UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTRE
NUMBER

CANDIDATE
NUMBER

CHEMISTRY **0620/63**

Paper 6 Alternative to Practical **October/November 2011**

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.
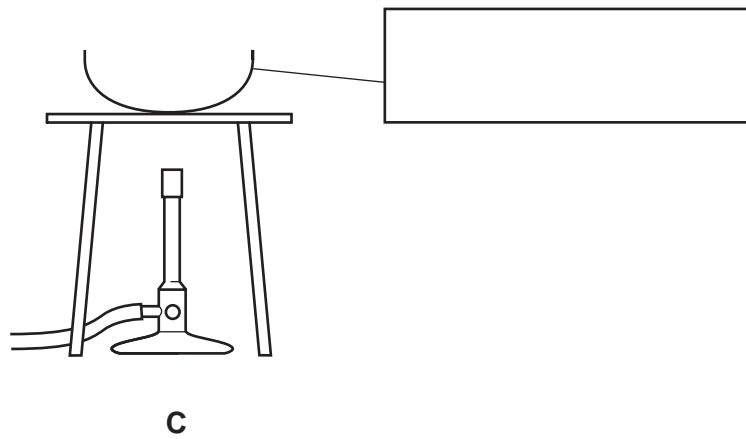
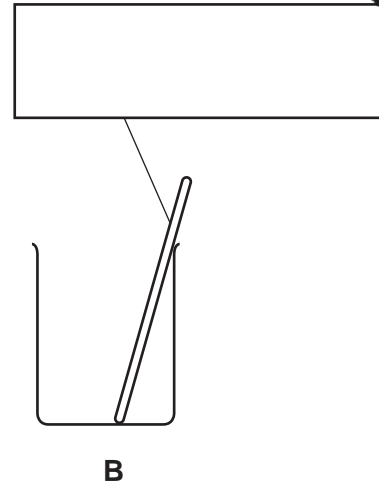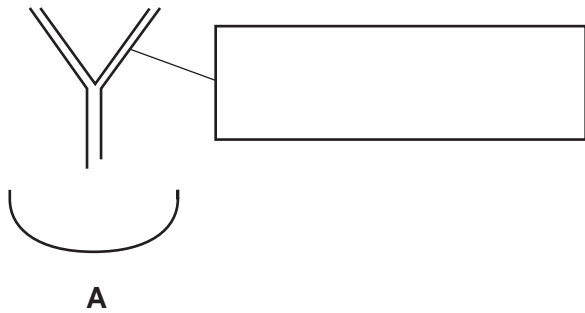| For Examiner's Use	
1	
2	
3	
4	
5	
6	
Total	

This document consists of **10** printed pages and **2** blank pages.

UNIVERSITY of CAMBRIDGE
International Examinations

[Turn over

BLANK PAGE

1 Three sets of apparatus, **A**, **B** and **C**, are shown below.

A

B

C

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

(b) What name is given to the separation method in **A**?

.... [1]

(c) Which apparatus would be most suitable to obtain crystals from an aqueous solution of copper sulfate?

.... [1]

[Total: 5]

2 A student investigated the temperature changes when metals are added to exces hydrochloric acid using the apparatus shown.

metal

dilute
hydrochloric acid
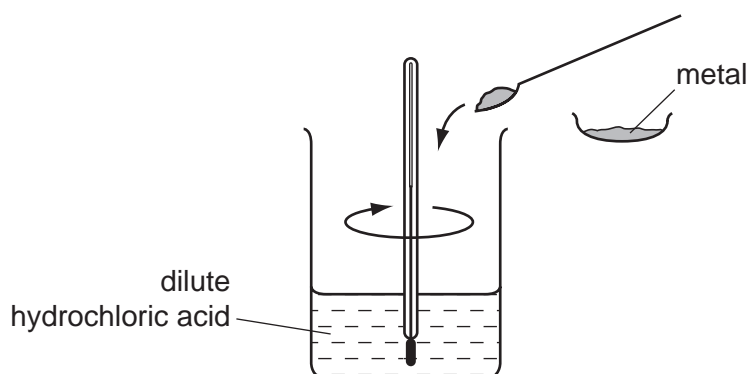
The five metals used were copper, magnesium, calcium, iron and zinc.
0.5 g of each metal was added to 25 cm³ of hydrochloric acid and the highest temperature reached was measured.
In each experiment the initial temperature of the acid was 25 °C.

