1 This question is about bromine and some of its compounds.

(a) Atoms of bromine can be represented as ^{79}Br and ^{81}Br

(i) State the number of protons, neutrons and electrons in an atom of ^{79}Br

(2)

Protons .....

Neutrons .....

Electrons .....

(ii) What name is used for atoms of bromine that have different numbers of neutrons?

(1)

.....

(iii) Why do all atoms of bromine have the same chemical properties?

(1)

.....

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(iv) The relative atomic mass of bromine is given in the Periodic Table as 80, but a more accurate value is 79.9

Suggest, with a reason, which of the atoms ^{79}Br and ^{81}Br exists in greater numbers in a sample of bromine.

(2)

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(b) Hydrogen bromide (HBr) and sodium bromide (NaBr) are compounds of bromine.

(i) Draw a dot and cross diagram to represent a hydrogen bromide molecule.

Show only the outer electrons in each atom.

(2)

(ii) Explain how the atoms are held together in a hydrogen bromide molecule.

(2)

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(iii) Explain why sodium bromide has a higher melting point than hydrogen bromide.

(3)

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(c) A compound has the percentage composition 13.8% sodium, 47.9% bromine and 38.3% oxygen by mass.

Calculate its empirical formula.

(3)

Empirical formula = ...

(Total for Question 1 = 16 marks)

2 The table shows some properties of four substances A, B, C and D.

Substance	Melting point in °C	Boiling point in °C	Conducts electricity when solid?	Conducts electricity when molten?
A	–101	–35	no	no
B	1063	2970	yes	yes
C	801	1413	no	yes
D	3550	4830	no	no

(a) Use the information in the table to identify the substance that

(i) is a metal

(1)

☐ **A** ☐ **B** ☐ **C** ☒ **D**

(ii) could be diamond

(1)

☐ **A** ☐ **B** ☐ **C** ☐ **D**

(iii) is a gas at 20 °C

(1)

☐ **A** ☐ **B** ☐ **C** ☐ **D**

(iv) contains oppositely charged ions

(1)

☐ **A** ☐ **B** ☐ **C** ☐ **D**

(b) Some of the substances in the table are compounds.

What is meant by the term **compound**?

(2)

.....

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.....

(c) (i) The electronic configurations of atoms of sodium and chlorine are

Na 2.8.1

Cl 2.8.7

Describe the changes in the electronic configurations of sodium and chlorine when these atoms form sodium chloride.

(3)

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(ii) Calculate the relative formula mass of sodium chloride (NaCl).

Use the Periodic Table on page 2 to help you.

(2)

relative formula mass = ...

(Total for Question 2 = 11 marks)

3 Use the the Periodic Table on page 2 to answer this question.

(a) (i) The symbol for silver is

(1)

☒ **A** Ag ☒ **B** As ☒ **C** S ☒ **D** Si

(ii) The element with an atomic number of 40 is

(1)

☒ **A** Al ☒ **B** Ar ☒ **C** Ca ☒ **D** Zr

(b) An atom of an element has the electronic configuration 2.8.3

(i) State the number of the group in the Periodic Table in which this element is found.

(1)

.....

(ii) Explain your answer in terms of the atom's electronic configuration.

(1)

.....

.....

(iii) State the number of the period in the Periodic Table in which this element is found.

(1)

.....

(iv) Explain your answer in terms of the atom's electronic configuration.

(1)

.....

.....

(v) Identify the element.

(1)

.....

(c) Complete the diagram to show the electronic configuration of an atom of fluorine, using x to represent an electron.

(1)



(Total for Question 3 = 8 marks)

4 Bromine is an element in Group 7 of the Periodic Table.

(a) What is the name given to the Group 7 elements?

(1)

☒ **A** alkali metals ☒ **B** alkaline earth metals ☒ **C** halogens ☒ **D** noble gases

(b) The symbols of two isotopes of bromine are $^{79}_{35}Br$ and $^{81}_{35}Br$.

(i) State what is meant by the term **isotopes**.

(2)

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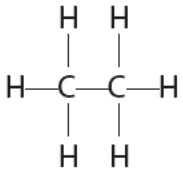
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(ii) Complete the table to show the number of protons, neutrons and electrons in one atom of $^{79}_{35}Br$ and in one atom of $^{81}_{35}Br$.

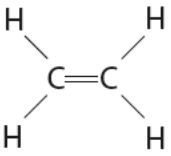
(3)

Isotope	Number of protons	Number of neutrons	Number of electrons
$^{79}_{35}Br$			
$^{81}_{35}Br$			

(c) Bromine water can be used to distinguish between ethane and ethene.



ethane



Describe what you would observe when orange bromine water is added separately to ethane and ethene, in the absence of UV light.

(2)

observation with ethane.....

observation with ethene.....

(Total for Question 4 = 8 marks)

5 This question is about elements in Group 1 of the Periodic Table.

(a) Which statement is correct about lithium?

(1)

- ☒ **A** lithium is a non-metal
- ☒ **B** lithium forms a sulfate with the formula $LiSO_4$
- ☒ **C** lithium reacts with water to form an alkali
- ☒ **D** lithium reacts with water to form a white precipitate

(b) Lithium and potassium have similar chemical properties because their atoms

(1)

- ☒ **A** have the same number of electrons in the outer shell
- ☒ **B** have the same number of protons
- ☒ **C** have two electrons in the first shell
- ☒ **D** form positive ions

(c) Small pieces of lithium and potassium are added to separate large troughs of water.

State one observation that would be similar for each element, and one that would be different for each element.

(2)

similar .....

.....

different .....

.....

(d) Suggest the formula of the compound formed when potassium reacts with oxygen, and when potassium reacts with chlorine.

(2)

oxygen .....

chlorine .....

(e) Complete the equation for the reaction between rubidium and water by inserting state symbols.

(1)

$$2Rb(\ldots\ldots) + 2H_2O(\ldots\ldots) \rightarrow 2RbOH(\ldots\ldots) + H_2(\ldots\ldots)$$

(f) The table shows information about the isotopes in a sample of rubidium.

Isotope	Number of protons	Number of neutrons	Percentage of isotope in sample
1	37	48	72
2	37	50	28

Use information from the table to calculate the relative atomic mass of this sample of rubidium. Give your answer to one decimal place.

(2)

relative atomic mass = ...

(Total for Question 5 = 9 marks)