Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

8955238231

CHEMISTRY **0620/62**

Paper 6 Alternative to Practical **October/November 2020**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

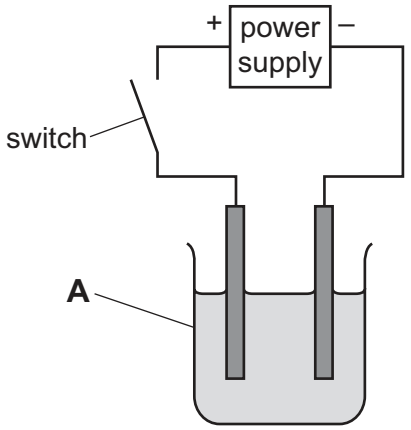
INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Blank pages are indicated.

[Turn over

1 The diagram shows the apparatus used to pass an electric current through concentrated hydrochloric acid. Hydrogen and chlorine were formed at the electrodes.



(a) Name the item of apparatus labelled **A**.

..... [1]

(b) The electrodes were made of platinum.

(i) Give **two** reasons why platinum is a suitable material for the electrodes.

1 .....

2 .....
[2]

(ii) Suggest another material suitable to use as electrodes in this experiment.

..... [1]

(c) The teacher doing this experiment wore safety glasses, gloves, had their hair tied back and stood up throughout the experiment.

State **one** other safety precaution that should be taken when doing this experiment.
Explain your answer.

safety precaution .....

explanation .....
[2]

[Total: 6]

2 A student investigated the rate of a reaction between sodium metabisulfite and potassium iodate. In the reaction, starch was used as an indicator. At first the reacting mixture remained colourless but then suddenly changed to a blue-black colour.

Five experiments were done. In each experiment the total volume of liquid was 45 cm^3.

Experiment 1

- Using a 10 cm^3 measuring cylinder, 5 cm^3 of aqueous sodium metabisulfite was poured into a beaker.
- Using another 10 cm^3 measuring cylinder, 5 cm^3 of aqueous starch was poured into the beaker.
- Using a 25 cm^3 measuring cylinder, 15 cm^3 of distilled water was poured into the beaker.
- Using another 25 cm^3 measuring cylinder, 20 cm^3 of aqueous potassium iodate was poured into the beaker. At the same time a stop-clock was started.
- The mixture in the beaker was stirred until a sudden colour change was seen.
- The stop-clock was immediately stopped and the time recorded.
- The beaker was rinsed with water.

Experiment 2

- Experiment 1 was repeated using 17 cm^3 of distilled water and 18 cm^3 of aqueous potassium iodate.

Experiment 3

- Experiment 1 was repeated using 21 cm^3 of distilled water and 14 cm^3 of aqueous potassium iodate.

Experiment 4

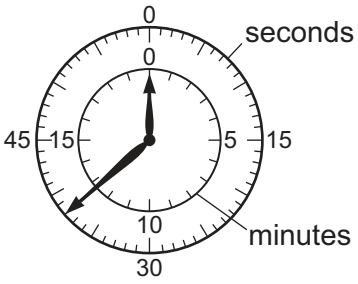
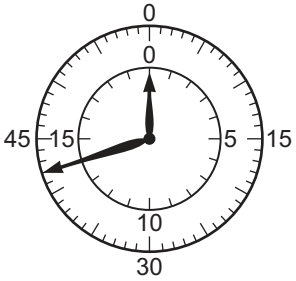
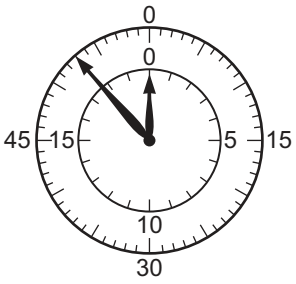
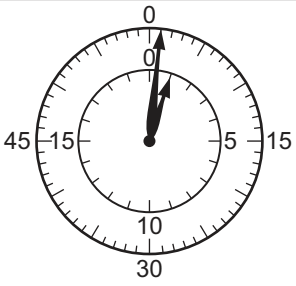
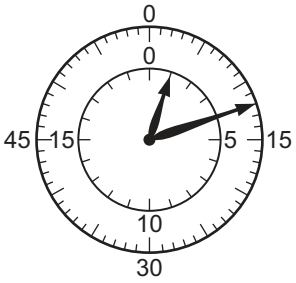
- Experiment 1 was repeated using 23 cm^3 of distilled water and 12 cm^3 of aqueous potassium iodate.

