



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE
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CHEMISTRY

0620/62

Paper 6 Alternative to Practical

May/June 2018

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.

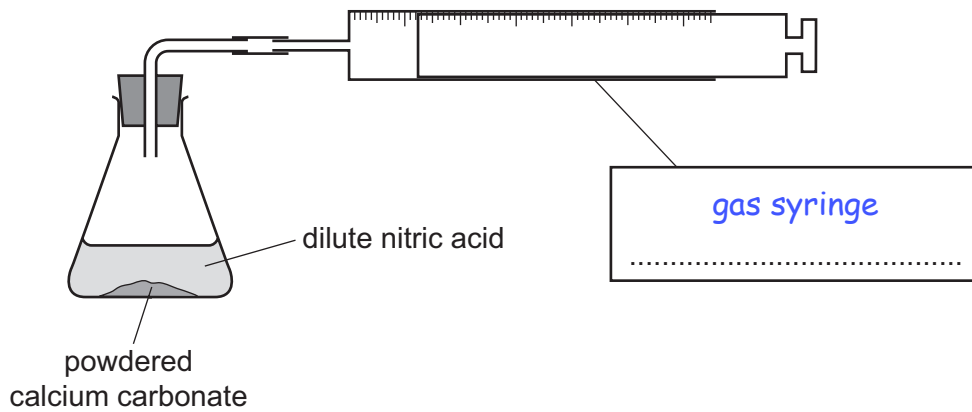
At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

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

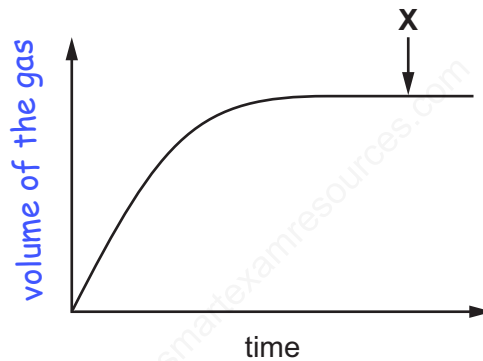
This document consists of **9** printed pages and **3** blank pages.

- 1 The rate of reaction between an excess of dilute nitric acid and powdered calcium carbonate was investigated. The carbon dioxide produced was collected. The apparatus used is shown.



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

A sketch graph of the results obtained is shown.



- (b) (i) Label the y-axis. [1]

- (ii) Explain why the sketch graph is horizontal at point X.

Because the reaction is finished as the calcium carbonate is all used up...

..... [2]

- (c) Draw **on the axes** the graph expected if the experiment were repeated using an equal mass of **lumps** of calcium carbonate. All other conditions were kept the same. [2]

- (d) Describe a test for carbon dioxide.

test **Lime water**

result **The lime water turns milky**

[2]

[Total: 8]

- 2 A student investigated the temperature changes when two different solids, solid **C** and solid **D**, dissolved in water.

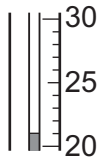
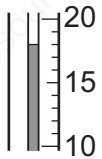
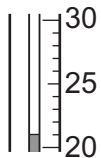
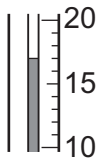
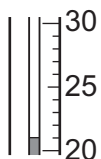
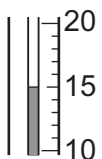
Two experiments were done.

Experiment 1

- Using a measuring cylinder, 40 cm³ of distilled water was poured into a polystyrene cup. The initial temperature of the distilled water was measured.
- 3 g of solid **C** was added to the polystyrene cup and the mixture was stirred with a thermometer. The temperature of the solution was measured after 1 minute.
- The procedure was repeated using 4 g of solid **C**.
- The procedure was repeated using 6 g of solid **C**.

- (a) Use the thermometer diagrams to record the results in the table.

