



Rewarding Learning

General Certificate of Secondary Education
2023

Centre Number

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Candidate Number

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Double Award Science Chemistry

Unit 7: Practical Skills

Booklet A

Higher Tier

[GDW75]



GDW75

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is **15**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Follow all health and safety instructions.
You may use a ruler and calculator if required.
The apparatus and materials required to complete the task(s) are provided.
A Data Leaflet, which includes a Periodic Table of Elements, is included in this question paper.

For Examiner's use only	
Question Number	Marks
1	
2	
Total Marks	

- 1 When magnesium is added to hydrochloric acid, a temperature change occurs.

You are provided with a piece of magnesium ribbon and hydrochloric acid.

- (a) You will now carry out the following procedure and use the table below to record the results. **Note point 6 in the method before starting.**

1. Using a measuring cylinder, place 10 cm^3 of 2.0 mol/dm^3 hydrochloric acid in a boiling tube.
2. Measure the initial temperature of the hydrochloric acid using the thermometer and record it in the table.
3. Add the magnesium ribbon to the hydrochloric acid in the boiling tube and stir using the thermometer.
4. Measure the highest temperature achieved and record it in the table.
5. Calculate the temperature change and record this in the table.
6. Apart from the heat released, **record in the table, two other observations** made during the reaction.

Initial temperature of hydrochloric acid /°C	
Highest temperature achieved /°C	
Temperature change /°C	
Observations	

[5]

- (b) Place a piece of universal indicator paper on a white tile. Using a glass rod, place a drop of 2.0 mol/dm^3 hydrochloric acid onto the piece of universal indicator paper. Record the colour of the paper and determine the pH of the hydrochloric acid using the colour chart provided.

Colour: _____

pH: _____ [2]

Examiner Only

Marks Remark

- 2 This is an investigation into the effect of changes in concentration on the rate of the reaction between sodium thiosulfate solution and hydrochloric acid.

Sodium thiosulfate solution reacts with hydrochloric acid to produce an insoluble solid. This solid causes the solution to become cloudy.

- (a) Carry out the following procedure and use the table below to record the results.

1. Mark a black X onto a piece of filter paper.
2. Using a measuring cylinder, place 50 cm³ of 0.10 mol/dm³ sodium thiosulfate solution into conical flask 1.
3. Prepare the four other conical flasks using the same measuring cylinder by adding the volumes of 0.10 mol/dm³ sodium thiosulfate solution and deionised water as shown in the table for conical flasks 2, 3, 4 and 5.
4. Using the 10 cm³ measuring cylinder, add 10 cm³ of 1.0 mol/dm³ hydrochloric acid to conical flask 1 and start the timer. Immediately swirl the flask to mix and set it on top of the filter paper marked with the X.
5. Stop the timer when the X is no longer visible through the reaction mixture. Record the time in seconds, **to the nearest whole number**, in the table.
6. Repeat steps 4 and 5 for conical flasks 2, 3, 4 and 5.

Examiner Only	
Marks	Remark

Conical flask	Volume of 0.10 mol/dm ³ sodium thiosulfate solution /cm ³	Volume of deionised water /cm ³	Concentration of sodium thiosulfate solution /mol/dm ³	Time taken for the cross to disappear /s	Rate = $\frac{1}{\text{time}}$ /s ⁻¹
1	50	0	0.10		
2	40	10	0.08		
3	30	20	0.06		
4	20	30	0.04		
5	10	40	0.02		

[5]

- (b) The rate of reaction can be calculated using the following equation:

$$\text{rate} = \frac{1}{\text{time}}$$

From the results obtained, calculate the rate of the reaction for each conical flask to 4 decimal places. Record this in the final column in the table.

[2]

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- (c) From your results, state the effect of increasing the concentration of sodium thiosulfate solution on the rate of reaction.

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

Examiner Only	
Marks	Remark

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