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

Tuesday 17 January 2023 Morning

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 the 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.

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Section B – Chemistry

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

0 1 Across the Periodic Table, the properties of the elements change from metallic to non-metallic.

0 1 . 1 What is the name given to the elements in Group 0 (18)?

[1 mark]

0 1 . 2 Group 0 (18) elements are very unreactive.

Explain why.

You should refer to electrons in your answer.

[2 marks]

0 1 . 3 Explain why the ionisation energies of Group 0 (18) elements decrease as atomic number increases.

[2 marks]

Do not write outside the box

0 1 . 4 Calculate the number of moles of neon in 0.250 m^3 of the gas at 110 kPa and 800 K.

The gas constant, R = 8.31 $JK^{-1}mol^{-1}$

Use the Formulae Sheet.

Give your answer to **3** significant figures.

[4 marks]

Number of moles of neon = _____

9

Turn over for the next question

Do not write outside the box

0 2 When magnesium carbonate ($MgCO_3$) is heated strongly it produces magnesium oxide and carbon dioxide.

0 2 . 1 What is the name given to this type of reaction?

[1 mark]

0 2 . 2 Write the balanced symbol equation for this reaction.

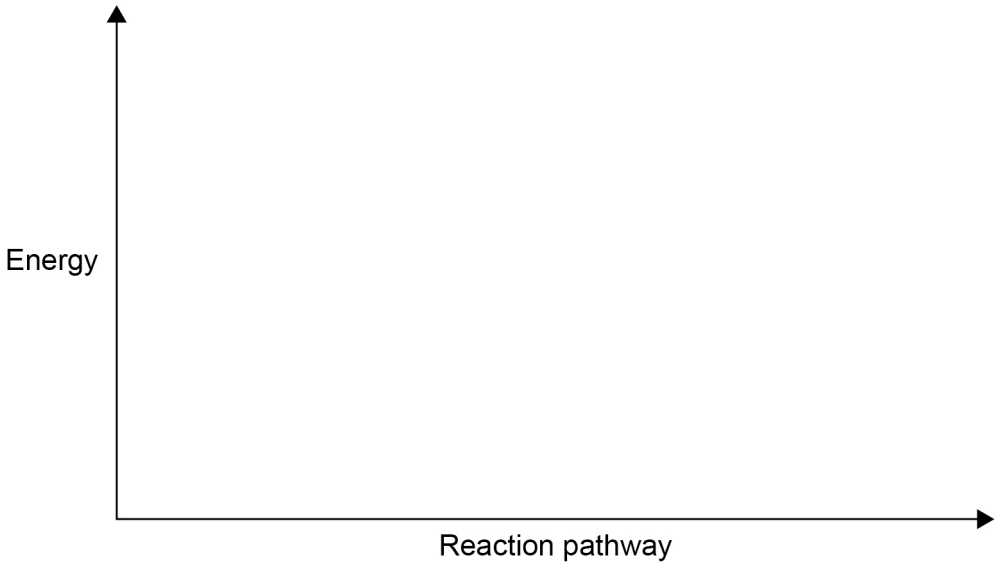
[1 mark]

0 2 . 3 Draw the energy profile on **Figure 1** for this endothermic reaction.

You should label the reactants and the products on your profile.

[3 marks]

Figure 1



0 2 . 4 Draw an arrow to show the activation energy on your energy profile in **Figure 1**.

[1 mark]

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0 2 . 5 Alloys of magnesium are useful because they have a low density.

Draw and label a diagram to show the arrangement of particles in an alloy that contains 90% magnesium and 10% aluminium.

