UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

2436791625

CHEMISTRY **0620/62**

Paper 6 Alternative to Practical **May/June 2013**

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.

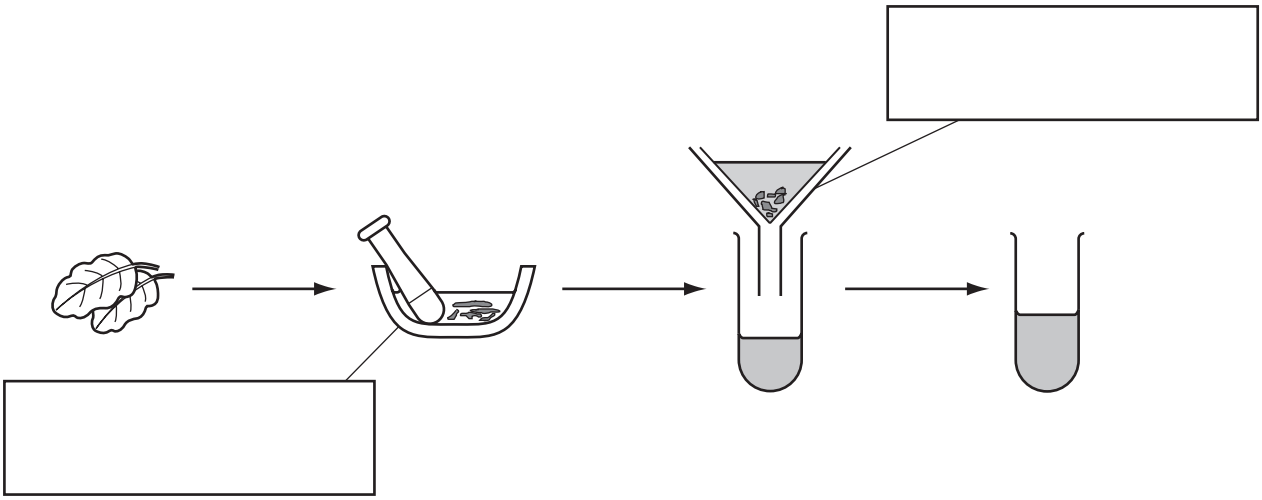
Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

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.

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

For Examiner's Use

1 A student extracted the colours present in some leaves using the apparatus below.



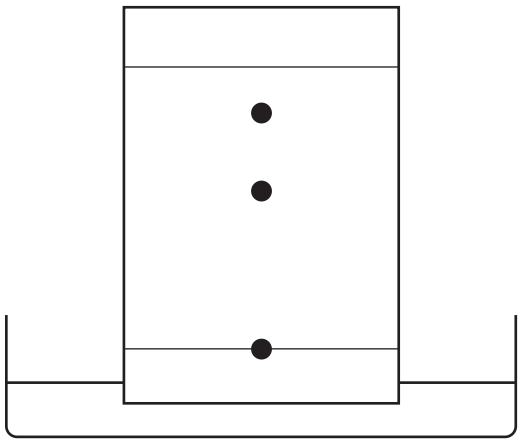
(a) Complete the boxes to identify the pieces of apparatus used. [2]

(b) Use labelled arrows to indicate

(i) the solvent,

(ii) the solution of colours. [2]

(c) Chromatography was used to separate the colours. The chromatogram obtained is shown.



(i) On the diagram, label the solvent front. [1]

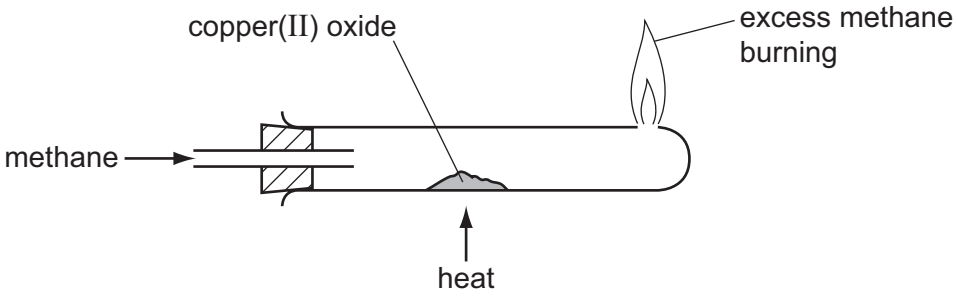
(ii) How many colours were present?

..... [1]

[Total: 6]

For Examiner's Use

2 A student investigated the reaction of methane, CH_4, and copper(II) oxide. She passed methane gas over hot copper(II) oxide using the apparatus shown.



The solid changed colour to red-brown and drops of liquid condensed in the cold part of the tube.

(a) What was the original colour of the solid?

..... [1]

(b) Suggest the identity of

(i) the red-brown solid, ...

