Periodic Table & Atomic Structure

N4 & N5 Homework Questions

Answer questions as directed by your teacher.

National 4 level questions are first followed by National 5 level questions.

National 4 Questions

1. The elements are arranged in the periodic table. Explain what is meant by
   (a) a group (b) a period. (2)

2. Write the name **and symbol** of an element which:
   (a) is a liquid at room temperature
   (b) has similar chemical properties to fluorine
   (c) is a solid non-metal (3)

3. Write the name **and atomic number** of an element which:
   (a) is called Albert Einstein
   (b) makes up approximately 20% of the air
   (c) is used in solution in swimming pools (3)

4. (a) What name is given to:
   (i) group 1 in the periodic table
   (ii) group 7 in the periodic table
   (b) Why do the elements in each of these groups have similar chemical properties? (3)

5. Choose an element from the block of transition metals. Research it and write down as much as you can eg:
   atomic number, symbol, use, when and who discovered it, how was it discovered. (3)

6. The grid shows the names of some elements.

A gold	B magnesium	C carbon
D nitrogen	E calcium	F iodine

   (a) Identify the element with atomic number 79. (1)
   You may wish to use page 4 of the data booklet to help you.
   (b) Identify the **two** elements which exist as diatomic molecules. (1)
   (c) Identify the **two** elements which have similar chemical properties. (1)
   You may wish to use page 6 of the data booklet to help you.

7. The periodic table lists the names of elements.

(a) Elements are made up of atoms. Why are atoms neutral? (1)

(b) The alkali metals, the halogens and the noble gases are groups of elements in the periodic table.
Copy and complete the table by circling a word in each box to give correct information about each group.
You may wish to use page 4 of the data booklet to help you.

Alkali Metals	Halogens	Noble Gases
(metal) / non-metal	metal / non-metal	metal / non-metal
reactive / unreactive	(reactive) / unreactive	reactive / unreactive

(2)

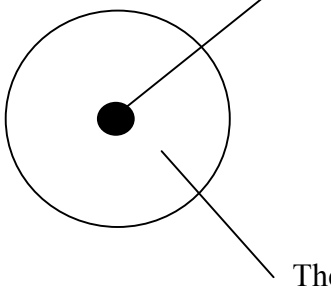
8. Which of the following elements is an alkali metal?

A Aluminium
B Calcium
C Copper
D Sodium

9. Which of the following is the electron arrangement for a halogen atom?

A 2,4
B 2,5
C 2,6
D 2,7 (2)

10. The diagram below represents an atom. Copy and complete the two sentences beside it.



This is called the _____

and has a positive charge.

The _____ have a negative charge and are moving in this space.

(2)

Explain why, despite the presence of charged particles inside them, atoms have no overall charge and are electrically neutral. (1)

11. A student made some statements about particles found in atoms.

A	Relative mass is almost zero
B	Charge = 1+
C	Charge = 0
D	Found inside the nucleus
E	Relative mass = 1

Identify the **two** statements which apply to **both** a proton and a neutron. (1)

12. Atoms are made up of smaller particles. The numbers of these particles can give information about the element.

A	The number of protons in the nucleus
B	The number of neutrons in the nucleus
C	The number of protons plus neutrons in the nucleus
D	The number of electrons outside the nucleus
E	The number of electrons in the outer energy level

(a) Identify the number which is 7 for the halogens.
(b) Identify the **two** numbers which are the same in all neutral atoms.
(c) Identify the mass number of an element. (3)

13. Consider the list of elements:

magnesium, carbon, oxygen, chlorine, sodium, nitrogen

(a) Which element has an atomic number of 17?
(b) Which element has 11 electrons in each of its atoms?
(c) Which element has atoms which have a mass of 12 amu?
(d) Which element has an electron arrangement of 2,6? (4)

14. Research: Who discovered the proton, electron and neutron?
When did they discover it?
How did they discover it? (3)

15. Which of the following numbers is the same for lithium and oxygen?

A mass number
B atomic number
C number of outer electrons
D Number of occupied energy levels

