Cambridge IGCSE

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

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

*0859698315*

**CHEMISTRY** **0620/62**

Paper 6 Alternative to Practical **May/June 2015**

**1 hour**

Candidates answer on the Question Paper.

No Additional Materials are required.

**MODIFIED LANGUAGE**

**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.

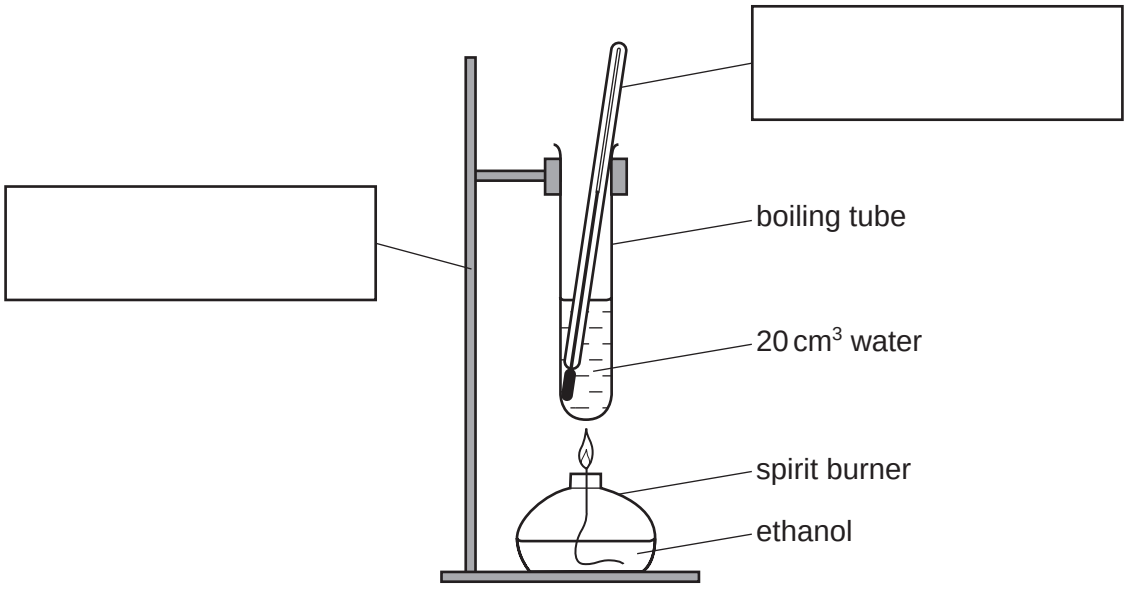
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

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 **11** printed pages and **1** blank page.


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**1** A student did an experiment to measure the energy produced by burning ethanol.
The apparatus used is shown.




The ethanol was burned for one minute. The temperature of the water was then measured and recorded.

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

**(b)** Give three other measurements the student should have taken.

1 .....

2 .....

3 .....
[3]

**(c)** The experiment was repeated using 40 $cm^3$ of water. What effect would this have on the results?

..... [1]

**(d)** Another student did this experiment using a copper can instead of a boiling tube.
Give one advantage of this change to the apparatus.

..... [1]

[Total: 7]

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**2** A student prepared some crystals of chromium(III) nitrate, $Cr(NO_3)_3.6H_2O$.
The following extract was taken from his practical notes.

> Making chromium(III) nitrate crystals
>
> Step 1 I poured 50 $cm^3$ of acid into a beaker. Solid chromium(III) oxide was then added a little at a time and the mixture stirred.
>
> Step 2 When no more chromium(III) oxide reacted I separated the mixture and collected the solution in an evaporating dish.
>
> Step 3 I boiled the solution strongly for ten minutes.

**(a)** Name the acid used in this preparation.

..... [1]

**(b)** What would be used in Step 1 to

**(i)** add the chromium(III) oxide to the acid,

..... [1]

**(ii)** stir the mixture?

..... [1]

**(c)** Name the separation method used in Step 2.

..... [1]

**(d)** **(i)** Suggest what was left in the evaporating dish at the end of Step 3.

..... [1]

**(ii)** How should the student have changed the method in Step 3 to obtain pure, dry crystals of chromium(III) nitrate?

.....

.....

.....

..... [3]

[Total: 8]

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**[Turn over**

**3** Three bottles of liquid have lost their labels. The liquids are known to be:

- aqueous potassium hydroxide,
- octane,
- pure water.

