UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

CHEMISTRY **0620/61**

Paper 6 Alternative to Practical **October/November 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.

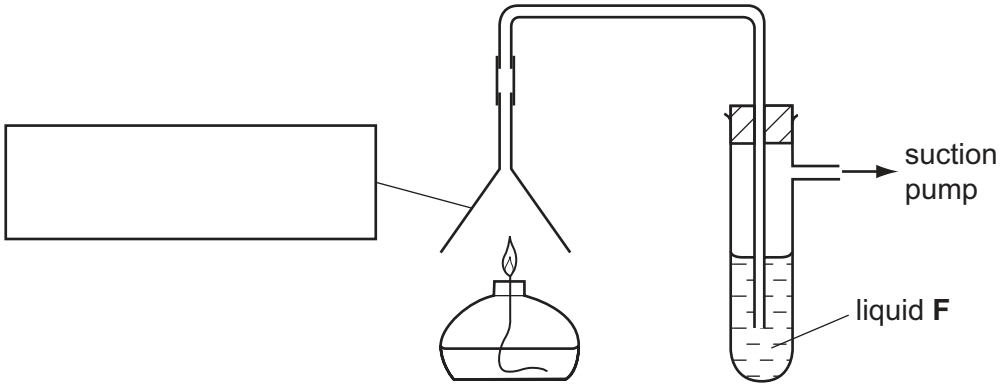
Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

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 **10** printed pages and **2** blank pages.

For Examiner's Use

1 A student investigated the products formed when ethanol was burned using the apparatus shown.



(a) Complete the box to identify the piece of apparatus. [1]

(b) Why is a suction pump used?

..... [1]

(c) **(i)** Suggest the purpose and identity of liquid **F**.

identity .....

purpose ..... [2]

(ii) Why is the end of the delivery tube below the surface of liquid **F**?

.....

..... [1]

(d) Give **one** expected observation in the horizontal part of the delivery tube.
Explain your answer.

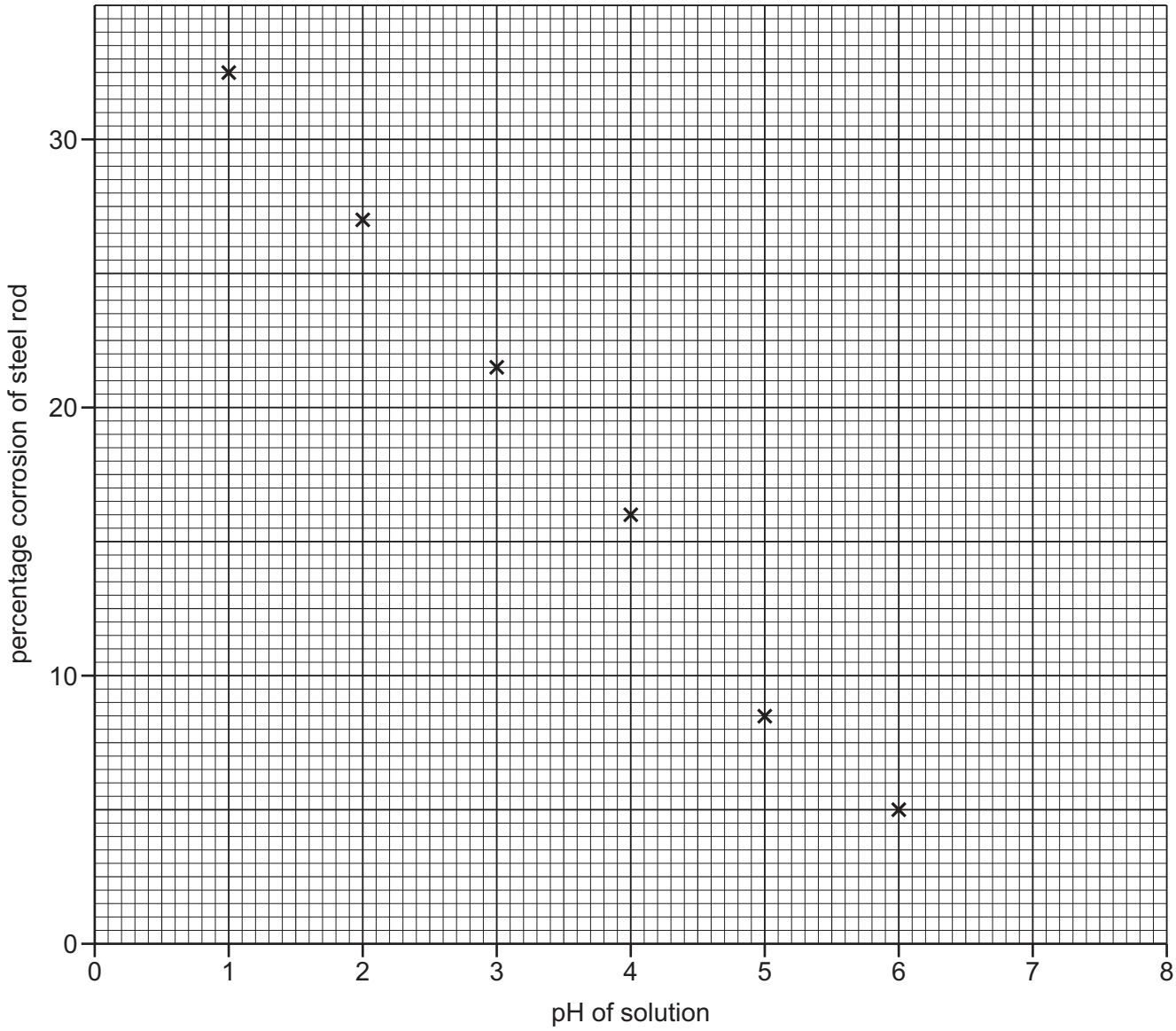
.....

