Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

4473552331

CHEMISTRY **0620/61**

Paper 6 Alternative to Practical **October/November 2017**

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.

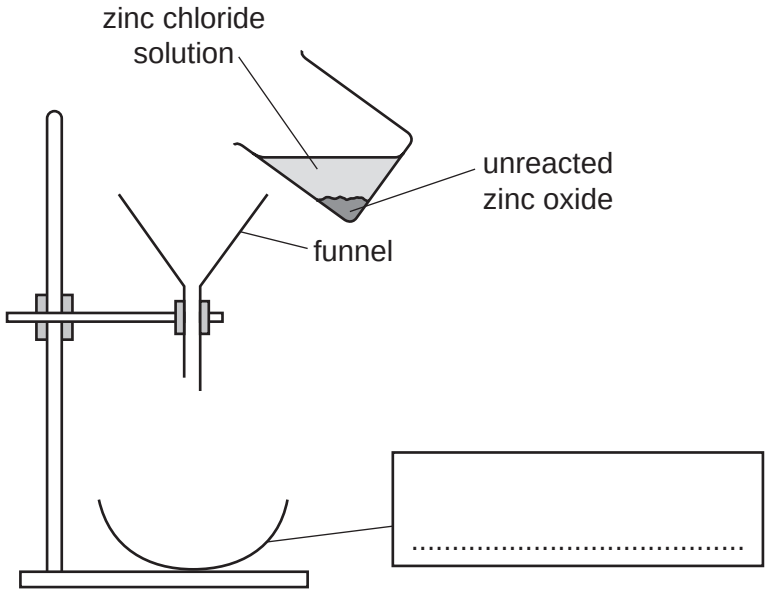
The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

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CAMBRIDGE International Examinations

1 A student reacted dilute hydrochloric acid with zinc oxide to prepare zinc chloride solution. The diagram shows part of the procedure.



(a) Complete the box to name the apparatus. [1]

(b) Which of the reactants was in excess?

..... [1]

(c) **(i)** Name the separation process this apparatus is used for.

..... [1]

(ii) Suggest why this apparatus would **not** work.

.....

..... [1]

(d) Describe how crystals of zinc chloride could be obtained from the zinc chloride solution.

.....

.....

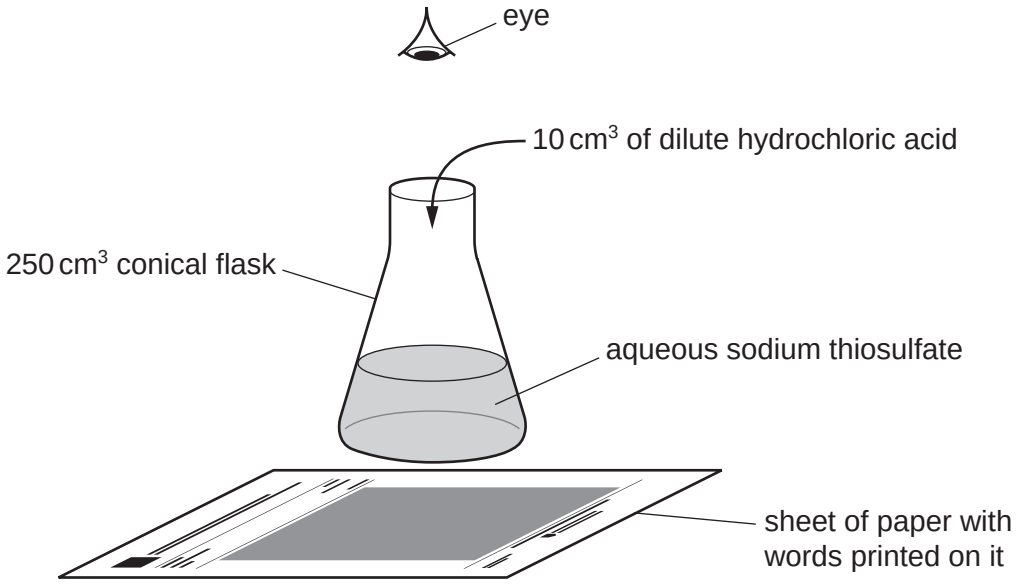
..... [3]

[Total: 7]

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2 A student investigated the rate of reaction between dilute 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 carried out using the apparatus shown.



Experiment 1

- Using a measuring cylinder, 50 cm^3 of aqueous sodium thiosulfate were poured into a conical flask. The initial temperature of the solution was measured. The conical flask was placed on a sheet of paper with words printed on it.
- Using a measuring cylinder, 10 cm^3 of dilute hydrochloric acid were added to the solution in the conical flask and a stopclock was started.
- The time taken for the printed words to disappear from view was measured.
- The final temperature of the mixture was measured.

