UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

4839073064

CHEMISTRY **0620/61**

Paper 6 Alternative to Practical **May/June 2011**

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.

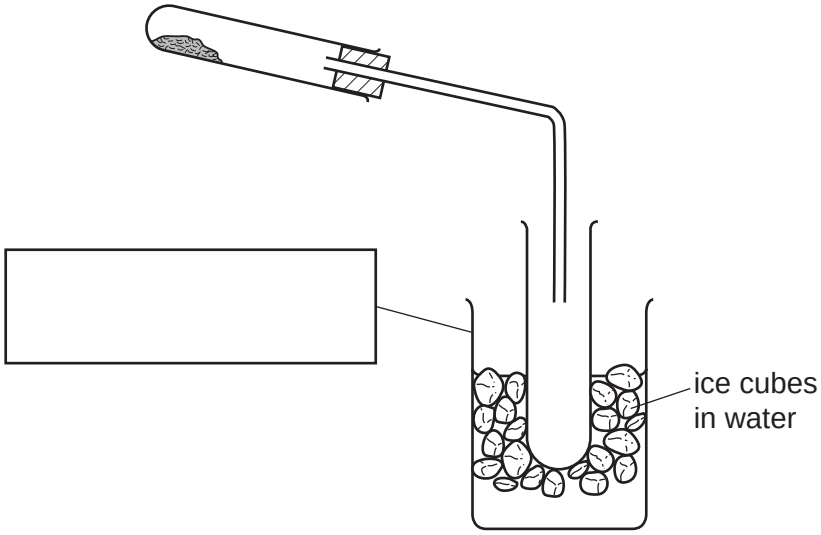
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
Total	

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

For Examiner's Use

1 A student heated hydrated zinc sulfate crystals, $ZnSO_4.7H_2O$, using the apparatus below to obtain a sample of water.



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

(b) Use labelled arrows to indicate:

(i) where the heat is applied,

(ii) where the sample of water would collect. [2]

(c) State the purpose of the ice cubes.

..... [1]

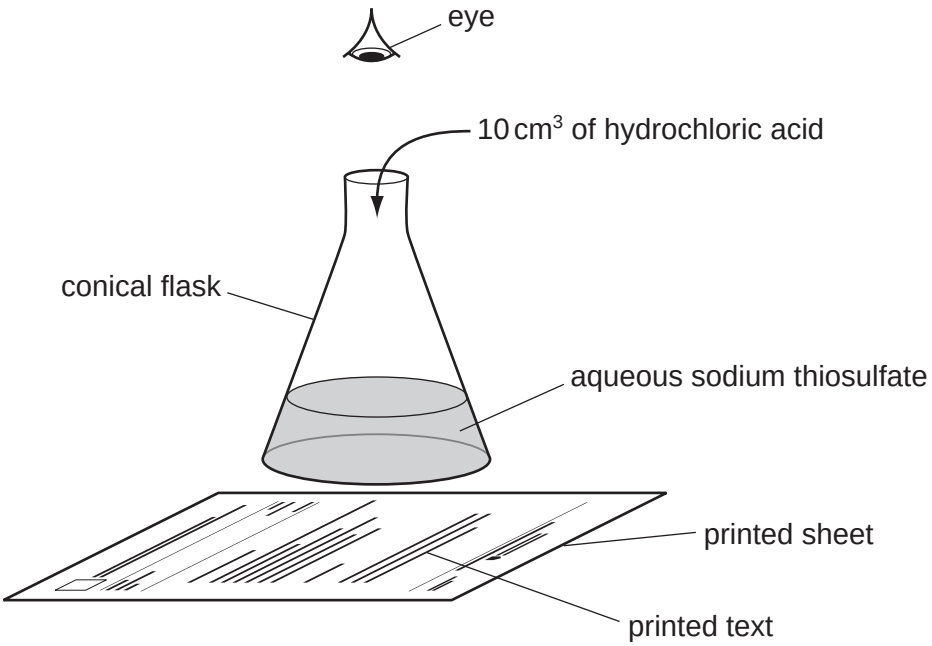
(d) Describe a physical test for pure water.

test .....

result ..... [2]

[Total: 6]

2 Hydrochloric acid reacts with aqueous sodium thiosulfate to form a precipitate, which makes the solution turn cloudy.
The formation of the precipitate can be used to show how fast the reaction proceeds, using the apparatus shown below.



