EXAMINATIONS COUNCIL OF SWAZILAND
Swaziland General Certificate of Secondary Education

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**PHYSICAL SCIENCE** **6888/03**

Paper 3 Practical Test **October/November 2018**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

Additional Materials: As listed in 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, graphs, tables or rough working.
Do **not** use staples, paper clips, highlighters, glue or correction fluid.
Do **not** write on any barcodes.

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 appropriate units.
The number of marks is given in brackets [ ] at the end of each question or part question.
Chemistry practical notes for this paper are printed on page 8.

| For Examiner's Use | |
|---|---|
| 1 | |
| 2 | |
| Total | |

This document consists of **8** printed pages.



**[Turn over**

**1** You are provided with a white mixture of two solids.

One solid is soluble in water while the other one is insoluble.

Add about 10 $cm^3$ of water to the mixture and stir for a few minutes.

**(a)** Separate the insoluble solid from the solution using the apparatus provided.

State the method you used to separate the insoluble solid from the solution.

..... [1]

***Do not discard any of the substances.***

**(b)** Place about 5 $cm^3$ of the solution from **(a)** in a test-tube.

Acidify with dilute nitric acid and add about 4 drops of silver nitrate solution.

Allow the solution to stand for about two minutes.

**(i)** State your observation.

.....

..... [2]

**(ii)** Identify the anion that is present in the solution.

..... [1]

**(c)** Pour about 2 $cm^3$ of the solution from **(b)** into a clean test-tube.

Add about 1 $cm^3$ of aqueous sodium hydroxide into the test-tube.

Put a small strip of aluminium foil into the test-tube.

Gently heat the solution while holding a damp strip of Universal indicator paper at the mouth of the test-tube.

**(i)** State your observation on the indicator paper.

..... [1]

**(ii)** Determine the pH value of the gas that is formed.

..... [1]

**(iii)** Describe how you determined the value of the pH from the Universal indicator paper.

.....

.....

..... [2]

**(iv)** Identify the gas formed.

..... [1]

**(v)** Explain why it is better to use a Universal indicator paper than a litmus paper for testing the pH of the gas.

.....

..... [2]

**(vi)** Explain why a clean test-tube is used in the experiment.

.....

..... [1]

**(d)** Take the white solid from **(a)** and put it in a test-tube.

Add about 5 $cm^3$ of hydrochloric acid to the solid.

**(i)** State and explain your observation.

observation.....

explanation.....

..... [2]

**(ii)** State how you can make the reaction in **(d) (i)** faster.

..... [1]

**(iii)** State **one** precaution you could take when handling the hydrochloric acid.

..... [1]

**(e)** Place about 2 $cm^3$ of the solution formed in **(d)** in a test-tube.

Add about 4 drops of aqueous sodium hydroxide.

**(i)** Record your observations.

..... [1]

**(ii)** Add an excess of aqueous sodium hydroxide and record your observation.

..... [1]

**(iii)** Identify the cation present in the solution.

..... [1]

**(f)** Suggest the name of the white solid in **(d)**.

..... [1]





**[Turn over**

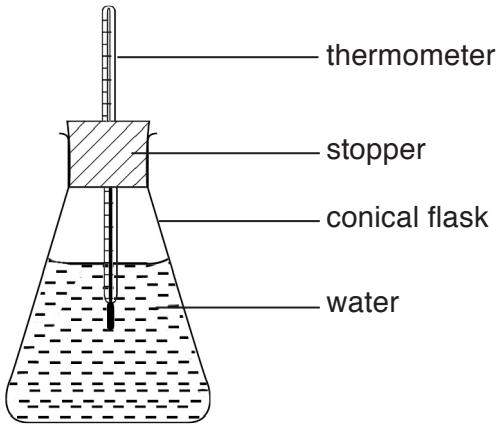
**2** In this experiment, you will compare the rate of cooling of water in two conical flasks.

Conical flask **A** is not insulated and conical flask **B** is insulated.

**(a)** Pour about 200 $cm^3$ of hot water into conical flask **A**.

Close the conical flask with a stopper fitted with a thermometer.

Fig. 2.1 shows the set up for the experiment.




conical flask **A**

**Fig. 2.1**

**(i)** Measure the initial temperature of the hot water in conical flask **A** for time, t = 0 s.

Record the reading in Table 2.1. [1]

Start the stopwatch immediately after recording.

***Do not stop the stopwatch.***

**(ii)** Read the temperature of the water in conical flask **A** after time, t = 60, 120, 180, 240 and 300 seconds.

Record the readings in Table 2.1.

**Table 2.1**

| conical flask **A** | |
|---|---|
| time/s | temperature/..... |
| 0 | |
| 60 | |
| 120 | |
| 180 | |
| 240 | |
| 300 | |

[3]

**(b)** Pour about 200 $cm^3$ of hot water into conical flask **B**.

Close the flask with a stopper fitted with a thermometer.

Fig. 2.2 shows the set up for the experiment.

