UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

8059847698

CHEMISTRY **0620/61**

Paper 6 Alternative to Practical **October/November 2010**

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.

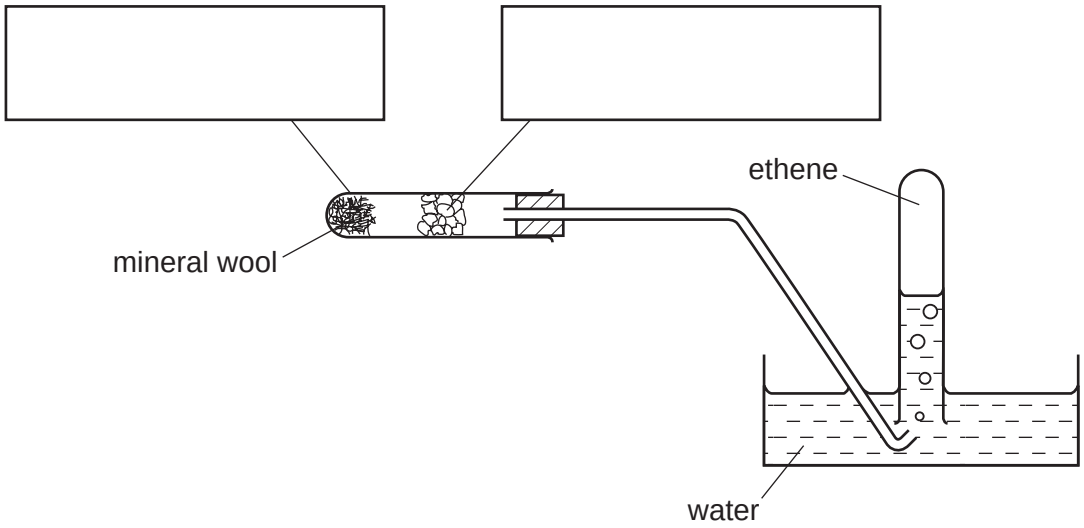
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1	
2	
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Total	

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1 Ethene can be prepared by passing ethanol vapour over hot aluminium oxide.



(a) Complete the boxes to show the chemicals used. [1]

(b) Show on the diagram with two arrows where the heat is applied. [2]

(c) Why must the delivery tube be removed from the water before the heating is stopped?

.....

.....

..... [2]

[Total: 5]

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2 The following instructions were used to prepare magnesium sulfate crystals, $MgSO_4.7H_2O$.

Step 1 Measure 50 cm^3 of dilute sulfuric acid into a beaker and warm the solution.

Step 2 Using a spatula, add some magnesium oxide and stir the mixture. Continue adding the magnesium oxide until excess is present.

Step 3 Separate the excess magnesium oxide from the solution of magnesium sulfate.

Step 4 Heat the solution until crystals form. Obtain the crystals and dry them.

(a) Why is the sulfuric acid warmed?

..... [1]

(b) How would you know when excess magnesium oxide is present in **Step 2**?

..... [1]

(c) What method is used in **Step 3**?

..... [1]

(d) Why must care be taken when drying the crystals in **Step 4**?

..... [1]

(e) Explain how the method would differ if magnesium carbonate was used instead of magnesium oxide.

.....

..... [2]

[Total: 6]

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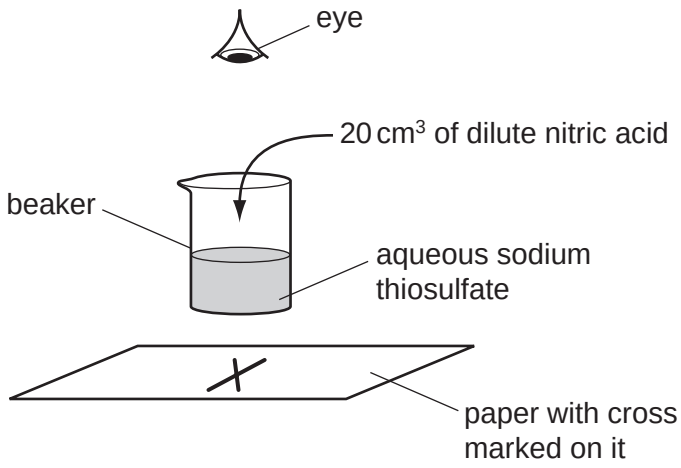
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3 A student carried out an experiment to investigate the speed of reaction between sodium thiosulfate solution and dilute nitric acid.
Sulfur is formed during this reaction and the mixture turns cloudy.

