



# Cambridge IGCSE™

CANDIDATE  
NAME

CENTRE  
NUMBER

--	--	--	--	--

CANDIDATE  
NUMBER

--	--	--	--

**CHEMISTRY**

**0620/61**

Paper 6 Alternative to Practical

**October/November 2020**

**1 hour**

You must answer on the question paper.

No additional materials are needed.

## INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

## INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Blank pages are indicated.

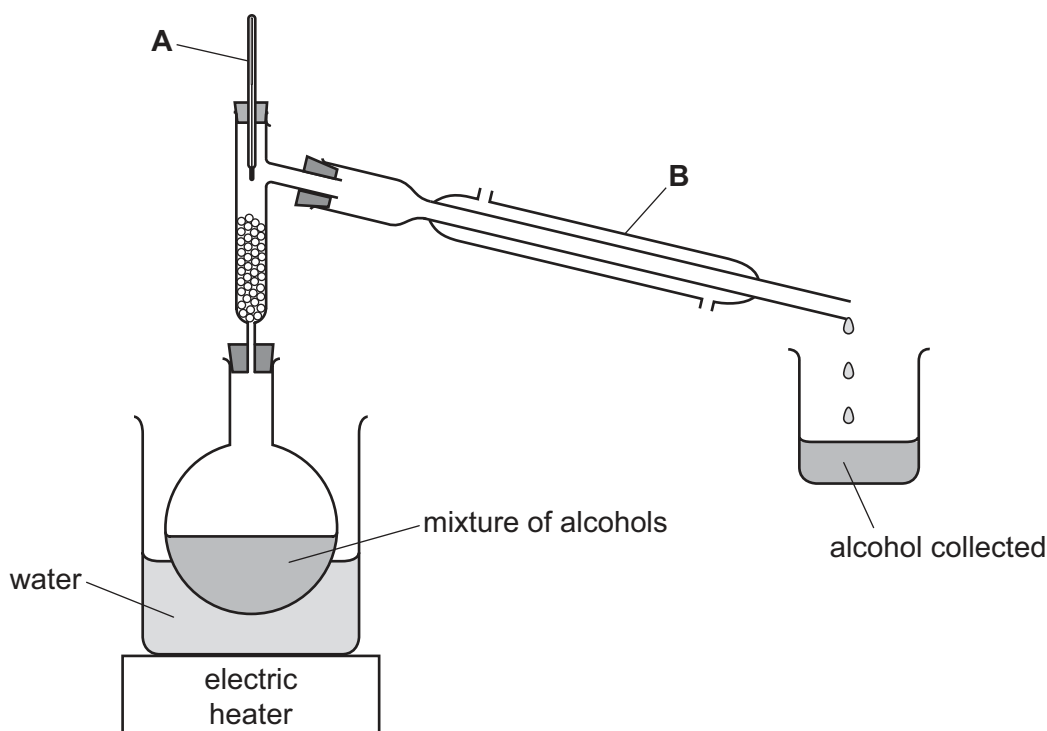




1 The table gives the boiling points of four alcohols.

alcohol	boiling point/°C
butanol	117
ethanol	79
pentanol	138
propanol	97

The apparatus shown can be used to obtain propanol from a mixture containing butanol, ethanol, pentanol and propanol.



(a) Name the items of apparatus labelled **A** and **B**.

**A** .....

**B** .....

[2]

(b) Name this method of separation.

..... [2]

(c) Explain why it is safer to heat the mixture of alcohols in the way shown rather than with a Bunsen burner.

..... [1]

(d) Describe how propanol can be obtained from the mixture. Use data from the table.

.....  
.....  
..... [2]

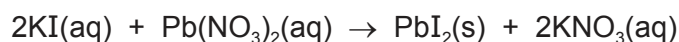
(e) Explain why the apparatus in the diagram **cannot** be used to obtain butanol from the mixture.

.....  
..... [1]

[Total: 8]

- 2 A student investigated the mass of lead(II) iodide precipitate formed when aqueous potassium iodide reacts with aqueous lead(II) nitrate.

The equation for the reaction is shown.



The student did seven experiments.

*Experiment 1*

- Using a 50 cm<sup>3</sup> measuring cylinder, 25 cm<sup>3</sup> of aqueous potassium iodide was poured into a beaker.
- Using a clean 50 cm<sup>3</sup> measuring cylinder, 10 cm<sup>3</sup> of aqueous lead(II) nitrate was added to the aqueous potassium iodide in the beaker. The solutions were mixed together.
- The mass of the precipitate of lead(II) iodide formed was found.

