Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

3845366912

CHEMISTRY **0620/61**

Paper 6 Alternative to Practical **May/June 2016**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all 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, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

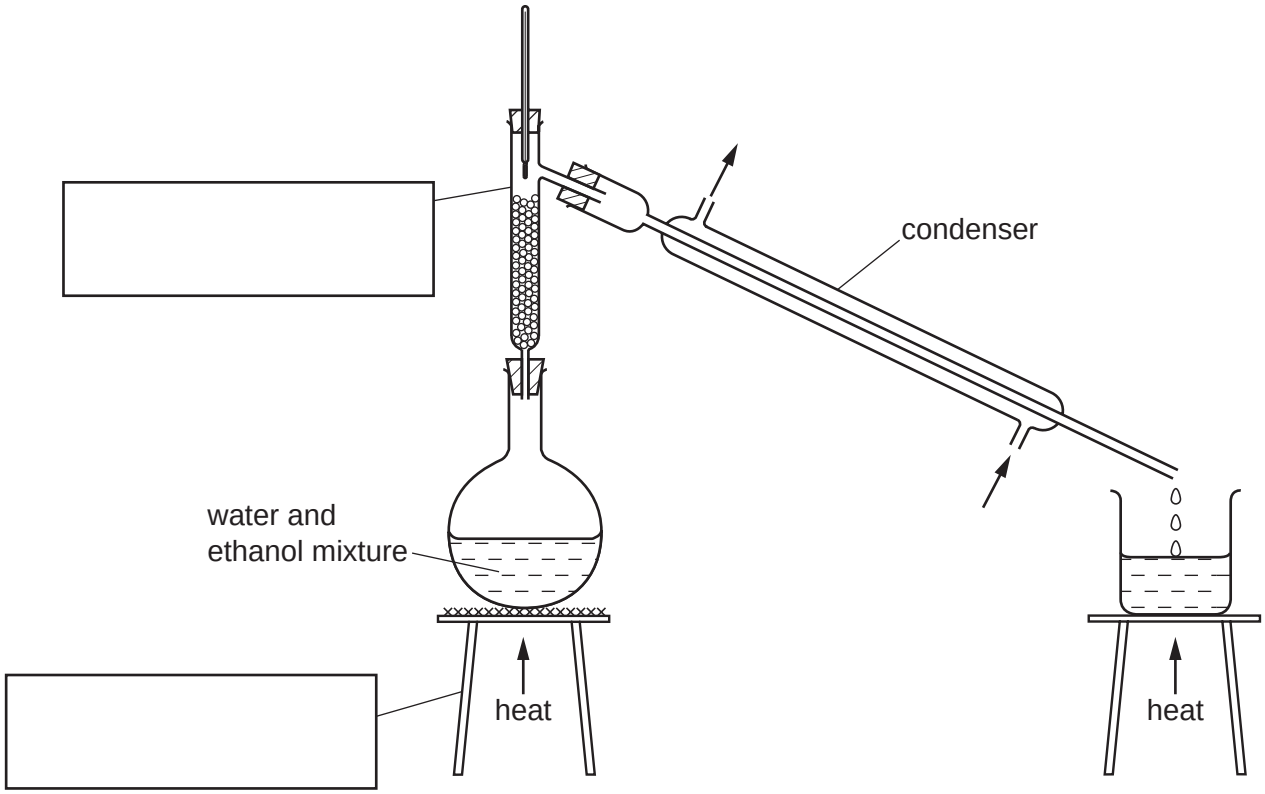
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **8** printed pages.

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1 The diagram shows the apparatus used to separate a mixture of water, boiling point 100 °C, and ethanol, boiling point 78 °C.



(a) Complete the boxes to name the apparatus. [2]

(b) Label the arrows on the condenser. [1]

(c) Identify **one** mistake in the apparatus.

..... [1]

(d) Which liquid would collect first? Explain your answer.

.....

..... [2]

(e) Why would it be better to use an electrical heater instead of a Bunsen burner to heat the water and ethanol mixture?

..... [1]

[Total: 7]

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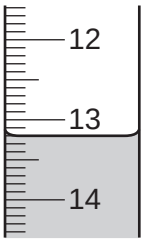
2 A student investigated the reaction between aqueous sodium carbonate and two different solutions of dilute hydrochloric acid, **A** and **B**.
The reaction is:

$$Na_2CO_3(aq) + 2HCl(aq) \rightarrow 2NaCl(aq) + H_2O(l) + CO_2(g)$$

Three experiments were carried out.

