UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

0139348906

CHEMISTRY **0620/61**

Paper 6 Alternative to Practical **May/June 2013**

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 a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, 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.

This document consists of **11** printed pages and **1** blank page.

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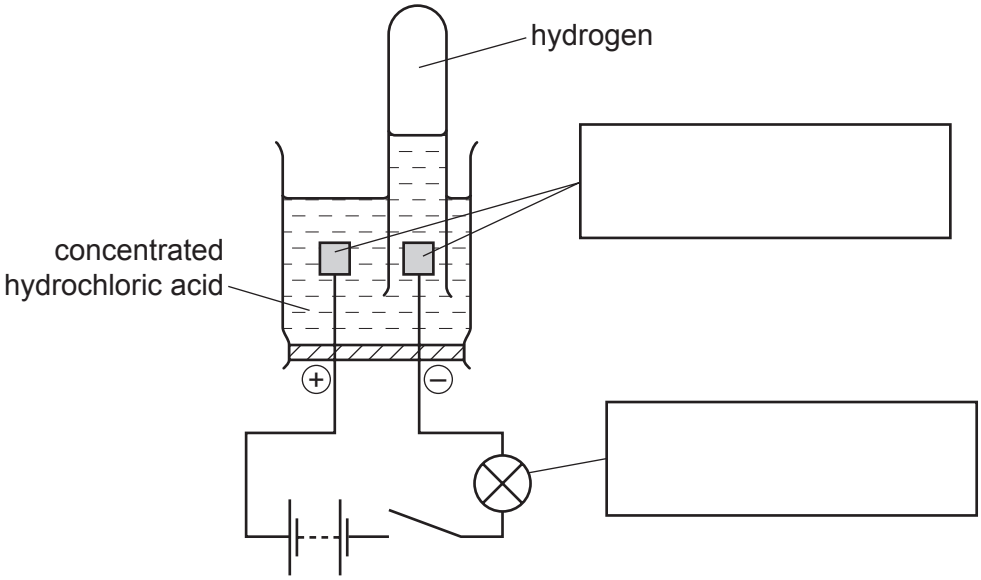
1 Electricity was passed through a solution of concentrated hydrochloric acid using the apparatus shown.



(a) Complete the boxes to identify the parts of the apparatus labelled. [2]

(b) Describe the test for hydrogen.

test .....

result ..... [2]

(c) Describe how a sample of the gas given off at the positive electrode could be collected and its volume measured.

.....

.....

..... [2]

(d) The experiment was repeated using a concentrated aqueous solution of sodium chloride instead of hydrochloric acid.

(i) State the name of the solution formed.

..... [1]

(ii) Give a test to show the presence of this product.

..... [1]

[Total: 8]

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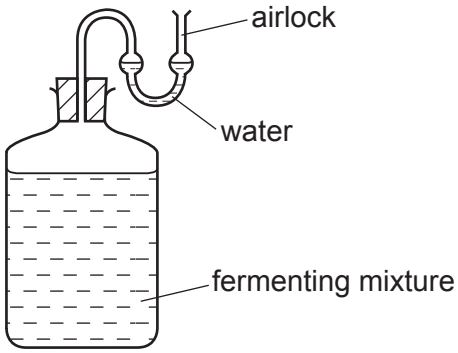
2 A student found a recipe for making elderberry wine by fermentation.

1 kg elderberries
0.5 kg sugar
10 g yeast granules
3 dm^3 water

The student decided to make some elderberry wine using the apparatus below.



The student carried out the following method.

Step 1 The elderberries were crushed.

Step 2 The crushed elderberries and sugar were added to the water and the mixture was boiled for ten minutes. The crushed elderberries were then separated from the mixture.

Step 3 Yeast was added to the liquid when it had cooled to room temperature.

(a) Suggest the purpose of the airlock in the apparatus.

..... [1]

(b) What apparatus could be used in Step 1?

..... [1]

(c) Draw a labelled diagram of the apparatus used to separate the crushed elderberries from the mixture in Step 2.

[2]

(d) Why was the yeast in Step 3 not added until the liquid was at room temperature?

..... [1]

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(e) (i) State **one** observation during the fermentation.

