Suggested guide

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Aim:

To investigate how the concentration of sulphuric acid affects the rate of reaction between the acid and magnesium ribbon, as observed by the time taken for bubbling to stop.

A=05
2A=05
1A=03

Hypothesis:

Allow - volume of acid instead of concentration
- time of reaction instead of rate

If the concentration of sulphuric acid is increased, the rate of reaction between magnesium and acid will also increase, and the time taken for bubbling to stop will decrease.

H=06
2H=06
1H=05

Allow; Any logical statement related to experiment with both key words.

Variables:

- ***Independent Variable:*** *Volume of sulphuric acid used in the acid-water mixture/ concentration of sulphuric acid*
- ***Dependent Variable:*** *Time taken for bubbling to stop / rate of reaction*
- ***Controlled Variable:*** *Length of magnesium ribbon*

V=06
3V=06
2V=05
1V=04

Apparatus and Materials:

Measuring cylinders, Beakers, Stopwatch/stop clock, Thermometer, Magnesium ribbon, Dilute sulphuric acid (solution BAI), Distilled water,

Procedure:

a) ***25.0 cm³*** *of sulphuric acid (BA1) was measured using a clean* ***measuring cylinder*** *and poured into a dry* ***beaker****.*
b) *A 1.0 cm piece of magnesium ribbon was quickly dropped into the acid, and a* ***stop clock*** *was started immediately.*
c) *The beaker was gently swirled by hand throughout the reaction to ensure uniform mixing.*
d) *The* ***time taken for bubbling*** *(effervescence) to completely stop was recorded.*
e) *The experiment was repeated using 20.0 cm³, 15.0 cm³, 10.0 cm³, and 5.0 cm³ of sulphuric acid, each time diluting with distilled water to keep the* ***total volume constant at 25.0 cm³****.*

P=05

$P_m + P_r + P_c = 3P = 05$
$P_m + P_r = 2P = 04$
$P_m = 1P = 01$
But $P_m \neq 3$

Reject P_c if P_r is missing
Deny P_r if a learner commits wrong units.

Risks and Mitigation:

Risk	Mitigation
Contact with acid spills on the body	Wear gloves and goggles
Hydrogen gas formed is flammable	Keep away from open flames

R

R=03

Award D (data presentation) if - results are in table
- Variable are in the table and have correct units.
- $\frac{3}{5}$ of required sets available.

Give D=0 if units are missing

D=05
2D=05
1D=04

Table of Results:

Volume of BA1 (cm^3)	5.0	10.0	15.0	20.0	25.0
Volume of Water Added (cm^3)	20.0	15.0	10.0	5.0	0.0
Time Taken (s)	29.5	22.0	17.0	14.0	12.0
Rate of reaction; $\frac{1}{Time}$ (s^{-1})	0.034	0.045	0.058	0.071	0.083

