Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

9821411450

CHEMISTRY **0620/61**

Paper 6 Alternative to Practical **May/June 2015**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

MODIFIED LANGUAGE

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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, 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.

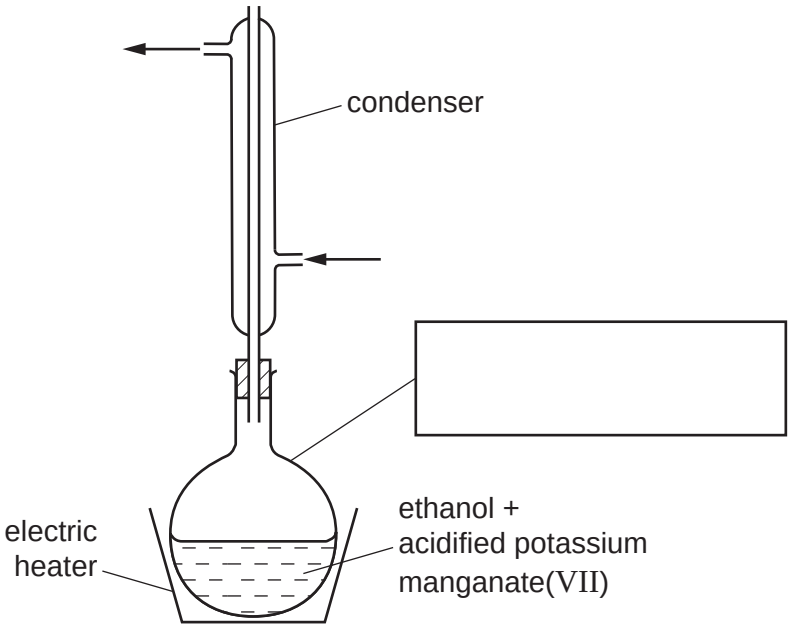
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

© UCLES 2015

1 Ethanol was reacted with hot acidified potassium manganate(VII) solution using the apparatus below. Ethanoic acid was formed.



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

(ii) Label the arrows. [1]

(b) (i) Suggest and explain why an electric heater is used to heat this reaction and not a Bunsen burner.

.....

..... [2]

(ii) Suggest why a condenser is necessary.

..... [1]

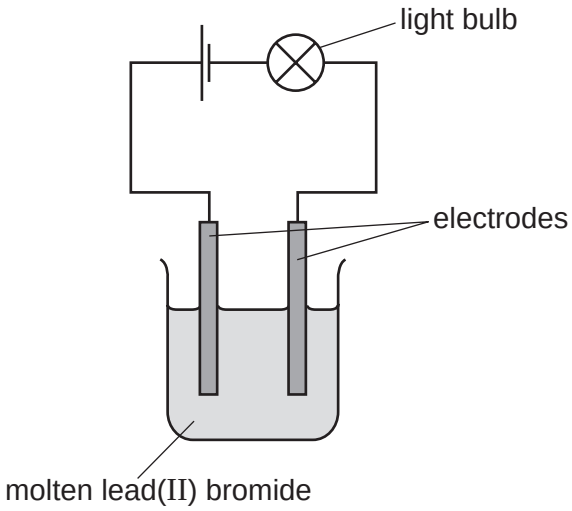
(c) Complete the table to show the difference in smell between ethanol and ethanoic acid.

	smell
ethanol	
ethanoic acid	

[2]

[Total: 7]

2 Electricity was passed through molten lead(II) bromide using the apparatus shown.



The formation of a brown gas was observed at the positive electrode.

(a) Give **one** other expected observation.

..... [1]

(b) (i) Name a non-metal that could be used for the electrodes.

..... [1]

(ii) Suggest why iron is not used for the electrodes.

..... [1]

(c) (i) Name the brown gas formed.

..... [1]

(ii) Suggest the result of testing this gas with damp blue litmus paper.

..... [1]

(d) Name the product formed at the negative electrode.

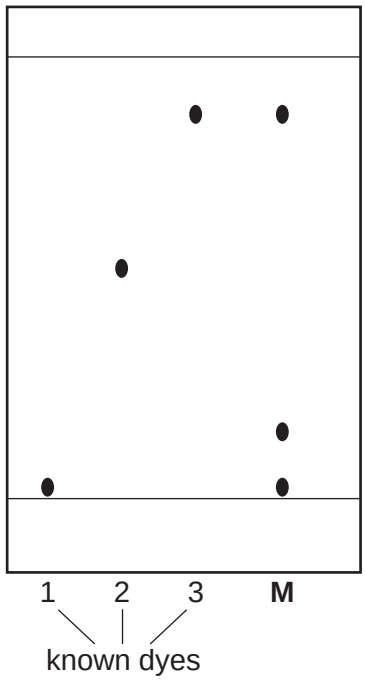
..... [1]

(e) State **one** safety precaution that should be used when doing this experiment.