Calculate and record the temperature change in each case, including whether the temperature increased (+) or decreased (–).

mass of solid C /g	thermometer diagram	initial temperature of the distilled water/°C	thermometer diagram	temperature of the solution after 1 min/°C	temperature change/°C
3		21		18	-3
4		21		17	-4
6		21		15	-6

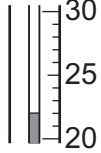
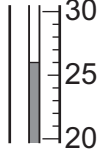
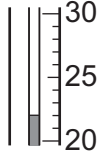
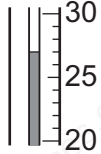
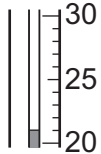
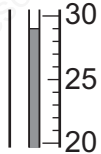
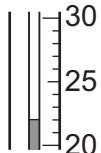
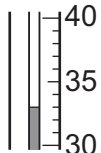
[2]

Experiment 2

- Experiment 1 was repeated but using 3 g, 4 g, 6 g and 8 g of solid **D**.

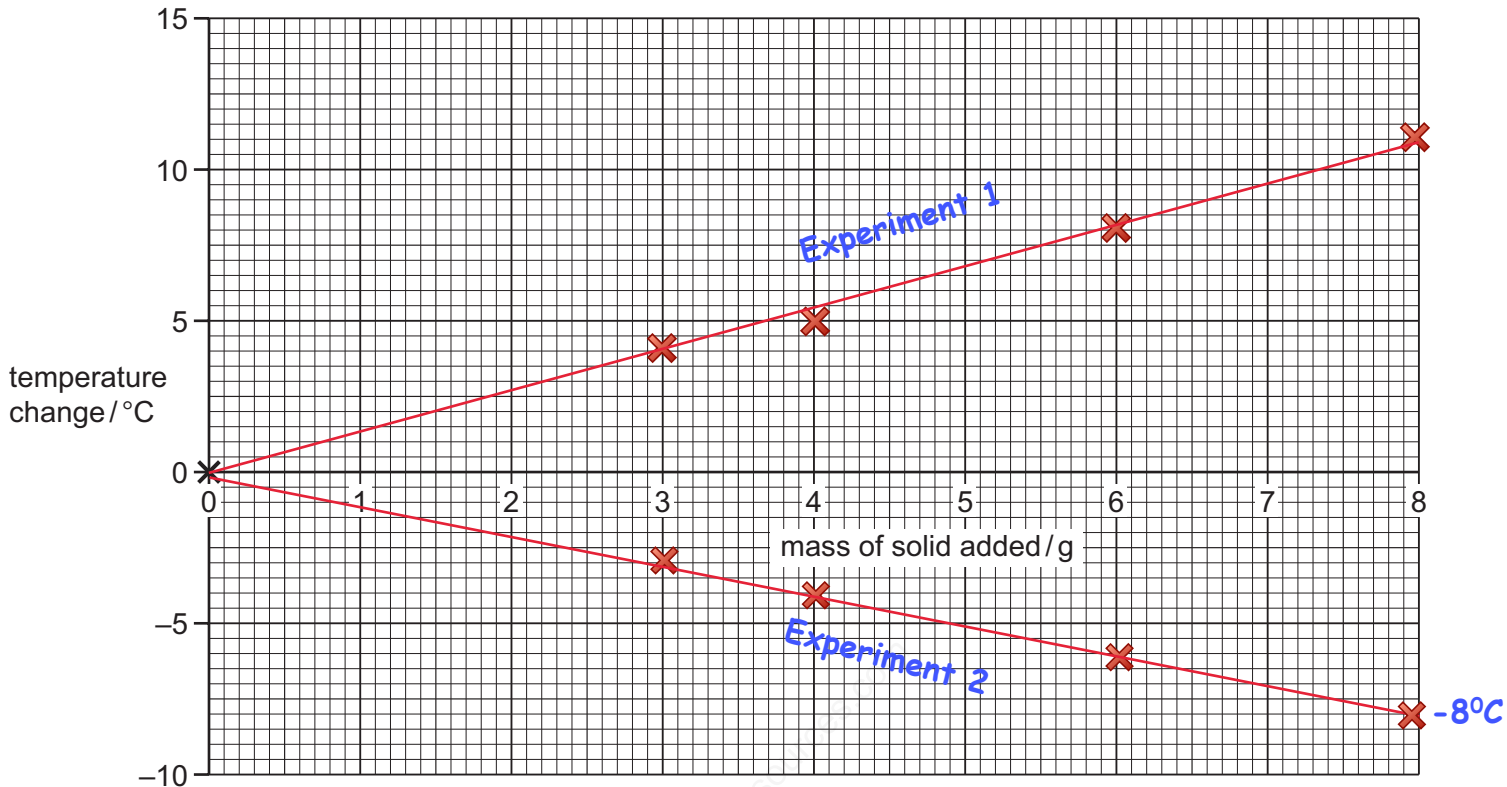
(b) Use the thermometer diagrams to record the results in the table.

