Cambridge IGCSE

**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CANDIDATE NAME | | | | | | | | | |
| CENTRE NUMBER | | | | | | CANDIDATE NUMBER | | | |

**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.

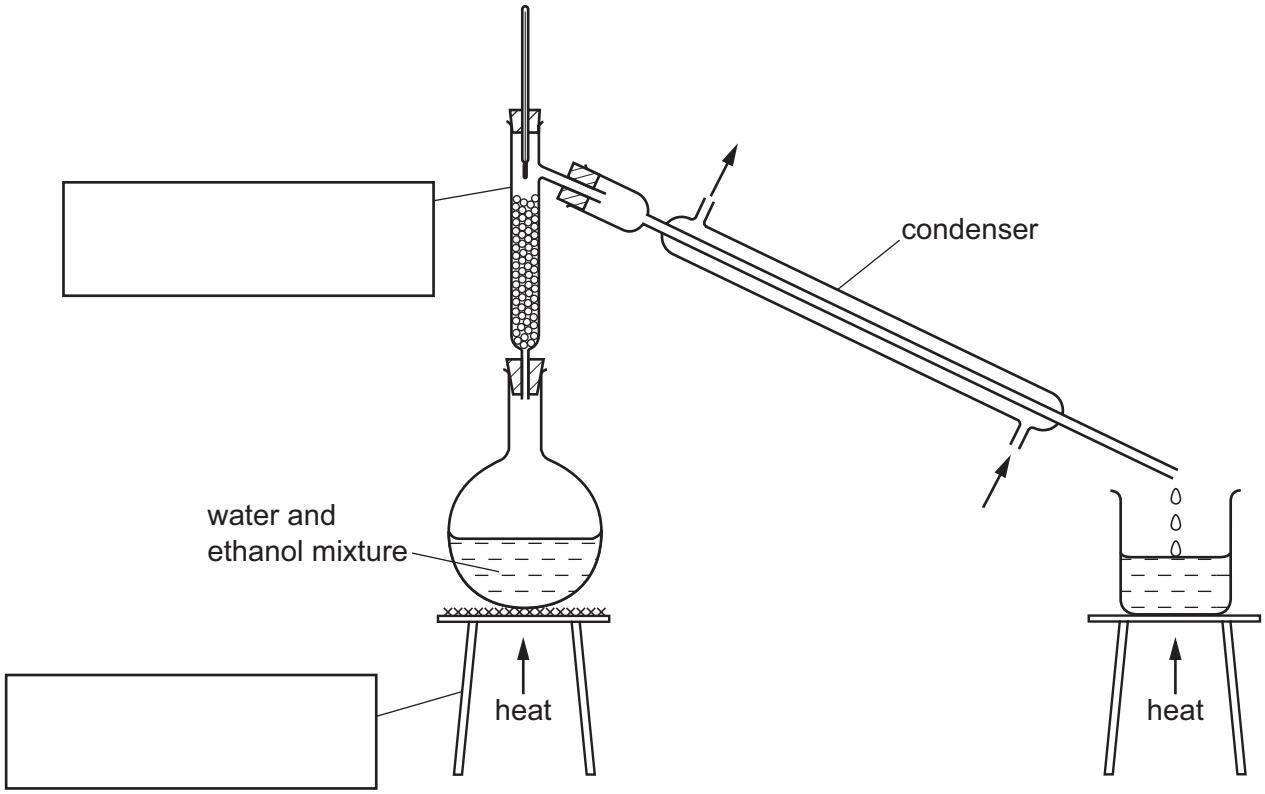
The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.



© UCLES 2016

CAMBRIDGE International Examinations

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




View solution

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

View solution

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

View solution

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

..... [1]

View solution

**(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]

View solution

© UCLES 2016

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

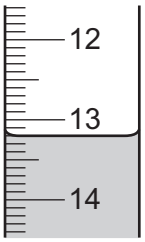
$$Na_2CO_3(aq) + 2HCl(aq) \rightarrow 2NaCl(aq) + H_2O(l) + CO_2(g)$$

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.

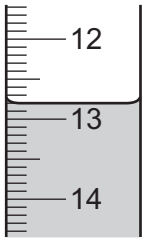
View solution



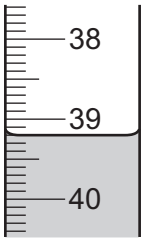

final reading

*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?

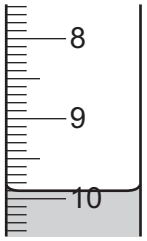
from ..... to ..... [1]

View solution

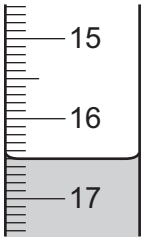
**(c)** *Experiment 3*

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]

View solution

**(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]

View solution

**(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 .....

View solution [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]

View solution

**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><br><br>Solid **C** was added to distilled water in a test-tube and shaken to dissolve.<br><br>The solution was divided into two portions in test-tubes, and the following tests carried out.<br><br>Appearance of the solution.<br><br>The pH of the first portion of the solution was tested. | colourless liquid<br><br>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**.

View solution

..... [2]

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

View solution

..... [1]

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

View solution

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**

View solution

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

observations ..... [2]

**(iii) test 3**

View solution

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.

View solution

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

..... [1]

[Total: 10]

**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.

View solution

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 6]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.