

1. Name \_\_\_\_\_ Index No. \_\_\_\_\_

Candidate's Signature \_\_\_\_\_

Date \_\_\_\_\_

**CHEMISTRY PRACTICAL  
PAPER 3**

**END OF YEAR 2017 EXAMINATION**

**TIME: 2 ¼ HOURS**

**INSTRUCTIONS TO CANDIDATES**

- Answer ALL questions in the spaces provided.
- Mathematical tables and electronic calculators may be used
- All working MUST be clearly shown where necessary.

**FOR EXAMINER'S USE ONLY**

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	12	
2	10	
3	18	

*This paper consists of 7 printed pages*

**Turn Over**

1. You are provided with the following:

- Solution A which contains 10g of NaOH in 500cm<sup>3</sup> of solution.
- Solution C which is 0.25M H<sub>2</sub>SO<sub>4</sub>.

You are required to dilute solution A and use it to standardize solution C.

### **Procedure**

- Fill the burette with solution C
- Pipette and transfer 25cm<sup>3</sup> of solution A into a 250cm<sup>3</sup> volumetric flask.
- Add distilled water up to the mark and label as solution B
- Rinse the pipette and use it to transfer 25cm<sup>3</sup> of solution B to a clean conical flask and add few drops of phenolphthalein indicator
- Titrate the solution B against solution C. Record your results in the table below. Repeat the experiment twice and complete the table.

	1	2	3
Final burette reading (cm <sup>3</sup> )			
Initial burette reading (cm <sup>3</sup> )			
Volume of solution R used (cm <sup>3</sup> )			

(4marks)

- (a) Calculate the average volume of solution C used. (1mark)

- (b) Determine the molarity of solution B. (1mark)  
( Na = 23, O = 16, H = 1)

- (c) Find the number of moles of NaOH in solution B that neutralized the acid. (1marks)

- (d) How many moles of the acid were used (2marks)

- (e) Determine the concentration of the acid

(i) In moles per litre.

(2marks)

(ii) In grams per litre

( H = 1.0, S = 32.0, O = 16.0 )

(1marks)

2. You are provided with the following

- Solution D, 1M copper(II) sulphate solution
- Solid E, Zinc powder

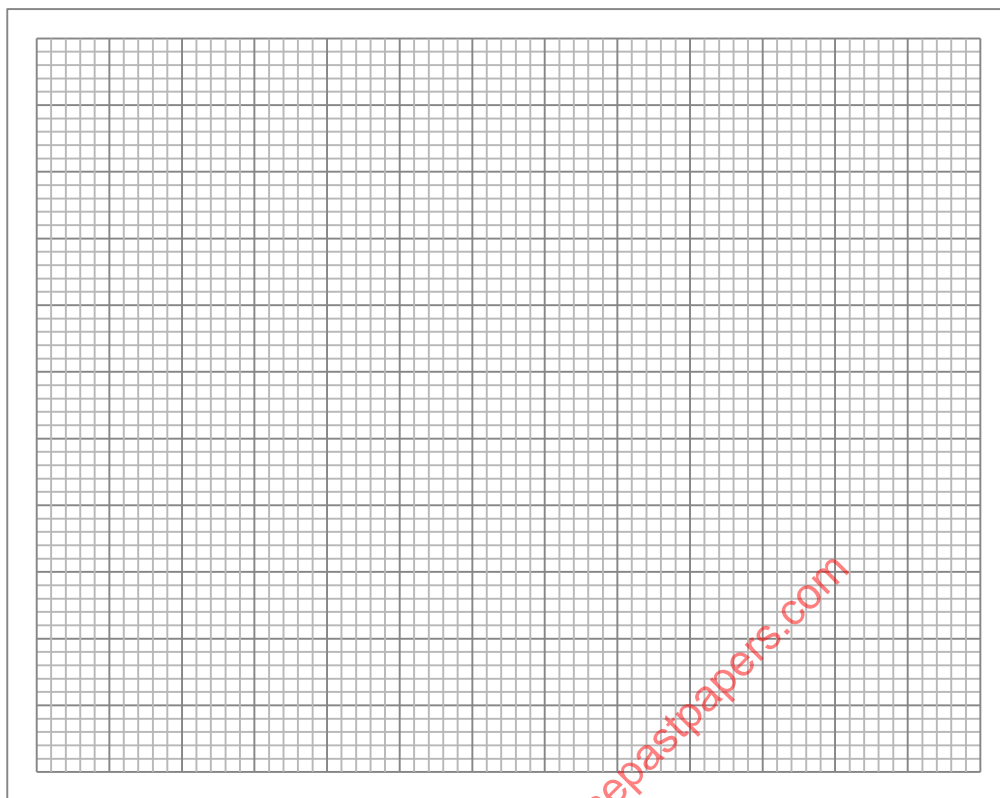
The purpose of this experiment is to determine the molar enthalpy of displacement of copper by Zinc.

#### Procedure

1. Pipette 25.0cm<sup>3</sup> of solution D into 50ml plastic beaker, stir with a thermometer and record the initial temperature then after every one minute for 2 minutes in the table below.
4. At precisely 3 minutes, add solid E.
5. Continue stirring, and record the temperature after every one minute for an additional 6 minutes in the table below. (3marks)

Time (minutes)	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0
Temperature (°C)				×						

- (a) Plot a graph of temperature (vertical axis) against time (horizontal axis) in the grid provided. (3marks)



- (b) From the graph determine the highest change in temperature (1mark)
- (c) Calculate the heat change for the reaction. (Specific heat capacity of the solution is  $4.2 \text{ J g}^{-1} \text{ K}^{-1}$ , density of solution is  $1 \text{ g cm}^3$ ) (2marks)
- (d) Determine the number of moles of copper that was displaced if zinc was excess (2marks)
- (e) Calculate the enthalpy change for one mole of copper by zinc (2marks)

3. You are provided with solid F and liquid G. Carry out the tests below. Write your observations and inferences in the spaces provided.

(a) Using a clean spatula heat a portion of solid F in a Bunsen burner flame.

Observations	Inferences

(b) Place the remaining portion of the solid F in a boiling tube. Add about 10cm<sup>3</sup> of distilled water. Stir and filter. Keep the residue for further tests. Divide the filtrate into four equal portions.

(i) To the first portion, add sodium hydroxide solution till in excess.

Observations	Inferences
<p>( 1mark )</p>	<p>( 1 mark )</p>

(ii) To the second portion, add ammonium hydroxide solution till in excess.

Observations	Inferences
( 1 mark )	( 1mark )



(d) Carry out the following tests on liquid G. Divide into four equal portions

(i) To the first portion add sodium hydrogen carbonate.

Observations	Inferences
( 1 mark )	( 1mark )

(ii) To the second portion add acidified potassium permanganate and warm.

Observations	Inferences
( 1 mark )	( 1 mark )

(iii) Place the third portion on a watch glass and ignite

Observations	Inferences
( 1 mark )	( 1 mark )