Topic Test: OxfordAQA International GCSE Combined Science 9204 Chemistry

Atomic structure and the periodic table

Name: _____

Class: _____

Date: _____

Time: **45 minutes**

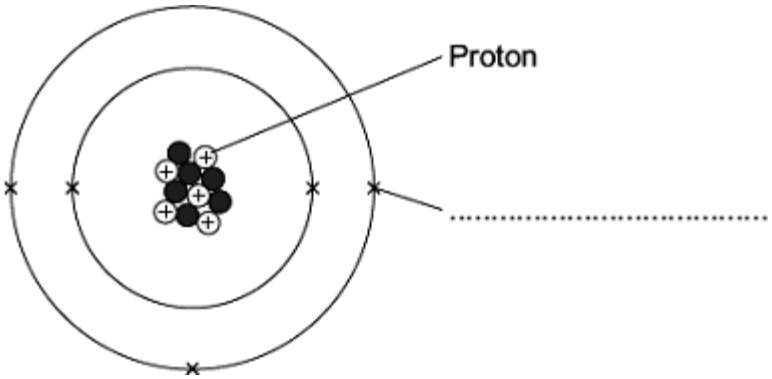
Marks: **45 marks**

Comments:

1 The diagram represents an atom of an element.

(a) Choose **one** word from the box to complete the label on the diagram.

electron	**neutron**	**nucleus**



(1)

(b) (i) What is the atomic (proton) number of this atom? _____

(1)

(ii) Name the element.

Use the periodic table on the Data Sheet to help you answer this question.

The name of the element is _____ .

(1)

(c) (i) Draw a ring around the mass number of this atom.

5 **11** **16**

(1)

(ii) Another atom of this element has a different mass number.

Draw a ring around the correct word in the box to complete the sentence.

Atoms of the same element with different numbers of

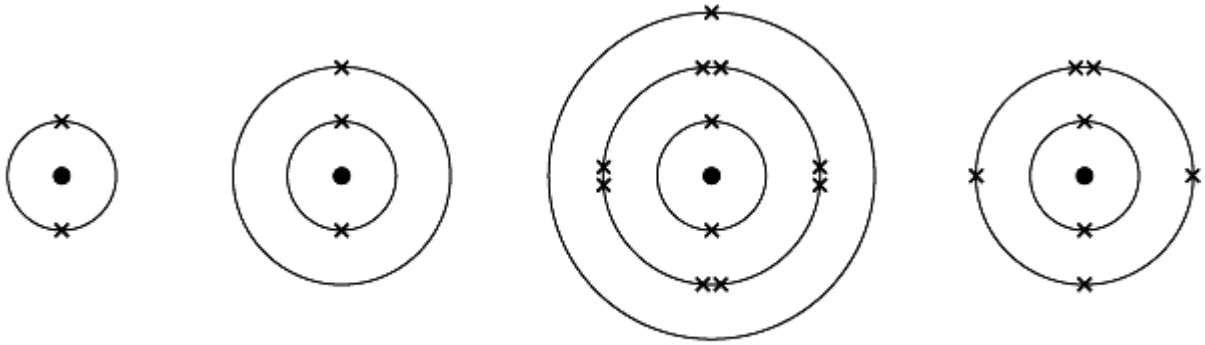
electrons
neutrons
protons

are called isotopes.

(1)

(Total 5 marks)

2 The diagrams show the electronic structure of four different atoms.



Atom A **Atom B** **Atom C** **Atom D**

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

(a) Name the two sub-atomic particles in the nucleus of an atom.

_____

(1)

(b) Why is there no overall electrical charge on each atom?

_____

_____

(1)

(c) Why is **Atom A** unreactive?

_____

(1)

(d) Which **two** of these atoms have similar chemical properties?
Give a reason for your answer.

_____

_____

_____

_____

(2)

(Total 5 marks)

3 Magnesium burns in oxygen.

By Kingsway School [CC BY 2.0], via Flickr

(a) Use the Chemistry Data Sheet to help you to answer this question.

The word equation for magnesium burning is:

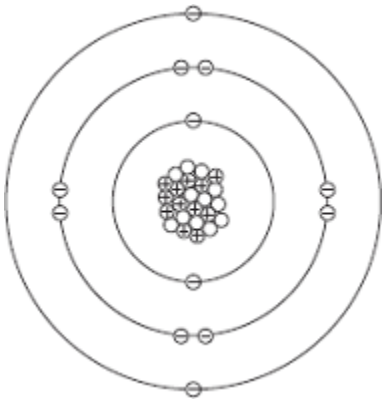
magnesium + oxygen ⟶ magnesium oxide

Draw **one** line from each substance to its correct description.

Substance	**Description**
magnesium	compound
magnesium oxide	metal
oxygen	mixture
	non-metal

(3)

(b) The diagram represents a magnesium atom.