Experiment 2

- Using a measuring cylinder, 50 cm^3 of aqueous sodium thiosulfate were poured into a conical flask. The solution was heated to about **30 °C** and the temperature was measured. The conical flask was placed on a sheet of paper with words printed on it.
- Using a measuring cylinder, 10 cm^3 of dilute hydrochloric acid were added to the solution in the conical flask and a stopclock was started.
- The time taken for the printed words to disappear from view was measured.
- The final temperature of the mixture was measured.

Experiment 3

- Experiment 2 was repeated but the 50 cm^3 of aqueous sodium thiosulfate were heated to about **40 °C** before adding the dilute hydrochloric acid.

Experiment 4

- Experiment 2 was repeated but the 50 cm^3 of aqueous sodium thiosulfate were heated to about **50 °C** before adding the dilute hydrochloric acid.

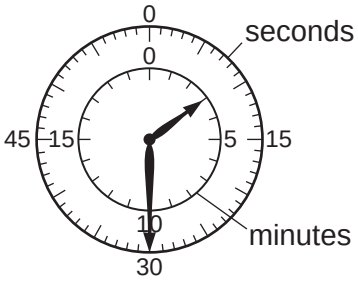
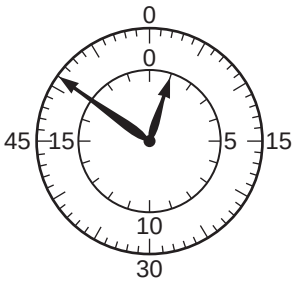
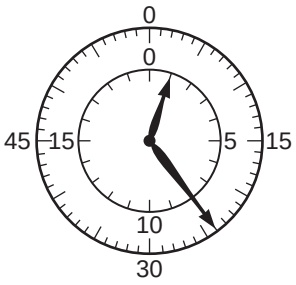
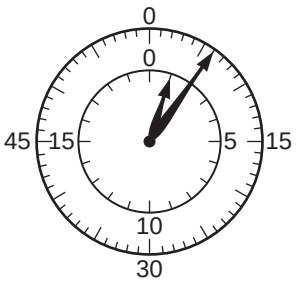
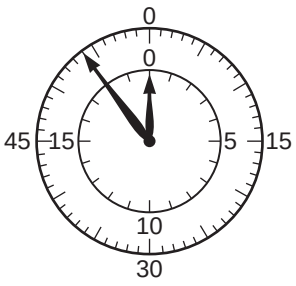
Experiment 5

- Experiment 2 was repeated but the 50 cm^3 of aqueous sodium thiosulfate were heated to about **60 °C** before adding the dilute hydrochloric acid.

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[Turn over

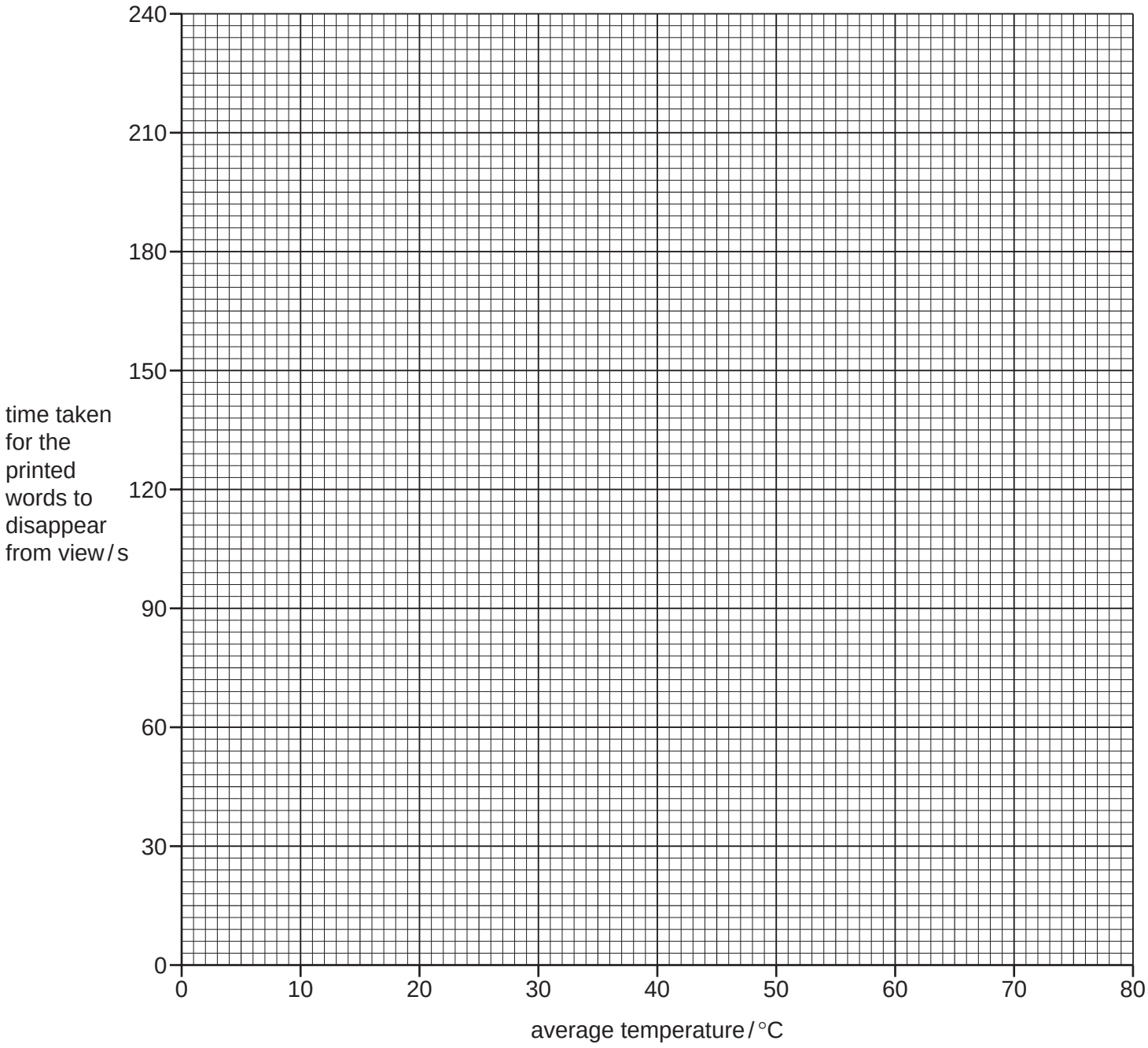
(a) Calculate the average temperatures and record them in the table.
Use the stopclock diagrams to record the times in the table.