..... [1]

[Total: 7]

3 A mixture of coloured dyes, **M**, was separated by chromatography. The dyes were insoluble in water.
The chromatogram below shows the result of separating the mixture and the chromatography of three known dyes 1, 2 and 3.



(a) On the diagram, label the base line (origin). [1]

(b) Name a solvent that could be used in this separation.

..... [1]

(c) How many dyes were there in the mixture, **M**?

..... [1]

(d) What are your conclusions about the identity of the dyes in the mixture, **M**?

.....

.....

..... [3]

(e) How could the reliability of the results be checked?

..... [1]

[Total: 7]

© UCLES 2015

4 A student investigated the reaction of aqueous sodium hydroxide with aqueous solutions of two different acids, **A** and **B**.

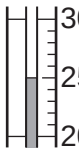
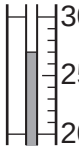
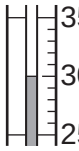
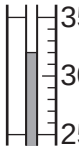
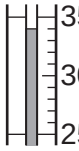
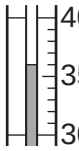
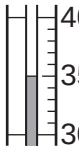
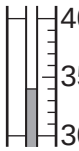
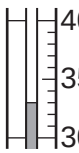
Two experiments were done.

(a) *Experiment 1*

Using a measuring cylinder, 50 cm^3 of aqueous sodium hydroxide solution was poured into a polystyrene cup. The initial temperature of the solution was measured.

A burette was filled with the solution of acid **A** to the 0.0 cm^3 mark.
5.0 cm^3 of acid **A** was added to the aqueous sodium hydroxide in the cup and the mixture stirred.
The temperature of the solution was measured. Another 5.0 cm^3 of acid **A** was added to the cup and the mixture stirred. The temperature of the mixture was measured.
More 5.0 cm^3 portions of acid **A** were added to the cup until a total volume of 40.0 cm^3 of acid had been added. After each addition, the mixture was stirred and the temperature measured.

Use the thermometer diagrams in the table to record the temperatures.

volume of acid **A** added / cm^3	thermometer diagram	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		

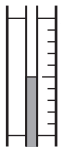
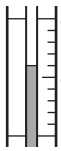
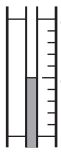
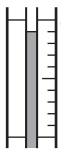
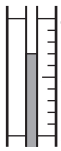
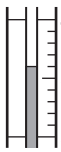
[3]

© UCLES 2015

The burette was emptied and rinsed with distilled water, and then with acid **B**. This acid was discarded. The burette was then filled up to the 0.0 cm^3 mark with acid **B**.

(b) *Experiment 2*

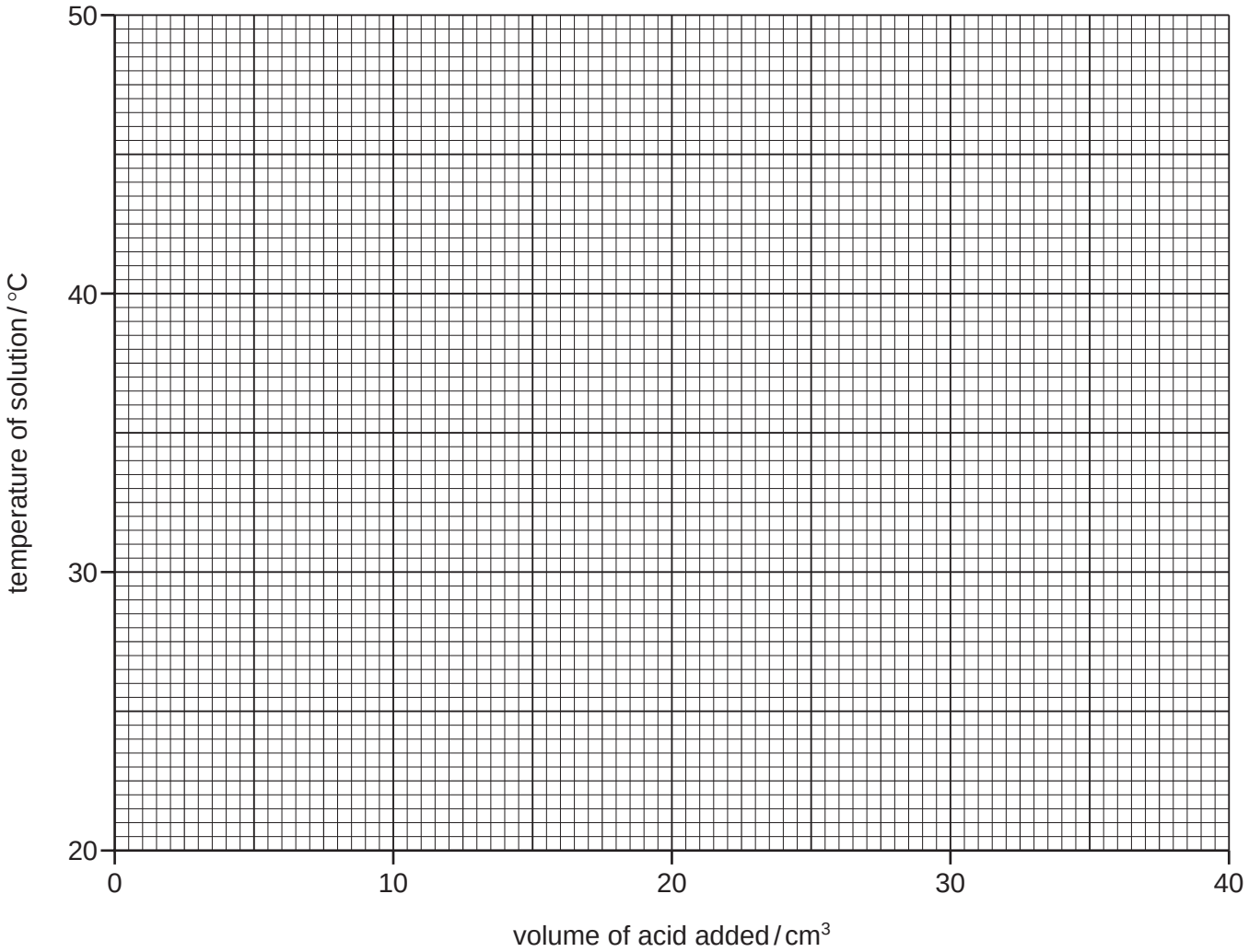
Experiment 1 was repeated using acid **B** instead of acid **A**.
Use the thermometer diagrams in the table to record the temperatures.

