UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

6376664364

CHEMISTRY **0620/62**

Paper 6 Alternative to Practical **October/November 2012**

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.

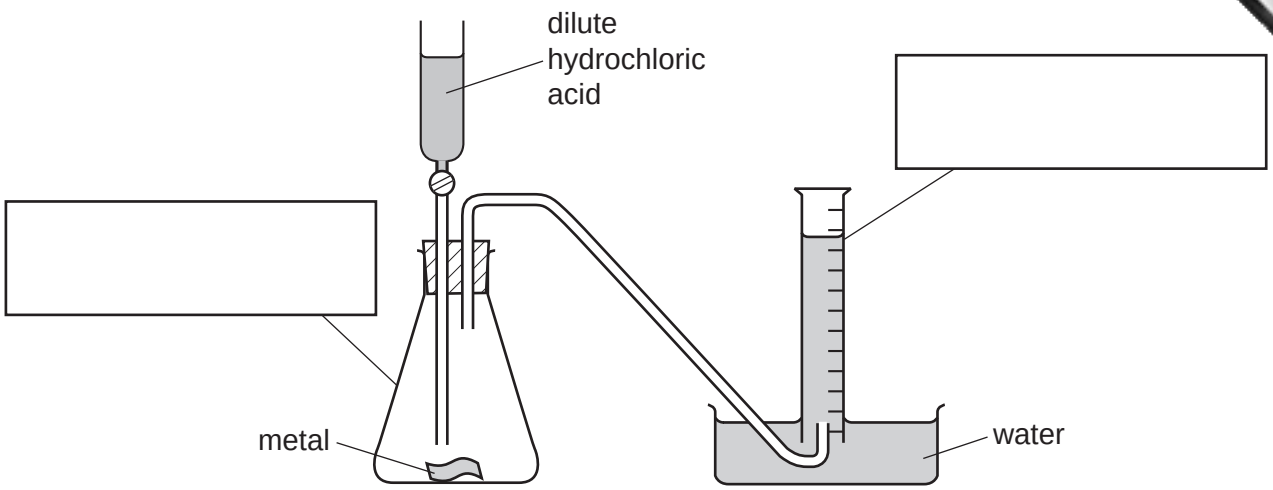
Answer **all** questions.

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.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
Total	

This document consists of **12** printed pages.

1 The apparatus below was used to prepare hydrogen and measure the volume produced.



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

(b) **(i)** Why would copper metal **not** be used in this preparation?

.....

(ii) Name a suitable metal that could be used in this preparation.

..... [2]

(c) Draw a labelled diagram to show a **different** method of collecting and measuring the hydrogen.

[2]

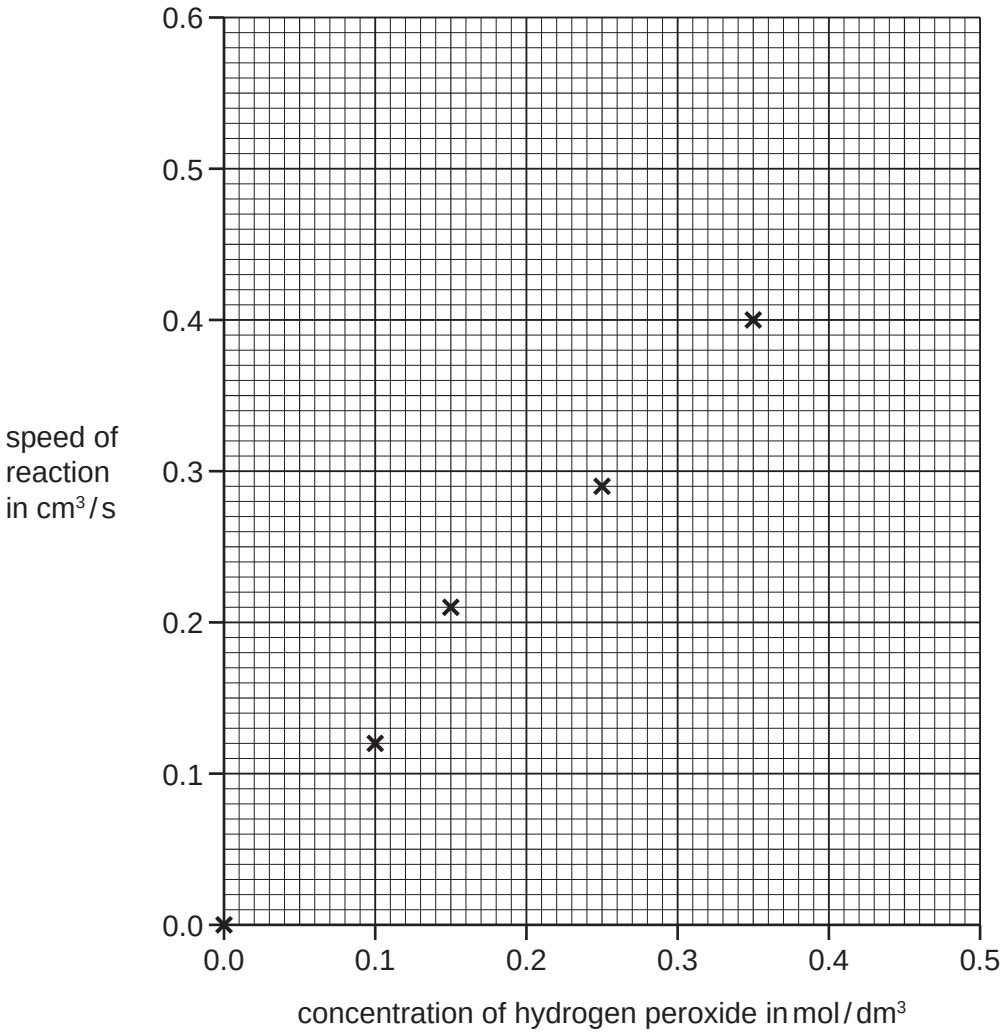
(d) State a test for hydrogen.