*Experiment 2*

- Experiment 1 was repeated using a larger volume of aqueous lead(II) nitrate than in Experiment 1.

*Experiment 3*

- Experiment 1 was repeated using a larger volume of aqueous lead(II) nitrate than in Experiment 2.

*Experiment 4*

- Experiment 1 was repeated using a larger volume of aqueous lead(II) nitrate than in Experiment 3.

*Experiment 5*

- Experiment 1 was repeated using a larger volume of aqueous lead(II) nitrate than in Experiment 4.

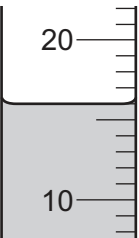
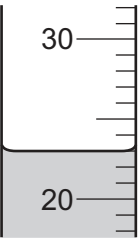

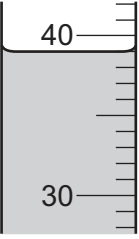
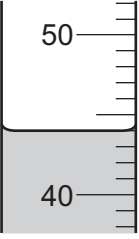
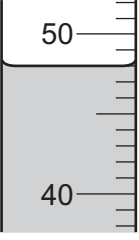
*Experiment 6*

- Experiment 1 was repeated using a larger volume of aqueous lead(II) nitrate than in Experiment 5.

*Experiment 7*

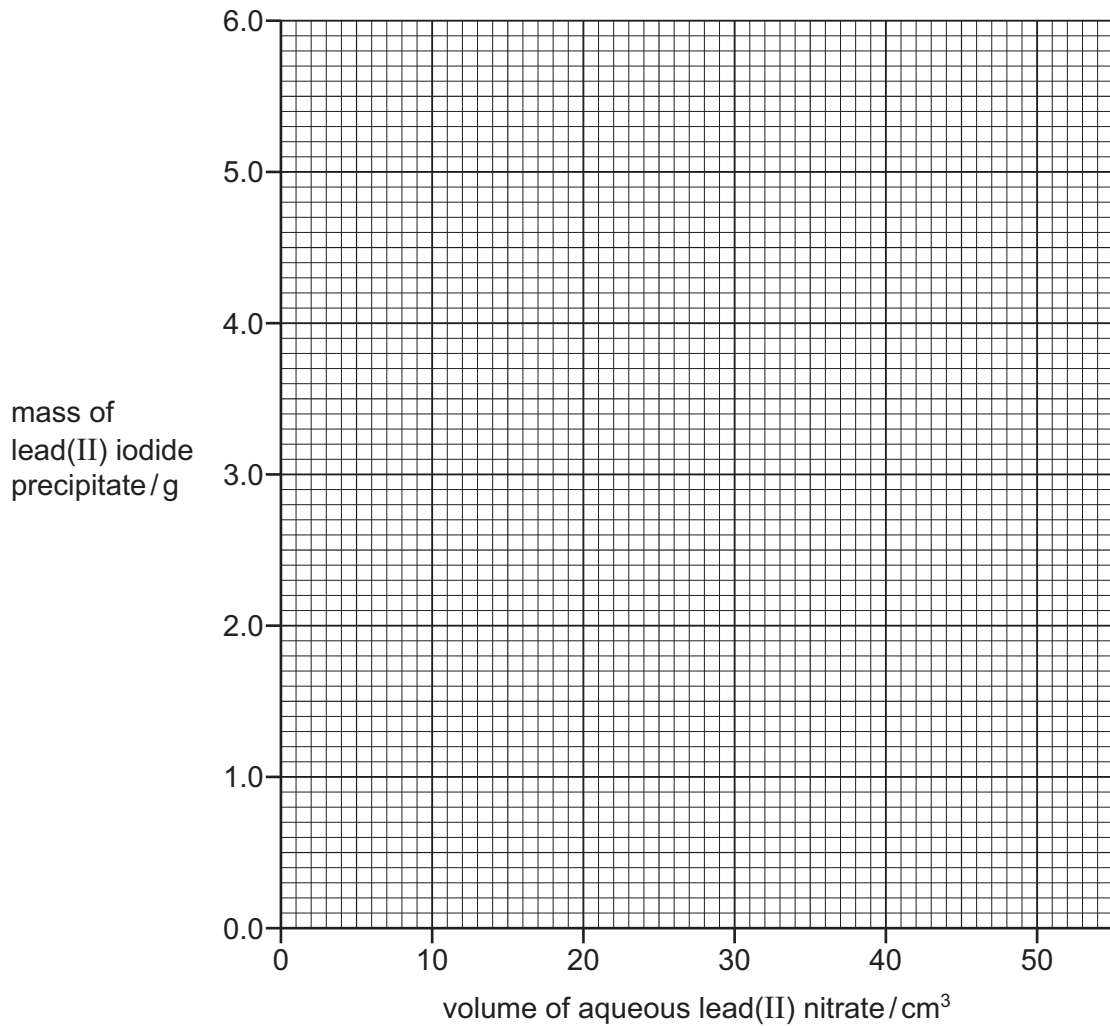
- Experiment 1 was repeated using a larger volume of aqueous lead(II) nitrate than in Experiment 6.

