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National Qualifications 2025

Mark

X813/76/01

Chemistry Paper 2

THURSDAY, 1 MAY

10:10 AM – 12:30 PM

X8137601

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth

Day | Month | Year

Scottish candidate number

Total marks — 95

Attempt ALL questions.

You may use a calculator.

You may refer to the Chemistry Data Booklet for Higher and Advanced Higher.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers and rough work is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting. Any rough work must be written in this booklet. Score through your rough work when you have written your final copy.

Use **blue** or **black** ink.

Before leaving the examination room you must give this booklet to the Invigilator; if you do not, you may lose all the marks for this paper.

SQA ©

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Total marks — 95

Attempt ALL questions

1. Some metal ions are required for a healthy diet.

(a) Sodium, magnesium and calcium form positively charged ions.

The table shows the values for ionisation energies for these elements.

Element	Ionisation energies (kJ mol^{-1})			
	First	Second	Third	Fourth
Sodium	496	4562	6910	9543
Magnesium	738	1451	7733	10 543
Calcium	590	1145	4912	6491

(i) Write the equation for the first ionisation of sodium. **1**

(ii) Using the ionisation energies from the table, calculate the energy required, in kJ mol^{-1}, for the following reaction. **1**

$$Ca(g) \rightarrow Ca^{2+}(g) + 2e^-$$

(iii) Explain **fully** why the second ionisation energy of sodium is much higher than the second ionisation energy of magnesium. **2**

1. (a) (continued)

(iv) The Mg^{2+} ion and the Na^{+} ion have the same number of occupied energy levels.

Explain why the Mg^{2+} ion is smaller than the Na^{+} ion. **1**

(b) Potassium forms ionic bonds.

(i) State what is meant by the term ionic bond. **1**

(ii) Adults with low potassium levels may be advised to take tablets or eat potassium-rich foods.

An adult takes eight potassium tablets per day for seven days. Each tablet contains 0.0012 moles of potassium ($GFM = 39.1$ g).

A banana contains an average mass of 450 mg of potassium.

Calculate the number of whole bananas the adult would have to consume to provide the same mass of potassium provided by eight tablets per day for seven days. **2**

[Turn over