Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

1868827148

CHEMISTRY **0620/63**

Paper 6 Alternative to Practical **October/November 2019**

1 hour

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

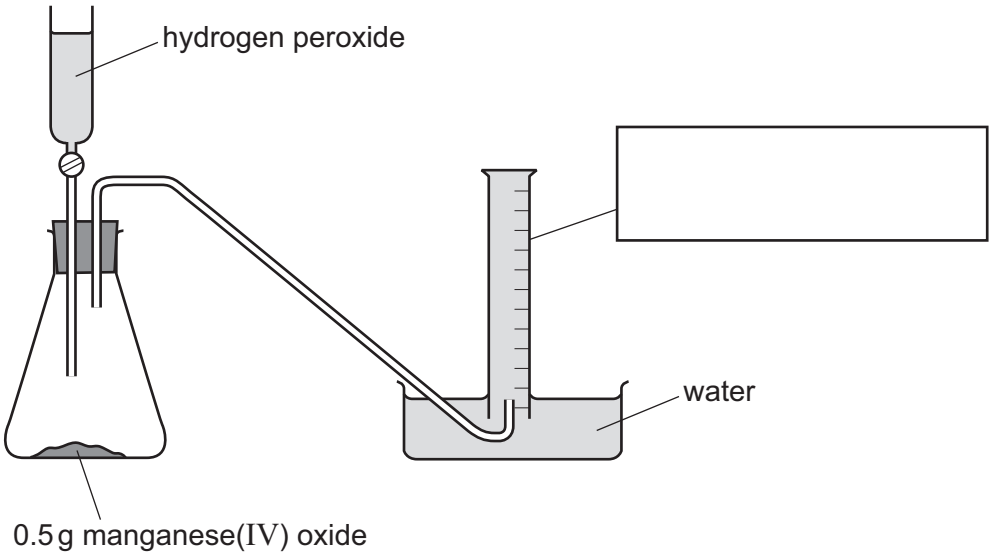
This document consists of **8** printed pages.

1 Hydrogen peroxide, $H_2O_2(aq)$, decomposes slowly to form water and oxygen.

$$2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$$

The addition of 0.5 g of manganese(IV) oxide speeds up this decomposition. Manganese(IV) oxide is an insoluble solid.

The apparatus shown was used to follow the rate of decomposition of hydrogen peroxide. The hydrogen peroxide was added to the conical flask and a stop-watch was started.



(a) Complete the box to name the apparatus. [1]

(b) What measurements should be taken to follow the rate of the reaction?

.....

..... [2]

(c) The rate of the reaction decreases over time. After 5 minutes the rate of reaction is zero.

(i) Why does the rate of reaction decrease?

..... [1]

(ii) Explain why the rate of reaction is zero after 5 minutes.

..... [1]

(d) (i) The manganese(IV) oxide acts as a catalyst.

How could a student separate the catalyst from the reaction mixture at the end of the reaction?

..... [1]

(ii) Suggest how the student could show that the catalyst separated in **(d)(i)** is unchanged at the end of the reaction.

.....

.....

.....

..... [3]

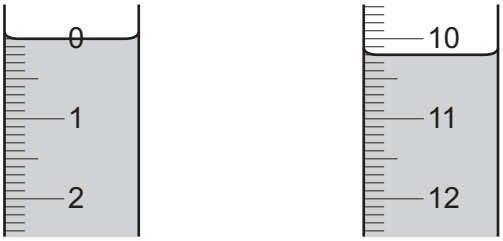
[Total: 9]

2 A student investigated the reaction between dilute hydrochloric acid and three different concentrations of aqueous sodium hydroxide, labelled **R**, **S** and **T**.

Three experiments were done.