Outline tests you would do to identify and distinguish the liquid in each bottle.

| liquid | test | result |
|---|---|---|
| aqueous potassium hydroxide | | |
| octane | | |
| pure water | | |

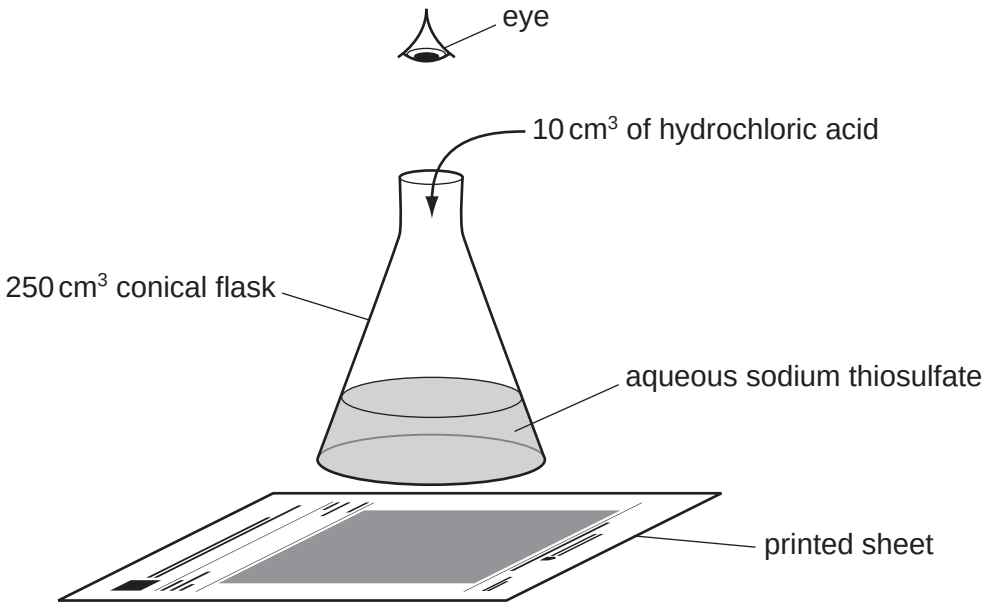
[6]

[Total: 6]

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**4** A student investigated the rate of reaction between hydrochloric acid and aqueous sodium thiosulfate. When these chemicals react they form a precipitate which makes the solution go cloudy. The formation of this precipitate can be used to show how fast the reaction proceeds.

Five experiments were done using the apparatus shown below.




**(a)** *Experiment 1*

Using a measuring cylinder, 50 $cm^3$ of aqueous sodium thiosulfate was poured into a conical flask. The conical flask was placed on a printed sheet of paper.
10 $cm^3$ of the hydrochloric acid was added to the solution in the conical flask and the stop clock started.
The time taken for the printed words to disappear from view was measured.

**(b)** *Experiment 2*

Using a measuring cylinder, 40 $cm^3$ of aqueous sodium thiosulfate was poured into a conical flask, followed by 10 $cm^3$ of distilled water. The conical flask was placed on the printed sheet.
10 $cm^3$ of the hydrochloric acid was added to the solution in the conical flask and the stop clock started.
The time taken for the printed words to disappear from view was measured.

**(c)** *Experiment 3*

Experiment 2 was repeated using 35 $cm^3$ of aqueous sodium thiosulfate and 15 $cm^3$ of distilled water.

**(d)** *Experiment 4*

Experiment 2 was repeated using 30 $cm^3$ of aqueous sodium thiosulfate and 20 $cm^3$ of distilled water.

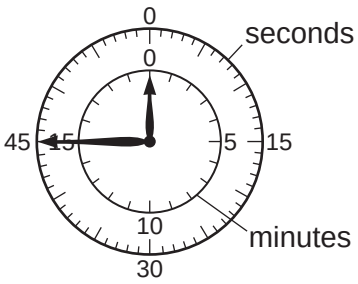
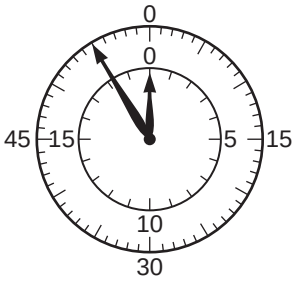
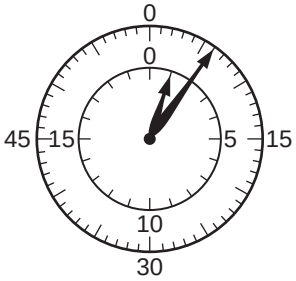
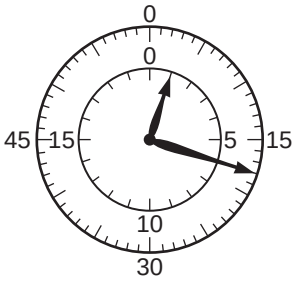
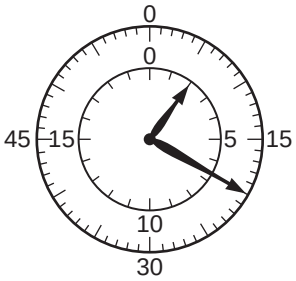
**(e)** *Experiment 5*

Experiment 2 was repeated using 20 $cm^3$ of aqueous sodium thiosulfate and 30 $cm^3$ of distilled water.

