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Student number

Name _____

Date _____

Attempt/Time taken _____

GCSE
CHEMISTRY

Topic Paper: 1 Atomic structure and the periodic table

Time allowed: 35 minutes

Materials

For this paper you must have:

- the Periodic Table/Data Sheet, provided as an insert (enclosed)
- a ruler with millimetre measurements
- a calculator, which you are expected to use where appropriate.

Instructions

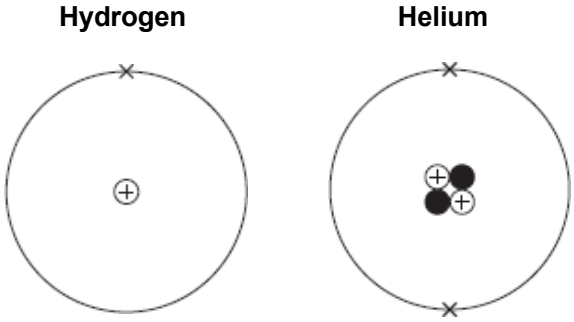
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The Periodic Table/Data Sheet is provided as in insert.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions you need to make sure that your answer:
  - is clear, logical, sensibly structured
  - fully meets the requirements of the question
  - shows that each separate point or step supports the overall answer.

28 Marks

Q1. The Sun produces helium atoms from hydrogen atoms by nuclear fusion reactions.



(a) Describe the differences in the atomic structures of a hydrogen atom and a helium atom.

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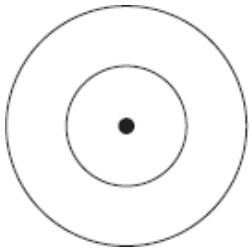
(3)

(b) The Sun consists of 73% hydrogen and 25% helium.
The rest is other elements.
One of the other elements in the Sun is neon.

Use the Chemistry Data Sheet to help you to answer these questions.

(i) Complete the diagram to show the electronic structure of a neon atom.



(1)

(ii) Why is neon in the same group of the periodic table as helium?

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(1)

(Total 5 marks)

Q2. Atoms are made up of three main particles called protons, neutrons and electrons.

Use the periodic table on the data sheet to help you to answer these questions.

(a) Sodium is in Group 1 of the periodic table.

(i) Why are potassium and sodium in the same Group of the periodic table?

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(1)

(ii) How many protons are in an atom of sodium? .....

(1)

(iii) The atomic number of sodium is 11.

How many neutrons are in an atom of sodium with mass number 23?

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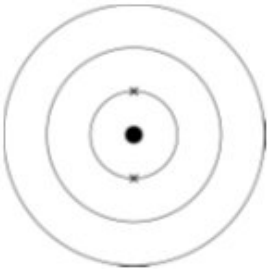
(1)

(iv) Each sodium atom has 11 electrons. Complete the electronic structure of sodium.



(2)

(b) The chemical equation for a reaction of sodium is shown below.

$$2Na + Cl_2 \rightarrow 2NaCl$$

Describe this reaction of sodium in terms of the names of the substances and the numbers of the atoms involved.

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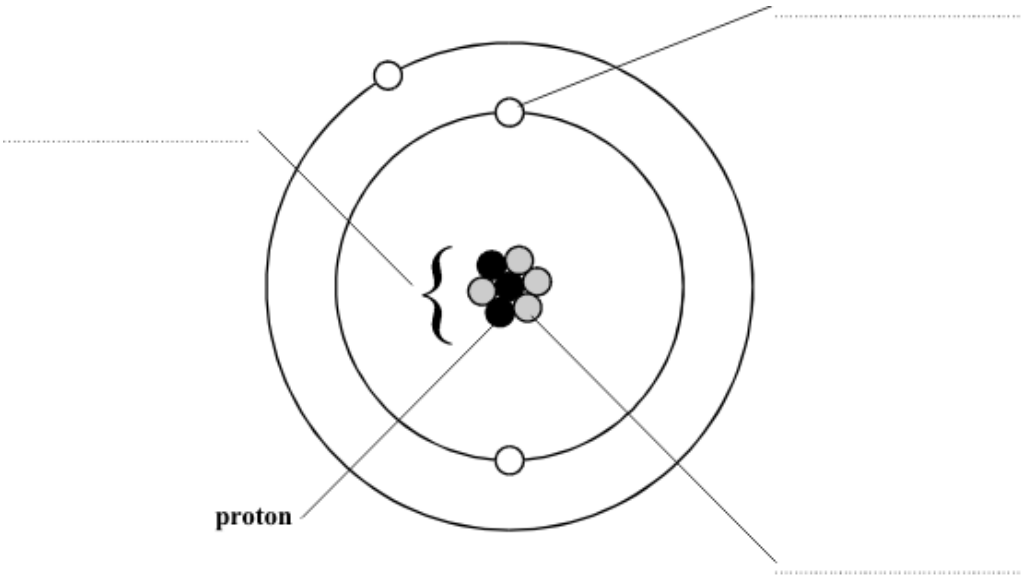
(3)
(Total 8 marks)

Q3. The diagram represents an atom. Choose words from the list to label the diagram.

electron **ion** **neutron** **nucleus**



(Total 3 marks)

Q4. The formula for the compound hydrogen peroxide is H_2O_2.

Write down everything that the formula tells you about each molecule of hydrogen peroxide.

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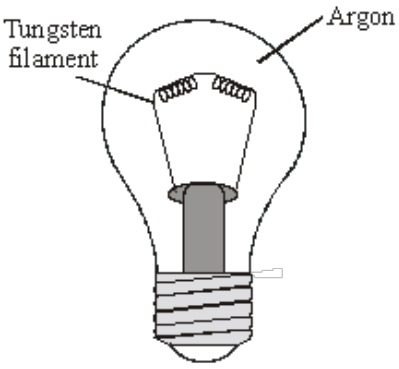
(Total 4 marks)

Q5. The diagram shows an electric light bulb.



When electricity is passed through the tungsten filament it gets very hot and gives out light.

(a) What reaction would take place if the hot tungsten was surrounded by air?

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(1)

(b) State why argon is used in the light bulb. Explain your answer in terms of the electronic structure of an argon atom.

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(3)

(Total 4 marks)

Q6. (a) Balance these chemical equations.

(i) H_2 + O_2 → H_2O

(1)

(ii) Al + O_2 → Al_2O_3

(1)

(b) Briefly explain why an unbalanced chemical equation cannot fully describe a reaction.

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(2)

(Total 4 marks)