Experiment 5

- Experiment 1 was repeated using 25 cm^3 of distilled water and 10 cm^3 of aqueous potassium iodate.

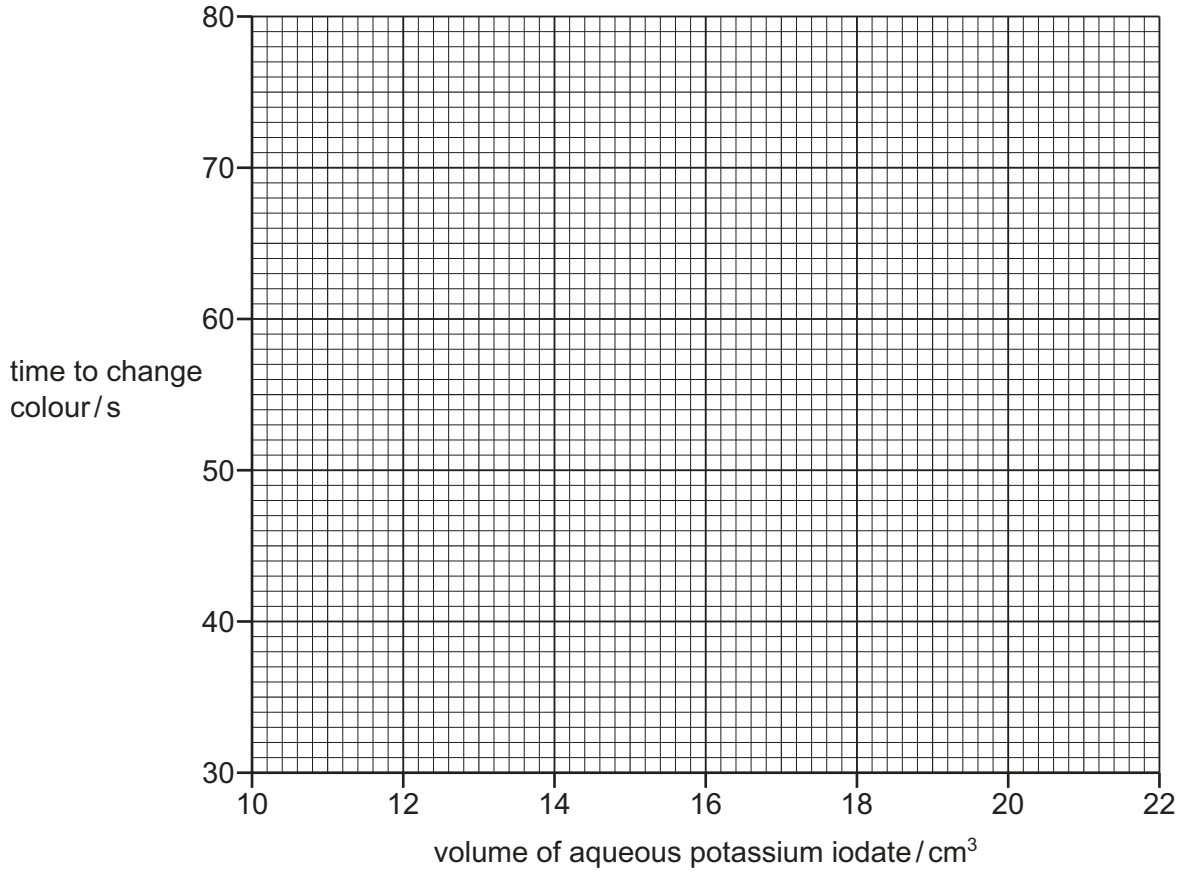
[Turn over

(a) Use the information in the description of the experiments and the stop-clock diagrams to complete the table. Record the times in **seconds**.

