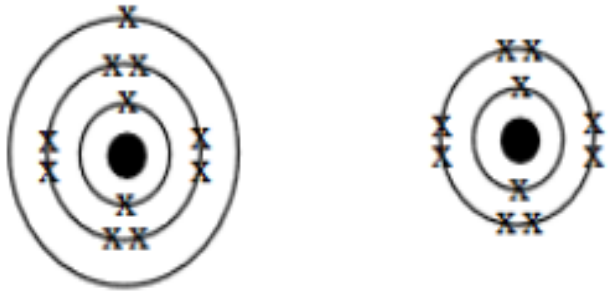
The diagram represents a sodium atom and a sodium ion.



A

B

(a) (i) Which diagram represents the sodium atom?

A

.....[1]

(ii) Give the reason for your choice.

It has not lost the outermost electron ∵ Na => 2, 8, 1

.....[2]

(iii) Sodium is in group 1 of the periodic table. How can you tell this from its electron structure?

It has one electron in the outermost shell hence it is in group I

.....[1]

The table below shows the elements on the third period. Sample of each of the elements were burnt in oxygen and the oxides formed were tested to see whether they were acids or bases.

11 Na sodium 23	12 Mg magnesium 23	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulphur 32	17 Cl chlorine 35.5	18 Ar argon 40

(a) (i) How many electron shells does the third period have?

3 shells hence in period three

11Na => 2, 8, 1

.....[1]

(ii) The element with atomic number 10 is neon. Explain in terms of electron arrangement why a new period starts after neon.

10Neon => 2, 8

Neon electron shells are two

.....[2]

(b) (i) Which three elements in the third period are metals?

Na, Mg, Al

.....[1]

.....[1]

(ii) What trend do you notice about metallic properties as you go across the period?

Metallic nature decrease as you go across the period

.....[1]

(c) (i) Oxygen is in group 6. What does this tell you about the number of electrons in the outside shell?

8O => 2, 6 Oxygen has 6 electrons in the outermost shell.

.....[1]

- Elements T and X are represented by the symbols $^{24}_{12}T$ and $^{14}_{7}X$ respectively.

(a) What do the numbers 12 and 7 stand for?

12 and 7 are atomic numbers / proton number

(b) What do the numbers 24 and 14 stand for?

14 and 24 are mass numbers or nucleon numbers

(c) Give the period for element T and X

$_{12}T$ => 2, 8, 2 → Period 3 since it has 3 shells

$_{7}X$ => 2, 5 → Period 2 since it has 2 shells

(d) Give the group for element T and X

$_{12}T$ => 2, 8, 2 → Group II since it has 2 electrons in the outermost shell

$_{7}X$ => 2, 5 → Group V since it has 5 electrons in the outermost shell

(e) Which element T or X is a non metal?

X is a non metal because it gains 3 electrons when it reacts with a metal

(f) Identify element T and X and write the electron configuration of element T and X

T ⇒ 2, 8, 2 is magnesium with atomic number 12

X ⇒ 2, 5 is nitrogen with atomic number 7

(g) What common name is given to groups I,II and VII elements

group I => Alkali metals

group II => Alkaline earth metals

group VII => Halogens

(i) How would the reaction of Lithium with water compare with the reaction of potassium with water and give a reason for differences in the reaction rates

Lithium would react very fast with water while Potassium would react violently with water. Potassium is more reactive than Lithium because it's last electron is far from the nucleus than that of lithium. Lithium outermost electron is attracted more to the nucleus

Since it is close to it.

(a) What determines the order of elements in the periodic table

(b) To which period and group does oxygen belong?

(c) Which elements belong to groups of halogens and alkali metals?

(d) Why is hydrogen not in group 1 although it has one electron in the outer shell?

(a) The atomic number

(b) Oxygen belong to group VI and period 2 since it has two shells.

(c) Halogen elements chlorine, Bromine, iodine
Alkali metal elements lithium, Sodium, potassium

(d) Hydrogen behaves like a metal in group I and a non metal in group VII

The electron configuration of nitrogen is 2,5.

What is the valence of nitrogen?

(e) How many valency electrons are in nitrogen?

(f) The mass number for nitrogen is 14. How many neutrons are present in a nitrogen atom?

Valence of nitrogen is 3

(e) Valency electrons of nitrogen is 5

(f) $^{14}_{7}N$ neutrons = 14 − 7 = 7 neutrons