Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

CHEMISTRY **0620/52**

Paper 5 Practical Test **October/November 2019**

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	
1	
2	
3	
Total	

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 **9** printed pages and **3** blank pages.

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

Read all the instructions carefully before starting the experiments.

Instructions
You are going to do two experiments.

(a) *Experiment 1*

View solution

- Put a polystyrene cup in 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 distilled water and record it in the table.
- Add all of solid **N** to the distilled water, start the timer and stir the mixture with the stirring thermometer.
- Continue to stir the mixture and measure the temperature of the mixture every 30 seconds for three minutes (180 seconds).
- Record your results in the table.

time / s	0	30	60	90	120	150	180
temperature of mixture / °C							

[2]

(b) *Experiment 2*

View solution

- Place the other polystyrene cup in 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 distilled water and record it in the table.
- Add all of solid **O** to the distilled water, start the timer and stir the mixture with the stirring thermometer.
- Continue to stir the mixture and measure the temperature of the mixture every 30 seconds for three minutes (180 seconds).
- Record your results in the table.

time / s	0	30	60	90	120	150	180
temperature of mixture / °C							

[2]

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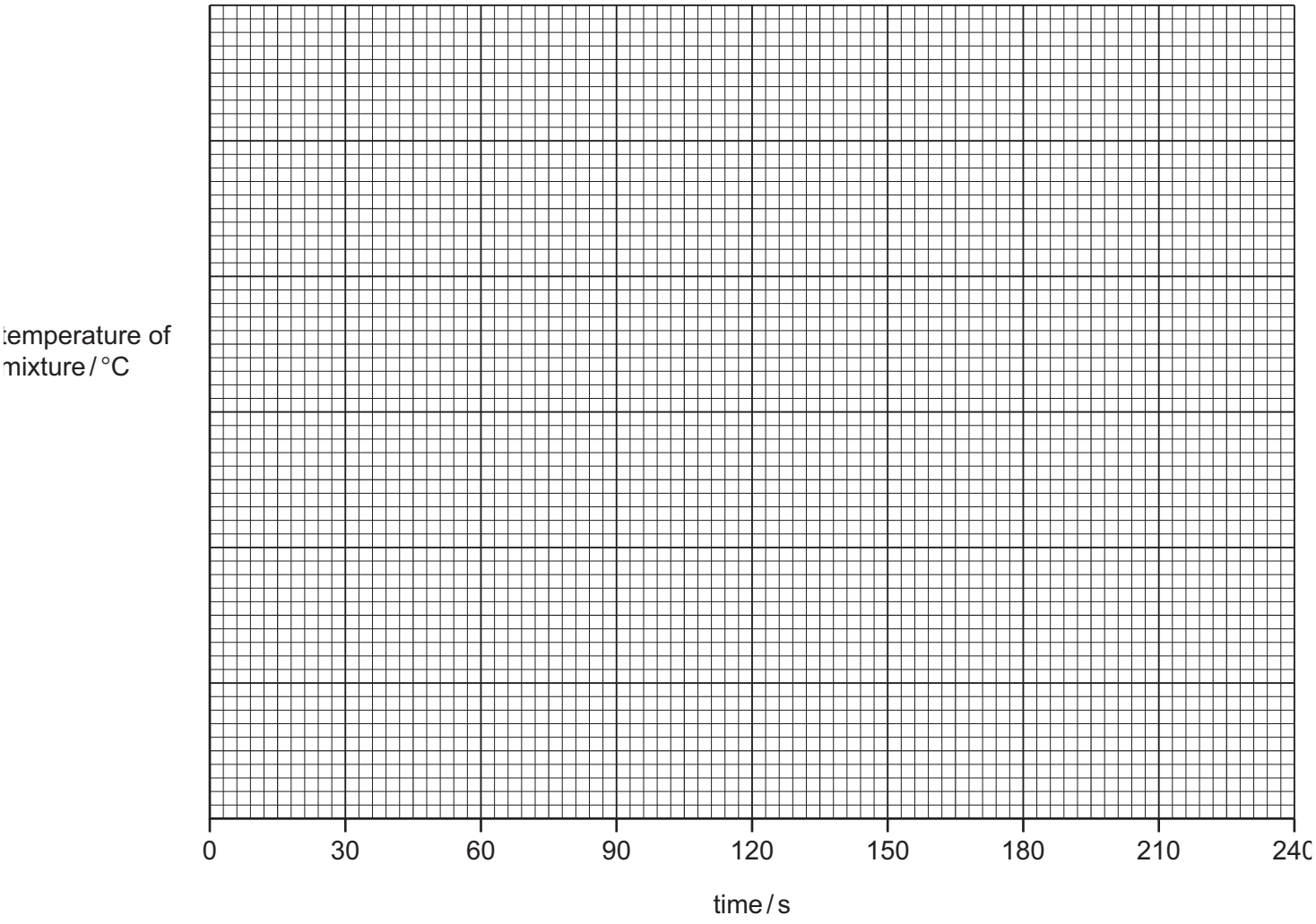
(c) Plot your results for Experiments 1 and 2 on the grid. Draw **two** smooth line graphs. Clearly label your graphs.

