1 Potassium sulfide is an ionic compound.

(a) Complete the table to show the arrangement of electrons in the ions formed when potassium and sulfur react to form potassium sulfide.

Give the charge on each of the ions.

(3)

Element	Arrangement of electrons in atom	Arrangement of electrons in ion	Charge on ion
K	2.8.8.1		
S	2.8.6		

(b) (i) Explain why potassium sulfide conducts electricity when molten.

(1)

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(ii) Explain why potassium sulfide has a high melting point.

(3)

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(Total for Question 1 = 7 marks)

2 The table shows the numbers of particles in two atoms, L and M.

	Atom L	Atom M
number of electrons	6	6
number of neutrons	8	6
number of protons	6	6

(a) Which particles are present in the nuclei of both atoms?

(1)

- ☒ **A** electrons and neutrons
- ☒ **B** electrons and protons
- ☒ **C** neutrons and protons
- ☒ **D** neutrons, protons and electrons

(b) (i) The atomic number of atom L is ..... .

(1)

(ii) The mass number of atom L is ..... .

(1)

(c) Atoms L and M are neutral because

(1)

- ☒ **A** the numbers of electrons and neutrons are equal
- ☒ **B** the numbers of electrons and protons are equal
- ☒ **C** the numbers of neutrons and protons are equal
- ☒ **D** the numbers of electrons, neutrons and protons are equal

(d) Use information from the table to explain why atoms L and M are isotopes of the same element.

(2)

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(e) The electronic configuration of atom M is

(1)

- ☒ **A** 2.2.2
- ☒ **B** 2.4
- ☒ **C** 2.4.6
- ☒ **D** 4.2

(Total for Question 2 = 7 marks)

3 (a) Complete the table to show the relative mass and relative charge of a proton, a neutron and an electron.

(4)

	Proton	**Neutron**	**Electron**
Relative mass			1/1840
Relative charge	+		

(b) The symbol for an atom of one isotope of hydrogen is $^{3}_{1}H$

(i) State the number of protons, neutrons and electrons present in one atom of this isotope.

(2)

Number of protons .....

Number of neutrons .....

Number of electrons .....

(ii) What is meant by the term **isotopes**?

(2)

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(c) Bromine has two naturally-occurring isotopes with mass numbers 79 and 81.
A sample of bromine contained the two isotopes in the following proportions:

bromine-79 50.7% and bromine-81 49.3%

Use this information to calculate the relative atomic mass of bromine.
Give your answer to **two** decimal places.

(2)

(Total for Question 3 10 marks)

4 Hydrated copper(II) sulfate is a soluble blue solid. A large crystal of this solid is placed at the bottom of a beaker of water.

The diagram shows the beaker immediately after placing the crystal in it, and after two days.



after placing the crystal

after two days

(a) After two days, the crystal becomes smaller and the liquid near the bottom of the beaker becomes blue.

Which statement explains these observations?

(1)

☒ **A** the crystal dissolves

☒ **B** the crystal freezes

☒ **C** the crystal melts

☒ **D** the crystal sublimes

(b) After two weeks, the crystal has disappeared.

Which statement best describes the appearance of the liquid in the beaker after two weeks?

(1)

☒ **A** it is all blue

☒ **B** it is all brown

☒ **C** only the lower part is blue

☒ **D** only the upper part is blue

(c) The formula of the compound in the crystal is $CuSO_4.5H_2O$

(i) How many different elements are shown in the formula?

(1)

.....

(ii) How many atoms are shown in the formula?

(1)

.....

(Total for Question 4 = 4 marks)

5 Bromine and iodine are halogens.

(a) Complete the table by giving the colour and physical state of each of these halogens at room temperature.

(2)

Halogen	Colour	Physical state
bromine	red-brown	
iodine		solid

(b) Bromine reacts with phosphorus to form the covalent compound phosphorus tribromide.

Draw a dot and cross diagram to show the outer electrons in a molecule of phosphorus tribromide.

(2)

Br P Br

Br

(c) Phosphorus tribromide reacts with water to form a mixture of two acids, HBr and H_3PO_3

Write a chemical equation for this reaction.

(2)

.....

(Total for Question 5 = 6 marks)