Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

7645677451

CHEMISTRY **0620/52**

Paper 5 Practical Test **May/June 2018**

1 hour 15 minutes

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions

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.
Notes for use in qualitative analysis are provided on pages 11 and 12.

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.

For Examiner's Use	
Total	

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.

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1 You are going to investigate the temperature changes when two different solids, solid **C** and solid **D**, dissolve in water.

Read all the instructions carefully before starting the experiments.

Instructions
You are going to do two experiments.

(a) *Experiment 1*

- Put the polystyrene cup into the 250 cm^3 beaker for support.
- Use the measuring cylinder to pour 40 cm^3 of distilled water into the polystyrene cup.
- Measure the initial temperature of the distilled water and record it in the first row of the table.
- Add the 3 g sample of solid **C** to the polystyrene cup and stir the solution with the thermometer.
- Measure and record the temperature of the solution after 1 minute.
- Calculate and record the temperature change, including whether the temperature increased (+) or decreased (–).
- Pour the solution away and rinse out the polystyrene cup with distilled water.

- Repeat the procedure using the 4 g sample of solid **C**. Record your results and the temperature change, including whether the temperature increased (+) or decreased (–), in the appropriate row of the table.
- Repeat the procedure using the 6 g sample of solid **C**. Record your results and the temperature change, including whether the temperature increased (+) or decreased (–), in the appropriate row of the table.

mass of solid **C** / g	initial temperature of the distilled water / °C	temperature of the solution after 1 min / °C	temperature change / °C
3			
4			
6			

[2]

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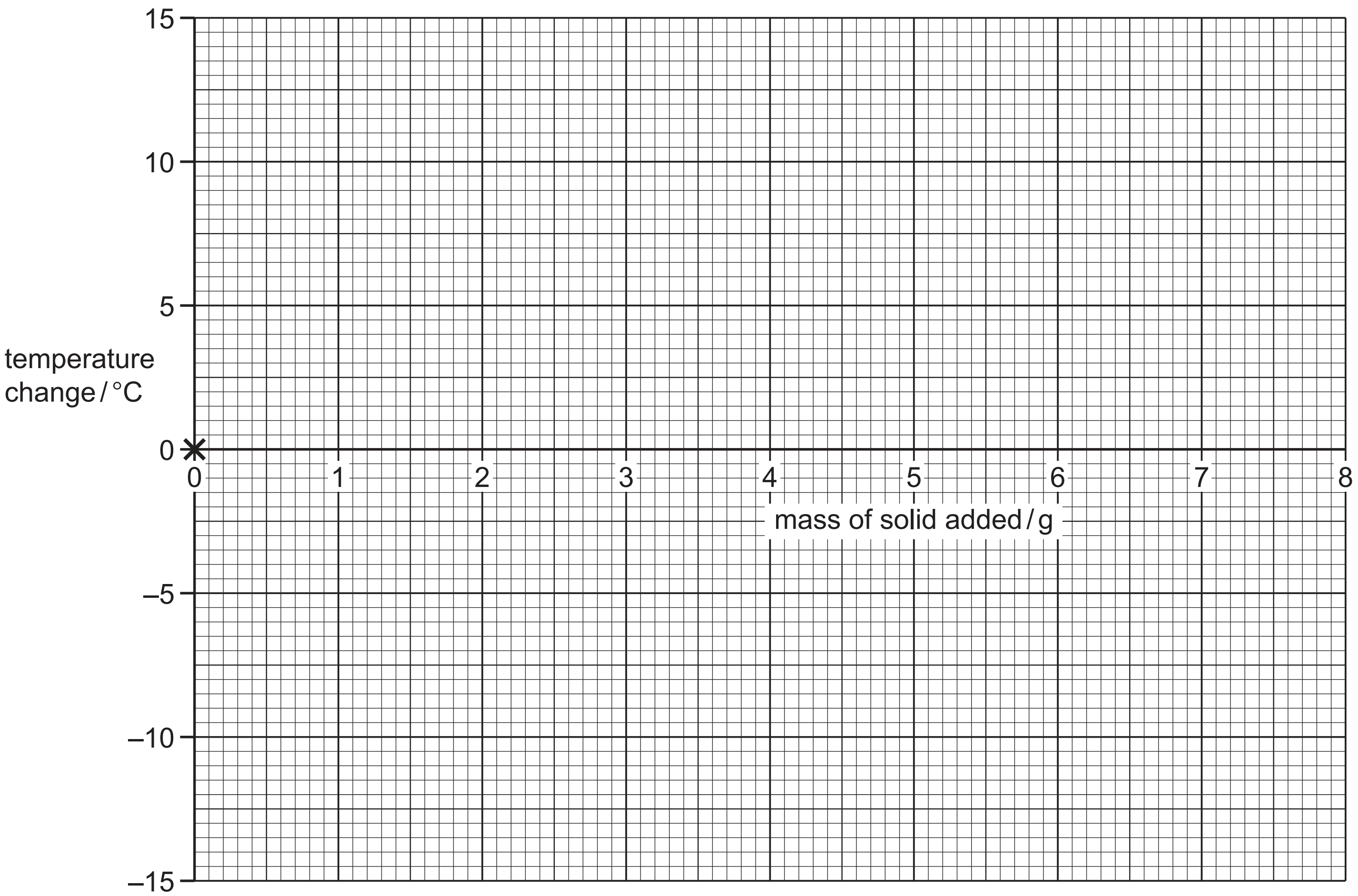
(b) *Experiment 2*

