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 2022**

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 in the spaces provided.
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 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 appropriate units.
Chemistry practical notes for this paper are printed on page 8.

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 **8** printed pages and **4** blank pages.

1 You are going to investigate properties of liquids **A**, **B** and **C**.

You are given the three liquids in beakers labelled **A**, **B** and **C**.

(a) Place a spatula-full of anhydrous copper(II) sulfate powder in each of three petri-dishes labelled **1**, **2** and **3**.

(i) Add two or three drops of liquid **A**, using a dropper, on the copper(II) sulfate powder in petri-dish **1**. Record your results.

.... [1]

(ii) Add two or three drops of liquid **B**, using a dropper, on the copper(II) sulfate powder in petri-dish **2**. Record your results.

.... [1]

(iii) Add two or three drops of liquid **C**, using a dropper, on the copper(II) sulfate powder in petri-dish **3**. Record your results.

.... [1]

(iv) State your conclusion about the presence or absence of water in each of the three liquids **A, B** and **C**.

A ....

B ....

C ....
[1]

(b) Describe an experiment that could be carried out to test if liquid **A** is a pure substance. (You may use a diagram to help you).

....

....

....

.... [3]

(c) Using a measuring cylinder, pour 50 cm^3 of liquid **A** into a beaker. Label it **A**.

Using a measuring cylinder, pour 50 cm^3 of liquid **B** into another 250 cm^3 beaker. Label it **B**.

Then, pour using a measuring cylinder 50 cm^3 of liquid **C** into a third test-tube. Label it **C**.

(i) Add a spatula-full of washing powder into each of the three test-tubes.

Stir each test-tube using different stirring rods for about a minute.

Record your observations in the second column of Table 1.1 with the heading "addition of washing powder". [2]

Table 1.1

liquid	observations		
	addition of washing powder	after heating	after heating and addition of washing soda
A			
B			
C			

(ii) The volume of the liquids is the same in all the beakers.
Suggest another variable that must be kept constant as the investigation proceeds.

.... [1]

(d) Add 50 cm^3 of liquids **A, B** and **C**, into separate, clean test-tubes.

(i) Heat test-tube **A** with a strong flame for about 2 minutes, ensuring that the liquid starts to boil.

Cool the beaker in a cold water bath for about 2 minutes.

Then add a spatula-full of the washing powder and stir for about 3 minutes.

Record your observation in the third column of Table 1.1 with the heading "after heating".

(ii) Heat beaker **B** with a strong flame for about 4 minutes.

Cool the beaker in a cold water bath for about 2 minutes. Then decant the clear liquid onto a clean beaker.

Add a spatula-full of washing powder and stir for about 3 minutes.

Record your observations in the third column of Table 1.1 with the heading "after heating".

Repeat the same procedure for liquid **C**. [2]

(e) Add 50 cm^3 of liquids **A, B** and **C**, into separate, clean test-tubes.

(i) Add a spatula-full of washing soda to test-tube **A**.

Stir the mixture for about a minute.

Add a spatula-full of washing powder to the mixture and stir.

Record your observation in the fourth column of Table 1.1 with the heading "after adding washing soda".

(ii) add a spatula-full of washing soda to beaker **B**.

Stir the mixture for about a minute.

Decant the clear liquid into a clean beaker.

Then add a spatula-full of washing powder to the clear liquid and stir.

Record your observations in the fourth column of Table 1.1 with the heading "after adding washing soda".

Repeat the procedure for liquid **C**. [2]

(f) Suggest the name of the anion that causes the observations in liquid **B**.

.... [1]

(g) Suggest the name of the cation that causes the changes that are observed in liquid **C**.

.... [1]

(h) Suggest a reason for using different stirring rods in the three test-tubes.

....

.... [1]

(i) Determine the pH of the washing powder using the Universal Indicator solution.

Colour of indicator after added to washing powder.

.... [1]

pH value ....

conclusion .... [3]

For Examiner's Use

2 In this experiment you will determine the density of glass using a glass block.

The apparatus is set up for you as shown in Fig. 2.1.