View solution



[4]

(d) (i) **From your graph**, deduce the time taken for the initial temperature of the solution in Experiment 2 to change by 3 °C.

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

View solution

..... s [3]

(ii) Extend your graph for Experiment 1 to suggest the expected temperature of the mixture after 240 seconds.

..... °C [1]

(e) Is the energy change in Experiment 2 exothermic or endothermic? Explain your answer.

View solution

.....

..... [1]

(f) State **two** possible sources of error in these experiments. Suggest **two** improvements to reduce each of these sources of error.

source of error 1 .....

improvement 1 .....

source of error 2 .....

improvement 2 .....

View solution [4]

(g) Suggest and explain the effect on the results if Experiment 1 were repeated using 15 cm^3 of distilled water.

.....

..... [2]

[Total: 19]

View solution

2 You are provided with two solids, **P** and **Q**, which are both salts.
Do the following tests on solid **P** and solid **Q**, recording all of your observations at each stage.

tests on solid P

(a) Do a flame test on a small sample of solid **P**.
Record your observations.

View solution

..... [1]

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

(b) (i) Add a few drops of aqueous sodium hydroxide to the first portion of solution **P** in a test-tube.
Record your observations.

..... [1]

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

View solution

..... [1]

(c) (i) Add a few drops of aqueous ammonia to the second portion of solution **P** in a test-tube.
Record your observations.

..... [1]

(ii) Now add an excess of aqueous ammonia to this mixture.
Record your observations.

View solution

..... [2]

(d) Add a small piece of aluminium foil and about 2 cm^3 of aqueous sodium hydroxide to the third portion of solution **P** in a boiling tube. Gently warm the mixture. Test the gas produced with litmus paper.
Record your observations.

View solution

.....

..... [3]

(e) Identify solid **P**.

View solution

..... [2]

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tests on solid Q

(f) Do a flame test on a small sample of solid **Q**.
Record your observations.

View solution

..... [1]

(g) Add the rest of solid **Q** to about 5 cm^3 of distilled water in a test-tube. Stopper the test-tube and shake the mixture to dissolve solid **Q**.

Add a few drops of dilute nitric acid and about 1 cm^3 of aqueous silver nitrate to this solution.
Record your observations.

..... [1]

(h) Identify solid **Q**.

..... [2]

[Total: 15]

View solution

3 The table gives some information about the properties of three substances found in a hand cream.

View solution

substance	reaction with dilute nitric acid
polystyrene beads	no reaction
calcium carbonate	reacts and dissolves
sodium fluoride	dissolves

Use the information in the table to plan an experiment to obtain a pure, dry sample of polystyrene beads from this mixture of substances.

You are provided with a mixture of the three substances and common laboratory apparatus.

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..... [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 result
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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