EXAMINATIONS COUNCIL OF ESWATINI
Eswatini General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

PHYSICAL SCIENCE **6888/03**

Paper 3 Practical Test **October/November 2019**

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 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.
Chemistry practical notes for this paper are printed on page 12.

For Examiner's Use	
1	
2	
Total	

This document consists of **12** printed pages.

[Turn over

1 Caution: Wear goggles when heating and carrying out these experiments

You are provided with strips of two metals, **R** and **S** and iron nails.

(a) Describe the physical appearance of metals **R** and **S**.

R .....

S ..... [2]

(b) You will determine the order of reactivity of the metals **R**, **S** and iron.

(i) Add about 5 cm^3 of copper(II) sulfate solution into two test-tubes.

Label the test-tubes **A** and **B**.

Add a strip of metal **R** into test-tube **A** and an iron nail into test-tube **B**.

Allow the test-tubes to stand for about 3 minutes.

Record your observations.

metal **R** .....

iron nail ..... [2]

(ii) Add about 2 cm^3 of dilute hydrochloric acid into each of three test-tubes.

Label the test-tubes **C**, **D** and **E**.

Add a strip of **R** into test-tube **C**, a strip of **S** into test-tube **D** and an iron nail into test-tube **E**.

Record your observations in Table 1.1.

Table 1.1

metal	observation
metal **R**	
metal **S**	
iron nail	

[3]

(iii) Arrange the **three** metals in their order of reactivity, starting with the most reactive.

most reactive .....

least reactive ..... [2]

[Turn over

(c) (i) You will determine the type of oxide that is produced by metal **R**.

Hold a strip of metal **R** with forceps and carefully ignite it using a Bunsen burner flame and collect the product as shown in Fig. 1.1.

Caution: Avoid looking directly at burning metal R.

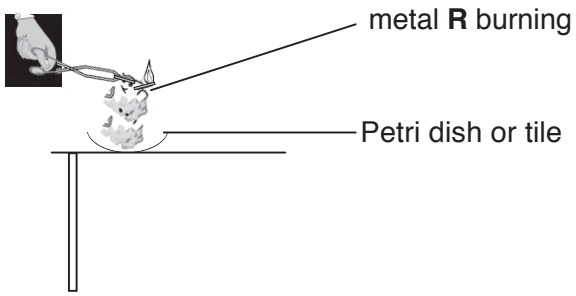

Fig. 1.1

Record your observations.

1 .....

2 ..... [2]

(ii) Pour about 3 cm^3 of water into a clean test-tube labelled **F**.

Add the substance formed in **(c) (i)** into test-tube **F** and gently shake.

The resulting solution is solution **F**.

[Keep this solution for later use]

Use a dropping pipette to remove a few drops of solution **F**.

Test the pH of these few drops of solution **F**. Give a conclusion from the results.

pH value .....

conclusion ..... [2]

(iii) Describe how you tested the pH of solution **F**.

.....

.....

..... [2]

(d) Add about 1 cm^3 of solution **F** into another test-tube, labelled **G**.

Add about 1 cm^3 of dilute hydrochloric acid into test-tube **G**. The resulting solution is **G.**

Place about 1 cm^3 of solution **G** into a crucible and heat it to dryness using a Bunsen burner flame.

(i) Record the colour of the substance formed on the walls of the crucible.

..... [1]

(ii) Name the type of reaction that has taken place.

..... [1]

(e) Place the remaining 1 cm^3 of solution **G** into another test-tube, **H**.

Add a few drops of aqueous sodium hydroxide.

(i) Record your observations.

..... [1]

(ii) If the reaction had been carried out on a larger scale in a school laboratory, draw the apparatus that you can use to separate the substance formed.

[2]

(f) State **one** precaution to be taken when handling acids.

.....

..... [1]

2 In this experiment you will investigate some factors that affect the strength of an electromagnet.

Fig. 2.1 shows the apparatus that has been set-up for you.

