



EXAMINATIONS COUNCIL OF ESWATINI
Eswatini General Certificate of Secondary Education

CANDIDATE
NAME

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CENTRE
NUMBER

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NUMBER

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PHYSICAL SCIENCE

6888/04

Paper 4 (Alternative to Practical)

October/November 2020

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 the spaces provided.

Write in dark blue or black pen.

You may use a HB pencil for any diagrams, graphs, tables or rough workings.

Do **not** use staples, paper clips, highlighters, glue or correction fluid.

Do **not** write on the barcode.

Answer **all** questions.

You may use an electronic calculator.

You may lose marks if you do not show your working or if you do not use the appropriate units.

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.

- 1 (a) A student is provided with two solutions: magnesium chloride and sodium carbonate in two different beakers.

He pours about 2cm^3 of magnesium chloride solution into test-tube **A** and uses a thermometer to measure the temperature of the magnesium chloride solution.

He then pours about 2cm^3 of sodium carbonate solution into test-tube **B** and uses the thermometer to measure the temperature of the sodium carbonate solution.

The temperature in both test-tubes **A** and **B** is 25°C .

The student then adds the contents of test-tube **A** into test-tube **B** to mix the two solutions.

He then measures the temperature of the mixture at 30 second intervals for 2 minutes using a thermometer.

Table 1.1. shows the temperatures T_1 , T_2 , T_3 and T_4 that were recorded.

Table 1.1

time/s	temperature/ $^\circ\text{C}$
30	$T_1 = 24.5$
60	$T_2 = 22.5$
90	$T_3 = 22.1$
120	$T_4 = 22.0$

- (i) Describe the relationship between the time and the temperature in Table 1.1.

.....
 [1]

- (ii) State the type of reaction that is taking place between magnesium chloride and sodium carbonate solutions.

Give a reason for your answer in terms of energy changes.

type of reaction
 reason
 [2]

- (iii) Describe an observation that shows that the reaction of magnesium chloride with sodium carbonate is an example of a chemical change.

..... [1]

- (iv) State **one** precaution you should take to ensure that an accurate reading is taken using a thermometer.

..... [1]

(b) The student then reacts dilute sulfuric acid with excess sodium hydroxide solution.

The temperature of the solution formed is measured at 30 second intervals.

Table 1.2 shows the results of this reaction.

Table 1.2

time/s	temperature/°C
0	25
30	28
60	30
90	31.5
120	32.5
150	33
180	33

(i) Plot these results in Fig. 1.1.