Complete the table to show the name of each particle and the charge of each particle in the magnesium atom.

Name of particle	Charge
proton	+1
neutron	_____
_____	−1

(2)

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

Draw a ring around the correct answer to complete each sentence.

(i) In a magnesium atom, the protons and neutrons are in the

core.

nucleus.

shell.

(1)

(ii) The number of protons in a magnesium atom is the

atomic number

mass number.

group number.

(1)

(iii) The sum of the protons and neutrons in a magnesium

atom is the

- atomic number.
- mass number.
- group number.

(1)

(Total 8 marks)

4 This question is about the periodic table.

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

(a) Complete the sentences.

Elements in the periodic table are arranged in order of atomic

_____ .

The elements in Group _____ are called the noble gases.

(2)

(b) Calcium (Ca) is in Group 2.

Name **one** other element in Group 2.

_____

(1)

(c) Draw a ring around the correct answer to complete each sentence.

(i) Sodium (Na) is

- an alkali metal.
- a non-metal.
- a transition metal.

(1)

(ii) Nickel (Ni) is

- an alkali metal.
- a non-metal.
- a transition metal.

(1)

(d) In 1869 Mendeleev produced his periodic table.

Why did Mendeleev leave gaps in his periodic table?

_____

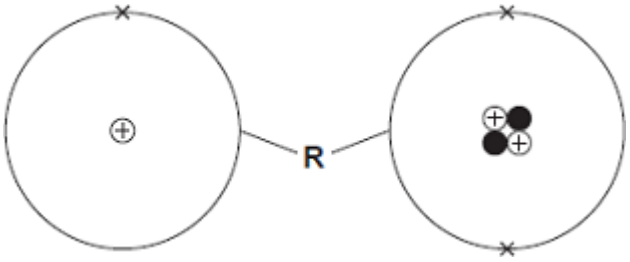
_____

(1)

(Total 6 marks)

5 The Sun is mainly hydrogen and helium.
The diagrams show an atom of hydrogen and an atom of helium.

Hydrogen **Helium**



(a) Draw a ring around the correct answer to complete each sentence.

(i) The centre of each atom is called the

molecule.
nucleus.
shell.

(1)

(ii) The circle (labelled **R**) around the centre of each atom

is called

a bond.
an electrical charge.
an energy level (shell).

(1)

(b) Use the diagrams in part (a) to help you to answer these questions.

Draw **one** line from each question to its correct answer.

Question	Answer
How many protons are there in the hydrogen atom?	1
How many electrons are there in the helium atom?	2
What is the mass number of the helium atom?	3
	4

(3)

(c) The Sun is 73% hydrogen and 25% helium. The rest is other elements.

What is the percentage of other elements in the Sun?

_____ %

(1)

(d) One of the other elements in the Sun is neon.
Neon is in the same group of the periodic table as helium.

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

(i) How many protons are there in a neon atom?

_____

(1)

(ii) Which group of the periodic table are helium and neon in?

_____

(1)

(Total 8 marks)

6 Use the periodic table on the Data Sheet to answer these questions.

The table below gives the electronic structures of four elements, **W**, **X**, **Y** and **Z**.

Element	Electronic structure
W	2,5
X	2,7
Y	2,8,8
Z	2,8,8,1

(a) Which element **W**, **X**, **Y** or **Z**:

(i) is a Group 0 gas? _____

(ii) is nitrogen? _____

(iii) is a Group 7 gas? _____

(iv) reacts violently with water? _____

(3)

(b) Which **two** Groups of the periodic table do **not** contain any non-metals?

_____

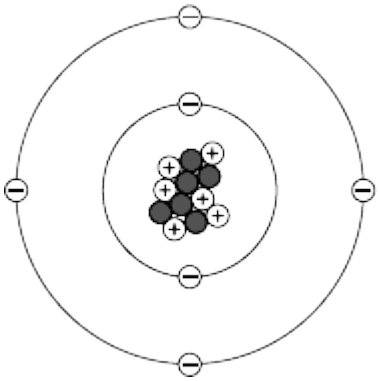
(1)

(Total 4 marks)

7 The picture shows a diamond ring.

Photograph supplied by Comstock/Thinkstock

(a) Diamond is a form of carbon. The diagram represents a carbon atom.



Complete the table to show the name and charge of each type of particle in the carbon atom.

Name of particle	Charge
proton	
neutron	0
	-1

(2)

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

(i) Draw a ring around the correct answer to complete the sentence.

Gold and carbon are

compounds.
elements.
mixtures.

(1)

(ii) Complete the sentence.

Gold and carbon have different properties because gold is a metal

and carbon is a _____

(1)

(c) Draw a ring around the correct answer to complete each sentence.

Pure gold is not used to make the ring because pure gold is too

hard.
reactive.
soft.

The gold ring is made by mixing pure gold with other metals to form

a compound.
an atom.
an alloy.