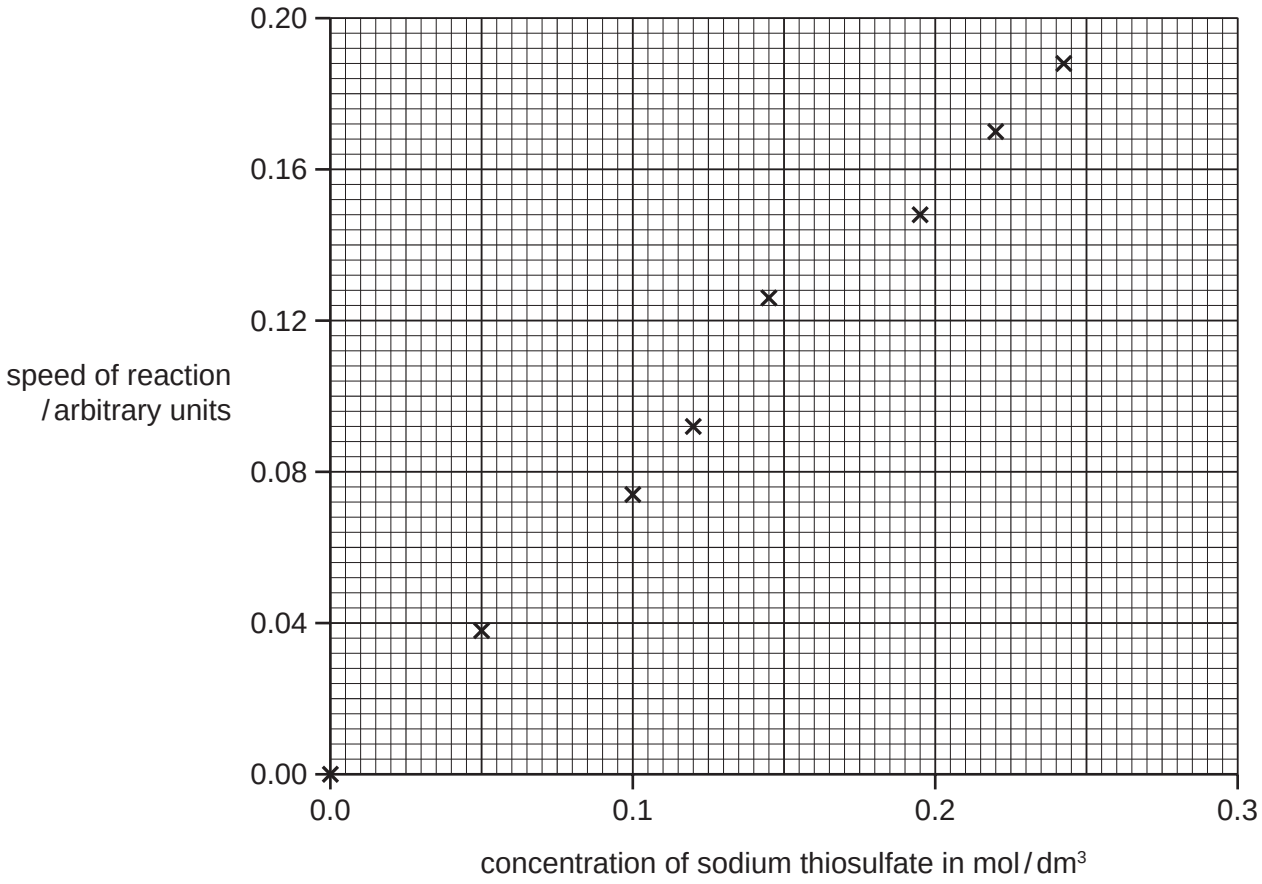
A student used this method to investigate the effect of changing the concentration of the sodium thiosulfate solution on the speed of the reaction.
The student used different concentrations of sodium thiosulfate solution.
All other variables were kept the same.