Experiment 1

Using a measuring cylinder, 100 cm^3 of sodium thiosulfate solution was poured into a 250 cm^3 beaker. The beaker was placed on a cross drawn on a piece of paper. 20 cm^3 of dilute nitric acid was added to the beaker and the timer started.



The time until the cross could not be seen was taken. The time was recorded in the table.

Experiment 1 was repeated using different volumes of sodium thiosulfate as shown in the table.
All experiments were carried out at 20 °C.

Table of results

experiment	volume of sodium thiosulfate solution / cm^3	volume of water / cm^3	time for cross to disappear / s
1	100	0	10
2	80	20	12
3	40	60	24
4	20	80	51
5	10	90	98

(a) Why was the total volume of solution kept constant?

.....

..... [1]

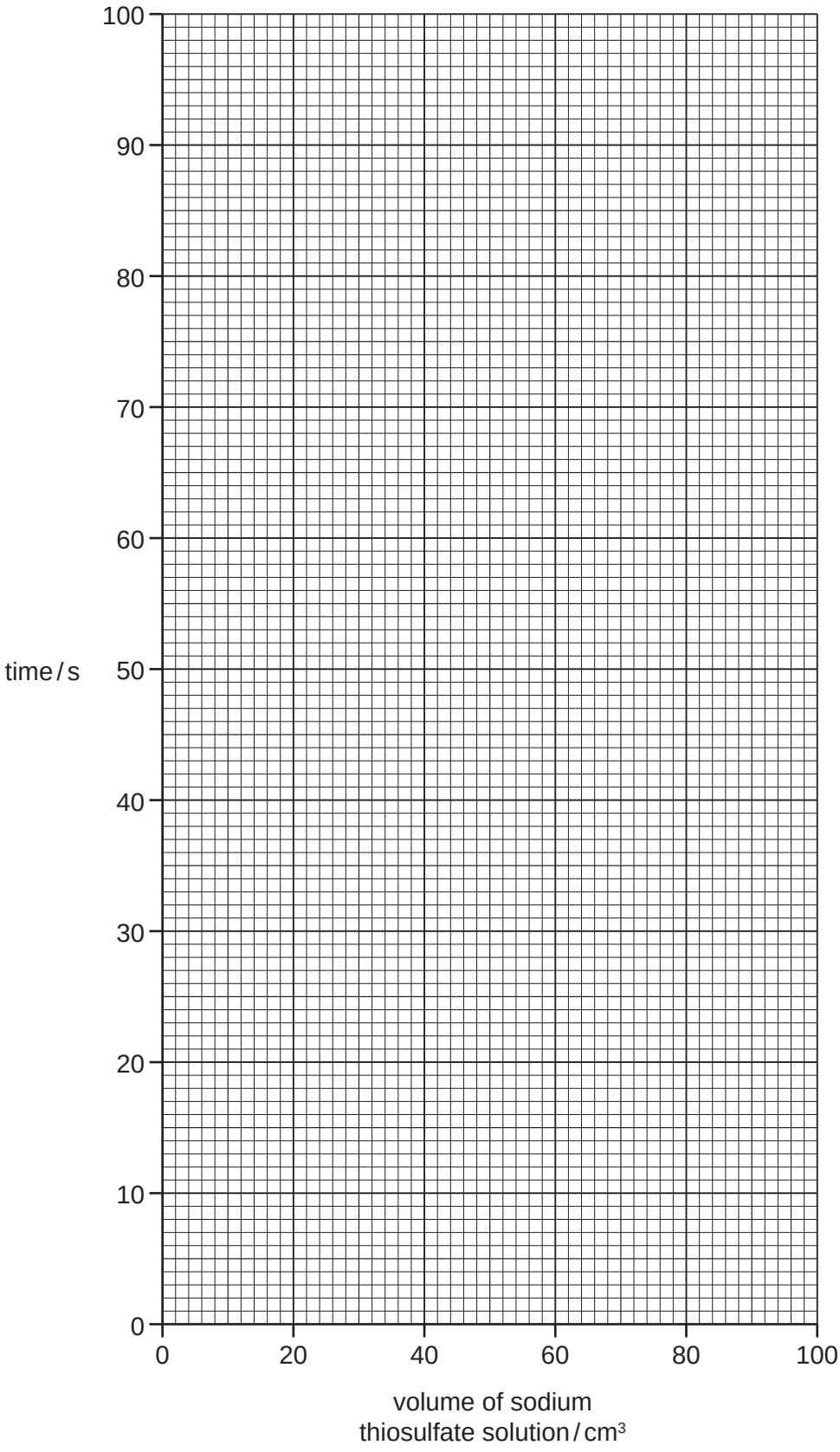
(b) In Experiment 2, which is the last liquid to be added to the beaker?