experiment	volume of aqueous sodium metabisulfite / cm^3	volume of distilled water / cm^3	volume of aqueous potassium iodate / cm^3	stop-clock diagram	time to change colour / s
1			20		
2			18		
3			14		
4			12		
5			10		

[5]

(b) Plot the results from Experiments 1 to 5 on the grid.
Draw a smooth curve of best fit.



[3]

(c) (i) **From your graph**, predict the time to change colour if 16 cm^3 of aqueous potassium iodate was used.
Show clearly **on the grid** how you worked out your answer.

time to change colour = ... s [2]

(ii) Calculate the volume of distilled water required if 16 cm^3 of aqueous potassium iodate was used.

volume of distilled water = ... cm^3 [1]

(d) Sketch **on the grid** the graph you would expect if Experiments 1 to 5 were repeated at a higher temperature. [1]

[Turn over

(e) The concentration of potassium iodate in the reaction mixture in each experiment can be calculated using the equation shown.

$$\text{concentration} = \frac{0.05 \times \text{volume of aqueous potassium iodate}}{45}$$

(i) Calculate the concentration of potassium iodate in the reaction mixture in Experiment 2.

concentration = ... mol/dm^3 [1]

(ii) State which experiment, 1, 2, 3, 4 or 5, had the fastest rate of reaction.

..... [1]

(f) Suggest why the volume of distilled water added to each experiment was increased as the volume of aqueous potassium iodate was decreased.

.....

..... [1]

(g) Give **one** change you could make to the apparatus used which would improve the results. Explain your answer.

change to apparatus .....

.....

explanation .....

.....

[2]

(h) How could the reliability of the results of this investigation be checked?

.....

..... [1]

[Total: 18]

3 Solid **Q** and solid **R** were analysed. Solid **Q** was zinc carbonate.
Tests were done on each solid.

tests on solid Q

Complete the expected observations.

(a) Solid **Q** was placed in a boiling tube. About 10 cm^3 of dilute sulfuric acid was added to the boiling tube. Any gas produced was tested.
The contents of the boiling tube were kept for **(c)**.

observations .....

.....

..... [3]

(b) Identify the gas given off in **(a)**.

..... [1]

(c) The reaction mixture from **(a)** was filtered.
The filtrate was solution **S**. 1 cm depth of solution **S** was poured into a boiling tube.

(i) Aqueous sodium hydroxide was added dropwise and then in excess to solution **S** in the boiling tube.

observations .....

.....

..... [2]

(ii) Explain why it is **not** possible to identify the cation contained in solution **S** from your observations in **(c)(i)**.

.....

..... [1]

(iii) Suggest an additional test that can be done on solution **S** to confirm the cation was Zn^{2+}.

.....

..... [1]

tests on solid R

Tests were done and the following observations were made.

tests on solid **R**	observations
test 1 A flame test was done on solid **R**.	yellow flame
Solid **R** was dissolved in distilled water to produce solution **R**. The solution was divided into two equal portions in two test-tubes. **test 2** About 1 cm^3 of dilute nitric acid followed by a few drops of aqueous silver nitrate were added to the first portion of solution **R**.	yellow precipitate formed
test 3 The second portion of solution **R** was added to 1 cm^3 of aqueous bromine in a test-tube.	the solution changed colour from orange to brown

(d) Identify solid **R**.

.....

..... [2]

[Total: 10]

4 Brass is a mixture of two metals, copper and zinc.

Copper does not react with dilute sulfuric acid. Zinc reacts with hot dilute sulfuric acid to form the soluble salt zinc sulfate.

Plan an investigation to find the percentage by mass of zinc in a sample of brass.
In your answer you should include how to calculate the percentage by mass of zinc.

You have access to normal laboratory apparatus.

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..... [6]

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