(a) Use the thermometer diagrams to record the highest temperatures in the table.
Complete the table by calculating the temperature rises.

metals	thermometer diagrams	highest temperature /°C	temperature rise /°C
copper	30 25 20		
magnesium	45 40 35		
calcium	50 45 40		
iron	35 30 25		
zinc	35 30 25		

[4]

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(b) Draw a labelled bar chart to show the results of the experiments.

temperature
rise / °C
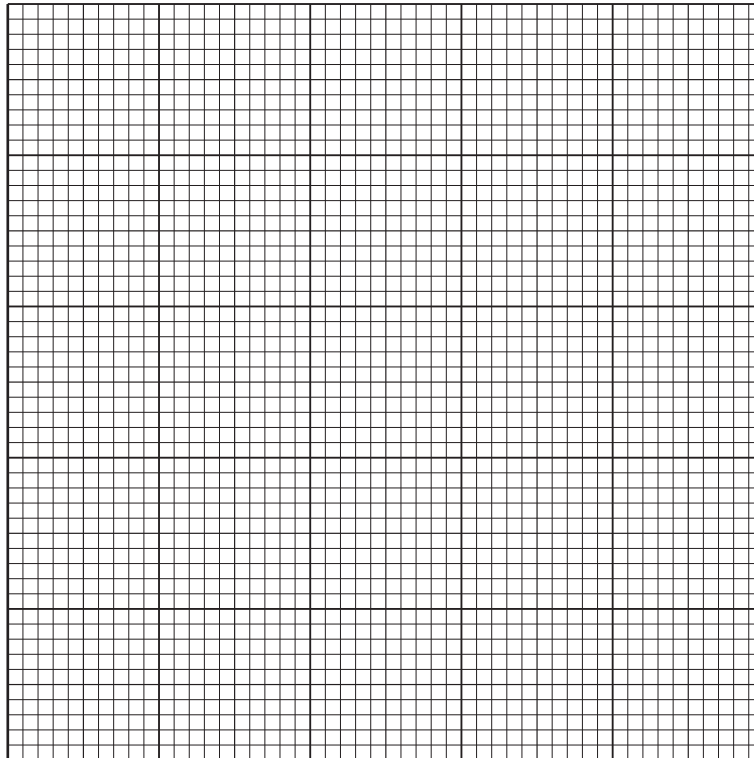
[4]

(c) (i) Which metal reacted with the hydrochloric acid to produce the largest temperature rise?

.... [1]

(ii) State and explain the result obtained for copper.

....

.... [2]

(d) Use the results to place the metals in order of increasing reactivity.

least reactive metal ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯➤ most reactive metal

[2]

(e) Predict the effect on the temperature changes if the experiments were repeated using 50 cm³ of the dilute hydrochloric acid. Explain your answer.

....

.... [2]

[Total: 15]

