Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8853841180

CHEMISTRY **0620/62**

Paper 6 Alternative to Practical **October/November 2021**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

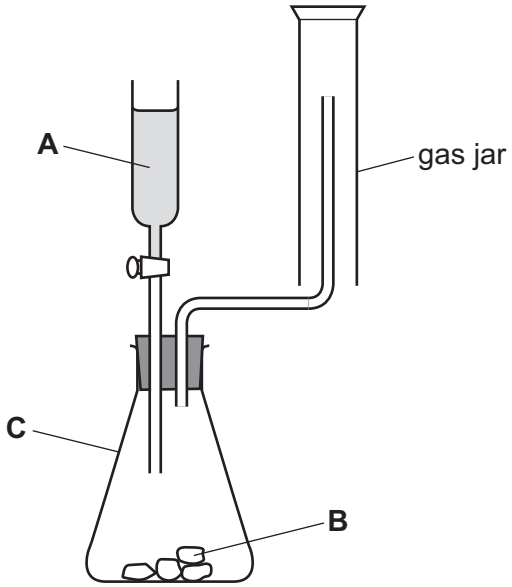
INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Any blank pages are indicated.

1 Carbon dioxide is a colourless gas that is denser than air.
Carbon dioxide can be made by reacting marble chips with dilute hydrochloric acid.

A student tried to make and collect carbon dioxide gas using the apparatus shown.



(a) (i) Name the substances labelled **A** and **B**.

A .....

B .....
[1]

(ii) Name the item of apparatus labelled **C**.

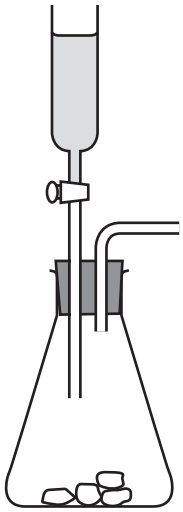
..... [1]

(b) Explain why very little carbon dioxide gas would be collected using the apparatus shown.

.....

..... [2]

(c) Complete the diagram to show how carbon dioxide gas could be collected and the volume measured.



[2]

(d) At the end of the experiment there were unreacted marble chips and aqueous calcium chloride in the item of apparatus labelled **C**.

Describe how you would find the mass of unreacted marble chips in apparatus **C**.

.....

.....

.....

..... [3]

[Total: 9]

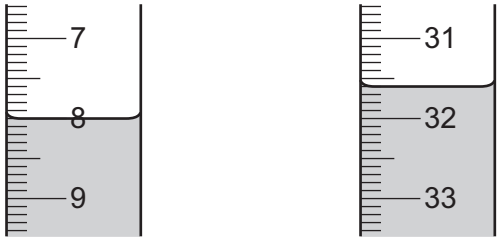
2 A student investigated the reaction between two different solutions of aqueous sodium carbonate, solution **K** and solution **L**, and two different solutions of dilute hydrochloric acid, acid **M** and acid **N**.

Three experiments were done.

(a) *Experiment 1*

- A burette was filled with solution **K**. Some of solution **K** was run out of the burette so that the level of solution **K** was on the burette scale.
- Using a measuring cylinder 25 cm^3 of acid **M** was poured into a conical flask.
- Five drops of methyl orange indicator were added to the conical flask.
- The conical flask was placed on a white tile.
- Solution **K** was added slowly from the burette to the conical flask, while the flask was swirled, until the solution just changed colour.

Use the burette diagrams to complete the table for Experiment 1.



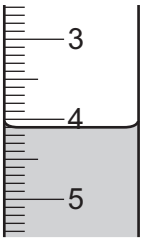
initial reading final reading

	Experiment 1
final burette reading / cm^3	
initial burette reading / cm^3	
volume of solution **K** added / cm^3	

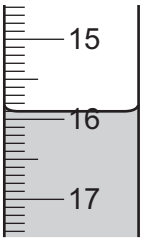
Experiment 2

- The conical flask was emptied and rinsed with distilled water.
- The burette was refilled with solution **K**. Some of solution **K** was run out of the burette so that the level of solution **K** was on the burette scale.
- Using a measuring cylinder 25 cm^3 of acid **N** was poured into the conical flask.
- Five drops of methyl orange indicator were added to the conical flask.
- The conical flask was placed on a white tile.
- Solution **K** was added slowly from the burette to the conical flask, while the flask was swirled, until the solution just changed colour.