test .....

result ..... [2]

[Total: 8]

2 Hydrogen peroxide breaks down to form oxygen. A student investigated the speed breakdown of aqueous solutions of hydrogen peroxide of different concentrations, using of powdered manganese(IV) oxide. The temperature was kept constant at 25 °C. She plotte her results on the grid below.



(a) Draw a straight line graph on the grid. [2]

(b) **From your graph**, work out the speed of the reaction when the concentration of hydrogen peroxide is 0.5 mol/dm³. Show clearly **on the grid** how you obtained your answer.

..... [2]

(c) Sketch on the grid the graph you would expect if the experiments were repeated at 10 °C. [1]

(d) **(i)** What is the function of the manganese(IV) oxide?

..... [1]

(ii) Suggest the effect of repeating the investigation using 1 g of lumps of manganese(IV) oxide. Explain your answer.

effect .....

explanation ..... [2]

[Total: 8]

3 A student prepared zinc nitrate from zinc oxide.
The zinc nitrate was then heated to change it back into zinc oxide.
The procedure followed was in three steps.

Step 1 Some zinc oxide was put into a weighed evaporating dish and the mass noted. The zinc oxide was transferred into a beaker.

Step 2 A dilute acid was slowly added to the beaker until all the zinc oxide had reacted. Zinc nitrate solution was produced.

Step 3 The solution was evaporated to dryness in the evaporating dish. The resulting solid was heated in a fume cupboard. After cooling, the dish was weighed. The dish was then heated again, cooled and reweighed.

The mass of zinc oxide produced was not the same as the amount used at the start.

(a) What could be used to transfer the zinc oxide in Step 1?

..... [1]

(b) Name the acid used in Step 2.

..... [1]

(c) **(i)** Suggest why the heating in Step 3 was carried out in a fume cupboard.

..... [1]

(ii) Why was the dish reweighed in Step 3?

.....

..... [2]

(d) Suggest **two** reasons why the amount of zinc oxide produced in Step 3 was not the same as the mass of zinc oxide used in Step 1.

1 .....

2 ..... [2]

[Total: 7]

4 A student investigated the reaction of aqueous sodium hydroxide with two different a
and **H**.
Two experiments were carried out.

Experiment 1

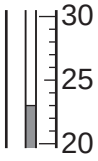
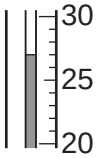
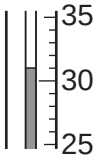
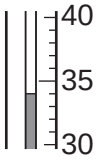
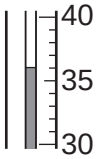
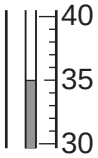
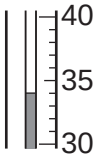
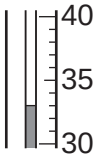
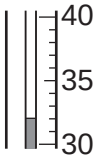
Using a measuring cylinder, 20 cm^3 of the solution of acid **G** was poured into a polystyrene cup. The initial temperature of the solution was measured.