experiment number	initial temperature of the solution / °C	final temperature of the mixture / °C	average temperature / °C	stopclock diagram	time taken for the printed words to disappear from view / s
1	19	17			
2	32	30			
3	42	40			
4	54	52			
5	65	61			

[3]

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(b) Plot the results of Experiments 1–5 on the grid. Draw a smooth line graph.



[4]

(c) **From your graph**, deduce the time taken for the printed words to disappear from view when Experiment 2 was repeated at an initial temperature of 73 °C. The final temperature of the mixture was 71 °C.

Show clearly **on the grid** how you worked out your answer.

..... [3]

(d) Sketch **on the grid** the graph you would expect if all of the experiments were repeated using a more dilute solution of aqueous sodium thiosulfate. [1]

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[Turn over

(e) (i) In which experiment, 1, 2, 3, 4 or 5, was the rate of reaction greatest?

..... [1]

(ii) Explain, in terms of particles, why the rate of reaction was greatest in this experiment.

.....

.....

.....

..... [2]

(f) Suggest and explain the effect on the results of using

(i) a burette to measure the volumes,

.....

.....

..... [2]

(ii) a 100 cm^3 conical flask instead of a 250 cm^3 conical flask.

.....

.....

..... [2]

[Total: 18]

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3 Two solid salts, **F** and **G**, were analysed. Solid **F** was iron(III) nitrate.
Tests were carried out on each solid.

tests on solid F

Complete the expected observations.

Solid **F** was dissolved in distilled water to produce solution **F**. Solution **F** was divided into three equal portions in three test-tubes.

(a) (i) A few drops of aqueous sodium hydroxide were added to the first portion of solution **F** until a change was seen.

observations ..... [2]

(ii) An excess of aqueous sodium hydroxide was then added to the mixture from **(a)(i)**.

observations ..... [1]

(b) An excess of aqueous ammonia was added to the second portion of solution **F** until a change was seen.

observations ..... [1]

(c) Aluminium foil and aqueous sodium hydroxide were added to the third portion of solution **F**. The mixture was heated and the gas which was produced was tested.

test for gas .....

test result .....
[2]

(d) Identify the gas produced in **(c)**.

..... [1]

tests on solid G

Tests were carried out and the following observations made.

tests on solid **G**	observations
test 1 A flame test was carried out on solid **G**.	red colour
test 2 Dilute nitric acid was added to solid **G**. The gas produced was passed through limewater.	rapid effervescence limewater turned milky

(e) Identify solid **G**.

..... [2]

[Total: 9]

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[Turn over

4 Iron, tin and zinc all react with dilute hydrochloric acid to produce hydrogen.
Plan an experiment to determine the order of reactivity of iron, tin and zinc.
You are provided with powdered samples of the metals and common laboratory apparatus.

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..... [6]

[Total: 6]

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