..... [2]

[Total: 7]

For Examiner's Use

2 Eight steel rods of the same size were placed in solutions of different pH for one week. The percentage corrosion of the rods was measured and the results plotted on the grid below.



(a) Draw a best fit straight line through the points. [1]

(b) Why were the steel rods the same size?

..... [1]

(c) State **one** other variable which should have been kept constant.

..... [1]

(d) State one conclusion that could be drawn from the results.

..... [1]

(e) Determine the percentage corrosion of a steel rod in a solution of pH 6.5.

..... [1]

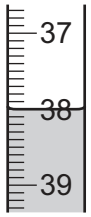
[Total: 5]

For Examiner's Use

3 A student investigated the reaction between aqueous sodium hydroxide and acid **K**.
Two experiments were carried out.

(a) *Experiment 1*

Using a measuring cylinder, 25 cm^3 of acid **K** was poured into a conical flask. Phenolphthalein indicator was added to the flask. A burette was filled with aqueous sodium hydroxide to the 0.0 cm^3 mark. Aqueous sodium hydroxide was added from the burette to the flask and the mixture shaken until the solution showed a permanent colour change.
The final volume was measured. Use the burette diagram to record the final volume in the table and complete the table.



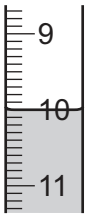
final volume

	burette reading
final volume / cm^3	
initial volume / cm^3	
difference / cm^3	

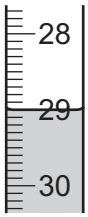
[2]

(b) *Experiment 2*

The solution was poured away and the conical flask rinsed.
Using a measuring cylinder, 50 cm^3 of acid **K** was poured into the conical flask. 0.3 g of powdered calcium carbonate was added to the flask and the flask shaken until no further reaction was observed.
Phenolphthalein was added to the mixture in the flask.
A burette was filled with the same aqueous sodium hydroxide and the initial volume measured. Aqueous sodium hydroxide was added from the burette to the flask and the mixture shaken until the solution showed a permanent colour change.
Use the burette diagrams to record the initial and final volumes in the table and complete the table.



initial volume



final volume

	burette reading
final volume / cm^3	
initial volume / cm^3	
difference / cm^3	

[2]

For Examiner's Use

(c) What colour change was observed after the sodium hydroxide solution was added to the flask?

from ..... to ..... [2]

(d) What type of chemical reaction occurred when acid **K** reacted with sodium hydroxide?

..... [1]

(e) If Experiment 1 were repeated using 50 cm^3 of acid **K**, what volume of sodium hydroxide would be required to change the colour of the indicator?

..... [2]

(f) **(i)** What were the effects of adding 0.3 g of powdered calcium carbonate to acid **K**?

.....

..... [2]

(ii) Use your answer in **(e)** to work out the difference between the volume of sodium hydroxide needed to completely react with 50 cm^3 of acid **K** and the volume of sodium hydroxide used in Experiment 2.

.....

..... [2]

(iii) Estimate the mass of calcium carbonate that would be needed to be added to 50 cm^3 of acid **K** to require 0.0 cm^3 of sodium hydroxide.

..... [1]

(g) What would be the effect on the results if the solutions of acid **K** were warmed before adding the sodium hydroxide? Give a reason for your answer.

effect on results .....

reason ..... [2]

For Examiner's Use

(h) Suggest the advantage, if any, of

(i) using a pipette to measure the volume of acid **K**.