A burette was filled with aqueous sodium hydroxide to the 0.0 cm^3 mark.
5.0 cm^3 of aqueous sodium hydroxide was added to the solution of **G** in the cup and the mixture stirred. The maximum temperature of the solution was measured.

A further 5.0 cm^3 of aqueous sodium hydroxide was added to the cup and the mixture stirred. The maximum temperature of the mixture was measured.

Further 5.0 cm^3 portions of aqueous sodium hydroxide were added to the cup, until a total volume of 40.0 cm^3 of sodium hydroxide had been added. After each addition, the mixture was stirred and the maximum temperatures measured.

(a) Use the thermometer diagrams in the table to record the temperatures.

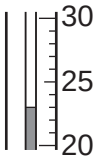
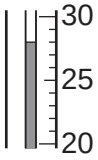
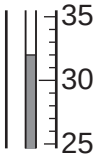
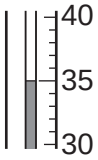
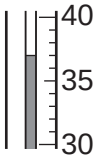
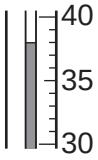
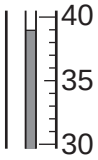
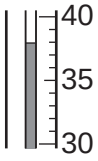
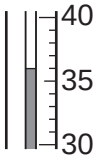
volume of aqueous sodium hydroxide added / cm^3	thermometer diagram	maximum temperature of solution in polystyrene cup / °C
0.0		
5.0		
10.0		
15.0		
20.0		
25.0		
30.0		
35.0		
40.0		

[3]

Experiment 2

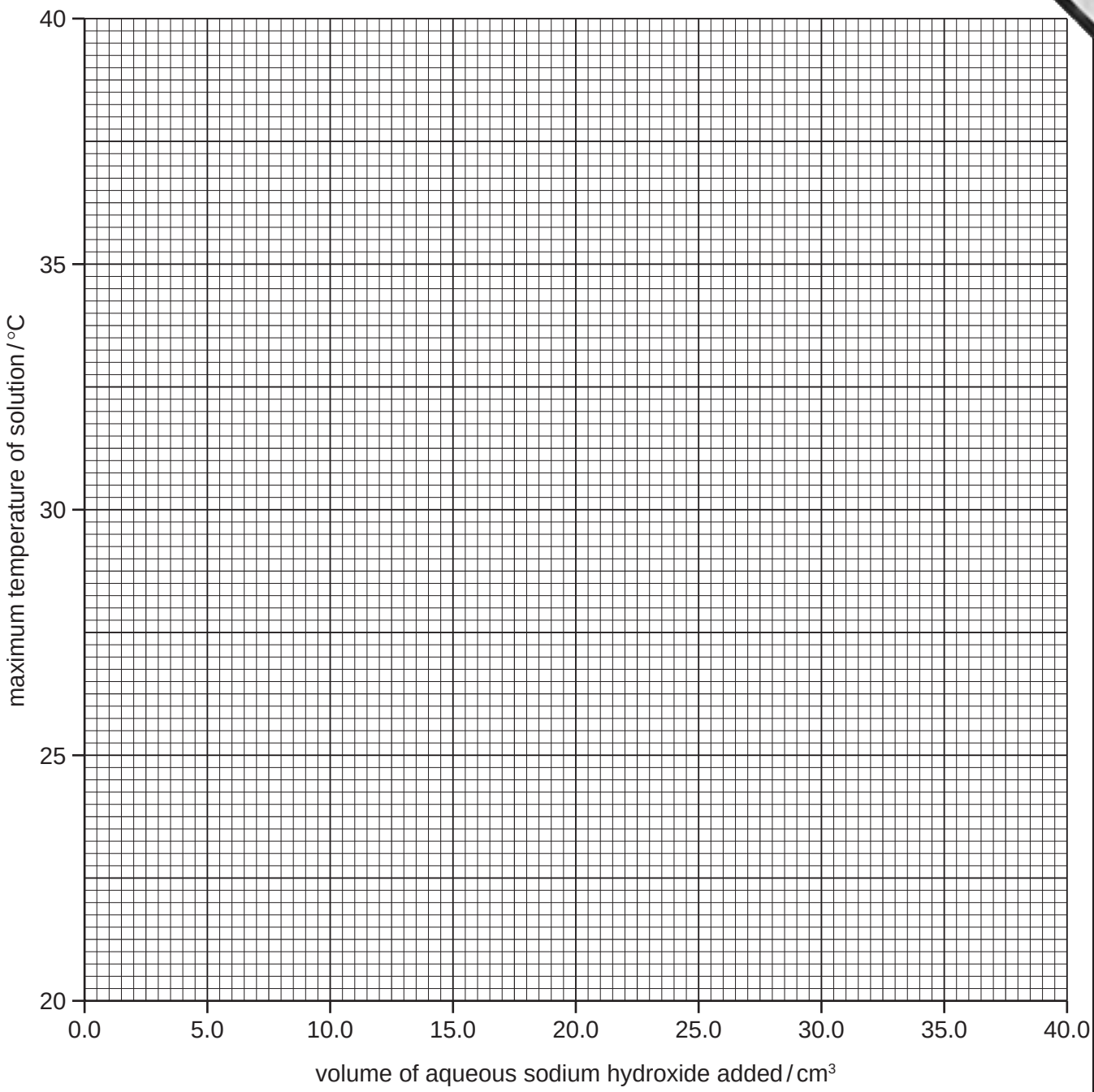
Experiment 1 was repeated using 20 cm^3 of the solution of acid **H** instead of the solution of acid **G**.

