Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

CHEMISTRY 0620/6

PAPER 6 Alternative to Practical

Monday **13 NOVEMBER 2000** Morning 1 hour

Candidates answer on the question paper.
Additional materials:
Mathematical tables and/or calculator

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
You may use a calculator.

FOR EXAMINER'S USE

This question paper consists of 11 printed pages and 1 blank page.

[Turn over

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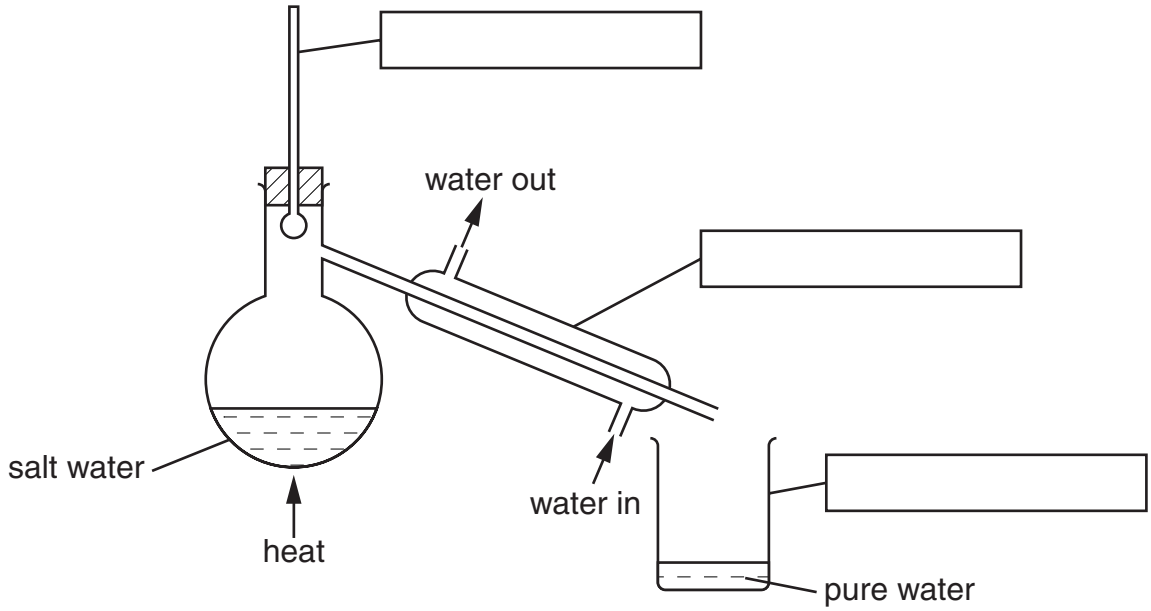
1 Pure water was obtained from salt water using the apparatus shown in the diagram.



(a) Complete the boxes to name the 3 pieces of equipment. [3]

(b) Name the process used in this separation.

.....[1]

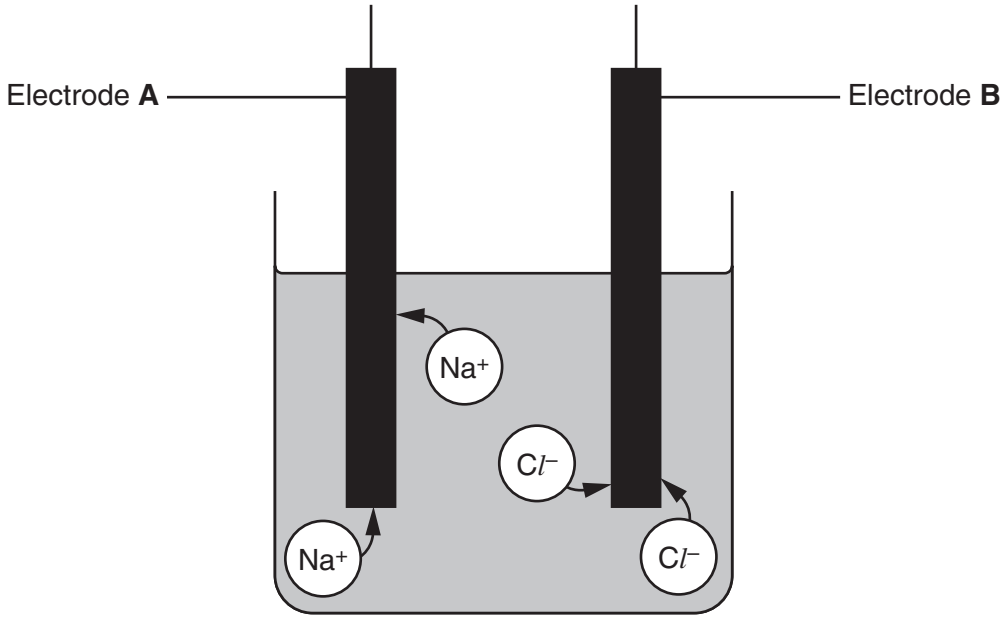
(c) How would you test the liquid produced to show that it was **pure** water?

test .....

result .....[2]

[Turn over

2 The diagram shows the movement of the ions Na^+ and Cl^- during the electrolysis of molten sodium chloride.



(a) Which electrode, **A** or **B**, is the positive electrode? Explain your choice.