[2 marks]

Turn over for the next question

8

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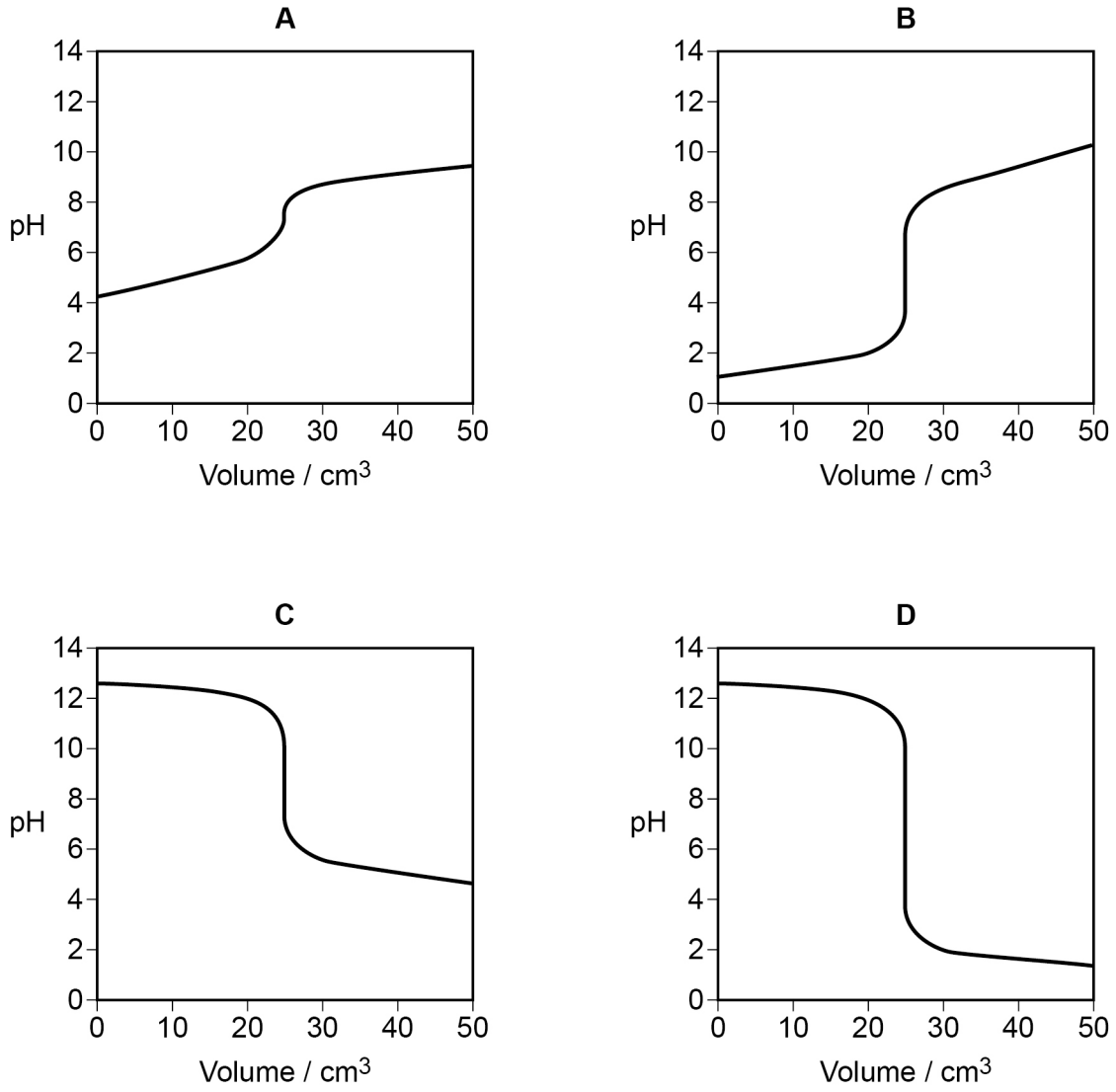
0 3 **Figure 2** shows titration curves for combinations of different acids and bases.

All solutions have the same concentration.

Figure 2



0 3 . 1 Which titration curve shows a weak base being added to a strong acid?

[1 mark]

_____

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Table 1 shows some acid-base indicators and the pH ranges of their colour change.

Table 1

Indicator	pH range
Bromophenol blue	3.0–4.6
Methyl orange	3.1–4.4
Bromothymol blue	6.0–7.6
Thymolphthalein	9.3–10.5

0 3 . 2 Suggest which **one** indicator from **Table 1** could be used in the titration that produces curve **C**.

Explain your choice.

[2 marks]

Indicator _____

Explanation _____

_____

_____

3

END OF QUESTIONS

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