(b) Use the thermometer diagrams in the table to record the temperatures.

volume of aqueous sodium hydroxide added / cm^3	thermometer diagram	maximum temperature of solution in polystyrene cup / °C
0.0		
5.0		
10.0		
15.0		
20.0		
25.0		
30.0		
35.0		
40.0		

[3]

(c) Plot the results for Experiments 1 and 2 on the grid and draw two smooth line gr
Clearly label your graphs.



[6]

(d) **Use your graph** to estimate the maximum temperature of the reaction mixture when 8.0 cm^3 of aqueous sodium hydroxide was added to 20 cm^3 of the solution of acid **G**. Show clearly **on the graph** how you worked out your answer.

..... [2]

(e) What type of chemical reaction, other than neutralisation, occurs when acid **H** reacts with aqueous sodium hydroxide?

..... [1]

(f) **(i)** In which experiment was the temperature change greater?

.....

(ii) Suggest why the temperature change was greater in this experiment.

.....

..... [1]

(g) Predict the temperature of the mixture in Experiment 2 after two hours.
Explain your answer.

.....

..... [2]

[Total: 19]

5 Two salt solutions, **J** and **K**, were analysed. **J** was aqueous iron(II) sulfate. The tests on the solutions, and some of the observations, are in the table. Complete the observations in the table.

tests	observations
<u>tests on solution **J**</u> **(a)** Appearance of solution **J**.	..... [1]
(b) To about 1 cm^3 of solution **J**, an equal volume of aqueous sodium hydroxide was added.	..... [2]
(c) To about 1 cm^3 of solution **J**, an equal volume of aqueous ammonia was added.	..... [1]
(d) To about 1 cm^3 of solution **J**, dilute nitric acid and aqueous silver nitrate were added.	..... [1]
(e) To about 1 cm^3 of solution **J**, dilute nitric acid and barium nitrate solution were added.	..... [2]
<u>tests on solution **K**</u> **(f)** Appearance of solution **K**.	dark pink liquid
(g) To about 1 cm^3 of solution **K**, an equal volume of aqueous sodium hydroxide was added.	blue precipitate formed
(h) To solution **K**, aqueous sodium hydroxide and aluminium powder were added. The mixture was heated. The gas given off was tested.	effervescence, pungent gas evolved damp red litmus turned blue

(i) Identify the gas given off in test **(h)**.

..... [

(j) What conclusions can you draw about solution **K**?

.....

..... [2]

[Total: 10]

6 **(a)** Ethanoic acid can be prepared by heating ethanol with acidified pot manganate(VII).
Give a test to distinguish between ethanoic acid and ethanol.

test .....

result ..... [2]

(b) Coal is a fossil fuel. When heated strongly, sulfur dioxide gas is one of the products formed.
Sulfur dioxide changes the colour of acidified potassium manganate(VII) from purple to colourless.
Plan an investigation to show which of the **two** different types of coal produces the most sulfur dioxide when heated. You are provided with one lump of each type of coal.

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 8]