For
miner's

3 The solubility of carbon dioxide gas in water varies with temperature.
A student used a data book to plot the solubility of carbon dioxide in water at diff
temperatures on the grid below.
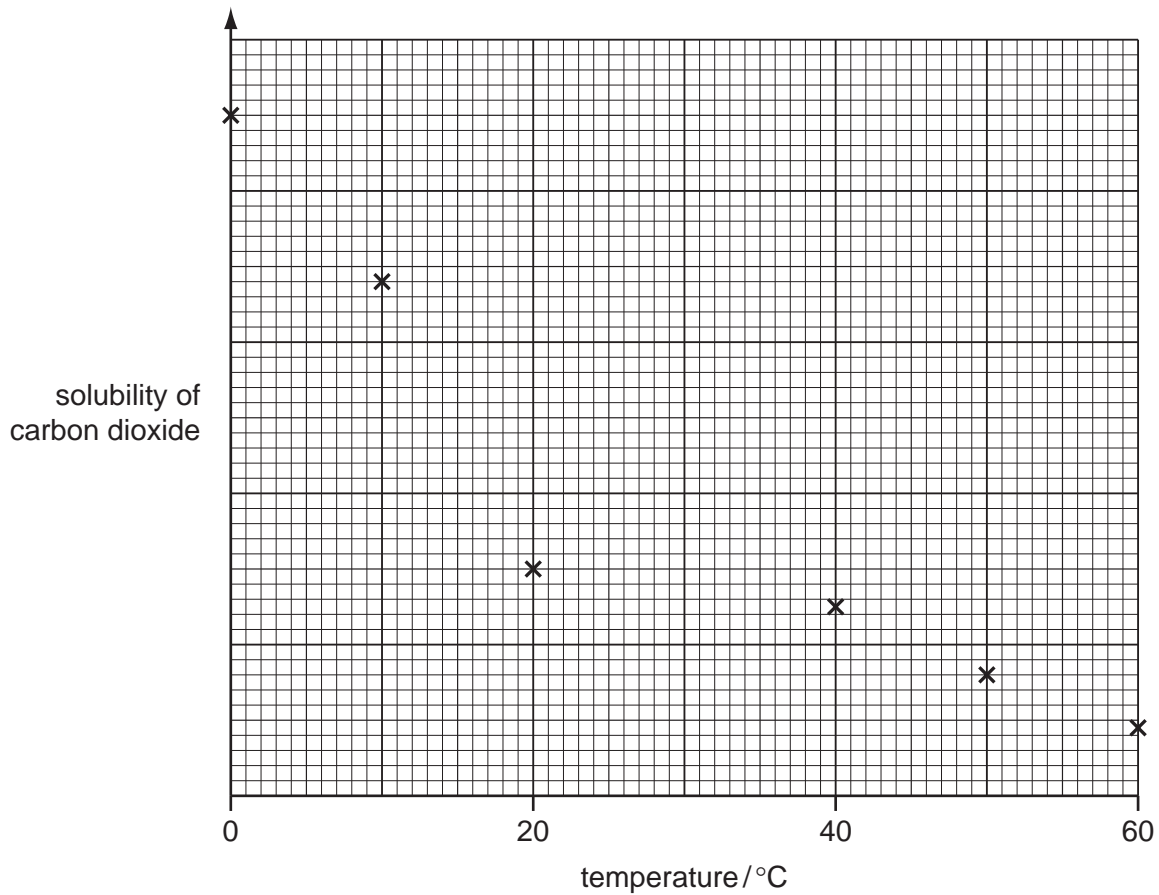
(a) Draw a smooth curve through the points. [1]

(b) Which point appears to have been incorrectly plotted?

.... [1]

(c) What is the effect of increasing the temperature on the solubility of carbon dioxide in water?

.... [1]

(d) Nitrogen is less soluble in water than carbon dioxide. On the grid, sketch a graph to represent the solubility of nitrogen. [1]

[Total: 4]

Question 4 starts on the next page.

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miner's

4 A student investigated the reaction between dilute sulfuric acid and three aqueous s of sodium hydroxide of different concentrations, labelled **A**, **B** and **C**.

Three experiments were carried out.

Experiment 1

A burette was filled up to the 0.0 cm³ mark with dilute sulfuric acid.

Using a measuring cylinder, 20 cm³ of solution **A** was poured into a conical flask with a few drops of phenolphthalein indicator.

The sulfuric acid was added to the flask, until the colour of the phenolphthalein changed.

(a) Use the burette diagram to record the final volume in the table.
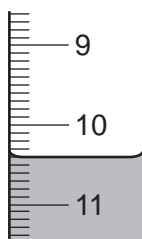
final reading

Experiment 2

Experiment 1 was repeated using solution **B**.

(b) Use the burette diagrams to record the volumes in the table.
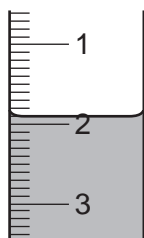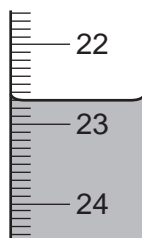
initial reading   final reading

Experiment 3

Experiment 2 was repeated using solution **C** instead of solution **B**.

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

initial reading   final reading

For
miner's
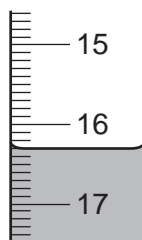
	burette readings / cm^3		
	experiment 1	experiment 2	experiment 3
final reading			
initial reading			
difference			

[4]

(d) What permanent colour change was observed after the sulfuric acid was added to the flask?

from .... to ....   [2]

(e) What type of chemical reaction occurs when sulfuric acid reacts with sodium hydroxide?