(a) *Experiment 1*

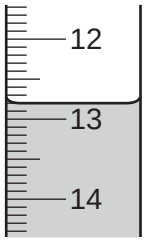
Using a measuring cylinder, 25 cm^3 of aqueous sodium carbonate were poured into a conical flask.
Thymolphthalein indicator was added to the conical flask.
A burette was filled up to the 0.0 cm^3 mark with solution **A** of dilute hydrochloric acid. **A** was added to the flask, until the solution just changed colour.
Use the burette diagram to record the reading in the table.



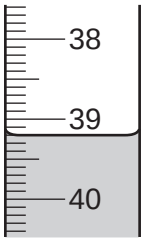
final reading

Experiment 2

Experiment 1 was repeated using methyl orange indicator instead of thymolphthalein.
Methyl orange is red-orange in acidic solutions and yellow in alkaline solutions.
Use the burette diagrams to record the readings in the table and complete the table.



initial reading



final reading

	experiment 1	experiment 2
final burette reading / cm^3		
initial burette reading / cm^3		
difference / cm^3		

[4]

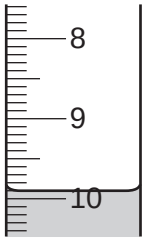
(b) What colour change was observed in the flask in experiment 2?

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

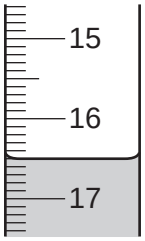
(c) *Experiment 3*

Experiment 1 was repeated using solution **B** of acid instead of solution **A**.

Use the burette diagrams to record the readings in the table and complete the table.



initial reading



final reading

	experiment 3
final burette reading / cm^3	
initial burette reading / cm^3	
difference / cm^3	

[2]

(d) Suggest **one** observation, other than colour change, that is made when hydrochloric acid is added to sodium carbonate.

..... [1]

(e) Complete the sentence below.

Experiment ..... needed the largest volume of hydrochloric acid to change the colour of the indicator. [1]

(f) What would be a more accurate method of measuring the volume of the aqueous sodium carbonate?

..... [1]

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(g) What would be the effect on the results, if any, if the solutions of sodium carbonate were warmed before adding the hydrochloric acid? Give a reason for your answer.

effect on results .....

reason .....
[2]

(h) **(i)** Determine the ratio of volumes of dilute hydrochloric acid used in experiments 1 and 3.

..... [1]

(ii) Use your answer to **(h)(i)** to deduce how the concentration of solution **A** differs from that of solution **B**.

..... [1]

(i) Suggest a **different** method, using standard laboratory chemicals, to determine which of the solutions of dilute hydrochloric acid, **A** or **B**, is more concentrated.

.....

.....

.....

.....

..... [3]

[Total: 17]

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[Turn over

3 Two substances, **C** and **D**, were analysed. Solid **C** was a salt and solution **D** was an aqueous solution of chromium(III) chloride.
The tests on solid **C**, and some of the observations, are in the following table.

tests	observations
<u>tests on solid **C**</u> Solid **C** was added to distilled water in a test-tube and shaken to dissolve. The solution was divided into two portions in test-tubes, and the following tests carried out. Appearance of the solution. The pH of the first portion of the solution was tested.	colourless liquid pH = 7
Dilute nitric acid was added to the second portion of the solution followed by aqueous silver nitrate.	cream precipitate
A flame test was carried out on solid **C**.	yellow flame colour

(a) Identify solid **C**.

..... [2]

(b) Describe the appearance of solution **D**.

..... [1]

(c) Tests were carried out on solution **D**.

Complete the observations for tests 1, 2 and 3.

(i) test 1

Drops of aqueous sodium hydroxide were added to solution **D**.

Excess aqueous sodium hydroxide was then added to the mixture.

observations .....

..... [3]

(ii) test 2

Excess aqueous ammonia was added to solution **D**.

observations ..... [2]

(iii) test 3

Dilute nitric acid was added to solution **D** followed by aqueous silver nitrate.

observations ..... [1]

(d) Chromium(III) can be converted to chromium(VI). Chromium(VI) is hazardous.

Suggest **one** safety precaution when using chromium(VI).

..... [1]

[Total: 10]

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[Turn over

4 Calcium burns in air to form calcium oxide. The reaction is vigorous and some of the calcium oxide can be lost as smoke.
Plan an investigation to determine the maximum mass of oxygen that combines to form calcium oxide when 2 g of calcium granules are burnt in air.
You are provided with common laboratory apparatus and calcium granules.

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 6]

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