dilute sulfuric acid

9 Lead chromate(VI) is an insoluble salt which can be used as a yellow paint pigment. Which of the following can be reacted with a solution of potassium chromate(VI) to form lead chromate(VI)?

A lead(II) carbonate
B lead(II) sulfate
C lead(II) chloride
D lead(II) nitrate

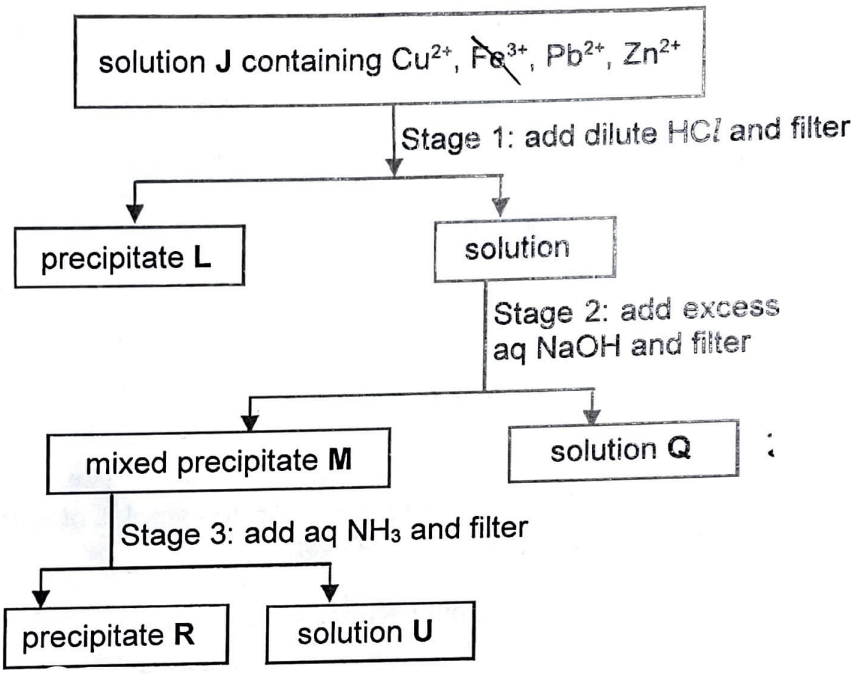
10 Given a supply of barium carbonate, copper(II) carbonate, dilute nitric acid and aqueous sodium hydroxide, how many different **insoluble** salts could be prepared?

A 0
B 1
C 2
D 3

Section B

Answer **all** the questions in this section.
The total mark for this section is 30.

1 Solution **J** contains the nitrate salts of four cations. The figure below shows the separation of all the cations in solution **J**.



(a) Name the precipitate **L**.

..... [1]

(b) State the chemical formula of the precipitate in **M** which has a lower relative molecular mass

..... [1]

(c) Give the chemical formula of the cation that is present in solution **Q**.

..... [1]

(d) State the colour of solution **U**.

..... [1]

(e) Write a balanced ionic equation for the formation of precipitate **R**.

..... [2]

(f) Name another acid that can replace dilute hydrochloric acid in **Stage 1** to produce similar result.
Explain your answer.

.... [2]

(g) Briefly describe how you would test for the anion present in solution J.

..... [2]

[Total: 10]

2 A student carried out some tests using four reagents, **A**, **B**, **C** and **D**.
In each test, he added a different reagent to separate samples of aqueous copper(II) chloride and copper(II) sulfate.

The table below shows the reagents he used for the tests.

	reagent
A	zinc powder
B	acidified aqueous silver nitrate
C	acidified aqueous barium nitrate
D	aqueous sodium hydroxide

Describe what the student would **observe** when he adds each of the four reagents to separate fresh samples of aqueous copper(II) chloride and aqueous copper(II) sulfate

[5]

[Total: 5]

3 Different salts were made by reacting an excess of a carbonate **X** with an acid **Y**. Unreacted solids were separated by filtration and the salt was recovered from the filtrate by crystallisation.

Four experiments were carried out using different combinations of **X** and **Y** to prepare salts. The percentage yield of each experiment is given in the table below.

experiment	**X**	**Y**	salt prepared	percentage yield of salt / %
1	$CuCO_3$	H_2SO_4	$CuSO_4$	95
2	$ZnCO_3$	HNO_3	$Zn(NO_3)_2$	92
3	$CaCO_3$	H_2SO_4	$CaSO_4$	18
4	Ag_2CO_3	HCl	AgCl	< 1

(a) Explain why the percentage yields of the salts were low in experiments **3** and **4**.

.... [2]

(b) Suggest another pair of reagents that could be used in experiment **4** to obtain a higher yield of the salt.

..... [1]

(c) Write the balanced chemical equation for the reaction that occurred in experiment **1**.

..... [2]

[Total: 5]

4 (a) A solution of zinc chloride can be prepared from zinc and dilute hydrochloric acid using the following steps.

step 1: Add an excess of zinc to warm dilute hydrochloric acid.

step 2: Filter the resulting mixture.

(i) Explain why an excess of zinc is added in step 1.

.....

..... [1]

(ii) State one observation to show that zinc is in excess.

..... [1]

(iii) Describe how a dry sample of pure zinc chloride crystals can be obtained after step 2.

.....

.....

.....

.....

..... [4]

(b) (i) State the names of two reagents that can be used to prepare lead(II) sulfate crystals.

.. [1]

(ii) Describe how a dry sample of pure lead(II) sulfate crystals can be obtained from the starting reagents in (b)(i).

...

....

... . [3]

[Total: 10]

END OF PAPER