(a) Give **two** variables which were kept the same in the investigation.

1. .....

2. ..... [2]

The results of the experiments are shown plotted on the grid below.



(b) Draw a line of best fit on the grid. [1]

(c) Suggest **two** reasons why not all of the points lie on the line of best fit.

1. .....

2. ..... [2]

(d) From your graph, deduce the speed of reaction when the concentration of sodium thiosulfate is 0.075 mol / dm^3. Show clearly **on the graph** how you worked out your answer.

..... [2]

(e) Explain why the speed of reaction increases when the concentration of sodium thiosulfate is increased.

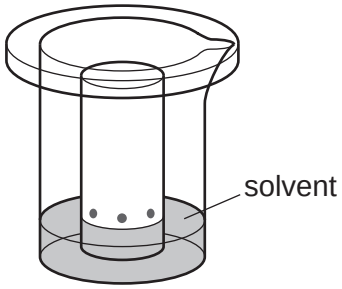
.....

..... [2]

(f) Sketch on the grid the line you would expect if the experiments were repeated at a higher temperature. [1]

[Total: 10]

3 The colours present in some fruit sweets can be separated using the apparatus below. The colours are water-soluble dyes.



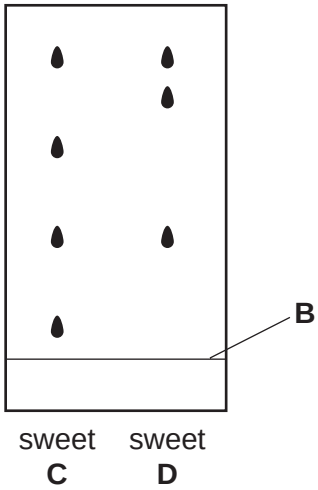
(a) Name the process used to separate the colours.

..... [1]

(b) Name the solvent used.

..... [1]

The results obtained for the colours in two different sweets, **C** and **D**, are shown below.



(c) What is the name for the line at position **B**?

..... [1]

(d) What conclusions can you draw about the colours present in sweets **C** and **D**?

.....

.....

..... [3]

[Total: 6]

For Examiner's Use

4 A student investigated the reaction between two different solutions of deep purple potassium manganate(VII), **A** and **B**, and an acidic solution of hydrogen peroxide.

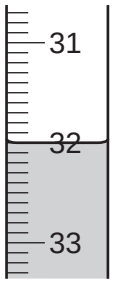
Three experiments were carried out.

Experiment 1

A burette was filled with the solution **A** of potassium manganate(VII) up to the 0.0 cm^3 mark. Using a measuring cylinder, 25 cm^3 of colourless hydrogen peroxide solution was poured into the conical flask.

The potassium manganate(VII) solution **A** was added slowly to the flask, and shaken to mix thoroughly. Addition of potassium manganate(VII) solution was continued until there was a permanent pink colour in the contents of the flask.

(a) Use the burette diagram to record the volume in the table of results and complete the column. [2]

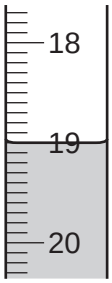


final reading

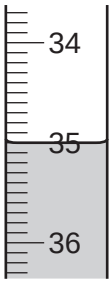
Experiment 2

Experiment 1 was repeated using the solution **B** of potassium manganate(VII) instead of solution **A**.

(b) Use the burette diagrams to record the volumes in the table of results and complete the table. [2]



initial reading



final reading

	experiment 1	experiment 2
final reading / cm^3		
initial reading / cm^3		
difference / cm^3		

Experiment 3

To a little of the hydrogen peroxide solution in a test-tube, manganese(IV) oxide was added.