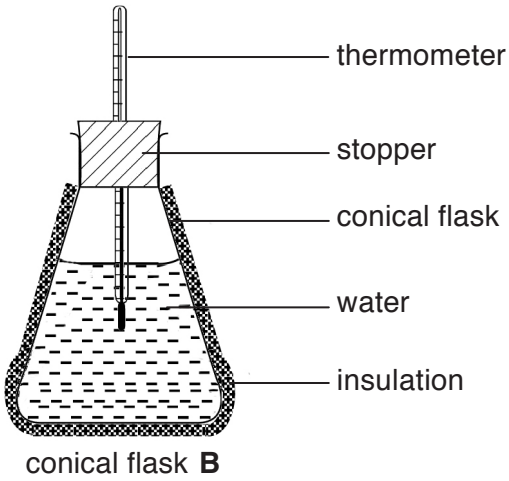



**Fig. 2.2**

**(i)** Measure the initial temperature of the water in conical flask **B** at time, t = 0 s.

Record the reading in Table 2.2.

Start the stopwatch immediately after recording.

**Do not stop the stopwatch.**

**(ii)** Read the temperature of the water in conical flask **B** after time, t = 60, 120, 180, 240 and 300 seconds. [1]

Record the readings in Table 2.2.

**Table 2.2**

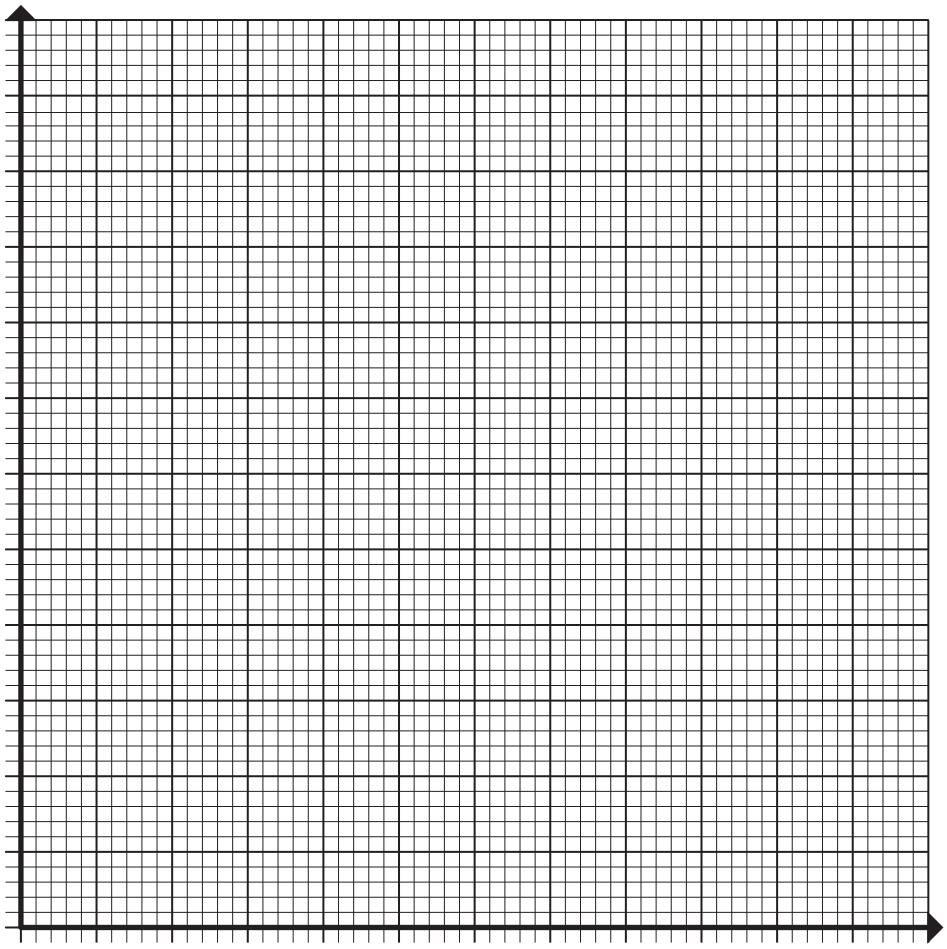
| conical flask **B** | |
|---|---|
| time/s | temperature/..... |
| 0 | |
| 60 | |
| 120 | |
| 180 | |
| 240 | |
| 300 | |

[1]

**(c)** Complete the column headings in Tables 2.1 and 2.2 by stating the unit of temperature. [1]

**(d)** **(i)** Plot on the grid below, using your data from Table 2.1, a graph of temperature against time for flask **A**.

Draw and label the line of best fit.




[3]

**Fig. 2.3**

**(ii)** Plot, on the same grid, your data from Table 2.2 for flask **B**.

Draw and label the line of best fit. [2]

**(e)** Calculate the gradient of

**(i)** graph **A**

..... [2]

**(ii)** graph **B**

..... [1]

**(f)** State and explain, using your values in **(e)**, which conical flask has a lower cooling rate.

.....

.....

..... [1]

**(g)** State the effect of insulating flask **B**.

..... [1]

**(h)** **(i)** Explain, using your graph in **(d)**, why the cooling rate of water can be said to be linear in the given time interval.

.....

.....

..... [2]

**(ii)** State **two** conditions that are kept constant in order to get reliable results in this experiment.

1 .....

2 ..... [2]





**[Turn over**

# CHEMISTRY PRACTICAL NOTES

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

## Test 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 |

## Test for gases

| *gas* | *test and 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 |