545/3

CHEMISTRY

Paper 3

July - August 2023

2 Hours

UGANDA MUSLIM TEACHERS' ASSOCIATION

UMTA JOINT MOCK EXAMINATIONS – 2023

NAME.....

INDEX NO.....SIGNATURE.....

UGANDA CERTIFICATE OF EDUCATION

CHEMISTRY

Paper 3

2 Hours

INSTRUCTIONS TO CANDIDATES

Answer **both** *questions .Answers are to be written in the spaces provided in this book let.*

You are **not** *allowed to use any reference books (i.e., text books, booklets on qualitative analysis etc)*

All working must be clearly shown.

Mathematical tables and silent non –programmable calculators may be used.

For Examiners' Use Only		
Q.1		
Q.2		
Total		

Qn1. You are provided with the following:-

- 5 pieces of **Solid P** (magnesium metal ribbon) of equal length.
- **BA1** solution, which is a **2.0M** hydrochloric acid solution.
- Distilled water.
- Stop clock or stop watch.
- 4 test tubes in a test tube rock.
- Measuring cylinders (50 cm^3 and 10 cm^3)
- Plastic cup or beaker.

You are required to **determine the rate of reaction between solid P and hydrochloric acid at different concentrations.**

Procedure

i) Obtain 4 clean test tubes and label them I, II, III and IV, using a masking tape.
ii) Using a 10 cm^3 measuring cylinder, measure out 2 cm^3 of distilled water into test tube I, 4 cm^3 of water test tube II, 6 cm^3 of distilled water into test tube III and 8cm^3 of water into test tube IV.
iii) Using another measuring cylinder, measure out 20 cm^3 of 2.0M **BA1** and pour the solution into a plastic beaker/cup.
iv) Place one piece of solid **P** into the beaker / cup containing 20 cm^3 of **BA1** solution and start the stop clock immediately. Swirl the beaker continuously ensuring that the solid **P** is always inside the solution. Note and record in the table the time taken for solid P to completely disappear.
v) Pour away the mixture in the plastic cup / beaker and thoroughly rinse the beaker with clean water.
vi) Then, measure accurately 18 cm^3 of **BA1** solution into the cup and add distilled water in test tube 1. Shake gently well to mix.
vii) Repeat procedure (iv) again and record in the table the time taken for solid **P** added to disappear.
viii) Repeat the procedure using 16 cm^3, 14 cm^3 and 12 cm^3 of **BA1** solution and distilled water in test tubes **II, III** and **IV** respectively as shown, and complete the table below:

EXPERIMENT NUMBER	**1**	**2**	**3**	**4**	**5**
Volume of **BA1** used (cm^3)	20	18	16	14	12
Volume of distilled water added (cm^3)	0	2	4	6	8
Time, **t**, taken for solid **P** to disappear (seconds)					
$^1/_{time}\ (sec^{-1})$ **to 3 dec.places**					