..... [1]

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(c) (i) Plot the results on the grid below. Draw a smooth line graph.



[4]

(ii) **Use your graph** to work out the time taken for the cross to disappear when 55 cm^3 of sodium thiosulfate solution and 45 cm^3 of water were used.
Indicate **on the graph** how you worked out your answer.

..... [2]

(d) The experiments were repeated at 40 °C. Suggest how the results would differ. Explain your answer.

.....

..... [2]

[Total: 10]

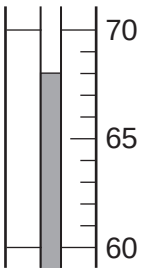
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4 A student investigated the solubility of salt **A** in water at various temperatures.
Five experiments were carried out.

Experiment 1

The student was provided with a boiling tube containing 12 g of salt **A**.
A burette was filled with distilled water and 10.0 cm^3 of water was added to the boiling tube.
The mixture of salt **A** and water was heated until all of the solid had dissolved.
The boiling tube was removed from the heat and the solution was stirred with a thermometer and allowed to cool.
The temperature at which crystals first appeared was measured.
Use the thermometer diagram to record the temperature in the table of results.



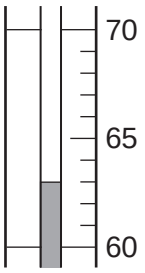
The boiling tube and contents were kept for the next four experiments.

Experiment 2

From the burette, 1.0 cm^3 more of water was added into the boiling tube and contents from Experiment 1.

The experiment was repeated exactly as before to find the temperature at which crystals first appeared.
The boiling tube was dipped for short periods of time in a beaker of cold water to speed up the cooling.

Record, in the table of results, the total volume of water in the boiling tube.
Use the thermometer diagram to record the temperature at which crystals first appeared.

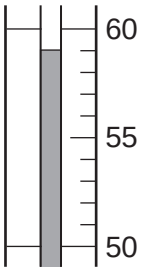


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Experiment 3

From the burette 1.0 cm^3 more of water was added into the boiling tube and contents from Experiment 2. The experiment was repeated exactly as before.

Record, in the table of results, the total volume of water used.
Use the thermometer diagram to record the temperature at which crystals first appeared.



This procedure was continued for Experiments 4 and 5 with two more successive additions of 1.0 cm^3 of water. Note all the results in the table.