- Repeat Experiment 1 but using the 3 g, 4 g, 6 g and 8 g samples of solid **D**.
- Record your results in the table.
- Calculate and record the temperature changes in each case, including whether the temperature increased (+) or decreased (–).

mass of solid **D** / g	initial temperature of the distilled water / °C	temperature of the solution after 1 min / °C	temperature change / °C
3			
4			
6			
8			

[2]

(c) Plot your 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]

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(d) **Use your graph** to estimate the temperature change after 1 minute if 8 g of solid **C** were added to 40 cm^3 of distilled water.

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

.... °C [2]

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

.... [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.

....

.... [2]

(g) How would the temperature changes measured after 1 minute differ if the experiments were repeated using 80 cm^3 instead of 40 cm^3 of distilled water in each case?

....

.... [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 ....

explanation ....

....
[2]

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

....

.... [2]

[Total: 19]

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2 You are provided with two solid salts, solid **E** and solid **F**.
Do the following tests on solid **E** and solid **F**, recording all of your observations at each stage.

tests on solid E

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

.... [1]

(b) Place about half of solid **E** in a hard glass test-tube. Heat the solid gently then strongly.
Record your observations.

....

.... [2]

Add the rest of solid **E** to about 10 cm^3 of distilled water in a boiling tube. Stopper the boiling tube and shake it to dissolve solid **E** and form solution **E**.
Divide solution **E** into three approximately equal portions in three test-tubes.

(c) Add a few drops of dilute nitric acid and about 1 cm^3 of aqueous silver nitrate to the first portion of solution **E**.
Record your observations.

.... [1]

(d) Add a few drops of dilute nitric acid and about 1 cm^3 of aqueous barium nitrate to the second portion of solution **E**.
Record your observations.

.... [1]

(e) Add an excess of aqueous sodium hydroxide to the third portion of solution **E**.
Record your observations.

.... [2]

(f) Identify solid **E**.

.... [2]

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tests on solid F

Add solid **F** to about 10 cm^3 of distilled water in a boiling tube. Stopper the boiling tube and shake it to dissolve solid **F** and form solution **F**.
Divide solution **F** into three approximately equal portions in three test-tubes.

(g) Test the pH of the first portion of solution **F**.

pH = ... [1]

(h) **(i)** Add a few drops of aqueous sodium hydroxide to the second portion of solution **F** and shake the mixture.
Record your observations.

.... [2]

(ii) Now add an excess of aqueous sodium hydroxide to the mixture.
Record your observations.

.... [1]

(i) Add an excess of aqueous ammonia to the third portion of solution **F**.
Record your observations.

.... [1]

(j) What conclusion can you draw about the cation present in solid **F**?

....

.... [1]

[Total: 15]

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3 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.

....

....

....

....

....

....

....

....

....

.... [6]

[Total: 6]

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Notes for use in qualitative analysis
Tests for anions

anion	test	test result
carbonate (CO_3^{2-})	add dilute acid	effervescence, carbon dioxide produced
chloride (Cl^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
bromide (Br^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	cream ppt.
iodide (I^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	yellow ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide, then aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify, then add aqueous barium nitrate	white ppt.
sulfite (SO_3^{2-})	add dilute hydrochloric acid, warm gently and test for the presence of sulfur dioxide	sulfur dioxide produced will turn acidified aqueous potassium manganate(VII) from purple to colourless

Tests for aqueous cations

cation	effect of aqueous sodium hydroxide	effect of aqueous ammonia
aluminium (Al^{3+})	white ppt., soluble in excess, giving a colourless solution	white ppt., insoluble in excess
ammonium (NH_4^+)	ammonia produced on warming	–
calcium (Ca^{2+})	white ppt., insoluble in excess	no ppt., or very slight white ppt.
chromium(III) (Cr^{3+})	green ppt., soluble in excess	grey-green ppt., insoluble in excess
copper(II) (Cu^{2+})	light blue ppt., insoluble in excess	light blue ppt., soluble in excess, giving a dark blue solution
iron(II) (Fe^{2+})	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) (Fe^{3+})	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc (Zn^{2+})	white ppt., soluble in excess, giving a colourless solution	white ppt., soluble in excess, giving a colourless solution

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Tests for gases

gas	test and test results
ammonia (NH_3)	turns damp red litmus paper blue
carbon dioxide (CO_2)	turns limewater milky
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	'pops' with a lighted splint
oxygen (O_2)	relights a glowing splint
sulfur dioxide (SO_2)	turns acidified aqueous potassium manganate(VII) from purple to colourless

Flame tests for metal ions

metal ion	flame colour
lithium (Li^+)	red
sodium (Na^+)	yellow
potassium (K^+)	lilac
copper(II) (Cu^{2+})	blue-green

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