..... [1]

(ii) Suggest how the rate of the fermentation reaction could be measured.

.....

..... [2]

(f) Name the method that could be used to separate ethanol from the fermented mixture.

..... [1]

[Total: 9]

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3 A student investigated the reaction between two different solids, **C** and **D**, and excess dilute hydrochloric acid.

Five experiments were carried out.

(a) *Experiment 1*

A measuring cylinder was used to pour 30 cm^3 of dilute hydrochloric acid into a polystyrene cup. The temperature of the dilute hydrochloric acid was measured. 1 g of solid **C** was added to the dilute hydrochloric acid and the mixture stirred with a thermometer.
The maximum temperature reached by the liquid mixture was measured.

(b) *Experiment 2*

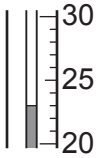
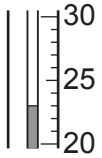
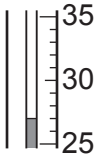
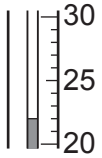
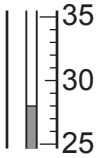
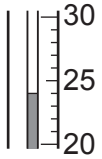
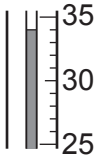
The polystyrene cup was emptied and rinsed with water.
Experiment 1 was repeated using 2 g of solid **C**.

(c) *Experiments 3 and 4*

Experiment 2 was repeated using 3 g and then 5 g of solid **C**.

Use the thermometer diagrams to record the results in the table below.

Complete the final column in the table.

experiment	mass of solid **C** / g	thermometer diagram	initial temperature of acid / °C	thermometer diagram	maximum temperature reached / °C	temperature difference / °C
1						
2						
3						
4						

[3]

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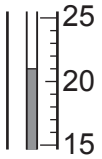
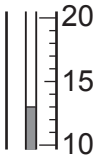
(d) *Experiment 5*

Experiment 1 was repeated using solid **D**. Use the thermometer diagrams to record the results in the spaces below.