Rapid effervescence was observed and a glowing splint relit.

(c) Identify the gas given off in Experiment 3.

..... [1]

(d) (i) What colour change was observed when potassium manganate(VII) solution was added to the flask?

from ..... to ..... [1]

(ii) Why was an indicator **not** added to the flask?

..... [1]

(e) (i) In which experiment was the greatest volume of potassium manganate(VII) solution used?

..... [1]

(ii) Compare the volumes of potassium manganate(VII) used in Experiments 1 and 2.

..... [1]

(iii) Suggest an explanation for the difference in volumes.

.....

.....

..... [2]

(f) If Experiment 2 was repeated using 12.5 cm^3 of the hydrogen peroxide solution, what volume of potassium manganate(VII) solution would be needed to react completely? Explain your answer.

.....

..... [3]

(g) Give **one** advantage and **one** disadvantage of using a measuring cylinder for the hydrogen peroxide solution.

advantage .....

disadvantage ..... [2]

[Total: 16]

5 Two different liquids, **M** and **N**, were analysed. **N** was aqueous potassium iodide. The tests on the liquids and some of the observations are in the following table. Complete the observations in the table.

tests	observations
(a) (i) Appearance of liquid **M**.	colourless liquid with an antiseptic smell
(ii) Appearance of liquid **N**.	..... [2]
(b) (i) A few drops of **M** were transferred to a dry watch glass. The liquid was touched with a lighted splint.	burns with a yellow flame
(ii) Test **(b)(i)** was repeated using liquid **N**.	..... [1]
(c) A little of liquid **M** was added to a crystal of iodine in a test-tube. The test-tube was shaken.	orange-brown solution
(d) To a little of liquid **N**, a few drops of dilute nitric acid was added, followed by silver nitrate solution.	..... [2]

(e) What type of substance is liquid **M**?

.....

..... [2]

[Total: 7]

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[Turn over

6 The reaction between aqueous barium chloride and aqueous sodium sulfate produces a white precipitate.
Six experiments were carried out to find the mass of precipitate produced using solution **P** and solution **Q**.

Solution **P** was aqueous barium chloride.
Solution **Q** was aqueous sodium sulfate.
Both solutions were of the same concentration.

5 cm^3 of solution **P** was put into each of six test-tubes. Increasing volumes of solution **Q** were added to each test-tube. The mixtures were filtered to obtain the precipitates, which were washed, dried and then weighed in a suitable container.

(a) Draw a labelled diagram to show how the mixture was filtered.

[2]