Dr

Dr

Dr

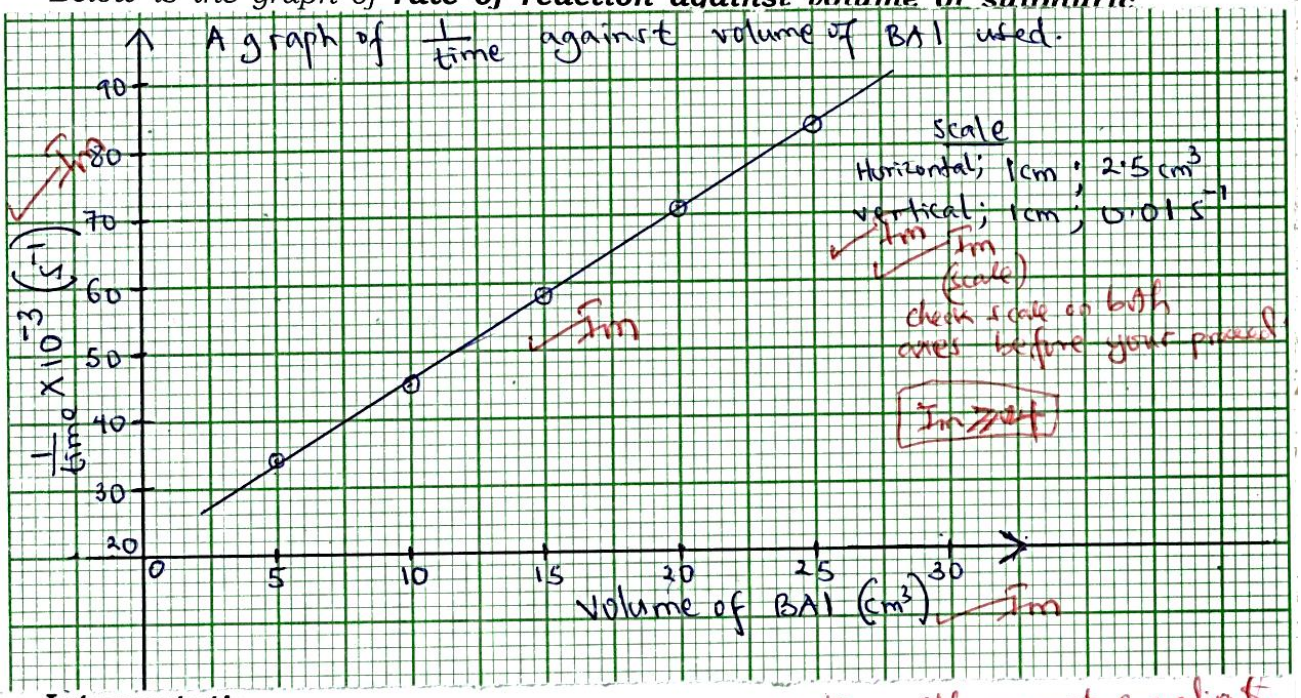
Dr=05
2Dr=05
1Dr=04

Award Dr (Data recording) if - values are at required dips
- Trend should be correct

Give Dr=00 if dips are missing

Data analysis;

Below is the graph of ***rate of reaction against volume of sulphuric***



Interpretation:

Ia

Allow; straight line with a positive gradient

The graph shows a ***positive linear relationship*** *between the volume of BA1 and the rate of reaction. As the volume of BA1 increases from* ***5.0 cm³***

I=06

4Im + Ia = 2I = 06

4Im = 1I = 05

***to 25.0 cm³**, the rate of reaction increases steadily from **0.034 s⁻¹ to 0.083 s⁻¹**. This is because increasing its volume (concentration) increases the number of reactive particles in solution, leading to **more frequent collisions per unit time**, hence a **higher reaction rate**.*

Conclusion:

The experiment confirms that increasing the concentration of sulphuric acid results in a faster reaction with magnesium, as shown by a shorter time for bubbling and a higher reaction rate.

C

C=06

Recommendation:

2C = 06

1C = 05

The Sports Club can safely increase the concentration of sulphuric acid to produce magnesium sulphate faster and more efficiently. This supports the team doctor's advice and can help reduce supply delays by enabling small-scale, local preparation.

C

Note: Award C only if I is correct

Candidate's Name.....

Signature..... Index number.....

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CHEMISTRY

Paper 2

2 hours

BUGANDA EXAMINATIONS COUNCIL MOCKS

Uganda Certificate of Education

CHEMISTRY

Paper 2

Practical

2 hours

INSTRUCTIONS TO CANDIDATES:

This paper consists of **one compulsory** examination item. Answers to this item are to be written in the spaces provided in this booklet. Use **blue** or **black** ink.

All working must be clearly shown. Graph paper will be provided.

Mathematical table and silent non-programmable scientific calculators may be used.

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

Candidates are advised to carefully read the item, make sure they have all the apparatus and chemicals they may need and then **plan** appropriately before starting.

Magnesium sulphate is a compound used to treat muscle ache and joint stiffness among others.

A Sports Club is experiencing delays in deliveries of magnesium sulphate from their suppliers. The team doctor advised the club management that the compound can be made locally on a small scaleby reacting magnesium ribbon with dilute sulphuric acid at **room temperature**according to the following equation:

$Mg_{(s)} + H_2SO_{4(aq)} \longrightarrow MgSO_{4(aq)} + H_{2(g)}$.

However, for **timely (faster)** production and delivery of the compound, a constant length of magnesium ribbon should be reacted with dilute sulphuric acid of **higher concentration.** The club managers have, however, not yet accepted the team doctor's advice.The club managers have contacted youto help and find out how true the piece of advice suggestedis.

You are provided with the following:

Metal **X**, which is magnesium ribbon

Distilled water and solution **BA1**; which is dilute sulphuric acid.

Task:

As a student who studied Chemistry, use the materials availed to you to:

(a)design an experiment you can carry out to guide the club managers.
(Your investigation should include;aim, variables, hypothesis, relevant apparatus and procedure, risks and mitigations)

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End

545/2

CHEMISTRY

July/August-2025

Practical instructions

BUGANDA EXAMINATIONS COUNCIL MOCKS

Uganda Certificate of Education

CHEMISTRY PRACTICAL

Paper 2

Confidential

Great care should be taken that the information given below does not reach the candidates either directly or indirectly.

Instructions for preparing apparatus and chemicals

In addition to the common laboratory reagents, each candidate should be provided with following:

- 1 glass beaker/A conical flask
- A stop clock /watch
- Thermometer
- Labels
- Measuring cylinder (50/100ml)
- 100 cm^3 of **BA1**; is a 1.0 M sulphuric acid
- 100 cm^3 of distilled water.
- 6 cm long of magnesium ribbon

NB:

A teacher or laboratory technician responsible for preparing the solutions must hand in trial results.

Candidates are not allowed to use reference books (i.e. textbooks, booklets on qualitative analysis etc.) during the examination.