Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

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.

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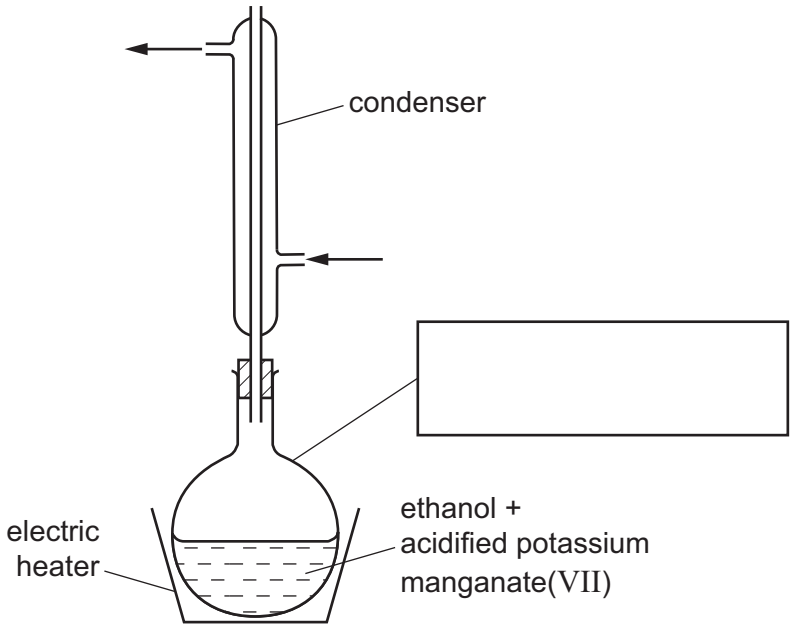
CAMBRIDGE International Examinations

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



View solution

(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.

View solution

.....

..... [2]

(ii) Suggest why a condenser is necessary.

View solution

..... [1]

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

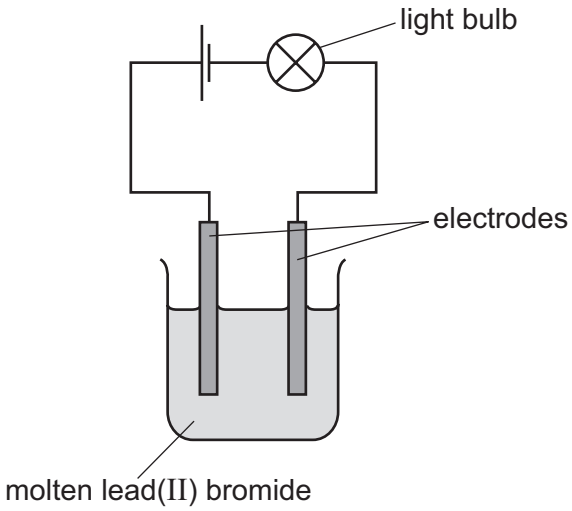
View solution

	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.

View solution

..... [1]

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

View solution

..... [1]

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

View solution

..... [1]

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

View solution

..... [1]

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

View solution

..... [1]

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

View solution

..... [1]

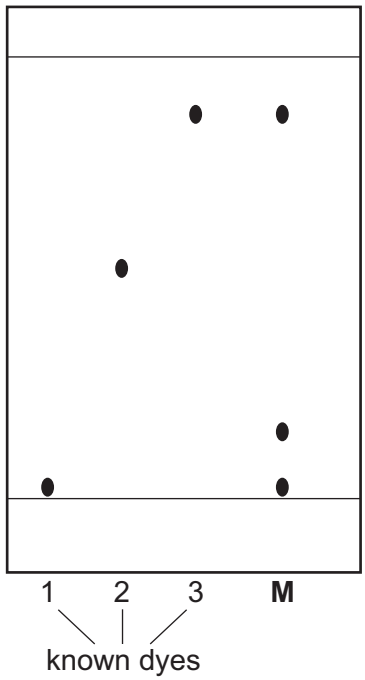
(e) State **one** safety precaution that should be used when doing this experiment.

View solution

..... [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.



View solution

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

View solution

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

..... [1]

View solution

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

..... [1]

View solution

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

.....

.....

..... [3]

View solution

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

..... [1]

[Total: 7]

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

Two experiments were done.

View solution

(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.

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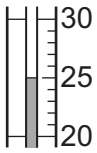
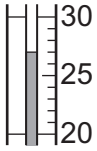
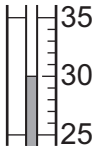
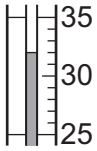
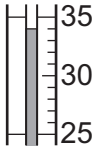
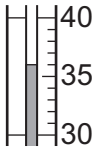
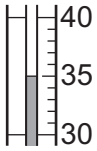
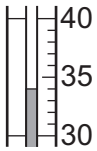
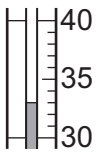
Use the thermometer diagrams in the table to record the temperatures.

