Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | CANDIDATE NUMBER

2819778805

PHYSICAL SCIENCE **0652/51**

Paper 5 Practical Test **October/November 2018**

1 hour 30 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.
Notes for Use in Qualitative Analysis for this paper are printed on page 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	
1	
2	
Total	

This document consists of **9** printed pages and **3** blank pages.

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1 Notes for use in Qualitative Analysis for this question are printed on page 12.

Solid **H** is a mixture of two substances, element **J** and compound **K**.

Compound **K** is soluble in water whereas element **J** is not soluble in water.

You are going to separate the mixture and identify the two substances.

(a) separating the mixture

- Place the solid **H** in a beaker and add 20 cm^3 of distilled water.
- Stir well for 30 seconds.
- Filter the mixture into a large test-tube.
- Keep the filtrate and residue for testing in **(b)** and **(c)**.

(i) Draw and label the apparatus you have used to filter the mixture.

[2]

(ii) Describe the appearance of the filtrate and residue.

filtrate ....

residue ....
[1]

(b) testing the liquid

- Place 1 cm depth of the liquid from **(a)** in another large test-tube.
- Slowly add sodium hydroxide solution until there is no further change.

(i) Record your observations and any conclusion you can make about the soluble compound **K**.

observations ....

....

....

conclusion ....
[3]

(ii) On the answer lines below, plan which **three** tests you need to carry out to determine whether the liquid contains the carbonate, chloride or sulfate anion.

You also need to plan the order in which you will carry out these tests.

The following reagents are available:

barium nitrate solution,
dilute nitric acid,
silver nitrate solution.

For each test, state the observation which would confirm the presence of the anion.

first test ....

....

anion tested for ....

observation for a positive result ....

....

second test ....

....

anion tested for ....

observation for a positive result ....

....

third test ....

....

anion tested for ....

observation for a positive result ....

....
[3]

(iii) Carry out your plan in **(b)(ii)**.

Record the reagent, observation and conclusion for the test which identifies the anion.

reagent ....

observation ....

anion present in filtrate ....
[1]

(c) **testing the solid**

- Scrape the solid from the filter paper in **(a)** into a test-tube.
- Add dilute hydrochloric acid until the test-tube is half-full.
- **Loosely** hold a bung in the test-tube.
- After 3 minutes take the bung away from the test-tube and test the gas produced with a lighted splint.

(i) Record the test result and the colour of the liquid.

test result ....

colour of liquid ....
[2]

(ii) Name the gas produced in this test.

gas ....[1]

(iii) Use your answers to **(c)(i)** and **(c)(ii)** to deduce the type of element which is in the solid from **(a)**.

type of element ....[1]

(iv) Suggest one test which could be carried out on the solution produced in the test-tube to identify the element **J**.

You should **not** carry out this test.

test ....[1]

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2 You are going to investigate the resistance and the power output of two lamps, **L** and **M**, connected in series and in parallel.

The circuit shown in Fig. 2.1 has been set up for you. The lamps are connected in series.

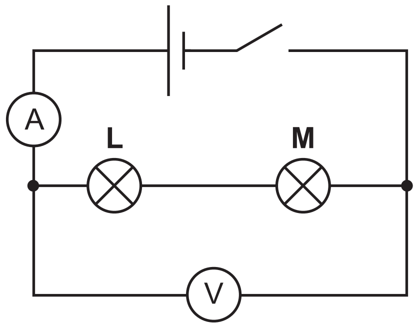

Fig. 2.1

(a)
- Close the switch.
- Measure the current I flowing through lamps **L** and **M**.
- Measure the potential difference V across the lamps.

Record your readings in Table 2.1.

- Open the switch. [2]

Table 2.1

	I / A	V / V	resistance R_S / Ω	power P_S / W
lamps L and M in series				

(b) State why it is important to open the switch after taking readings.

....[1]

(c) (i) Calculate the combined resistance R_S of lamps **L** and **M** when connected in series. Use the equation shown.

$$R = \frac{V}{I}$$

Record your answer in Table 2.1. [1]

(ii) Calculate the combined power output P_S of lamps **L** and **M** when connected in series. Use the equation shown.

$$P = V \times I$$

Record your answer in Table 2.1. [1]

(d) Rearrange the circuit and set it up as shown in Fig. 2.2.

Lamps **L** and **M** are now connected in parallel with the power supply.

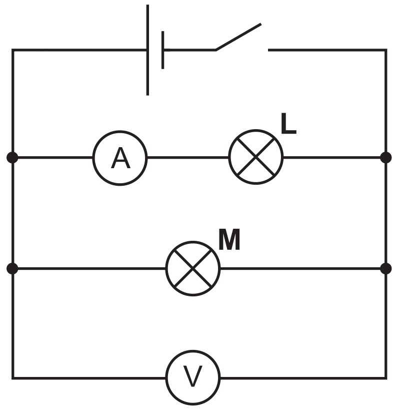

Fig. 2.2

(i)
- Close the switch.
- Measure the current I flowing through lamp **L**.
- Measure the potential difference V across lamp **L**.

Record your readings in Table 2.2.

- Open the switch. [1]

Table 2.2

	I / A	V / V	resistance R / Ω	power P / W
lamp L in parallel				
lamp M in parallel				

(ii) • Disconnect the ammeter from the circuit shown in Fig. 2.2.

• Reconnect the ammeter so that it is now in series with lamp **M** as shown in Fig 2.3.

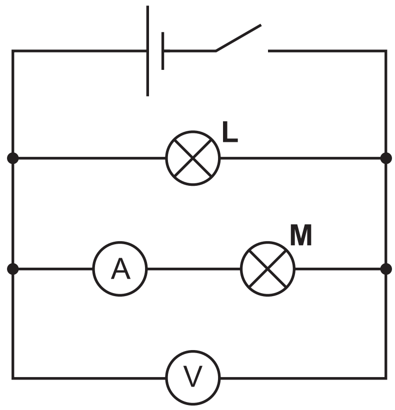

Fig. 2.3

• Close the switch.

• Measure the current I flowing through lamp **M**.

• Measure the potential difference V across lamp **M**.

Record your readings in Table 2.2.

• Open the switch. [2]

(e) **(i)** Calculate the resistance of each lamp. Use the equation shown.

$$R = \frac{V}{I}$$

Record your answers in Table 2.2. [1]

(ii) Calculate R_P, the **sum** of the resistances of lamps **L** and **M**.

R_P = ... Ω [2]

(f) **(i)** Calculate the power output of each lamp. Use the equation shown.

$$P = V \times I$$

Record your answers in Table 2.2. [1]

(ii) Calculate the total power output, P_P, of lamps **L** and **M** in parallel.

P_P = ... W [1]

(g) A student says that the combined resistance R_S of the lamps in the series circuit should be equal to the sum of the resistances R_P in the parallel circuit.

State whether your values of R_S and R_P from **(c)(i)** and **(e)(ii)** support the suggestion made by the student. Justify your statement by referring to the values you have calculated.

....

....

....[1]

(h) The power output P_S of the lamps connected in series is less than the power output P_P of the lamps connected in parallel.

Without referring to your results, state **one** observation you made while carrying out the experiment that supports the conclusion that P_S is less than P_P.

....

....

....[1]

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NOTES FOR USE IN QUALITATIVE ANALYSIS

Tests 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.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide, then aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify with dilute nitric acid, then add aqueous barium nitrate	white ppt.

Tests for aqueous cations

cation	*effect of aqueous sodium hydroxide*	*effect of aqueous ammonia*
ammonium (NH_4^+)	ammonia produced on warming	–
copper(II) (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

Tests for gases

gas	*test and test result*
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