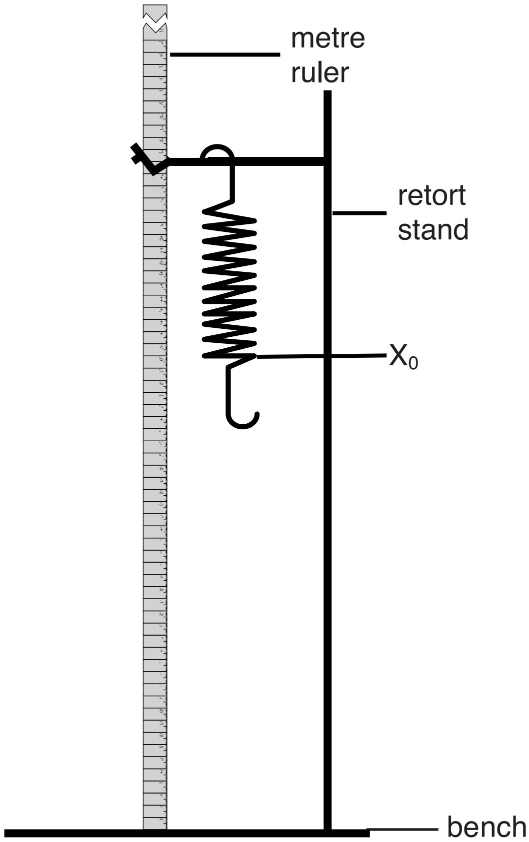

Fig. 2.1

(a) (i) Read and record the position of the bottom of the spring, X_0, on the metre rule on **your** set-up.

X_0 .... [2]

(ii) Hang the glass block vertically on the spring.

Read and record the new position of the bottom of the spring, X_1.

X_1 .... [1]

Do not remove the glass block from the spring.

(iii) Calculate the extension, e_1, on the spring using the equation,

$$e_1 = X_1 - X_0$$

e_1 .... [2]

(b) Attach the block to the spring using the string as shown in Fig. 2.2.

Gently raise beaker **A** with 200 ml water under the glass block until the block is totally submerged as shown in Fig. 2.2.

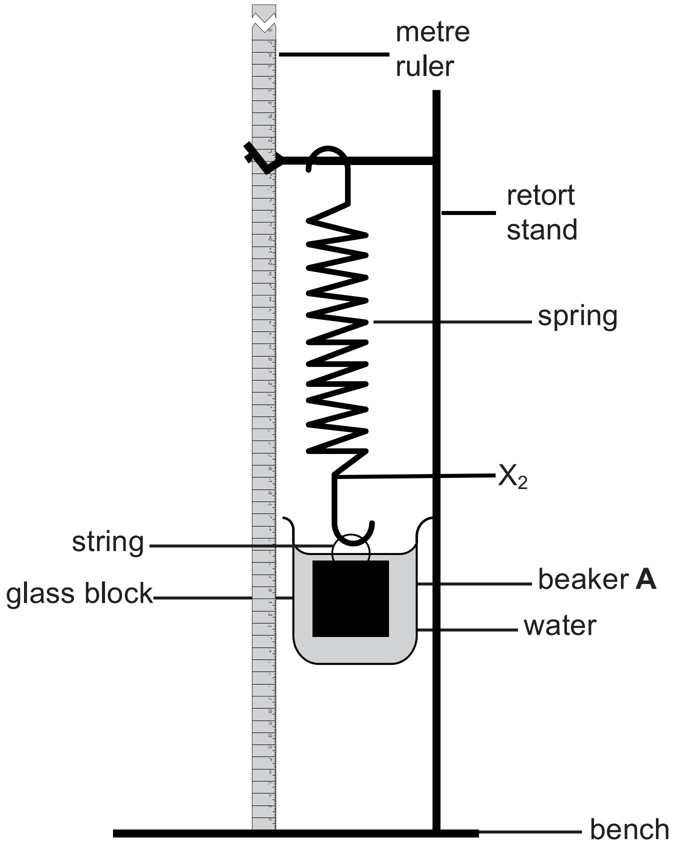

Fig. 2.2

(i) Read and record the new position of the bottom of the spring, X_2 on **your** set-up.

X_2 .... [1]

(ii) Calculate the extension, e_2, on the spring using the equation

$$e_2 = X_2 - X_0$$

e_2 .... [2]

(c) Calculate the density, ρ, of the material that makes up the glass block using the formula shown.

Density of water (ρ_w) = 1.00 g / cm^3

$$\rho = \frac{e_1 p_w}{(e_1 - e_2)}$$

ρ = ... [3]

(d) **(i)** Describe how you avoided parallax error when taking the reading from the metre rule.

.... [1]

(ii) State any other precaution you took before taking the readings.

.... [1]

(e) The glass block is replaced with another glass block of the same material and mass, but is thinner and longer.

This block is not completely submerged in the water.

State and explain whether,

(i) the value calculated for e_2 would be greater, smaller or equal to that obtained in **(b)(ii)**,

value of e_2 ....

explanation ....

.... [2]

(ii) the value calculated for density, ρ, would be greater, smaller or equal to that calculated in **(c)**.

value of density ....

explanation ....

.... [2]

(f) Replace beaker **A** with beaker **B** in Fig. 2.2.

(i) Gently raise beaker **B** under the glass block until the block is totally submerged.

Read and record the reading on the metre rule.

.... [1]

(ii) Explain why the reading in **(f)(i)** is different from the reading in **(b)(i)**.

....

....

.... [2]

For Examiner's Use

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 aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify, 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 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

BLANK PAGE

BLANK PAGE

BLANK PAGE

BLANK PAGE