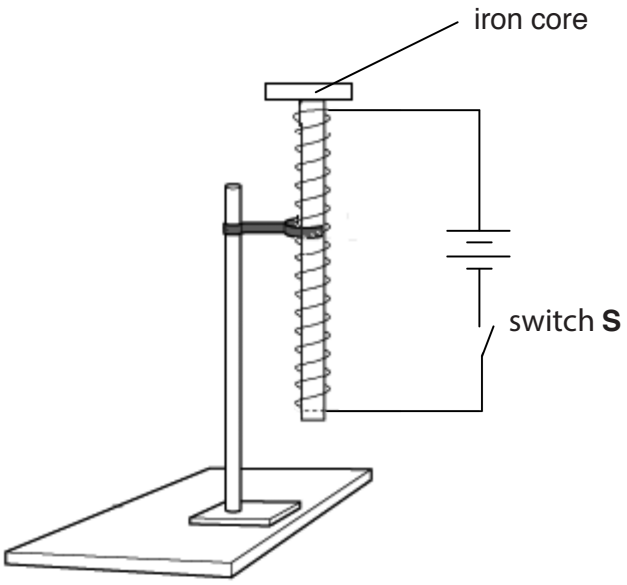

Fig. 2.1

(a) (i) Close the switch, **S**.

Attach one paper clip to one end of the electromagnet.

Bring a permanent magnet with its North Pole closer to the end of the paper clip, but not touching, as shown in Fig. 2.2.

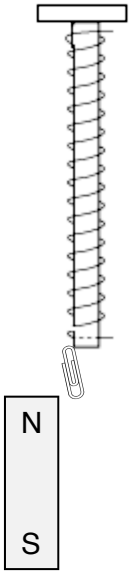

Fig. 2.2

State your observation.

.....

..... [1]

[Turn over

(ii) Now bring the South Pole of the magnet closer to the end of the paper clip, but not touching, as shown in Fig. 2.3.

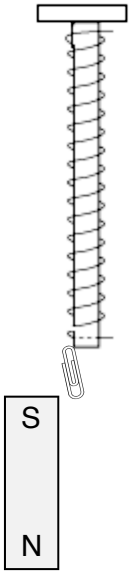

Fig. 2.3

State your observation.

.....

..... [1]

Switch off the circuit.

(iii) Deduce the polarity of the end of the electromagnet.

.....

.....

..... [2]

(b) Switch on the circuit.

(i) Attach one paper clip onto one end of the electromagnet.

Bring another paper clip to one end of the first paper clip such that it touches it as shown in Fig. 2.4.

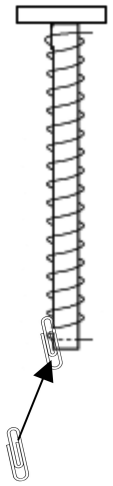

Fig. 2.4

Record and explain your observation.

observation .....

explanation .....

..... [3]

(ii) Keep adding paper clips.

Record and explain your observations.

observation .....

.....

explanation .....

.....

..... [2]

(iii) Open switch, **S**.

State and explain your observations.

observation .....

.....

explanation .....

.....

..... [2]

(c) Keep the number of turns at 30.

Add one more cell in the circuit.

Repeat the procedure in **(b) (i)** and **(b) (ii)**.

State and explain the effect of increasing the number of cells.

.....

.....

..... [2]

(d) Keep the number of cells the same.

Replace the coil with a coil with 60 turns.

Close switch, **S**.

Repeat the procedure in **(b) (i)** and **(b) (ii)**.

Compare your results with those in **(c)**.

Explain your answer.

comparison .....

explanation .....

..... [2]

(e) Suggest **one** way of improving the accuracy of this experiment.

.....

..... [1]

(f) Fig. 2.5 shows an electromagnet.

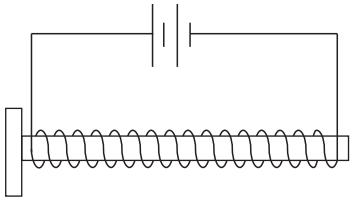

Fig. 2.5

Design an experiment to show the magnetic field lines of the electromagnet.

.....

.....

.....

..... [3]

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]	acidif, then add aqueous barium chloride *or* 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 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