initial temperature of acid



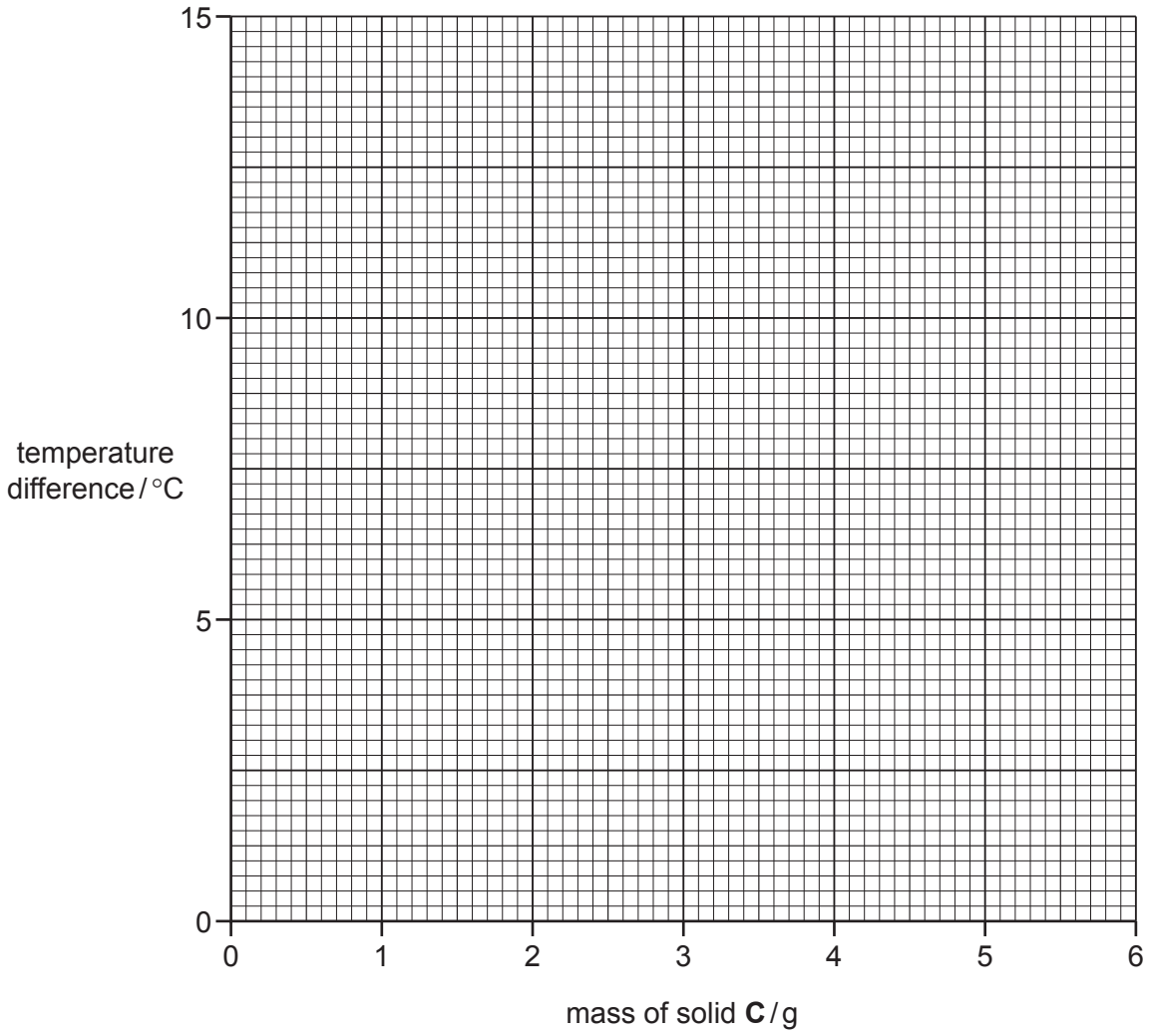
final temperature of liquid mixture

initial temperature of dilute hydrochloric acid = ... °C

final temperature of liquid mixture = ... °C

temperature change = ... °C [2]

(e) Plot the results for Experiments 1, 2, 3 and 4 on the grid and draw a straight line graph.



[4]

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(f) **(i)** **From your graph**, deduce the temperature of the solution when 6 g of solid **C** is added to 30 cm^3 of dilute hydrochloric acid.
Show clearly **on the grid** how you worked out your answer.

..... °C [2]

(ii) **From your graph**, deduce the mass of solid **C** that would give a temperature rise of 9 °C when added to 30 cm^3 of dilute hydrochloric acid.

.....

..... [2]

(g) What type of chemical process occurs when solid **D** reacts with dilute hydrochloric acid?

..... [1]

(h) Suggest the effect on the results if Experiment 3 was repeated using 60 cm^3 of dilute hydrochloric acid.

.....

..... [2]

(i) Predict the temperature of the solution in Experiment 4 after 1 hour. Explain your answer.

.....

..... [2]

(j) When carrying out the experiments, what would be **one** advantage and **one** disadvantage of taking the temperature readings after exactly one minute?

advantage .....

.....

disadvantage .....

..... [2]

[Total: 20]

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[Turn over

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4 A mixture of two solids, **E** and **F**, was analysed.
Solid **E** was the water-soluble salt aluminium chloride, $AlCl_3$, and solid **F** was an insoluble salt.
The tests on the mixture and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
Distilled water was added to the mixture in a boiling tube. The contents of the boiling tube were shaken and filtered, keeping the filtrate and residue for the following tests.	
<u>tests on the filtrate</u> The filtrate was divided into five portions in five test-tubes. **(a)** The first portion was used to describe the appearance of the filtrate.	appearance ..... [1]
(b) Several drops of aqueous sodium hydroxide were added to the second portion of the solution. Excess aqueous sodium hydroxide was then added to the test-tube.	.... [3]
(c) Aqueous ammonia was added to the third portion, dropwise and then in excess.	.... [2]
(d) To the fourth portion of the solution, dilute nitric acid and aqueous silver nitrate were added.	..... [2]
(e) To the fifth portion of the solution, about 1 cm^3 of dilute nitric acid and barium nitrate solution were added.	..... [1]

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tests	observations
<u>tests on the residue</u>	
(f) (i) To a little of the residue, dilute hydrochloric acid was added. The gas given off was tested.	rapid effervescence gas turned limewater milky
(ii) The residue was heated, gently then strongly.	solid changed colour from green to black

(g) What conclusions can you draw about solid **F**?