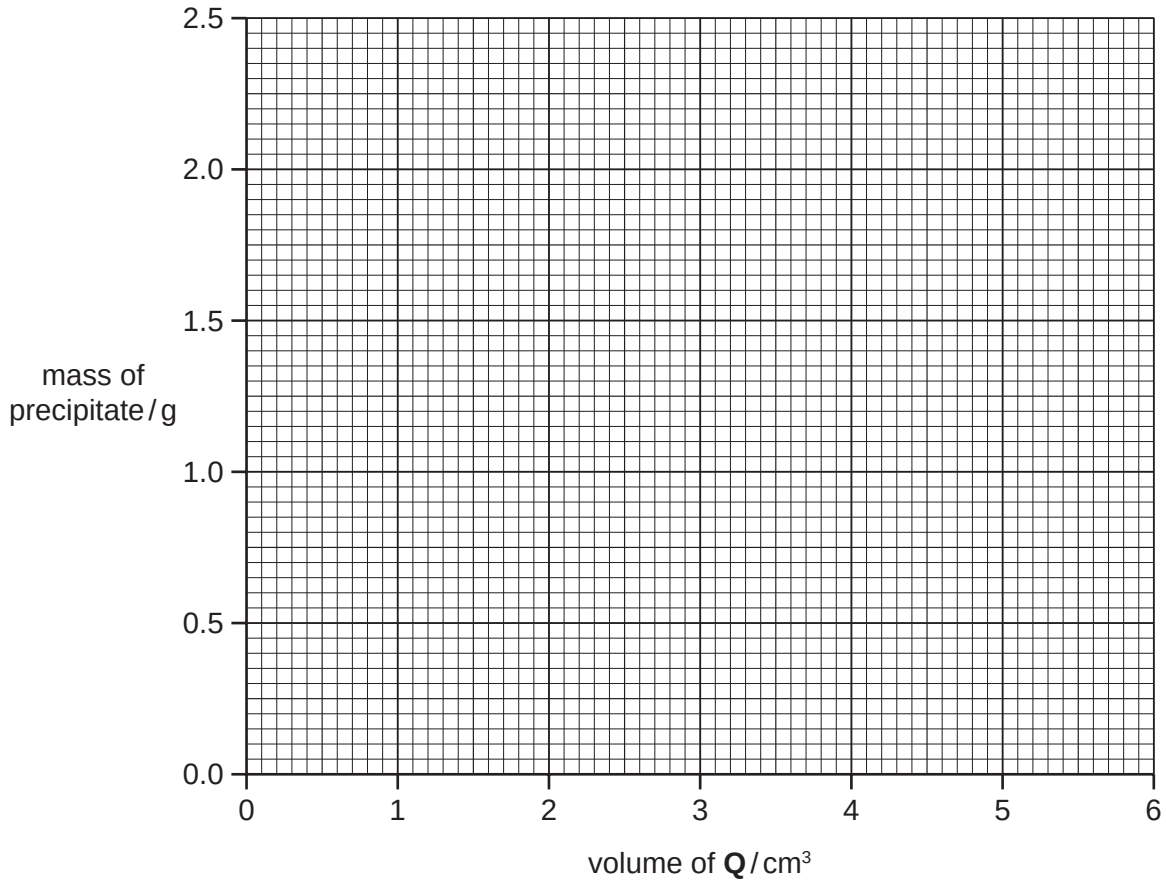
The results are shown in the table below.

(b) Complete the table.

volume of **P** / cm^3	volume of **Q** / cm^3	mass of container / g	mass of container and precipitate / g	mass of precipitate / g
5	1	4.50	4.95	
5	2	4.50	5.45	
5	3	4.50	5.90	
5	4	4.50	6.40	
5	5	4.50	6.85	
5	6	4.50	6.85	

[2]

(c) Plot the points on the grid below. Join the points with two intersecting straight lines.



[3]

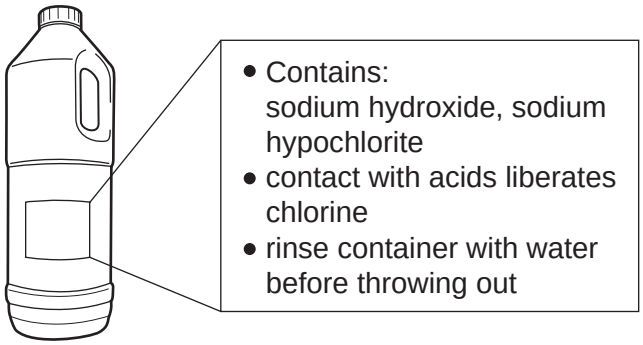
(d) What is the minimum volume of **Q** required to completely react with 5 cm^3 of **P**?

..... [1]

[Total: 8]

For Examiner's Use

7 The label shows some information on a bottle of liquid sink and drain cleaner.



(a) Give a chemical test for the presence of sodium hydroxide.

test .....

result ..... [2]

(b) Suggest why it could be dangerous to pour fizzy drinks into a sink containing this liquid cleaner.

.....

..... [2]

(c) Why should the container be rinsed with water before throwing out?

..... [1]

(d) Give a chemical test for chlorine.

test .....

result ..... [2]

[Total: 7]