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		

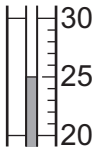
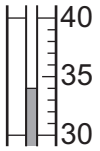
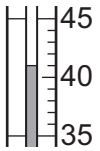
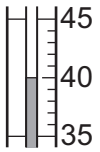
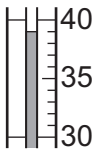
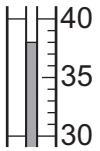
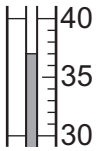
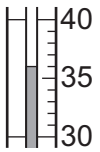
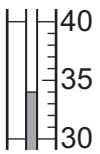
[3]

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**.

View solution

(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]

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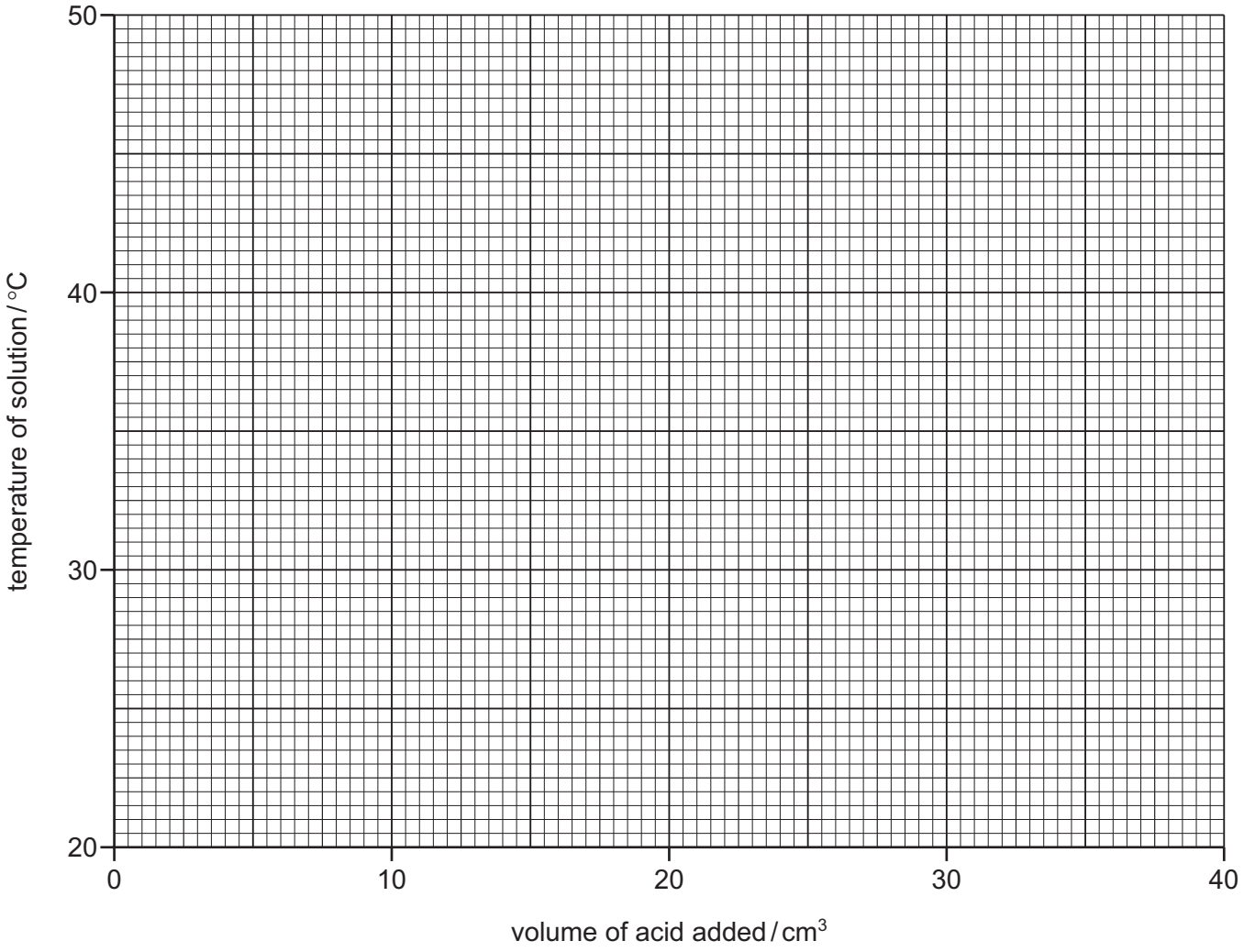
(c) Plot the results for Experiments 1 and 2 on the grid and draw a smooth line graph for each experiment.
Clearly label your graphs.

View solution



[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.

View solution

..... [2]

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

..... [1]

View solution

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

View solution

.....

..... [2]

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

View solution

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

..... [1]

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

View solution

.....

..... [1]

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

View solution

source of error .....

improvement .....

[2]

[Total: 20]

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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**.	View solution
(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**.	View solution ..... [1]
(f) A few drops of dilute nitric acid and barium nitrate solution were added to solution **C**.	..... [2]

View solution

(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**?

View solution

..... [1]

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

View solution

..... [1]

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

..... [1]

[Total: 11]

View solution

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.


View solution

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]

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