.....

.....[2]

(b) Which ion is attracted to the cathode?

.....[1]

(c) Name the two elements formed by the electrolysis of molten sodium chloride.

1. .....

2. .....[2]

(d) Give **one** expected observation during this electrolysis.

.....[1]

3 A student investigated the solubility of potassium chlorate in water at various temperatures.

Experiment 1

The student was provided with a clean boiling tube containing 5 g of potassium chlorate.

A burette was filled with pure water and 12.0 cm^3 of water added to the boiling tube. The mixture of potassium chlorate and water was heated carefully until all of the solid had dissolved. The boiling tube was removed from the heat and the solution allowed to cool. The solution was stirred with a thermometer.

The temperature at which crystals of solid first appeared was taken.

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.

Experiment 3

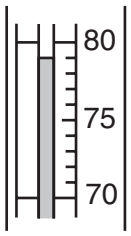
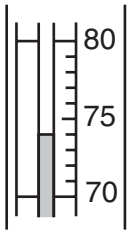
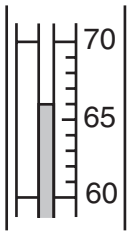
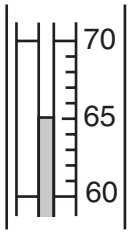
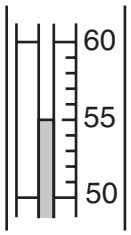
From the burette, 1.0 cm^3 more of water was added into the boiling tube and contents from Experiment 2. The experiment was repeated as before. This procedure was repeated for *Experiments 4 and 5* with two more successive additions of 1.0 cm^3 of water.

At the end of Experiment 5, the total volume of water in the boiling tube was 16.0 cm^3.

[Turn over

Record, in the table, the **total** volume of water used for each experiment. Use the thermometer diagrams to read the temperatures at which crystals first appear and record the values in the table.