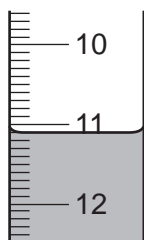.. [1]

(f) **(i)** Complete the sentences below.

Aqueous sodium hydroxide labelled .... needed the smallest volume of sulfuric acid to change the colour of the phenolphthalein.

Aqueous sodium hydroxide labelled .... needed the largest volume of sulfuric acid to change the colour of the phenolphthalein.   [1]

(ii) The order of concentration of the solutions of sodium hydroxide is

least concentrated ⎯⎯⎯⎯⎯⎯⎯⎯⎯⟶ most concentrated

[2]

(g) Compare the volumes of sulfuric acid used in Experiments 1 and 2.

.... [1]

(h) If Experiment 3 was repeated using 40 cm^3 of solution **C**, what volume of sulfuric acid would be used?

.... [2]

(i) What would be a more accurate method of measuring the volume of the aqueous sodium hydroxide?

.... [1]

*For
miner's
e*

(j) What would be the effect on the results if the solutions of sodium hydroxide were w
before adding the sulfuric acid? Give a reason for your answer.

effect on results ....

reason .... [2]

(k) Suggest a **different** method of finding the order of concentrations of the solutions of sodium hydroxide.

....

....

....

....

.... [3]

[Total: 19]

5   Two different salts, **D** and **E**, were analysed.
    D was an aqueous solution of iron(III) chloride and **E** was a solid.
    The tests on the salts and some of the observations are in the following table.
   Complete the observations in the table.

tests	observations
(a) (i) Appearance of solution **D**.	.... [1]
(ii) Appearance of solid **E**.	white crystals
tests on solution **D** **(b)** The solution was divided into four equal portions in test-tubes, and the following tests carried out.	
(i) Dilute hydrochloric acid was added to the first portion of the solution and then aqueous barium chloride.	.... [1]
(ii) Dilute nitric acid was added to the second portion and then aqueous silver nitrate.	.... [2]
(iii) An excess of aqueous sodium hydroxide was added to the third portion of the solution.	.... [2]
(iv) An excess of aqueous ammonia was added to the fourth portion.	.... [1]
tests on solid **E** **(c) (i)** Solid **E** was heated in a test-tube. The gas given off was tested.	limewater turned milky
(ii) Dilute nitric acid was added to solid **E** in a test-tube.	rapid effervescence, limewater turned milky

(d)   Identify the gas given off in tests **(c)(i)** and **(c)(ii)**.

.... [1]

(e)   What conclusions can you draw about solid **E**?

....

.... [2]

[Total: 10]

6 The label on an aerosol can of Kleen Air air freshener is shown.

Contains: solvents
ethanol
propanone

lemon oil
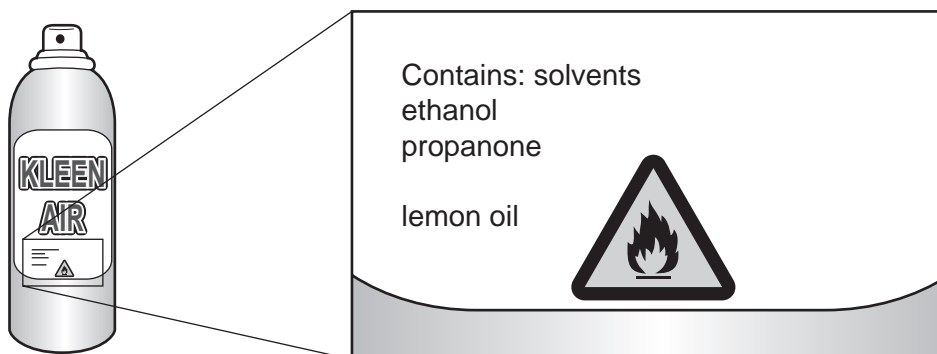
(a) What is meant by the term *solvent*?

.... [1]

(b) What does the hazard sign indicate?

.... [1]

(c) What method could be used to obtain ethanol (boiling point 78 °C) from a mixture of ethanol and propanone (boiling point 56 °C)?

.... [1]

(d) Describe an experiment to investigate the number of coloured substances present in a sample of the lemon oil obtained from Kleen Air.

....

....

....

....

....

.... [4]

[Total: 7]