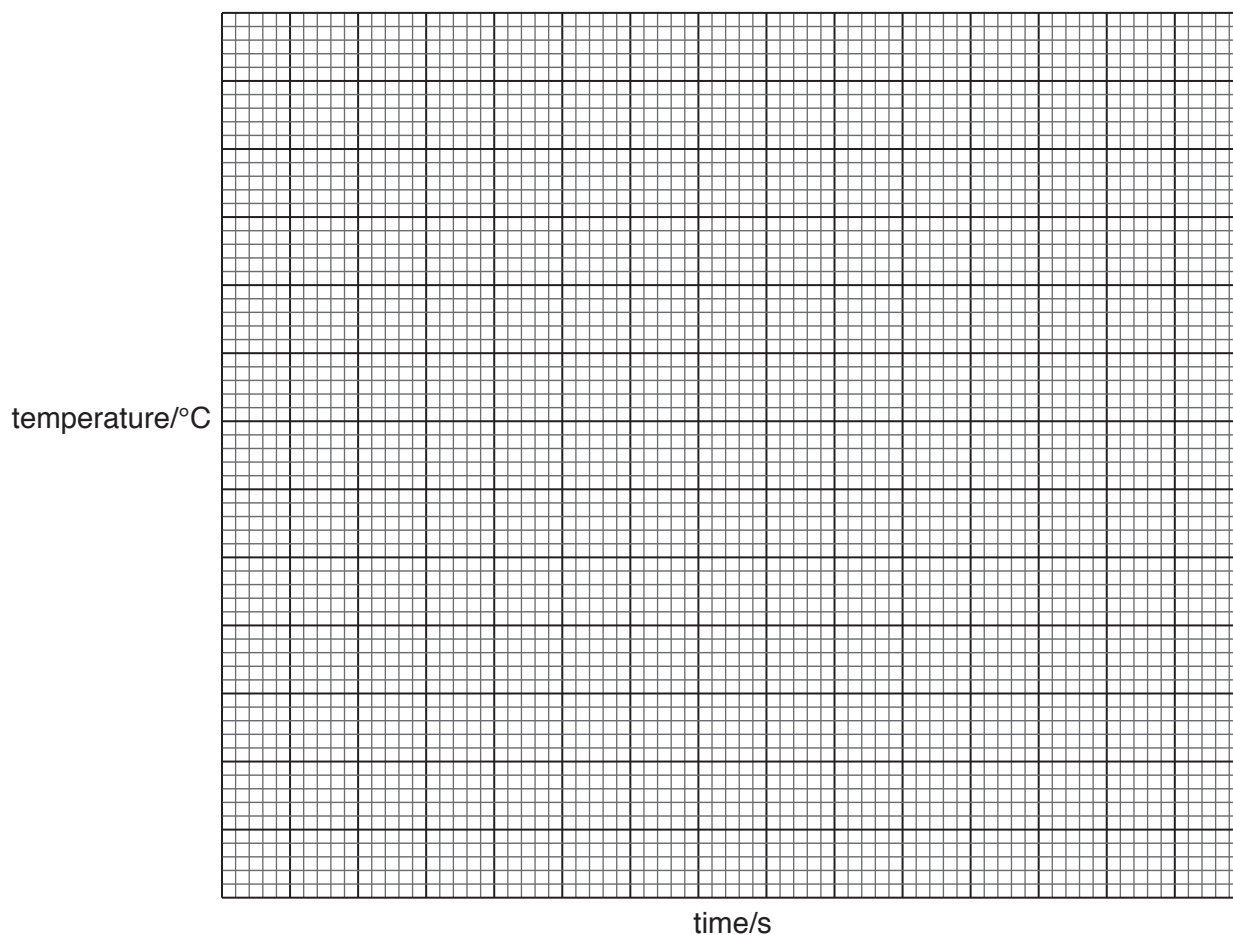


Fig. 1.1

[3]

- (ii) Suggest the value of the temperature after four minutes (240 seconds) and give a reason for your answer.

value

reason

..... [2]

- (c) The student then places about 2 cm^3 of sodium carbonate solution in a test-tube **C**.

He adds about 2 cm^3 of dilute sulfuric acid into the test-tube and closes with a stopper fitted with a delivery tube.

He then immerses the delivery tube in limewater solution shown in Fig. 1.2.

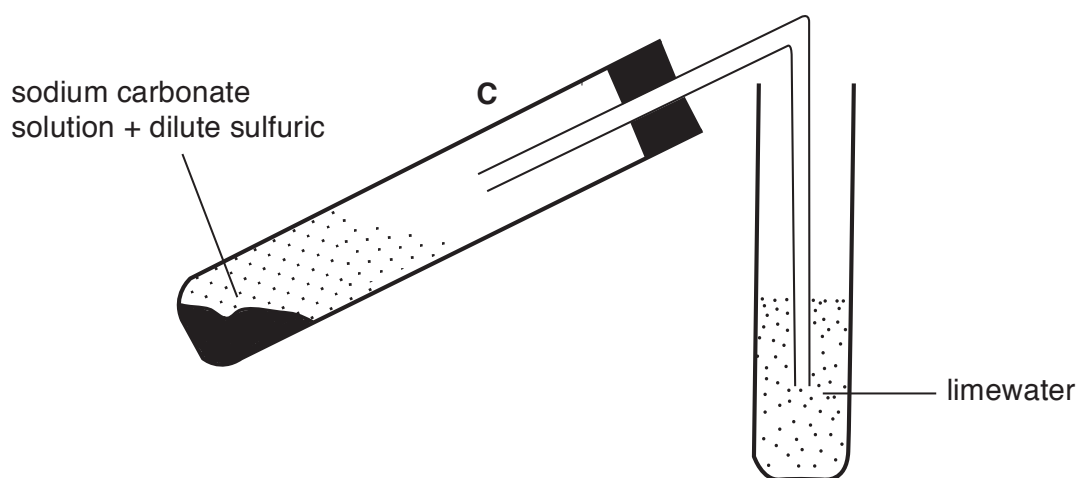


Fig. 1.2

- (i) Record the observations made in test-tube **C** and limewater solution.

