Answer all the questions below then check your answers.

1. What are ions?

2. When metals react they tend to lose electrons and form ions with what charge?

b. What do we call ions with a positive charge?

3. When non-metals react they tend to gain electrons, what charge will be on an atom that gains electrons?

b. What do we call ions with a negative charge?

4 Sodium has the symbol Na, it has an atomic number of 11 and a relative atomic mass of 23.

a. How many protons and electrons does a sodium atom have?

b. What is the electronic configuration (arrangement) of a sodium atom?

c. Complete the diagram of the sodium atom shown opposite by adding in the number of protons in the nucleus and by filling the electrons shells. Show the electrons as dots.

5. A chlorine atom has the symbol Cl, its atomic number is 17 and it has a relative

atomic mass of 35.

a. How many protons and electrons does a chlorine atom have?

b. What is the electronic arrangement of a chlorine atom?

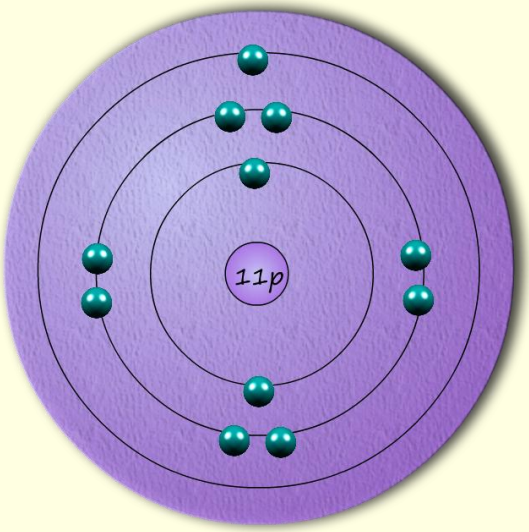
c. Complete the atomic structure diagram opposite of a chlorine atom by filling in the number of protons in the nucleus and the electron shells. Show the electrons as crosses.

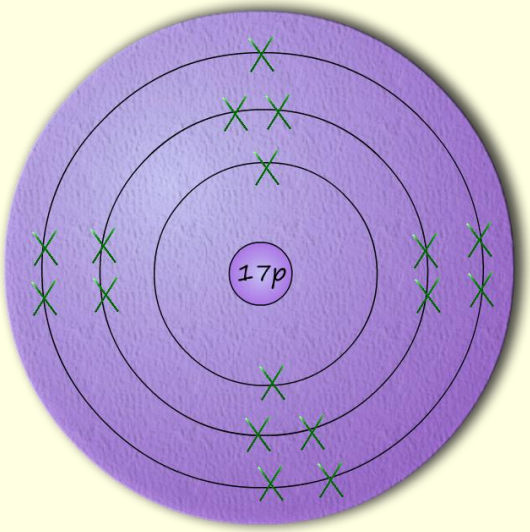
6. In terms of electrons:

a. How does a sodium atom end up with full last shells?

b. How does a chlorine atom end up with full last shells?

c. The diagram below shows the sodium and chlorine atoms, complete the diagram by adding an arrow to show how the electrons move when these two atoms react with each other.





d. Explain why the sodium atom ends up forming a sodium ion with a + charge.

e. Explain why the chlorine atom ends up forming a chloride ion with a – charge?

f. What is an ionic bond?

g. What is the electronic arrangement of a:

i. chloride ion? Which noble gas has the same electron arrangement as a chloride ion?

ii sodium ion? Which noble gas has the same electron arrangement as a sodium ion?

7. Draw a dot and cross diagram to show the formation of (you only need to draw simplified diagrams showing electrons in the last shell only):

i. magnesium oxide.

ii. aluminium chloride.

Answers.

1. What are ions? Charged particles

2. When metals react they tend to lose electrons and form ions with what charge?

   Metals form positively charged ions. Loss of 1 electron =1+ charge, loss of 2 electrons =2+ charge, loss of 3 electrons = 3+ charge.

b. What do we call ions with a positive charge? cations

3. When non-metals react they tend to gain electrons, what charge will be on an atom that gains electrons? Negatively charged

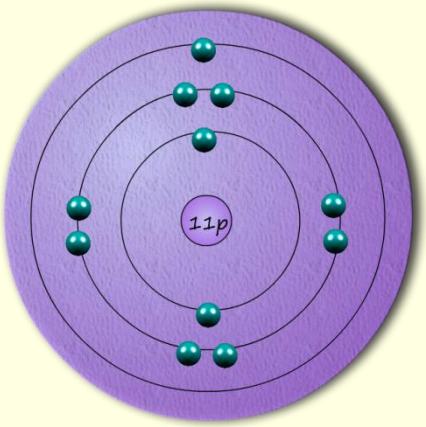
b. What do we call ions with a negative charge? anions