Use the burette diagrams to complete the table for Experiment 2.



initial reading



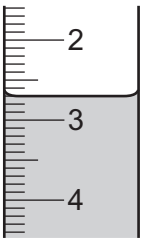
final reading

	Experiment 2
final burette reading / cm^3	
initial burette reading / cm^3	
volume of solution **K** added / cm^3	

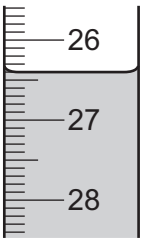
Experiment 3

- The burette was emptied and rinsed with distilled water.
- The conical flask was emptied and rinsed with distilled water.
- The burette was filled with solution **L**. Some of solution **L** was run out of the burette so that the level of solution **L** was on the burette scale.
- Using a measuring cylinder 25 cm^3 of acid **N** was poured into the conical flask.
- Five drops of methyl orange indicator were added to the conical flask.
- The conical flask was placed on a white tile.
- Solution **L** was added slowly from the burette to the conical flask, while the flask was swirled, until the solution just changed colour.

Use the burette diagrams to complete the table for Experiment 3.



initial reading



final reading

	Experiment 3
final burette reading / cm^3	
initial burette reading / cm^3	
volume of solution **L** added / cm^3	

[5]

(b) State the colour change observed at the end-point in the conical flask in Experiment 1.

from ..... to ..... [1]

(c) Describe one **other** observation made when solution **K** was added to acid **M** in Experiment 1.

..... [1]

(d) (i) Compare the volumes of solution **K** used in Experiment 1 and Experiment 2.

.....

..... [2]

(ii) Suggest why different volumes of solution **K** were needed in Experiment 1 and Experiment 2.

..... [1]

(e) Deduce the volume of solution **L** required to reach the end-point if Experiment 3 is repeated using acid **M** in place of acid **N**.

volume of solution **L** = ... cm^3 [1]

(f) Explain why the conical flask was rinsed with water at the start of Experiment 2 and Experiment 3.

..... [1]

(g) At the start of Experiment 3 the burette was rinsed with water.

Describe an additional step that should have been done after rinsing the burette with water but before filling the burette with solution **L**. Explain your answer.

.....

..... [2]

(h) Explain why the conical flask is placed on a white tile.

..... [1]

(i) Describe how the reliability of the results can be confirmed.

.....

..... [1]

(j) State **one** source of error in Experiment 1. Suggest an improvement to reduce this error.

source of error .....

improvement .....
[2]

[Total: 18]

3 Solid **O** and liquid **P** were analysed. Solid **O** was ammonium bromide.
Tests were done on each substance.

tests on solid O

Complete the expected observations.

Solid **O** was dissolved in water to form solution **O**. Solution **O** was divided into four approximately equal portions in four test-tubes.

(a) To the first portion of solution **O**, approximately 2 cm^3 of aqueous ammonia was added.

observations ..... [1]

(b) To the second portion of solution **O**, approximately 2 cm^3 of aqueous sodium hydroxide was added. The mixture formed was warmed. A gas was given off.

(i) The gas given off was tested with damp red litmus paper.

observations ..... [1]

(ii) Identify the gas given off.

..... [1]

(c) To the third portion of solution **O**, approximately 1 cm^3 of dilute nitric acid followed by a few drops of aqueous silver nitrate were added.

observations ..... [1]

(d) To the fourth portion of solution **O**, approximately 1 cm^3 of aqueous chlorine was added.

observations ..... [1]

tests on liquid P

tests	observations
test 1 A few drops of liquid **P** were placed in a crucible. A lighted splint was applied to the surface of liquid **P** in the crucible.	burned with an orange flame and lots of smoke; soot was left around the top of the crucible
test 2 A few drops of liquid **P** were added to a test-tube containing 1 cm^3 of aqueous bromine.	colour changed from orange to colourless

(e) State what conclusions can be made about liquid **P**.

.....

..... [2]

[Total: 7]

4 Cobalt is a metal. Cobalt is between copper and iron in the reactivity series. The mineral spherocobaltite contains the compound cobalt(II) carbonate and no other metal ions. Cobalt(II) carbonate is insoluble in water and reacts with dilute acids to form an aqueous solution of a salt.

Describe how you would obtain a sample of cobalt metal starting with a large lump of spherocobaltite. You have access to all normal laboratory apparatus and chemicals.

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..... [6]

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