test-tube **C**

limewater [2]

- (ii) Identify the product of the reaction in test-tube **C** responsible for the observation made in the limewater solution.

..... [1]

- (iii) Suggest how the rate of this reaction can be increased.

..... [1]

- (d) The student then places 5 cm^3 of magnesium chloride solution into a test-tube and adds 2 cm^3 of aqueous silver nitrate into the test-tube.

A precipitate is formed.

- (i) State the colour of the precipitate.

..... [1]

- (ii) Describe how the student can obtain a pure salt of the precipitate from the mixture.

.....
.....
.....
..... [3]

- (iii) Explain why aqueous silver nitrate should not be exposed to light.

.....
.....
..... [2]

- 2 A student conducts an experiment to determine the volume of the material making a drinking glass.

- (a) She uses two blocks of wood and a ruler to measure the external diameter, d , of the drinking glass, as shown in Fig. 2.1.

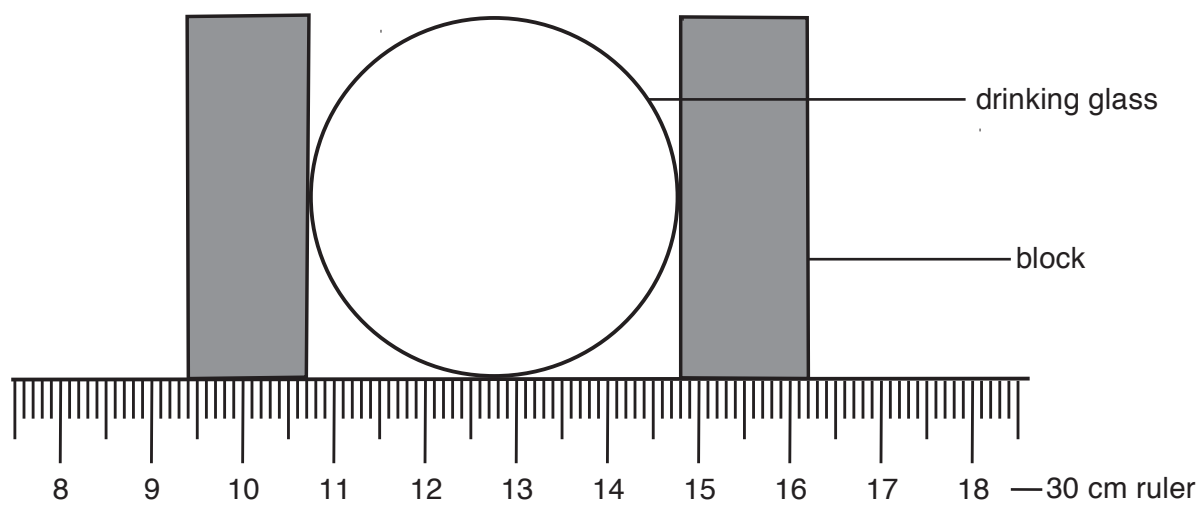


Fig. 2.1

Determine the diameter of the drinking glass.

Show your working.

$d = \dots\dots\dots$ cm [2]

- (b) Calculate the external radius, r , of the drinking glass.

$$(r = \frac{d}{2})$$

$r = \dots\dots\dots$ cm [1]

- (c) She measures the height, h , of the drinking glass as shown in Fig. 2.2.

Read and record the height of the drinking glass.