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**[Turn over**

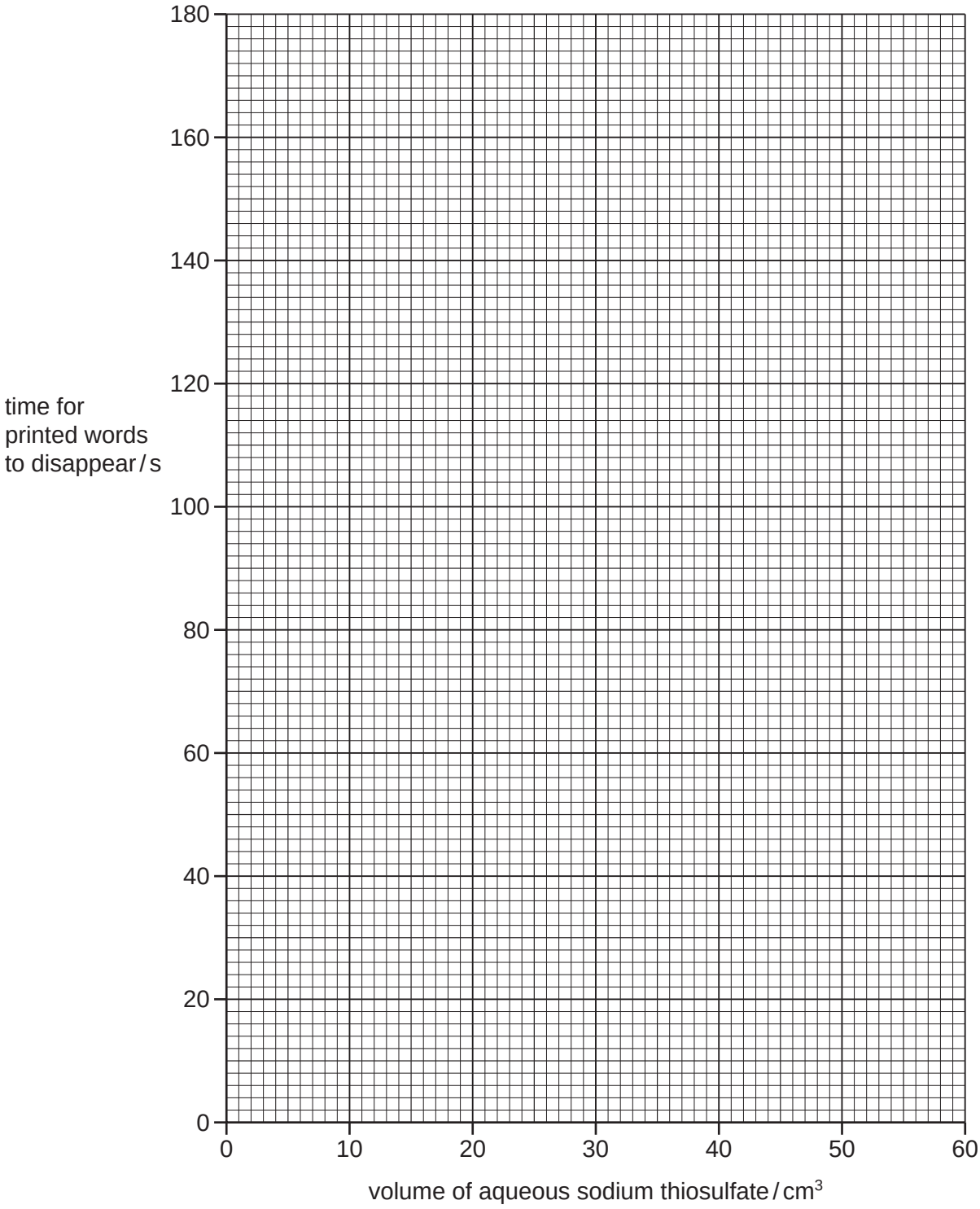
**(f)** Use the stop clock diagrams to record the times in the table.
Complete the table.

| Experiment number | volume of aqueous sodium thiosulfate / $cm^3$ | volume of distilled water / $cm^3$ | stop clock diagram | time for printed words to disappear / s |
|---|---|---|---|---|
| 1 | | |   | |
| 2 | | |   | |
| 3 | | |   | |
| 4 | | |   | |
| 5 | | |   | |

[4]

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**(g)** Plot the results on the grid and draw a smooth line graph.