(ii) the drops of liquid. ..... [2]

(c) Suggest a physical test to identify the liquid.

test .....

result ..... [2]

[Total: 5]

For Examiner's Use

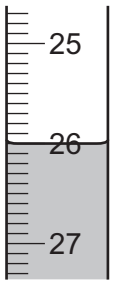
3 A student investigated the reaction between a solution of deep purple aqueous potassium manganate(VII), and two different colourless solutions, **B** and **C**, of an acidic solution of a sodium salt.

Two experiments were carried out.

Experiment 1

A burette was filled with the solution of potassium manganate(VII) to the 0.0 cm^3 mark.
Using a measuring cylinder, 25 cm^3 of solution **B** was poured into the conical flask.
The potassium manganate(VII) solution was added slowly to the flask and shaken to mix thoroughly. Addition of the 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 table.



final reading

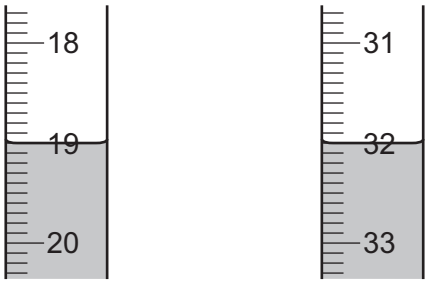
final reading / cm^3	
initial reading / cm^3	
difference / cm^3	

[2]

Experiment 2

Experiment 1 was repeated using solution **C** instead of solution **B**.

(b) Use the burette diagrams to record the volumes in the table and complete the table.



initial reading final reading

final reading / cm^3	
initial reading / cm^3	
difference / cm^3	

[2]

(c) (i) What colour change was observed in the contents of the flask when potassium manganate(VII) solution was added to the flask in Experiment 1?

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

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

..... [1]

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

..... [1]

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

..... [1]

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

.....

.....

..... [2]

(e) If Experiment 2 was repeated using 12.5 cm^3 of solution **C**, what volume of potassium manganate(VII) solution would be used? Explain your answer.

.....

.....

..... [3]

(f) A redox reaction occurs when potassium manganate(VII) reacts with solutions **B** and **C**. Explain the term *redox reaction*.

.....

..... [2]

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

advantage .....

disadvantage ..... [2]

[Total: 17]

For Examiner's Use

4 A mixture of two solids, **R** and **S**, was analysed.
Solid **R** was the water-soluble salt aluminium sulfate, $Al_2(SO_4)_3$, and solid **S** was an insoluble salt.
The tests on the mixture and some of the observations are in the following table.
Complete the observations in the table.

tests	observations
Distilled water was added to the mixture in a boiling tube. The boiling tube was shaken and the contents of the boiling tube filtered, keeping the filtrate and residue for the following tests. The filtrate was divided into five test-tubes.	
<u>tests on the filtrate</u> **(a)** Appearance of the first portion of the filtrate.	..... [1]
(b) Drops of aqueous sodium hydroxide were added to the second portion of the solution and the test-tube shaken. Excess aqueous sodium hydroxide was then added to the test-tube.	.... [3]
(c) Aqueous ammonia was added to the third portion, dropwise and then in excess.	.... [2]
(d) Dilute nitric acid was added to the fourth portion of the solution followed by aqueous silver nitrate.	..... [1]
(e) Dilute nitric acid was added to the fifth portion of the solution and then aqueous barium nitrate.	..... [2]

tests	observations
<u>tests on the residue</u>	
(f) Dilute hydrochloric acid was added to the residue.	rapid effervescence
The gas given off was tested.	limewater turned milky
Excess aqueous sodium hydroxide was added to the mixture in the test-tube.	white precipitate, insoluble in excess

(g) Name the gas given off in test **(f)**.

..... [1]

(h) What conclusions can you draw about solid **S**?

..... [2]

[Total: 12]

[Turn over

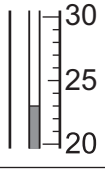
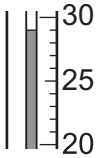
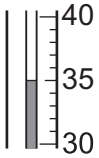
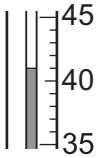
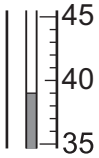
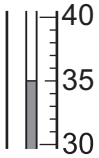
5 A student investigated the temperature changes when dilute nitric acid neutralised aqueous potassium hydroxide. The instructions followed are listed below.

Step 1 The solutions were left at room temperature for one hour.

Step 2 Using a measuring cylinder, 20 cm^3 of aqueous potassium hydroxide solution was poured into a polystyrene cup and its temperature measured.

Step 3 From a burette, 5.0 cm^3 of nitric acid was added to the cup. The highest temperature reached by the mixture was measured. A further 5.0 cm^3 of nitric acid was added to the mixture and the highest temperature measured. Further 5.0 cm^3 additions were made until a total of 30.0 cm^3 of nitric acid had been added.

