Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

CHEMISTRY **0620/52**

Paper 5 Practical Test **February/March 2016**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions

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.
Practical notes are provided on pages 11 and 12.

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	
Total	

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 **9** printed pages and **3** blank pages.

CAMBRIDGE International Examinations

1 You are going to investigate the rate of a reaction between two solutions, **J** and **K**, and sulfuric acid at different temperatures.

Read all the instructions below carefully before starting the experiments.

Instructions
You are going to carry out four experiments.

(a) *Experiment 1*

Use the large measuring cylinder to pour 50 cm^3 of distilled water and 40 cm^3 of sulfuric acid into the 250 cm^3 conical flask.
Use the small measuring cylinder to add 2 cm^3 of methyl orange and 5 cm^3 of solution **J** to the mixture in the conical flask. Measure the temperature of the mixture and record it in the table.
Use the small measuring cylinder to now start the reaction by adding 5 cm^3 of solution **K** to the conical flask and immediately start your timer and swirl the mixture.
Measure the time taken for the mixture to turn very pale yellow and record the time in the table.
Measure and record the final temperature of the mixture.

Experiment 2

Repeat Experiment 1 but heat the mixture in the conical flask to about 30 °C **before** adding the solution **K**. Measure and record the temperature of the mixture.
Now add 5 cm^3 of solution **K** to the conical flask and immediately start your timer and swirl the mixture.
Measure the time taken for the mixture to turn very pale yellow and record the time in the table.
Measure and record the final temperature of the mixture.

Experiment 3

Repeat Experiment 1 but heat the mixture in the conical flask to about 40 °C before adding the solution **K** to the conical flask. Take the same measurements and record the values in the table.

Experiment 4

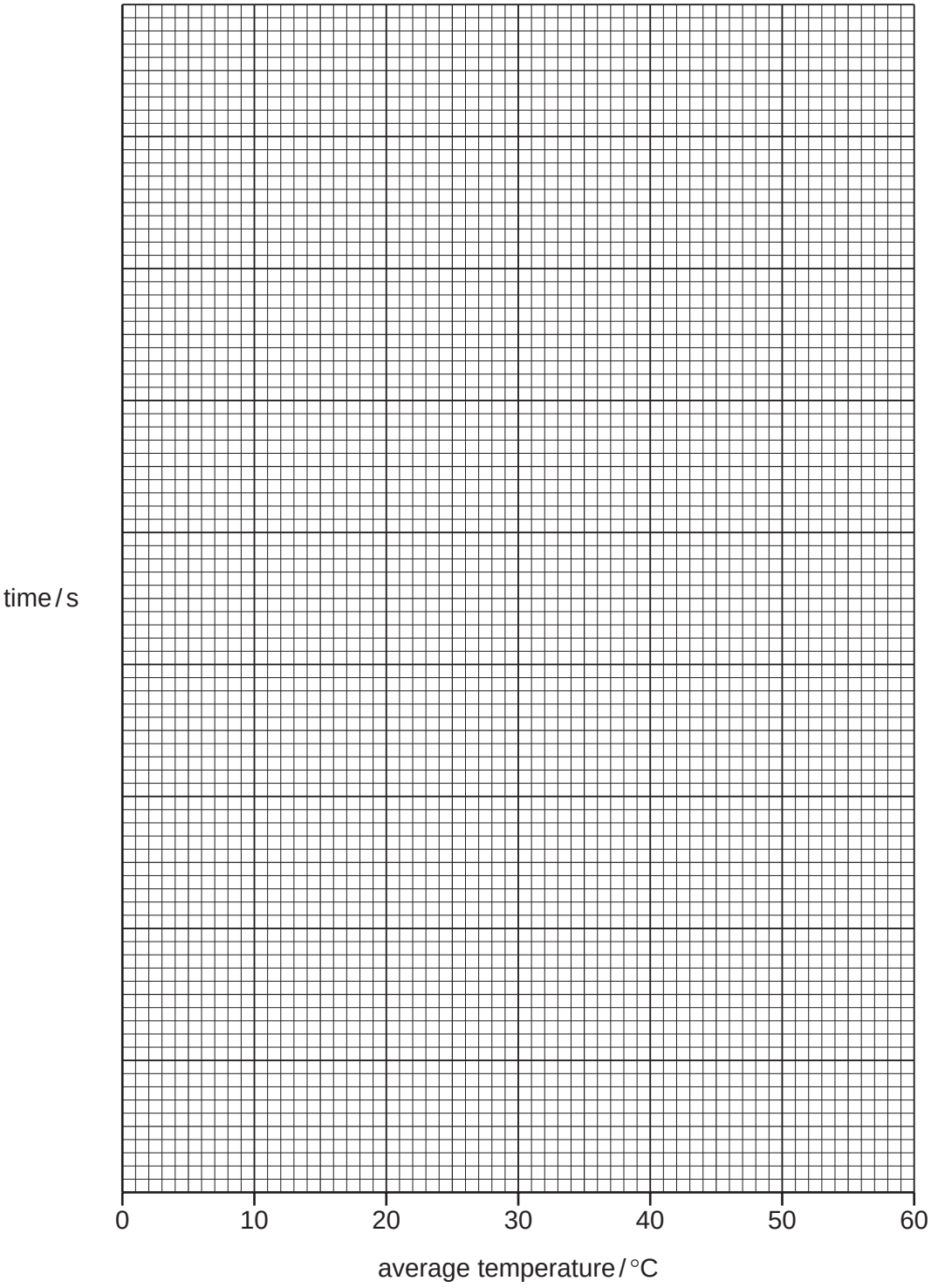
Repeat Experiment 1 but heat the mixture in the conical flask to about 50 °C before adding the solution **K** to the conical flask. Take the same measurements and record the values in the table.