.....

..... [2]

(ii) using a polystyrene cup instead of a flask.

.....

..... [2]

[Total: 20]

For Examiner's Use

4 Two liquids, **L** and **M**, were analysed. **L** was aqueous potassium iodide. **M** was a colourless liquid.
The tests on the liquids and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
<u>tests on liquid **L**</u> **(a)** Appearance of liquid **L**.	..... [1]
Liquid **L** was divided into three equal portions in separate test-tubes. **(b) (i)** An iodine crystal was added to the first portion of liquid **L**. The test-tube was stoppered and the contents shaken. **(ii)** An equal volume of liquid **M** was added to the test-tube, the contents shaken and left to stand for five minutes.	liquid turned orange two layers were formed, pink top layer and orange lower layer
(c) To the second portion of liquid **L**, dilute nitric acid and barium nitrate solution were added.	..... [1]
(d) To the third portion of liquid **L**, dilute nitric acid and silver nitrate solution were added.	..... [2]

(e) Why does the colour of liquid **L** change in test **(b)(i)**?

.....

..... [1]

(f) What conclusions can you draw about liquid **M** from test **(b)(ii)**?

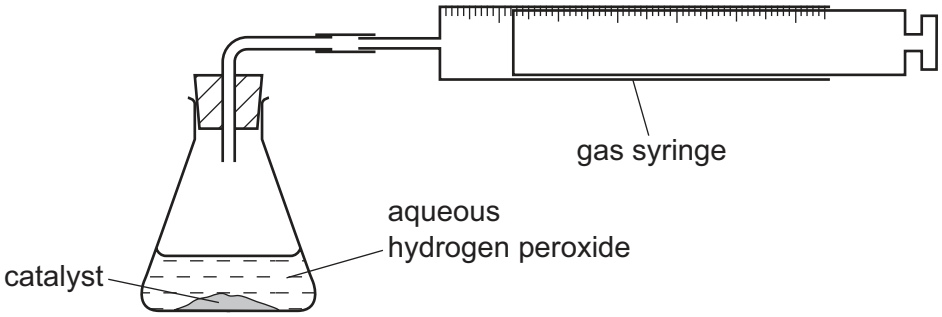
.....

..... [2]

[Total: 7]

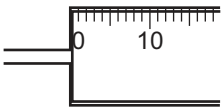
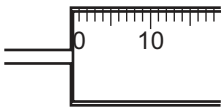
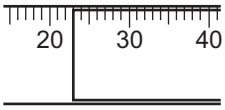
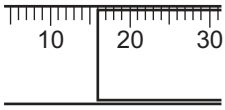
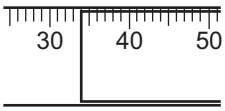
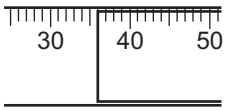
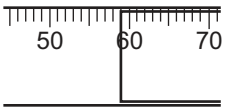
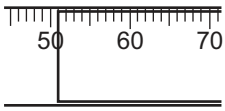
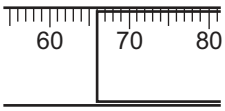
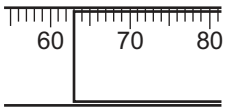
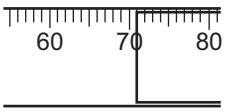
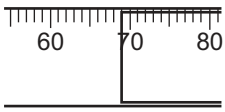
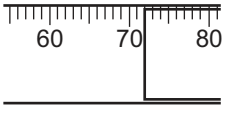
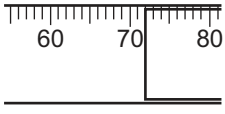
For Examiner's Use

5 Two experiments using catalysts were carried out. Catalysts **R** and **S** were used to break down 50 cm^3 of aqueous hydrogen peroxide at a temperature of 20 °C. The volume of oxygen given off was measured using the apparatus shown.



The gas syringe diagrams show the volume of oxygen formed every 30 seconds in each experiment.