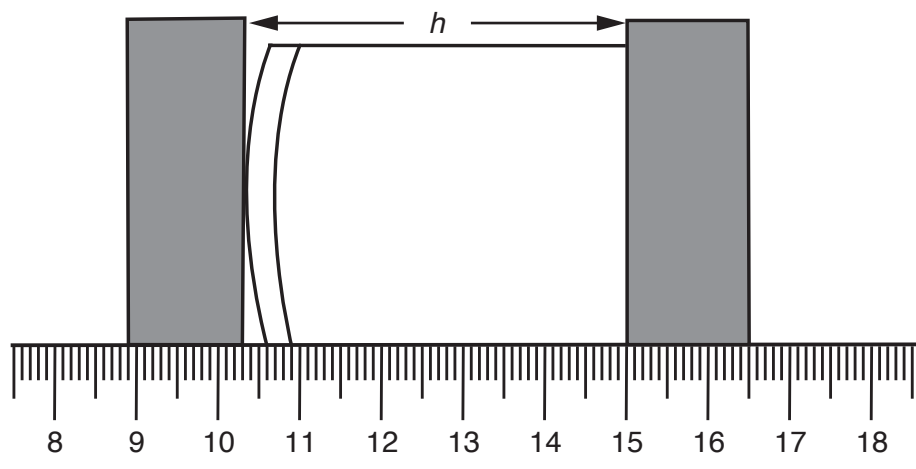


Fig. 2.2

$h = \dots\dots\dots$ cm [1]

- (d) Calculate the external volume, V_1 , of the drinking glass using the equation $V_1 = \pi r^2 h$.

$V_1 = \dots\dots\dots$ cm³ [2]

- (e) (i) She fills up the drinking glass with water.

She pours the water in the measuring cylinder as shown in Fig. 2.3.

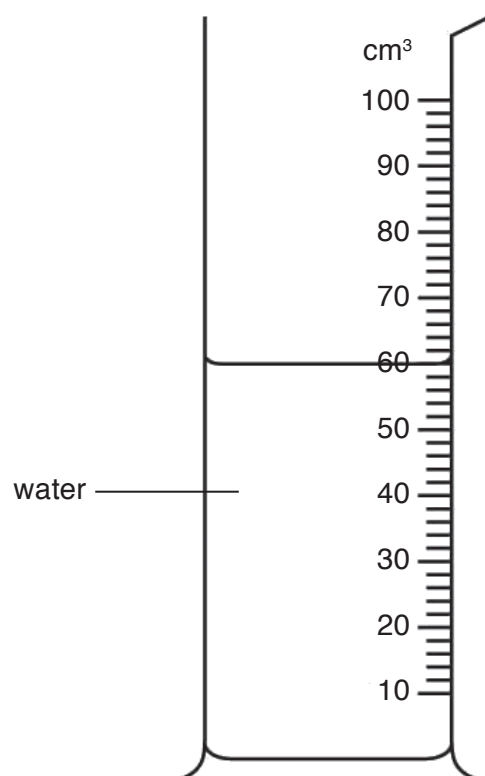


Fig. 2.3

Read and record the volume of the water.

$$V_2 = \dots\dots\dots \text{cm}^3 \text{ [1]}$$

- (ii) State **one** precaution that she takes when reading the volume of the water in the measuring cylinder.

.....
 [1]

- (f) Calculate the approximate volume, V , of the glass material used to make the drinking glass.

Show your working.

$$V = \dots\dots\dots \text{cm}^3 \text{ [2]}$$

- (g)** She then uses the displacement can method to determine the volume of the material that makes the drinking glass.

She finds the volume to be 0.4 cm^3 less than the volume in **(f)**.

- (i)** Describe how she uses the displacement method to determine the volume of the material that makes the drinking glass.

.....

.....

.....

..... [3]

- (ii)** Explain why the volume of the glass in **(f)** is more than the volume in **g(i)**.

.....

..... [1]

- (h)** Calculate the mean of the two values for V in **(f)** and **(g)(i)**.

mean volume = cm^3 [3]

- (i)** Describe how you would measure the mass of the water in the glass in **(e)(i)**.

.....

.....

.....

..... [3]