Experiment 1

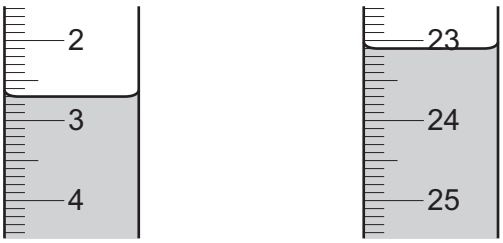
- A burette was filled with dilute hydrochloric acid. The initial burette reading was measured.
- Using a measuring cylinder, 20 cm^3 of solution **R** was poured into a conical flask.
- Six drops of methyl orange indicator were added to the conical flask.
- Dilute hydrochloric acid was added from the burette, until the solution just changed colour.
- The final burette reading was measured.



initial final

Experiment 2

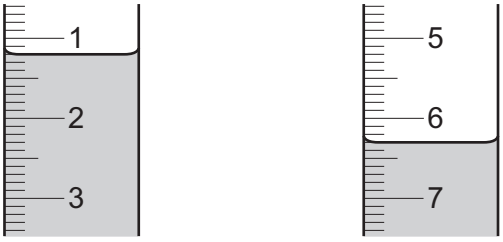
- Experiment 1 was repeated but using 20 cm^3 of solution **S** instead of solution **R**.



initial final

Experiment 3

- Experiment 1 was repeated but using 20 cm^3 of solution **T** instead of solution **R**.



initial final

(a) Use the burette diagrams to record all the burette readings in the table.

burette reading / cm^3	Experiment 1 using solution **R**	Experiment 2 using solution **S**	Experiment 3 using solution **T**
final burette reading			
initial burette reading			
volume used			

[4]

(b) What colour change is observed in the conical flask at the end-point?

from ..... to .....

[2]

(c) Suggest why Universal Indicator is **not** a suitable indicator in these experiments.

.....

..... [1]

(d) (i) Complete the sentences below.

Experiment ..... needed the smallest volume of dilute hydrochloric acid to change the colour of the indicator.

Experiment ..... needed the largest volume of dilute hydrochloric acid to change the colour of the indicator.

[1]

(ii) Determine the simplest whole number ratio of volumes of dilute hydrochloric acid used in Experiments 1 and 2.

Experiment 1 ..... **:** ..... Experiment 2 [1]

(iii) Deduce the order of concentrations of the solutions of aqueous sodium hydroxide, **R**, **S** and **T**.

most concentrated .....

.....

least concentrated .....

[1]

(e) What would be the effect on the results, if any, if the solutions of aqueous sodium hydroxide were warmed before adding the dilute hydrochloric acid? Give a reason for your answer.

effect on the results .....

reason .....

[2]

[Turn over

(f) Suggest how the reliability of the results could be checked.

.....

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..... [2]

(g) Suggest a different method, **not** involving an indicator, of finding the order of concentrations of the solutions of aqueous sodium hydroxide, **R**, **S** and **T**.

.....

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..... [3]

[Total: 17]

3 Two substances, solid **U** and liquid **V**, were analysed. Solid **U** was chromium(III) nitrate. Tests were done on solid **U** and liquid **V**.

tests on solid U

Complete the expected observations.

Solid **U** was added to distilled water and shaken to dissolve solid **U** and form solution **U**.

(a) Describe the colour of solution **U**.

..... [1]

Solution **U** was divided into three equal portions in three test-tubes.

(b) (i) A few drops of aqueous sodium hydroxide were added to the first portion of solution **U** until a change was seen.

observations ..... [2]

(ii) An excess of aqueous sodium hydroxide was then added to the mixture.

observations ..... [1]

(c) An excess of aqueous ammonia was added to the second portion of solution **U**.

observations ..... [1]

(d) Aluminium foil and aqueous sodium hydroxide were added to the third portion of solution **U**. The mixture was heated and the gas produced was tested.

observations .....

..... [2]

tests on liquid V

One of the tests done on liquid **V** and the observations made are shown.

tests on liquid **V**	observations
A lighted splint was used to touch about 1 cm^3 of liquid **V**.	liquid **V** set on fire and burned with a smoky blue flame

(e) Draw **one** conclusion about liquid **V**.

..... [1]

[Total: 8]

[Turn over

4 Potassium nitrate and ammonium chloride are two salts. The energy change when they each dissolve in water is endothermic.

Plan an experiment to show which of these two salts produces the larger endothermic energy change per gram.

Your answer should include:
- any measurements you would take and record
- how the results could be used to draw a conclusion.

You are provided with potassium nitrate and ammonium chloride, distilled water and common laboratory apparatus.

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..... [6]