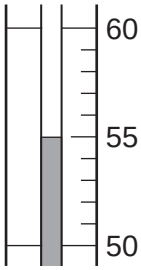


diagram for Experiment 4

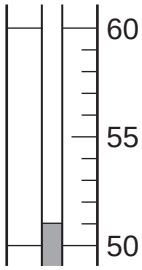


diagram for Experiment 5

Table of results

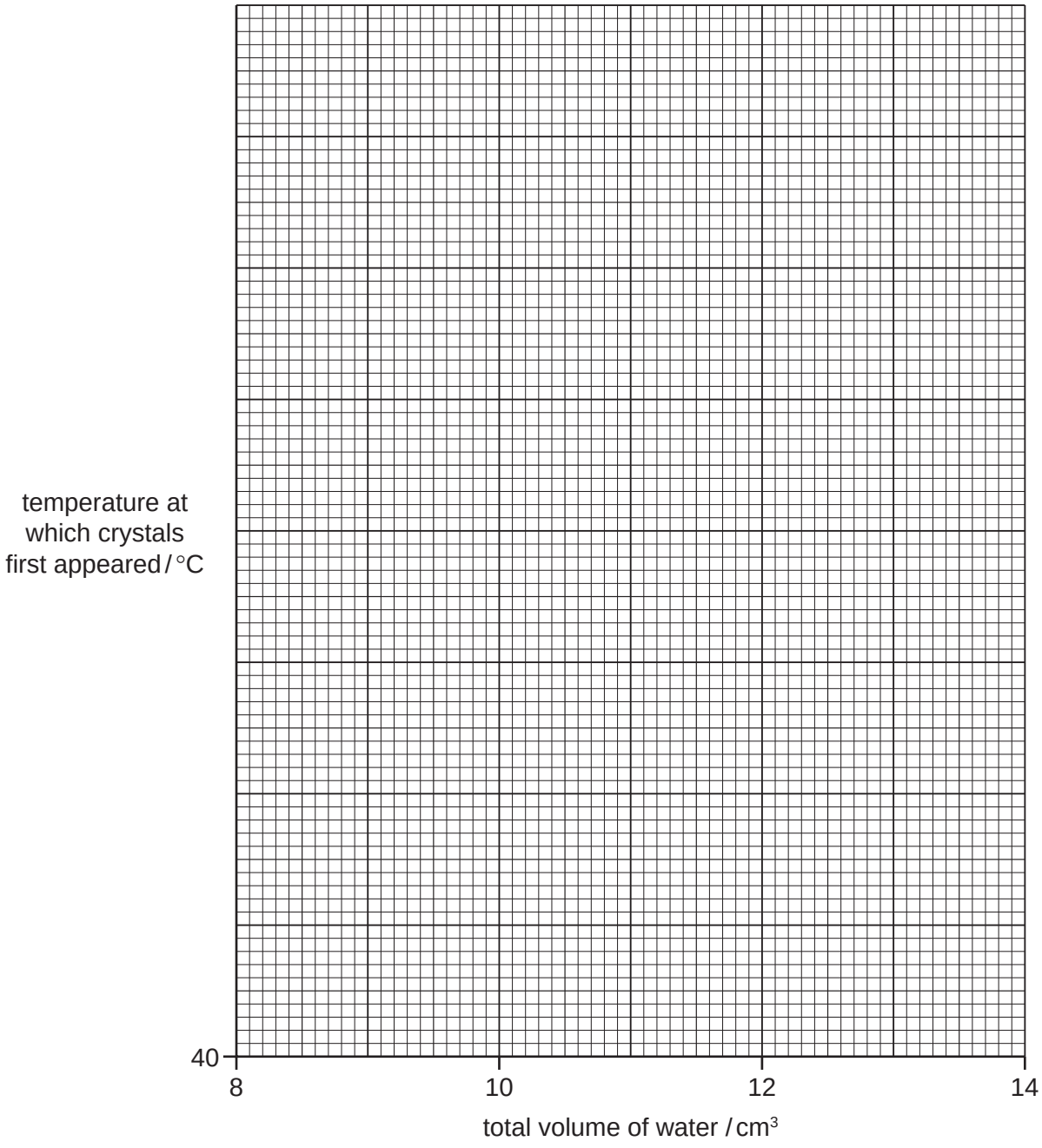
experiment	total volume of water / cm^3	temperature at which crystals first appeared / °C
1	10.0	
2		
3		
4		
5		

[5]

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(a) Plot the results on the grid below and draw a straight line graph.