16. An atom has 26 protons, 26 electrons and 30 neutrons. The atom has

A atomic no 26, mass no 56
B atomic no 56, mass no 30
C atomic no 30, mass no 26
D atomic no 52, mass no 56 (2)

17. Copy and complete the following table.

Element	Number of Protons	Number of Neutrons	Atomic Number	Mass Number	Electrons in outer shell
		5	5		
	12			25	
			11		

(6)

National 5 Questions

1. An atom can be written as $^{23}_{11}Na$. Write each of the atoms below in a similar way.

   (a) An oxygen atom with 10 neutrons.
   (b) An atom, atomic number 6, with 7 neutrons.
   (c) An atoms with 17 protons and 20 neutrons.
   (d) An atom of hydrogen, mass number 3. (4)

2. Identify the two correct statements which refer to an atom of potassium.
   You may wish to use page 6 of the data booklet to help you.

A	It has two more electrons than an atom of argon.
B	It has similar chemical properties to an atom of lithium.
C	It has the same atomic number as an atom of sodium.
D	It is the same size as an atom of fluorine.
E	It will form an ion by losing one electron.

(2)

3. $^{12}_{6}C$ and $^{14}_{6}C$ are two types of carbon.

   (a) What name is given to two such atoms?
   (b) In what way do they differ from each other? (2)

4. There are two different types of lithium atom $^{6}_{3}Li$ and $^{7}_{3}Li$.

   Lithium has a relative atomic mass of 6.9.

   (a) How many neutrons does **each** lithium atom have?
   (b) What can be said about the proportions of each type of atom of lithium?
   (c) When a lithium atom reacts it loses an electron from its outer shell to become a lithium ion. This ion is written as $^{6}_{3}Li^{+}$

   Copy and complete the table to show the number of protons, neutrons and electrons in this lithium ion.

Particle	Number
Protons	
Neutrons	
electrons	

(4)

5. Copy and complete the following table to show number of protons and electrons in the following ions.

Ion	Number of Protons	Number of Electrons
Ca^{2+}		
Cl^{-}		
Al^{3+}		
O^{2-}		

(4)

6. The grid shows information about some particles.

	Number of		
Particle	protons	neutrons	electrons
A	11	12	11
B	9	10	9
C	11	13	11
D	19	20	18
E	9	10	10

(a) Identify the particle which is a negative ion. (1)

(b) Identify the particle which would give a lilac flame colour. (1)

You may wish to use page 6 of the data booklet to help you.

(c) Identify the **two** particles which are isotopes. (1)

7. The grid shows information about some particles.

A $^{23}_{11}Na$	B $^{18}_{8}O$	C $^{40}_{19}K^{+}$
D $^{24}_{12}Mg^{2+}$	E $^{35}_{17}Cl^{-}$	F $^{16}_{8}O$

(a) Identify the **two** particles with the same number of neutrons. (1)

(b) Identify the particle which has the same electron arrangement as neon. (1)

8. The nuclide notation for an isotope of hydrogen is ${}^{1}_{1}\mathrm{H}$.

(a) An isotope of copper has atomic number 29 and mass number 63.
(i) Write the nuclide notation for this isotope of copper.
(ii) How many neutrons are present in this isotope of copper? (2)

(b) A sample of copper was found to contain **equal** amounts of two isotopes.
One has mass number 63 and the other has mass number 65.
What is the relative atomic mass of this sample of copper? (1)

9. Different isotopes of the same element have identical

A electron arrangement
B nuclei
C number of neutrons
D mass number

10. A positively charged particle with electron arrangement 2,8 could be

A a neon atom
B a fluoride ion
C a sodium atom
D an aluminium ion (2)

11. When an atom X of an element in group 1 reacts to become X^+

A the mass number of X increases
B the charge of the nucleus increases
C the atomic number of X decreases
D the number of occupied energy levels decreases (1)