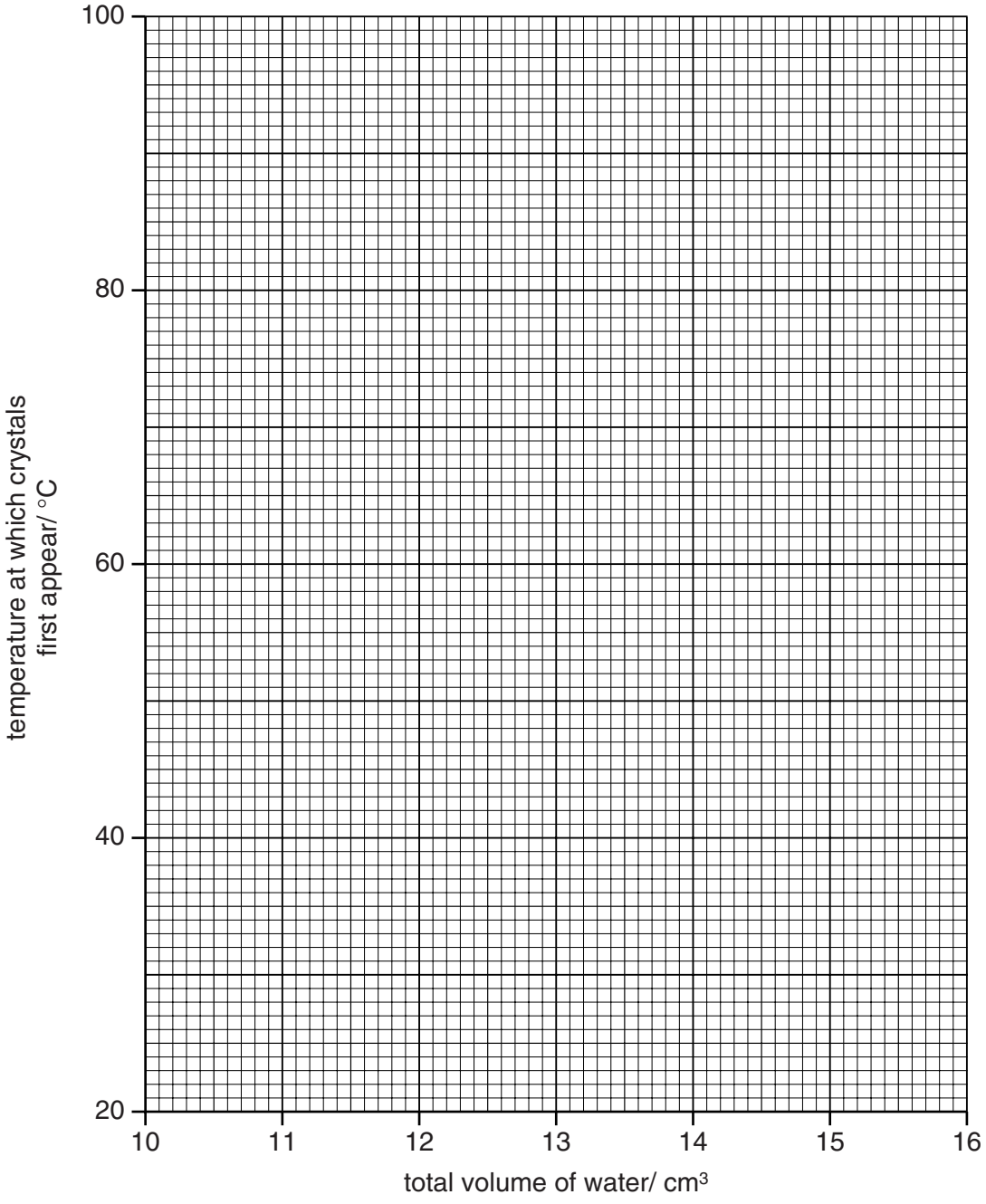
Table of results

experiment	total volume of water/cm^3	thermometer diagrams	temperature at which crystals first appear/°C
1	12.0		
2			
3			
4			
5			

[5]

For Examiner's Use

(a) Plot your results on the grid and draw a straight line graph. [4]



(b) (i) **From your graph**, find the temperature at which crystals of potassium chlorate would first appear if the total volume of water in the solution was 11.0 cm^3. **Show on the grid** how you obtained your answer.

.....[2]

(ii) Substance **N** is less soluble in water than potassium chlorate. Sketch on the grid the straight line graph you would expect for **N**. Label this line. [2]

[Turn over

(c) How would the student know when the potassium chlorate was completely dissolved in the water?

.....

.....[1]

(d) Suggest, with a reason, how the results would be different if 2.5 g of potassium chlorate were used instead of 5 g.

.....

.....

.....[2]

(e) **(i)** Which result appears to be inaccurate?

.....

.....[1]

(ii) Explain **one** improvement which could be made to **the experimental procedure** to obtain more accurate results.

improvement .....

explanation .....

.....[2]

4 Two different solutions, **O** and **P**, were tested. The tests and some of the observations are in the following table.

Solution **O** was aqueous ammonia and solution **P** was a calcium salt dissolved in water.

Complete the observations in the table.

tests	observations
Tests on solution **O** **(a)** Appearance of solution **O**.	....[1]
(b) Solution **O** was tested with Universal Indicator paper. Record the pH.	colour ..... pH .....[2]
(c) **(i)** To 1 cm^3 of aqueous copper(II) sulphate was added a few drops of solution **O**. **(ii)** An excess of solution **O** was added.	....[2] ....[2]
Tests on solution **P**. **(d)** To 1 cm^3 of solution **P** was added a few drops of dilute hydrochloric acid and then aqueous barium chloride.	no visible reaction
(e) To 1 cm^3 of solution **P** was added aqueous sodium hydroxide drop by drop with shaking. An excess of aqueous sodium hydroxide was added to the mixture. To the mixture was added one spatula measure of aluminium powder. The mixture was boiled and the gas tested with damp Universal Indicator paper.	....[2] .....[1] paper turned blue

[Turn over

tests	observations
(f) To solution **P** was added solution **O**, drop by drop with shaking. An excess of solution **O** was added to the mixture.	....[1] ....[1]

(g) What gas is given off in test **(e)**?

.....[1]

(h) What conclusion can you draw about the identity of solution **P**?

.....[1]

5 The following is an account of the preparation of zinc sulphate crystals, $ZnSO_4.7H_2O$.

Pour 50 cm^3 of dilute sulphuric acid into a small beaker. Warm the acid. Add a spatula measure of zinc oxide and stir. Repeat until zinc oxide is in excess. Filter off the excess of zinc oxide. Heat the filtrate until it is on the *point of crystallising*. Leave it to cool. When crystals have formed, filter off the crystals and dry them with filter paper.

(a) Why is the acid heated?

.....[1]

(b) Why is the mixture stirred with a glass rod and not a metal spatula?

.....[1]

(c) Why does it not matter if the volume of sulphuric acid is not exactly 50 cm^3?

.....[1]

(d) Draw a diagram to represent the filtration apparatus.

[2]

(e) How would you know that the *point of crystallising* had been reached?

.....

.....[1]

(f) Why are the crystals dried with a filter paper and not in an oven?

.....

.....[1]

(g) How would the **method** differ if zinc carbonate were used instead of zinc oxide?

.....

.....[2]

[Turn over

6 # Are egg shells pure calcium carbonate?

Calcium carbonate is found in egg shells. All carbonates react with hydrochloric acid to form chlorides. Calcium carbonate is insoluble in water but calcium chloride is soluble. Most impurities in egg shells are insoluble. Plan an experiment to find out if egg shells are 100% calcium carbonate.

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.....[6]