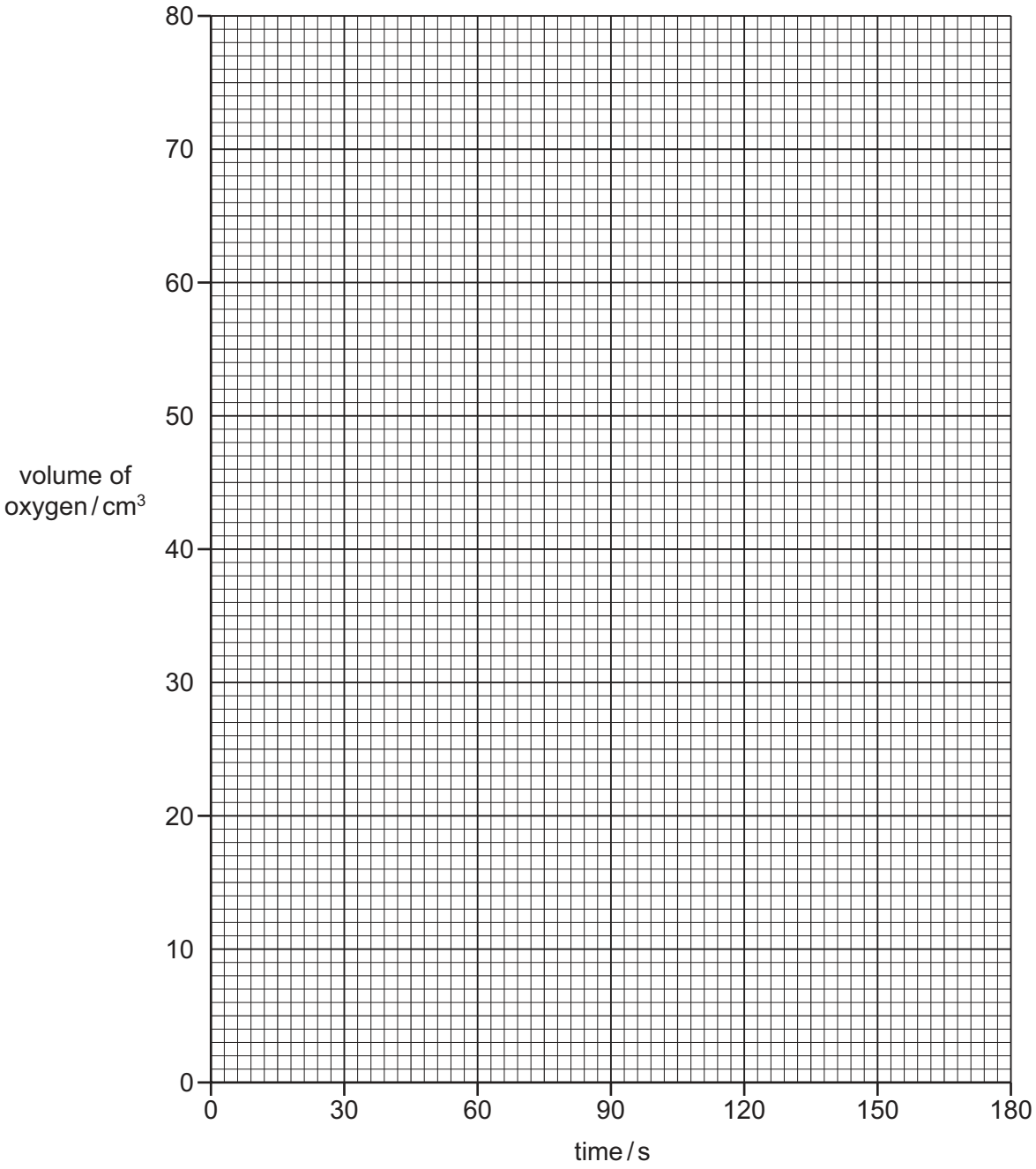
(a) Use the syringe diagrams to complete the volumes in the table.

time / s	using catalyst **R**		using catalyst **S**	
	syringe diagram	volume / cm^3	syringe diagram	volume / cm^3
0				
30				
60				
90				
120				
150				
180				

[4]

For Examiner's Use

(b) Plot a graph to show each set of results. Clearly label the graphs **R** and **S**.



[6]

(c) Which result using catalyst **R** was inaccurate?

..... [1]

(d) Which is the better catalyst in this reaction? Explain your answer.

.....

..... [2]

(e) Sketch a line on the grid to show the graph you would expect if the reaction with catalyst **R** was repeated at 50 °C. [2]

[Total: 15]

For Examiner's Use

6

Old documents

Some documents are stored in containers with packets of silica gel crystals. These crystals absorb water from air that enters the container. Water could damage the documents.
Anhydrous cobalt(II) chloride is added to the silica gel. As the crystals absorb water they change colour from blue to pink. Heating the silica gel in an oven removes the water from the crystals so that the crystals can be reused.

Plan an experiment to find the mass of water absorbed by a packet of silica gel crystals.

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 6]

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