Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

2908845984

CHEMISTRY **0620/52**

Paper 5 Practical Test **October/November 2017**

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 **10** printed pages and **2** blank pages.

CAMBRIDGE International Examinations

[Turn over

1 You are going to investigate what happens when two different solids, **S** and **T**, dissolve in water.

Read all the instructions carefully before starting the experiments.

Instructions
You are going to carry out two experiments.

(a) *Experiment 1*

- Put the polystyrene cup into the 250 cm^3 beaker for support.
- Use the measuring cylinder to pour 30 cm^3 of distilled water into the polystyrene cup.
- Measure the initial temperature of the water and record it in the first row of the table.
- Add the 2.0 g sample of solid **S** to the polystyrene cup and stir the solution with the thermometer.
- Measure and record the **maximum** temperature of the solution.
- Pour the solution away and rinse out the polystyrene cup with distilled water.

- Repeat the procedure using the 3.0 g sample of solid **S**. Record your results in the appropriate row of the table.
- Repeat the procedure using the 5.0 g sample of solid **S**. Record your results in the appropriate row of the table.

mass of solid **S** / g	initial temperature of the water / °C	maximum temperature of the solution / °C
2.0		
3.0		
5.0		

[2]

(b) *Experiment 2*

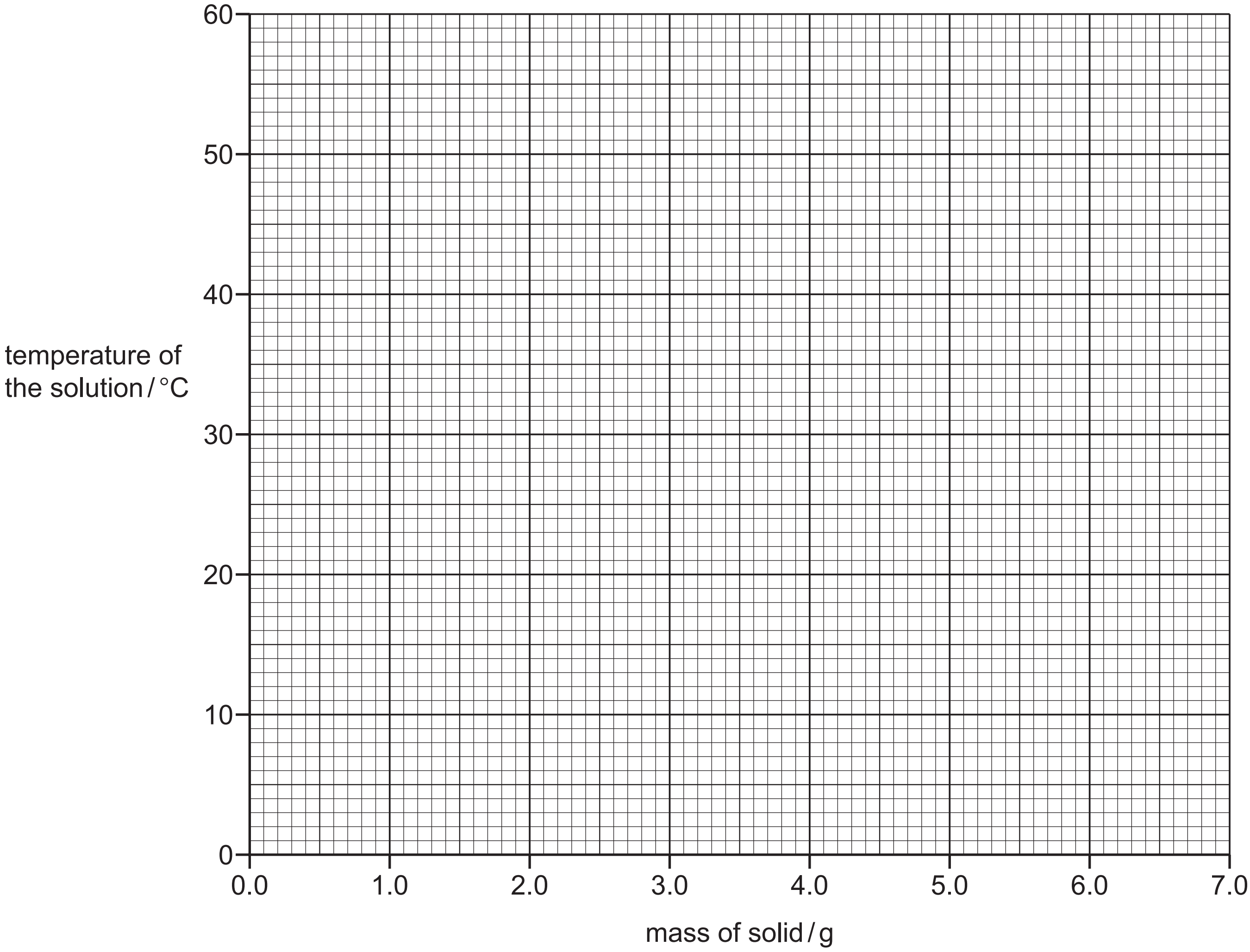
- Put the polystyrene cup into the 250 cm^3 beaker for support.
- Use the measuring cylinder to pour 30 cm^3 of distilled water into the polystyrene cup.
- Measure the initial temperature of the water and record it in the first row of the table.
- Add the 2.0 g sample of solid **T** to the polystyrene cup and stir the solution with the thermometer.
- Measure and record the **minimum** temperature of the solution.
- Pour the solution away and rinse out the polystyrene cup with distilled water.