[3]

**(h) (i)** **From your graph**, deduce the time for the printed words to disappear if Experiment 2 was repeated using 25 $cm^3$ of aqueous sodium thiosulfate and 25 $cm^3$ of distilled water. Show clearly **on the grid** how you worked out your answer.

..... [3]

**(ii)** Sketch **on the grid** the curve you would expect if the experiments were repeated at a lower temperature. Label this curve 'lower temperature'. [1]

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**[Turn over**

**(i)** **(i)** In which experiment was the rate of reaction greatest?

..... [1]

**(ii)** Explain why the rate of reaction was greatest in this experiment.

.....

..... [1]

**(j)** A student did a sixth experiment using 60 $cm^3$ of aqueous sodium thiosulfate.

Why would this not be an appropriate volume to use in this series of experiments?

.....

..... [2]

**(k)** Suggest and explain the effect of

**(i)** using a burette to measure the volume of the hydrochloric acid,

.....

..... [2]

**(ii)** using a 100 $cm^3$ conical flask.

.....

..... [2]

[Total: 19]

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**5** A mixture of two salts, **J** and **K**, was analysed. **J** was ammonium iodide which is water soluble and **K** is insoluble.
The tests on the mixture, and some of the observations are in the following table.
Complete the observations in the table.

| tests | observations |
|---|---|
| **(a)** Appearance of the mixture. | white solid |
| Distilled water was added to the mixture. The mixture was shaken and filtered.<br><br><u>tests on the filtrate</u><br><br>The solution was divided into two equal portions in two test-tubes.<br><br>**(b)** To the first portion of the solution, aqueous sodium hydroxide was added. The mixture was heated gently and the gas evolved was tested with pH indicator paper. | .....<br><br>..... [2] |
| **(c)** To the second portion of the solution, dilute nitric acid and aqueous silver nitrate solution were added. | ..... [2] |
| <u>tests on the residue</u><br><br>**(d)** Dilute hydrochloric acid was added to the residue in a test-tube. The gas given off was tested.<br><br>Dilute sulfuric acid was added to the solution formed. | rapid effervescence<br><br>limewater turned milky<br><br>white precipitate formed |

**(e)** What is the pH value of the gas given off in test **(b)**?

..... [1]

**(f)** Identify the gas given off in test **(d)**.

..... [1]

**(g)** What are your conclusions about solid **K**?

.....

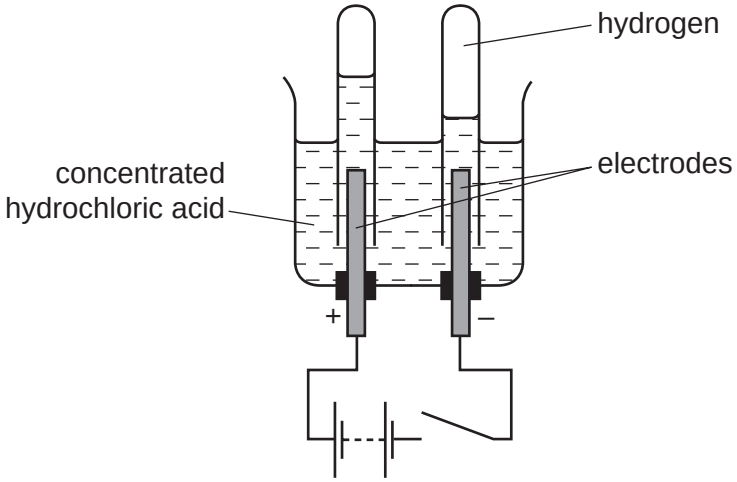
..... [2]

[Total: 8]

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**[Turn over**

**6** Concentrated hydrochloric acid was electrolysed.




Hydrogen gas formed at the cathode (negative electrode).

**(a)** Name a suitable metal to use for the electrodes.

..... [1]

**(b)** Why does hydrogen form at the negative electrode?

..... [1]

**(c)** **(i)** Identify the gas given off at the anode (positive electrode).

..... [1]

**(ii)** Give a test for this gas.

test .....

result .....
[2]

**(d)** Suggest why the volume of gas formed at the positive electrode is less than the volume of hydrogen.

..... [1]

[Total: 6]

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7 **Tonic Water**

Tonic water is a solution containing citric acid. The concentration of the acid can be determined by reaction with aqueous potassium hydroxide solution.
Plan an investigation to show which of two different brands of colourless tonic water, Tastyton and Slimton, contains the highest concentration of citric acid.
You can use common laboratory apparatus and chemicals.

.....

.....

.....

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.....

.....

.....

.....

.....

.....

..... [6]

[Total: 6]

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