Calculate and record the temperature change in each case, including whether the temperature increased (+) or decreased (-).

mass of solid D /g	thermometer diagram	initial temperature of the distilled water/°C	thermometer diagram	temperature of the solution after 1 min/°C	temperature change/°C
3		22		26	+4
4		22		27	+5
6		21		29	+8
8		22		33	+11

[2]

- (c) Plot the results for Experiments 1 and 2 on the grid. The (0,0) point has been plotted for you. Draw **two** straight lines of best fit. Clearly label your graphs.



[4]

- (d) Use your graph to estimate the temperature change after 1 minute if 8 g of solid C were added to 40 cm³ of distilled water.

Show clearly on the grid how you worked out your answer.

..... -8 °C [2]

- (e) What type of energy change occurs when solid D dissolves in water?

Exothermic energy changes occur when the solid dissolves

..... [1]

- (f) Suggest the temperature of the solution containing 8 g of solid D, if the solution were left for 2 hours.

Explain your answer.

Temperature: Room temperature

Because the heat would have been lost to the surroundings

..... [2]

- (g) How would the temperature changes measured after 1 minute differ if the experiments were repeated using 80 cm³ instead of 40 cm³ of distilled water in each case?

.. **Half as much** ..
 [2]

- (h) Suggest **one** change you could make to the experiments to obtain more accurate results. Explain how this change would make the results more accurate.

change **Use a pipette** ..
 explanation **More accurate than a measuring cylinder** ..
 [2]

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

Repeat experiment. Then take average and compare the results.
 [2]

[Total: 19]

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- 3 Two substances, solid **E** and solution **F**, were analysed. Solid **E** was iron(II) sulfate. Tests were done on solid **E** and solution **F**.

tests on solid E

Complete the expected observations.

- (a) Describe the appearance of solid **E**.

Pale green crystals [1]

Solid **E** was added to distilled water in a test-tube. The test-tube was shaken to dissolve solid **E** and form solution **E**. Solution **E** was divided into four equal portions in four test-tubes.

- (b) Dilute nitric acid and aqueous silver nitrate were added to the first portion of solution **E**.

observations **No change** [1]

- (c) Dilute nitric acid and aqueous barium nitrate were added to the second portion of solution **E**.

observations **White precipitate** [1]

- (d) An excess of aqueous sodium hydroxide was added to the third portion of solution **E**.

observations **Green precipitate** [2]

- (e) An excess of aqueous ammonia was added to the fourth portion of solution **E**.

observations **Calcium** [1]

tests on solution F

Solution **F** was an aqueous salt solution.

Some of the tests and observations are shown.

tests on solution F	observations
<p>Solution F was divided into two equal portions in two test-tubes.</p> <p>test 1</p> <p>Drops of aqueous sodium hydroxide were added to the first portion of solution F.</p> <p>An excess of aqueous sodium hydroxide was then added to the mixture.</p>	<p>white precipitate formed</p> <p>white precipitate was insoluble</p>
<p>test 2</p> <p>An excess of aqueous ammonia was added to the second portion of solution F.</p>	<p>no precipitate formed</p>

(f) What conclusion can you draw about the cation present in solution **F**?

Calcium

.....
 [1]

[Total: 7]

- 4 Aqueous solutions of barium hydroxide are alkaline.
Plan an investigation to find the concentration of an aqueous solution of barium hydroxide.

You are provided with an aqueous solution of barium hydroxide, dilute hydrochloric acid of known concentration and common laboratory apparatus.

Fill the burette with hydrochloric acid Then take a measured volume of barium hydroxide solution in a beaker. Next add a few drops of phenolphthalein indicator to the beaker. Add the acid added gradually until the indicator colour changes the colour [till the end point is reached]. Note the initial and the final volume of the acid that was added. Then find the concentration of the aqueous solution of barium hydroxide using the formula for concentration and volume: $C_a V_a = C_b V_b$.

..... [6]

[Total: 6]

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