volume of acid **B** added / cm^3	thermometer diagram	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]

© UCLES 2015

(c) Plot the results for Experiments 1 and 2 on the grid and draw a smooth line graph for each experiment.
Clearly label your graphs.



[5]

(d) **Use your graph** to estimate the temperature of the reaction mixture when 8.0 cm^3 of acid **B** were added to 50 cm^3 of aqueous sodium hydroxide.

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

..... [2]

(e) What type of chemical reaction, other than neutralisation, occurred when acid **A** reacted with sodium hydroxide?

..... [1]

© UCLES 2015

(f) Why was the burette rinsed firstly with distilled water and then with acid **B** before starting Experiment 2?

.....

..... [2]

(g) The solutions of acids **A** and **B** are the same concentration.

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

..... [1]

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

.....

..... [1]

(h) Describe one source of error in Experiment 2. Suggest one improvement to reduce this source of error.

source of error .....

improvement .....
[2]

[Total: 20]

5 Solid **C** was analysed. Solid **C** was a mixture of salts containing aluminium ions, sulfate ions and another cation (positive ion).
Tests on solid **C**, and some of the observations, are in the table.
Complete the observations in the table.

tests	observations
<u>tests on solid **C**</u> **(a)** Appearance of solid **C**.	white solid
(b) A little of solid **C** was heated gently and then strongly.	condensation was formed at the top of the test-tube
The gas given off was tested with damp pH indicator paper.	pungent gas, pH = 10
<u>tests on a solution of **C**</u> Water was added to solid **C** to produce an aqueous solution, solution **C**. **(c)** Drops of aqueous sodium hydroxide were added to solution **C** using a teat pipette.	.....
Excess aqueous sodium hydroxide was then added to the mixture.	..... [3]
The mixture was boiled gently and any gases given off were tested.	pungent gas, pH = 10
(d) Excess aqueous ammonia was added to solution **C**.	..... [1]
(e) A few drops of dilute nitric acid and aqueous silver nitrate were added to solution **C**.	..... [1]
(f) A few drops of dilute nitric acid and barium nitrate solution were added to solution **C**.	..... [2]

© UCLES 2015

(g) What does the formation of condensation in test **(b)** tell you about the nature of solid **C**?

..... [1]

(h) What does test **(e)** tell you about the nature of solid **C**?

..... [1]

(i) **(i)** Name the gas given off in test **(b)**.

..... [1]

(ii) What is your conclusion about the identity of the other cation in solid **C**?

..... [1]

[Total: 11]

6 A catalyst is a substance that speeds up the rate of a chemical reaction and remains unchanged at the end of the reaction.
Hydrogen peroxide solution, H_2O_2, breaks down to form oxygen. This decomposition is very slow if a catalyst is not used.
Plan an investigation to show that copper(II) oxide is a suitable catalyst for this reaction.
You can use aqueous hydrogen peroxide and common laboratory apparatus.

Step 1 Show that copper(II) oxide catalyses the decomposition of hydrogen peroxide and measure the rate of the reaction.

.....

.....

.....

.....

.....

.....

.....

.....

Step 2 Show that the copper(II) oxide is unchanged at the end of the decomposition.

.....

.....

.....

.....

.....

.....

.....

[Total: 8]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwit ingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.