- Repeat the procedure using the 3.0 g sample of solid **T**.
- Repeat the procedure using the 4.0 g sample of solid **T**.
- Repeat the procedure using the 6.0 g sample of solid **T**.
- Record your results in the appropriate rows of the table.

mass of solid **T** / g	initial temperature of the water / °C	minimum temperature of the solution / °C
2.0		
3.0		
4.0		
6.0		

[2]

(c) Plot your results for Experiment 1 (maximum temperature) and Experiment 2 (minimum temperature) on the grid. Draw **two** straight lines of best fit.
Clearly label your lines.



[4]

(d) (i) **From your graph**, deduce the maximum temperature of the solution if 6.0 g of solid **S** were added to 30 cm^3 of distilled water.

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

.... °C [2]

(ii) **From your graph**, deduce the minimum temperature of the solution if 4.5 g of solid **T** were added to 30 cm^3 of distilled water.

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

.... °C [2]

(e) Use your results to identify the type of energy change that occurs when solid **S** dissolves in water.

.... [1]

(f) 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]

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

.... [1]

(h) Explain how the temperatures measured would be different if Experiment 1 were repeated using 60 cm^3 of distilled water in each case.

....

.... [2]

[Total: 18]

Question 2 starts on the next page.

2 You are provided with two solid salts, **U** and **W**.
Carry out the following tests on solid **U** and solid **W**, recording all of your observations at each stage.

tests on solid U

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

.... [1]

Add about half of solid **U** to about 5 cm^3 of distilled water in a test-tube. Stopper the test-tube and shake it to dissolve solid **U** and form solution **U**.

Divide solution **U** into two equal portions in two test-tubes and carry out the following tests.

(b) To the first portion of solution **U**, add about 1 cm^3 of dilute hydrochloric acid.
Test the gas produced.
Record your observations.

....

.... [3]

Keep the second portion of solution **U** for the test in **(g)(i)**.

(c) Identify the gas produced in **(b)**.

.... [1]

(d) Carry out a flame test on solid **U**.
Record your observations.

.... [1]

(e) Identify solid **U**.

.... [2]

tests on solid W

Add about half of solid **W** to about 5 cm^3 of distilled water in a test-tube. Stopper the test-tube and shake it to dissolve solid **W** and form solution **W**.

Divide solution **W** into two equal portions in two test-tubes and carry out the following tests.

(f) To the first portion of solution **W**, add a few drops of dilute nitric acid and about 1 cm^3 of aqueous silver nitrate.
Record your observations.

.... [2]

(g) **(i)** To the second portion of solution **W**, add the second portion of solution **U**.
Record your observations.

.... [2]

(ii) Now add an excess of dilute hydrochloric acid to the mixture from **(g)(i)**.
Record your observations.

.... [2]

(h) What conclusions can you draw about solid **W**?

....

.... [2]

[Total: 16]

3 When iron nails rust, the mass of the nails increases.
Plan an experiment to investigate if iron nails rust more quickly in tap water or in distilled water.
You are provided with new iron nails and common laboratory apparatus.

....

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....

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....

....

.... [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

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