AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

Level 3 Certificate/Extended Certificate

APPLIED SCIENCE

Unit 1 Key Concepts in Science
Section B – Chemistry

Monday 12 June 2023 Afternoon

Time allowed: 1 hour 30 minutes.
You are advised to spend approximately 30 minutes on this section.

Materials
For this paper you must have:
- a calculator
- the Formulae Sheet (enclosed)
- the Periodic Table (enclosed).

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in each section.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

For Examiner's Use	
Question	Mark
1	
2	
3	
TOTAL	

Information
- You will be provided with a copy of the Formulae Sheet and Periodic Table.
- There are three sections in this paper:
  Section A – Biology **Section B** – Chemistry **Section C** – Physics.
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60 and the maximum mark for this section is 20.

Advice
Read each question carefully.

Do not write outside the box

Section B – Chemistry

Answer **all** the questions in this section.

0 1 A student used a pH meter to record the change in pH during an acid-base titration.

Table 1 shows the results.

Table 1

Volume of Base / cm^3	0	5	10	15	19	20	21	25	30	35	40
pH	1.0	1.0	1.0	1.2	1.9	2.4	7.6	8.8	9.4	10	10.3

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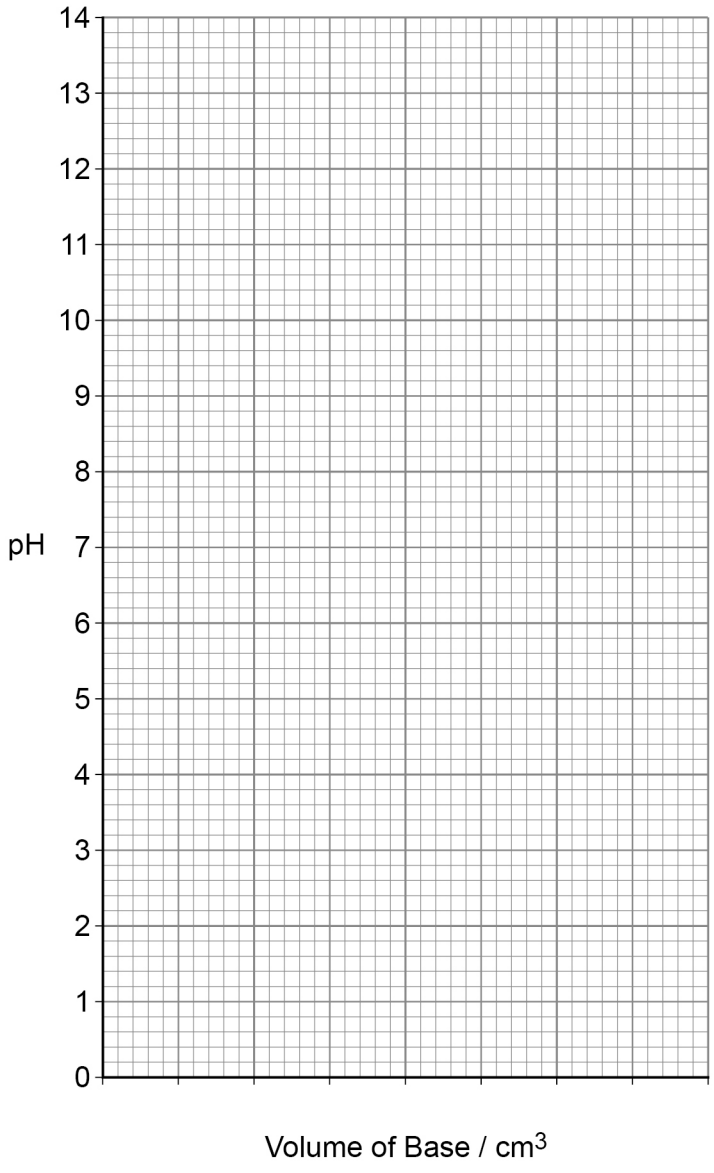
0 1 . 1 Plot the results in **Table 1** on **Figure 1**.

You should:

- add a scale to the x-axis
- draw a line of best fit.

[4 marks]

Figure 1



0 1 . 2 Determine the equivalence point.

Use **Figure 1**.

[1 mark]

_____ cm^3

Question 1 continues on the next page

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0 1 . 3 Which combination of acid and base was used for the titration in Question **01.1**?

Tick (✓) **one** box.

[1 mark]

Strong acid-strong base ☐

Strong acid-weak base ☐

Weak acid-strong base ☐

Weak acid-weak base ☐

6

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0 2 Potassium is an element in Group 1 of the Periodic Table.

Group 1 elements are called alkali metals.

0 2 . 1 Suggest why this group of metals are called alkali metals.

[1 mark]

0 2 . 2 Give the charge on a potassium ion.

[1 mark]

0 2 . 3 Potassium-40 (^{40}K) is one isotope of potassium.

State the number of protons and neutrons in an atom of the potassium-40 isotope.

Use the Periodic Table.

[2 marks]

Numbers of protons _____

Numbers of neutrons _____

Question 2 continues on the next page

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0 2 . 4 **Table 2** shows information about a sample of potassium that contains three isotopes.

Table 2

Isotope	Symbol	Isotopic abundance / %
Potassium-39	^{39}K	86.70
Potassium-40	^{40}K	4.39
Potassium-41	^{41}K	

Calculate the relative atomic mass of potassium.

[3 marks]

Relative atomic mass = _____

0 2 . 5 Draw a diagram to show the metallic bonding in potassium metal.

Label each type of particle.

[2 marks]

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0 2 . 6 Metals are usually hard.

Explain why.

[2 marks]

11

Turn over for the next question

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0 3 Ammonia (NH_3) is widely used in industry.

0 3 . 1 Balance the symbol equation for the combustion of ammonia.

[2 marks]

$$4\,NH_3 + \_\_\_\_\ O_2 \rightarrow \_\_\_\_\ N_2 + \_\_\_\_\ H_2O$$

Ammonia Oxygen → Nitrogen Water

0 3 . 2 Ammonia is the hydride of nitrogen.

Phosphorus (P) is in the same group of the Periodic Table as nitrogen (N).

Suggest the formula for the hydride of phosphorus.

[1 mark]

_____

3

END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

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