4 Sodium has the symbol Na, it has an atomic number of 11 and a relative atomic mass of 23.

a. How many protons and electrons does a sodium atom have? 11 protons and 11 electrons.

b. What is the electronic configuration (arrangement) of a sodium atom? 2,8,1

c. Complete the diagram of the sodium atom shown opposite by adding in the number of protons in the nucleus and by filling the electrons shells. Show the electrons as dots.



5. A chlorine atom has the symbol Cl, its atomic number is 17 and it has a relative atomic mass of

35.

a. How many protons and electrons does a chlorine atom have? 17 protons and 17 electrons

b. What is the electronic arrangement of a chlorine atom? 2,8,7

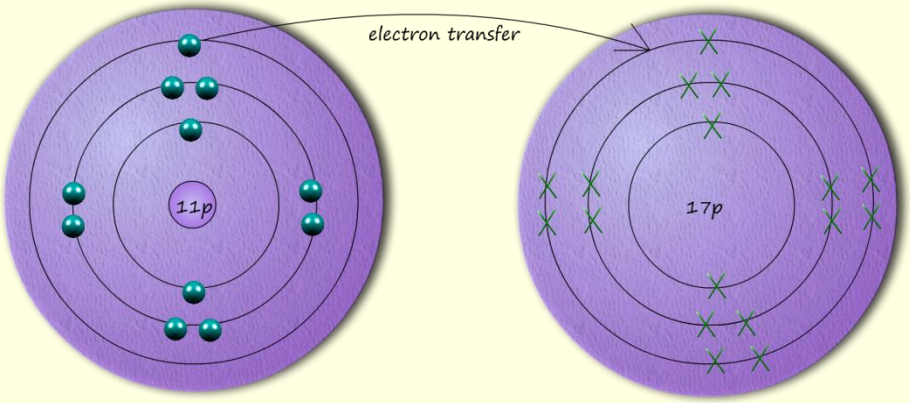
c. Complete the atomic structure diagram opposite of a chlorine atom by filling in the number of protons in the nucleus and the electron shells. Show the electrons as crosses.

6. In terms of electrons:

a. How does a sodium atom end up with full last shells? Loses 1 electron in last shell to chlorine

b. How does a chlorine atom end up with full last shells? Gains 1 electron from sodium

c. The diagram below shows the sodium and chlorine atoms, complete the diagram by adding an arrow to show how the electrons move when these two atoms react with each other.



d. Explain why the sodium atom ends up forming a sodium ion with a + charge.

Loses 1 electron so has 11 protons (11 positive charges) but only 10 electrons (10 negative charges), so has 1 more positive charge than negative charge

e. Explain why the chlorine atom ends up forming a chloride ion with a - charge?

Has 18 electrons but only 17 protons

f. What is an ionic bond? Force of attraction between a positive and negative ion, these are often called electrostatic forces.

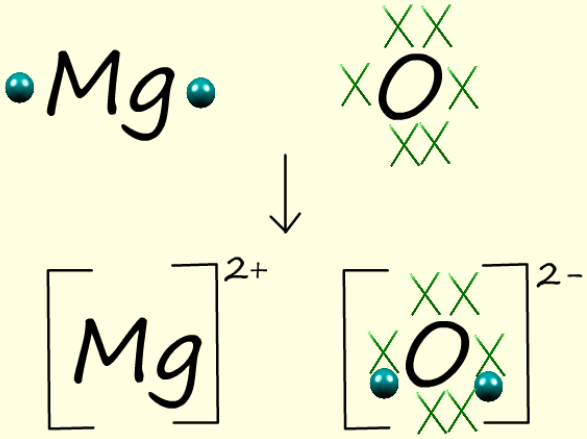
g. What is the electronic arrangement of a:

i. chloride ion? Which noble gas has the same electron arrangement as a chloride ion? 2,8,8 same as argon

ii sodium ion? Which noble gas has the same electron arrangement as a sodium ion? 2,8 same as neon

7. Draw a dot and cross diagram to show the formation of (you only need to draw simplified diagrams showing electrons in the last shell only):

i. magnesium oxide.



ii. aluminium chloride.