.....

..... [2]

[Total: 11]

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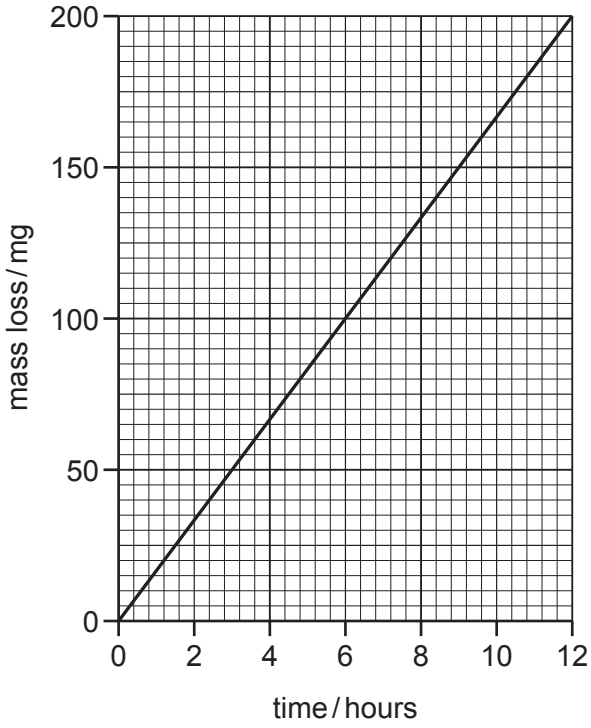
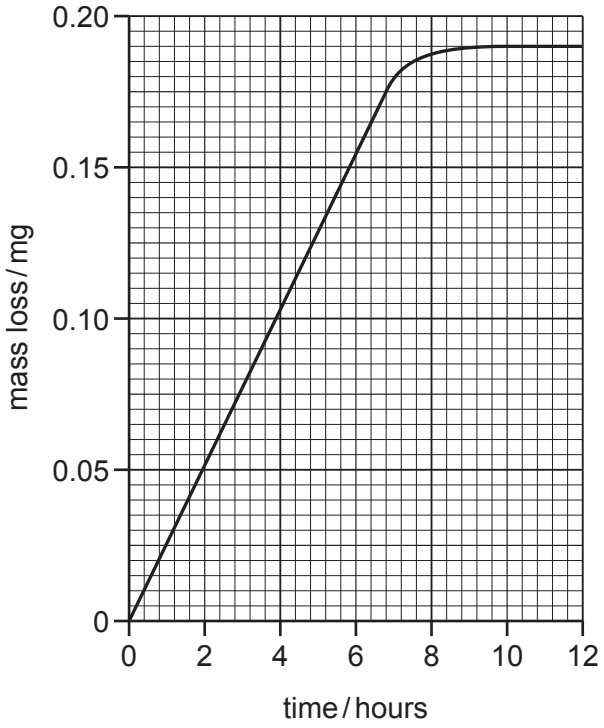
5 Identical pieces of steel were placed in two different boiling liquids for 12 hours. The graphs show how the mass of each piece of steel changed.

graph **A**
steel in boiling acid solution



graph **B**
steel in boiling alkali solution



(a) Give **one** similarity in the change in mass of the steel in both liquids.

..... [1]

(b) Describe **two** ways in which the mass loss shown in graph **A** is different from that shown in graph **B**.

1. .....

.....

2. .....

..... [3]

(c) State **two** different safety precautions that would need to be taken when carrying out this investigation.

1. .....

2. ..... [2]

[Total: 6]

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6 Copper(II) oxide and carbon are both black solids. Copper(II) oxide reacts with dilute sulfuric acid to form aqueous copper(II) sulfate. Carbon does not react with dilute sulfuric acid.
You are given a mixture of copper(II) oxide and carbon and access to dilute sulfuric acid.
Plan an experiment to investigate the percentage of copper(II) oxide in the mixture.

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 6]

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