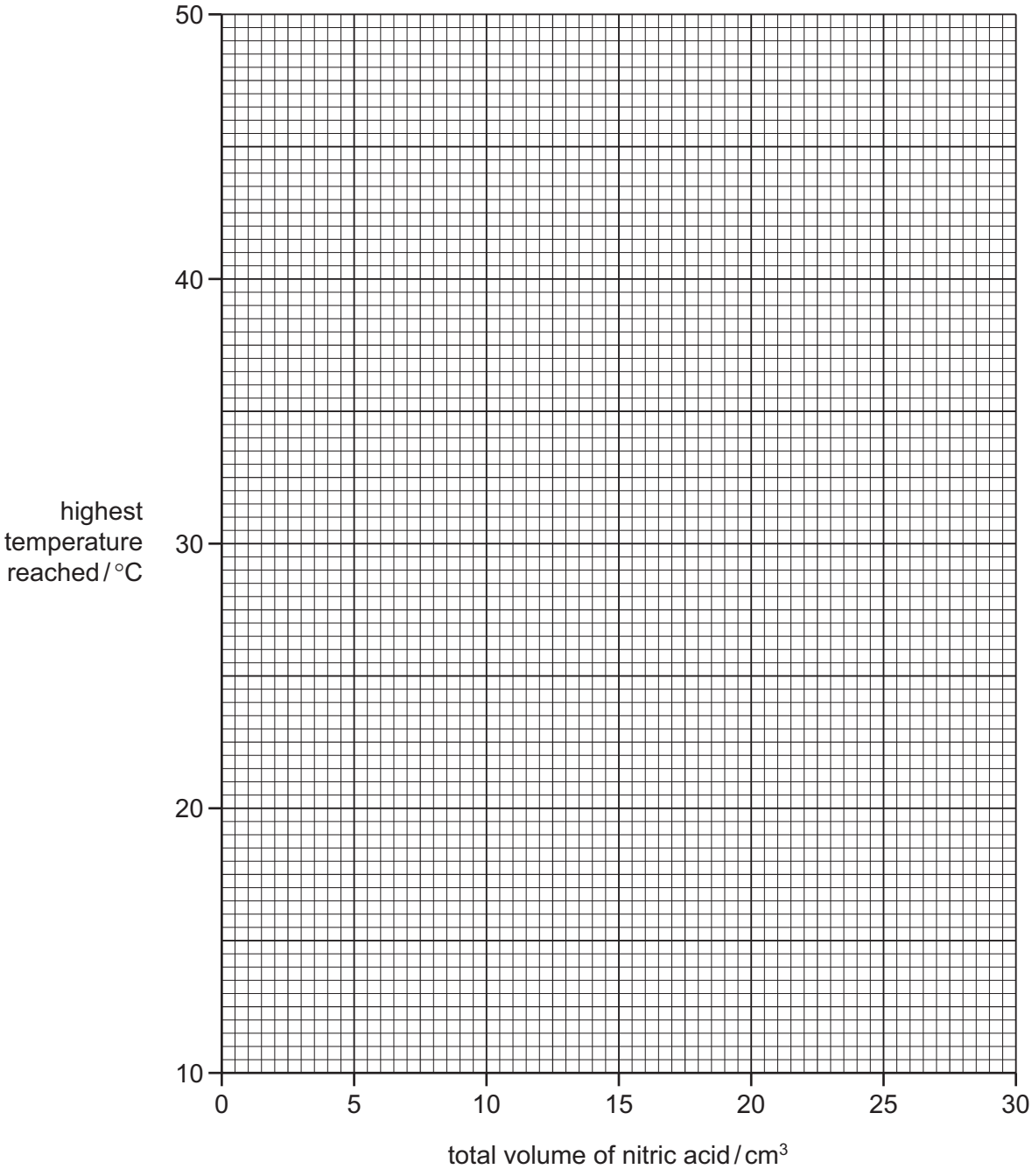
(a) Use the thermometer diagrams to complete the temperatures in the table.

volume of nitric acid added / cm^3	thermometer diagram	highest temperature reached / °C
0.0		
5.0		
10.0		
15.0		
20.0		
25.0		
30.0		

[3]

For Examiner's Use

(b) Plot the results on the grid. Draw two intersecting straight lines through the points.



[4]

(c) **From your graph**, work out the volume of nitric acid needed to completely neutralise the 20 cm^3 of aqueous potassium hydroxide. Using an arrow, show clearly **on the grid** this neutralisation point.

..... [2]

(d) What was the room temperature?

..... [1]

(e) Why was a polystyrene cup used instead of a glass beaker?

..... [1]

(f) Why does the temperature:

increase .....

.....

then decrease? .....

..... [2]

(g) What type of chemical reaction is this neutralisation?

..... [1]

[Total: 14]

For Examiner's Use

6 Two metals, **A** and **B**, each react with dilute sulfuric acid to produce hydrogen.

Plan an investigation to show which metal, **A** or **B**, is the more reactive metal. You may include a diagram in your answer.

You are provided with:

- standard laboratory equipment
- powdered metals **A** and **B**
- dilute sulfuric acid.

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.....

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.....

.....

.....

.....

.....

.....

..... [6]

[Total: 6]

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