Work out the average temperatures to complete the table.

experiment	time taken for mixture to turn very pale yellow / s	initial temperature / °C	final temperature / °C	average temperature / °C
1				
2				
3				
4				

[4]

(b) Plot the results you have obtained on the grid and draw a smooth line graph.



[4]

(c) **From your graph**, deduce the time taken for the mixture to turn very pale yellow if Experiment 1 was repeated at an average temperature of 60 °C.
Show clearly **on the grid** how you worked out your answer.

..... [2]

(d) (i) In which experiment was the rate of reaction greatest?

..... [1]

(ii) Explain why the rate of reaction was greatest in this experiment.

.....

.....

..... [2]

(e) (i) Suggest and explain the effect **on the results** of using a burette to measure the volume of solution **J**.

.....

..... [2]

(ii) Suggest and explain one **other** improvement to these experiments.

.....

..... [2]

[Total: 17]

2 You are provided with two solids, **L** and **M**, which are both salts.
Carry out the following tests on the solids, recording all of your observations at each stage.

tests on solid L

(a) Describe the appearance of solid **L**.

..... [1]

(b) Add about 10 cm^3 of distilled water to solid **L** and shake the mixture for about one minute to dissolve.

Divide the solution into four equal portions in four test-tubes and carry out the following tests.

(i) Add several drops of aqueous ammonia to the first portion of the solution.

Now add excess ammonia solution to the mixture and shake.

observation .....

.....

.....

..... [4]

(ii) Add excess aqueous sodium hydroxide to the second portion of the solution.

observation .....

..... [1]

(iii) Add about 1 cm^3 of dilute nitric acid to the third portion of the solution followed by aqueous silver nitrate.

observation ..... [1]

(iv) Add about 1 cm^3 of dilute nitric acid to the fourth portion of the solution followed by aqueous barium nitrate.

observation ..... [1]

(c) Identify solid **L**.

.....

..... [2]

tests on solid M

(d) Use a spatula to divide solid **M** into two portions in two test-tubes.

Heat the first portion of the solid, **gently**.
Test the gas given off with damp red litmus paper.

observation .....

.....

..... [3]

(e) Dissolve the second portion of the solid in about 6 cm^3 of water. Pour half of the solution into a boiling tube.

(i) Add about 1 cm^3 of aqueous sodium hydroxide to the solution in the boiling tube and heat the mixture gently. Test the gas given off.

observation ..... [1]

(ii) Add about 1 cm^3 of dilute nitric acid to the remaining solution in the test-tube followed by aqueous silver nitrate.

observation ..... [1]

(f) Identify solid **M**.

.....

..... [2]

[Total: 17]

3 The label on a bottle of orange drink stated ‘contains no artificial colours’. A scientist thought that the orange colour in the drink was a mixture of two artificial colours:

- Sunset Yellow E110
- Allura Red E129

Plan an investigation to show that the orange colour in the drink did **not** contain these two artificial colours.
You are provided with samples of E110, E129 and the orange colouring from the drink. You are also provided with common laboratory apparatus.
You may draw a diagram to help answer the question.

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.....

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.....

.....

..... [6]

[Total: 6]

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NOTES FOR USE IN QUALITATIVE ANALYSIS

Test for anions

anion	test	test result
carbonate (CO_3^{2-})	add dilute acid	effervescence, carbon dioxide produced
chloride (Cl^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
bromide (Br^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	cream ppt.
iodide (I^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	yellow ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide then aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify, then add aqueous barium nitrate	white ppt.
sulfite (SO_3^{2-})	add dilute hydrochloric acid, warm gently and test for the presence of sulfur dioxide	sulfur dioxide produced will turn acidified aqueous potassium manganate(VII) from purple to colourless

Test for aqueous cations

cation	effect of aqueous sodium hydroxide	effect of aqueous ammonia
aluminium (Al^{3+})	white ppt., soluble in excess giving a colourless solution	white ppt., insoluble in excess
ammonium (NH_4^+)	ammonia produced on warming	–
calcium (Ca^{2+})	white ppt., insoluble in excess	no ppt., or very slight white ppt.
chromium(III) (Cr^{3+})	green ppt., soluble in excess	grey-green ppt., insoluble in excess
copper (Cu^{2+})	light blue ppt., insoluble in excess	light blue ppt., soluble in excess, giving a dark blue solution
iron(II) (Fe^{2+})	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) (Fe^{3+})	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc (Zn^{2+})	white ppt., soluble in excess, giving a colourless solution	white ppt., soluble in excess, giving a colourless solution

Test for gases

gas	test and test results
ammonia (NH_3)	turns damp, red litmus paper blue
carbon dioxide (CO_2)	turns limewater milky
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	'pops' with a lighted splint
oxygen (O_2)	relights a glowing splint
sulfur dioxide (SO_2)	turns acidifed aqueous potassium manganate(VII) from purple to colourless

Flame tests for metal ions

metal ion	flame colour
lithium (Li^+)	red
sodium (Na^+)	yellow
potassium (K^+)	lilac
copper(II) (Cu^{2+})	blue-green