(2)

(d) The data in the table shows some information about the three metals in the gold ring.

Name of metal	Atomic number	Percentage (%) of metal
gold	79	
silver	47	16
copper	29	9

Draw **one** line from each question to its correct answer.

Question	Answer
What is the percentage of gold in this ring?	29
How many electrons are there in a copper atom?	61
How many neutrons are in an atom of silver with a mass number of 108?	75
	79

(3)

(Total 9 marks)

1

(a) electron

1

(b) (i) 5

1

(ii) boron

accept B

1

(c) (i) 11

1

(ii) neutrons

1

[5]

2

(a) protons **(and)** neutrons

*both needed for **1** mark*

ignore p / + and n / 0

*do **not** accept electrons*

1

(b) because the number of protons is equal to the number of electrons

allow protons and electrons balance / cancel out

allow positive / + and negative / - balance / cancel out

1

(c) *it = atom A*

because atom A has a full highest energy level **or** full outer shell

*allow all the shells are full **or** no incomplete shell*

or because atom A has a stable arrangement of electrons

allow because atom A is in Group 0 / a noble gas

1

(d) (atom) B / lithium / Li **(and)**

(atom) C / sodium / Na

*both needed for **1** mark*

1

because they have the same number/one outer electron(s)

linked to answer for first mark

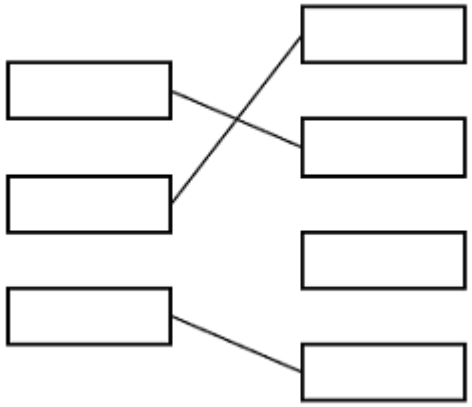
accept because both need to lose one / an electron

allow because (atoms) B and C are in Group 1 / the same group / are alkali metals

1

[5]

3 (a)



one mark for each substance linked correctly to its description

*do **not** accept more than one line from each substance*

3

(b) 0 / zero / none / no charge

1

electron

1

(c) (i) nucleus

1

(ii) atomic number

1

(iii) mass number

1

[8]

4 (a) number

1

0

allow 8

1

(b) beryllium **or** magnesium **or** strontium **or** barium **or** radium

allow correct symbols

1

(c) (i) an alkali metal

1

(ii) a transition metal

1

(d) for undiscovered elements

accept so elements with similar properties were in the same groups

accept so elements fitted the pattern of properties

1

[6]

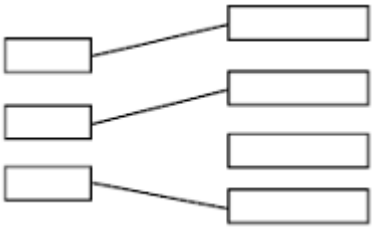
5 (a) (i) nucleus

1

(ii) an energy level (shell)

1

(b)



3

(c) 2 / two(%)

1

(d) (i) 10 / ten

1

(ii) (group) 0

accept noble gases
ignore (group) 8

1

[8]

6 (a) (i) Y **or** 2,8,8 **or** Argon **or** Ar

All correct gains 3 marks

(ii) W **or** 2,5

3 correct gains 1 mark

(iii) X **or** 2,7 **or** fluorine **or** F

2 or 1 correct gains 1 mark

(iv) Z **or** 2,8,8,1 **or** potassium **or** K

N.B. number of ticks on script must equal number of marks

3

(b) 1 and 2 (both needed)

do not credit if any other group listed
'transition metals' neutral
allow alkali metals and alkali earth metals

1

[4]

7 (a) +1/+

*do **not** accept 1 without the +*

1

electron

allow phonetic spelling

1

(b) (i) elements

1

(ii) non-metal

1

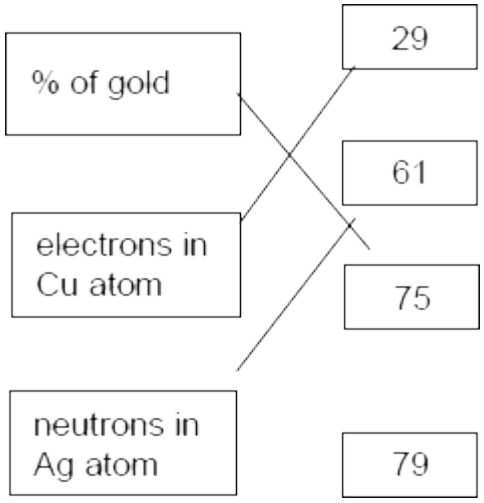
(c) soft

1

an alloy

1

(d)



one *mark for each correct link*

extra lines lose the mark

3

[9]