(a) Use the measuring cylinder diagrams to complete the table.

experiment	volume of aqueous potassium iodide / cm <sup>3</sup>	measuring cylinder diagram for aqueous lead(II) nitrate	volume of aqueous lead(II) nitrate / cm <sup>3</sup>	mass of lead(II) iodide precipitate / g
1	25		10	1.4
2	25			2.3
3	25			3.3
4	25			4.1
5	25			5.1
6	25			5.1
7	25			5.1

[2]

- (b) Plot the results from Experiments 1 to 7 on the grid. Draw two straight lines through the points. Extend your straight lines so that they meet.



[5]

- (c) **From your graph**, deduce the mass of lead(II) iodide precipitate that would be formed if Experiment 1 was repeated using  $20\text{ cm}^3$  of aqueous lead(II) nitrate.

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

mass = ..... g [2]

- (d) Explain why the same mass of precipitate is formed in Experiment 5, Experiment 6 and Experiment 7.

.....  
 ..... [1]

- (e) Sketch **on the grid** the graph you would expect if all of the experiments were repeated using aqueous potassium iodide with half the concentration. [2]

(f) (i) State why using a 25.0 cm<sup>3</sup> pipette to measure the volume of aqueous potassium iodide would be an improvement.

.....  
..... [1]

(ii) State why a 25.0 cm<sup>3</sup> pipette could **not** be used to measure the volume of aqueous lead(II) nitrate in each experiment.

.....  
..... [1]

(g) Describe how the solid lead(II) iodide can be separated from the reaction mixture and its mass found.

.....  
.....  
.....  
.....  
.....  
.....  
..... [3]

[Total: 17]



- 3 Solid **Y** and solid **Z** were analysed.  
Tests were done on each solid.

tests on solid <b>Y</b>	observations
<p>Solid <b>Y</b> was dissolved in distilled water to form solution <b>Y</b>. Solution <b>Y</b> was divided into four portions in four boiling tubes.</p> <p><b>test 1</b></p> <p>Aqueous ammonia was added dropwise and then in excess to the first portion of solution <b>Y</b>.</p>	<p>a white precipitate formed which was insoluble in excess</p>
<p><b>test 2</b></p> <p>Aqueous sodium hydroxide was added dropwise and then in excess to the second portion of solution <b>Y</b>.</p>	<p>a white precipitate formed which dissolved in excess to form a colourless solution</p>
<p><b>test 3</b></p> <p>A piece of aluminium foil was added to the solution formed in <b>test 2</b>. The mixture was warmed and any gas given off was tested.</p>	<p>the gas turned damp red litmus paper blue</p>
<p><b>test 4</b></p> <p>About 1 cm<sup>3</sup> of dilute nitric acid and a few drops of aqueous silver nitrate were added to the third portion of solution <b>Y</b>.</p>	<p>the solution remained colourless, no precipitate formed</p>

- (a) Name the gas given off in **test 3**.

..... [1]

- (b) Identify solid **Y**.

.....

..... [2]

- (c) A strip of universal indicator paper was dipped into the fourth portion of solution **Y**.  
The universal indicator paper turned orange.

What additional information does this give about solution **Y**?

..... [1]

**tests on solid Z**

Solid **Z** was iron(II) sulfate.

Complete the expected observations.

Solid **Z** was dissolved in water to produce solution **Z**. Solution **Z** was split into three equal portions in three boiling tubes.

**(d)** Aqueous ammonia was added dropwise and then in excess to the first portion of solution **Z**.

observations .....

.....

..... [2]

**(e)** About 2 cm<sup>3</sup> of dilute hydrochloric acid was added to the second portion of solution **Z**.

observations ..... [1]

**(f)** The solution from **(e)** was warmed and a piece of filter paper soaked in acidified aqueous potassium manganate(VII) was held at the mouth of the boiling tube.

observations ..... [1]

**(g)** About 1 cm<sup>3</sup> of dilute nitric acid followed by a few drops of aqueous barium nitrate were added to the third portion of solution **Z**.

observations ..... [1]

[Total: 9]



**BLANK PAGE**

---

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at [www.cambridgeinternational.org](http://www.cambridgeinternational.org) after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.