[6]

(b) How did the student know when salt **A** was completely dissolved in the water?

..... [1]

(c) **From your graph**, find the temperature at which crystals of salt **A** would first appear if the total volume of water in the solution was 9.0 cm^3.

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

..... [2]

(d) Suggest, with a reason, how the results would be different if 6 g of salt **A** were used instead of 12 g of salt **A**.

.....

..... [2]

(e) Salt **B** is more soluble in water than salt **A**.
Sketch on the grid the graph you would expect for salt **B**. Label this graph. [2]

(f) Explain **one** improvement you could make to the experimental procedure to obtain more accurate results in this investigation.

improvement .....

explanation ..... [2]

[Total: 20]

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5 Two different solutions, **X** and **Y**, were analysed. **X** was copper sulfate solution. The tests on the solutions, and some of the observations, are in the following table.

Complete the observations in the table.

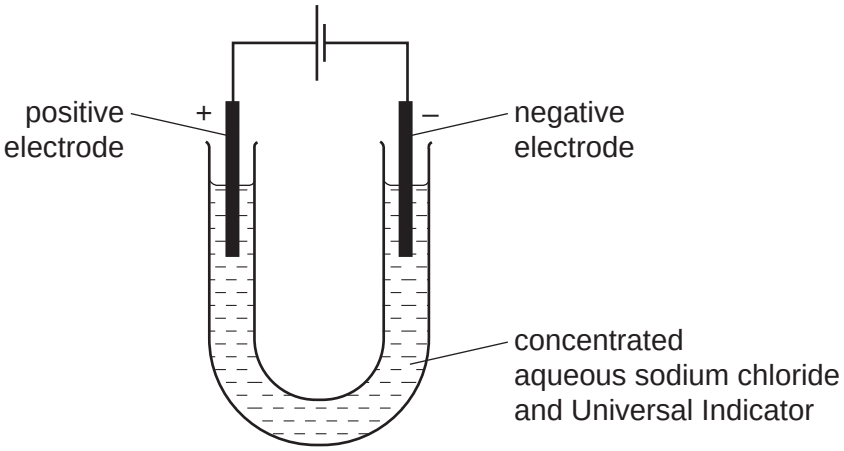
tests	observations
tests on solution **X**	
(a) (i) Appearance of solution **X**.	..... [1]
(ii) To a little of solution **X**, aqueous sodium hydroxide was added.	..... [2]
(iii) To a little of solution **X**, aqueous ammonia was added drop by drop and shaken.	..... [1]
Excess aqueous ammonia solution was then added to the test-tube.	.... [2]
tests on solution **Y**	
(b) (i) A little of solution **Y** was tested with Universal Indicator paper. The pH was recorded.	pH1
(ii) To about 3 cm^3 of solution **Y** a few drops of dilute hydrochloric acid and then aqueous barium chloride was added.	white precipitate

(c) Identify solution **Y**.

..... [2]

[Total: 8]

6 A concentrated solution of sodium chloride was electrolysed using the apparatus below.



One observation noted was that the Universal Indicator turned purple at the negative electrode.

(a) What observation would be made at **both** electrodes?

..... [1]

(b) Why did the indicator turn purple at the negative electrode?

..... [1]

(c) (i) Name the product formed at the positive electrode.

..... [1]

(ii) Suggest the effect of this product on the Universal Indicator.

..... [1]

[Total: 4]

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7 E numbers identify chemicals which are added to foods.

(a) E210 is benzoic acid. How could you show that a solution of benzoic acid is a weak acid?

test .....

result ..... [2]

(b) E211 is sodium benzoate. Name a suitable substance that would react with a solution of benzoic acid to form sodium benzoate.

..... [1]

(c) E110 is Sunset yellow.
Outline a method you could use to show the presence of E110 in a food colouring.
A space has been left if you want to draw a diagram to help you answer the question.

.....

.....

.....

.....

..... [4]

[Total: 7]

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