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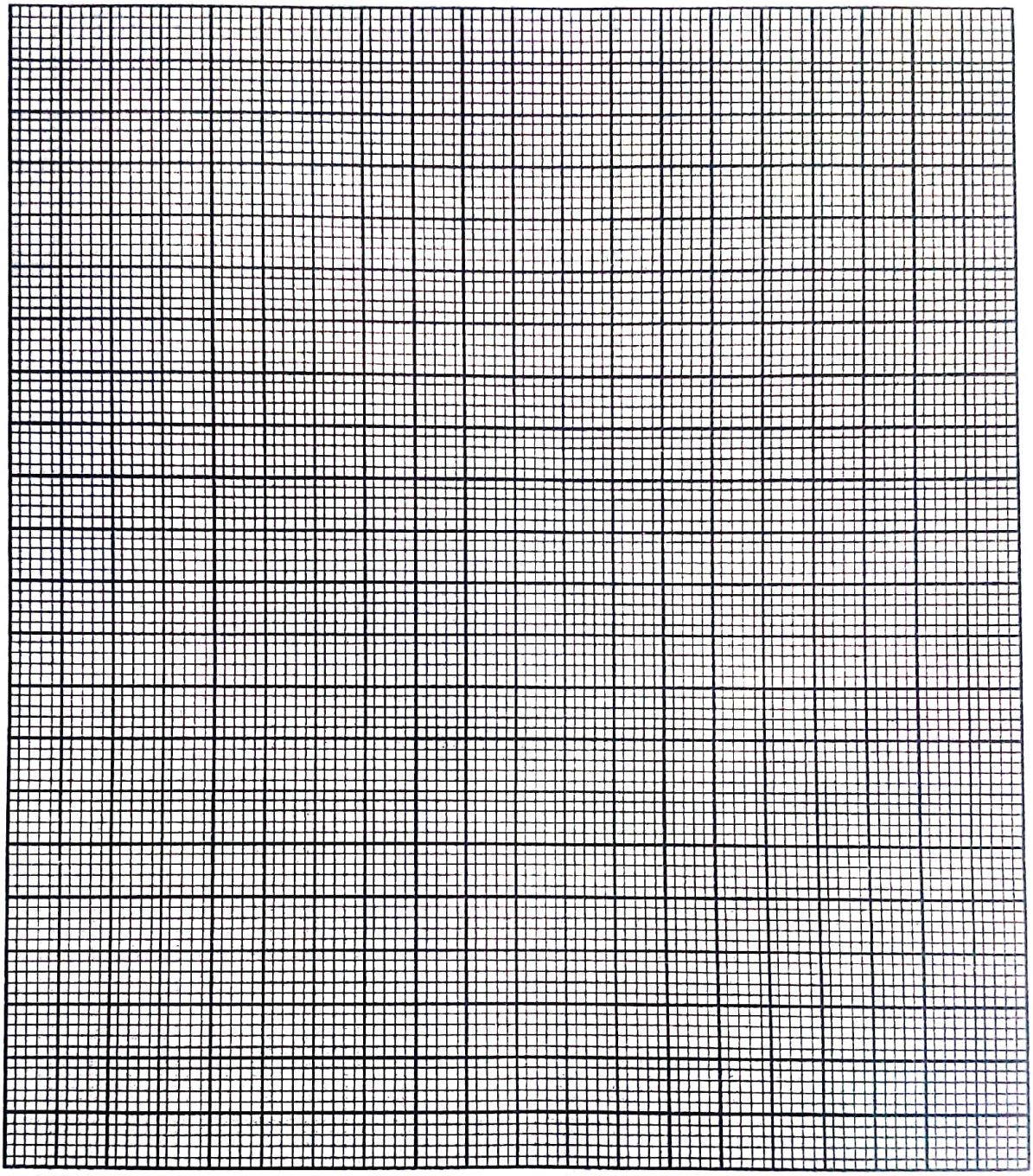
Questions

(a) (i) Plot a graph of $^{1}/_{time}$ against volume of **BA1** solution used (along x-axis).



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(ii) Write down the equation for the reaction that occurred.

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(b) Use your graph to determine the time that would be taken for the same length of solid P to disappear if the volume of the **BA1** solution used was 15 cm^3.

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(c) (i) From the results of your graph, state how the concentration of hydrochloric acid affects the rate of its reaction with magnesium ribbon.

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(ii) Explain your answer in c(i) above.

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Qn2. You are provided with substance **T** which contains **two** cations and **one** anion. You are required to carry out tests on **T** to identify the **cations** and **anion** present. Identify any gas(es) that may be evolved.

Test	Observation	Deduction
a) Heat a spatula endful of **T** in a hard, dry test tube, first gently and then strongly.		
b) To a spatula endful of **T** in a test tube; add about 10cm^3 of distilled water and shake very well. Divide the resultant mixture into 5 equal portions.		

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i) To the first portion in a test tube, add dilute sodium hydroxide solution drop wise, until in excess. Gently warm the mixture.		
ii) To the second portion in a test tube; and a few drops of silver nitrate solution.		
iii) To the third portion in test tube, add aqueous ammonia, drop wise until in excess.		
iv)To the forth portion in a test tube; add lead (II) nitrate solution.		
v) To the fifth portion in a test tube, carry out a test tube of your own choice to confirm the anion in **T**. **Test:**		

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c) i) The cations in T are,

- .....
- .....

ii) The anion in T is

- .....

END

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Question 1.

Solid P is a magnesium metal ribon

BA1 is a 2.0M hydrochloric acid solution

Each candidate should be provided with;

5 pieces of solid P, each measuring 2.0cm long.

100 cm^3 of BA1 solution.

Access to distilled water (about 30 cm^3)

1 stop clock / stop watch.

1 plastic beaker (250ml) or plastic cup.

4 test tubes in a test tube rack.

1 measuring cylinder (10 cm^3)

1 measuring cylinder (50 cm^3)

A piece of masking tape or label stickers

Question 2.

Solid substance T is prepared by mixing Ammonium sulphate and zinc sulphate salt, in the ratio 1:1

Each candidate should be provided with;

2 spatula endful of substance T

Distilled water.

1 boiling tube and 4 test tubes

1 test tube holder.

Access to the following reagents;

Distilled sodium hydroxide solution.

Aqueous ammonia solution

Blue and red litmus paper.

Silver nitrate solution.

Lead (II) nitrate solution.

Dilute nitric acid solution.

Dilute hydrochloric solution.

Barium nitrate solution.

Potassium iodide solution

Access to heat source.