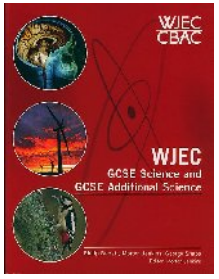
GCSE Additional Science
Chapter 5

ATOMIC STRUCTURE

CHEMISTRY 2



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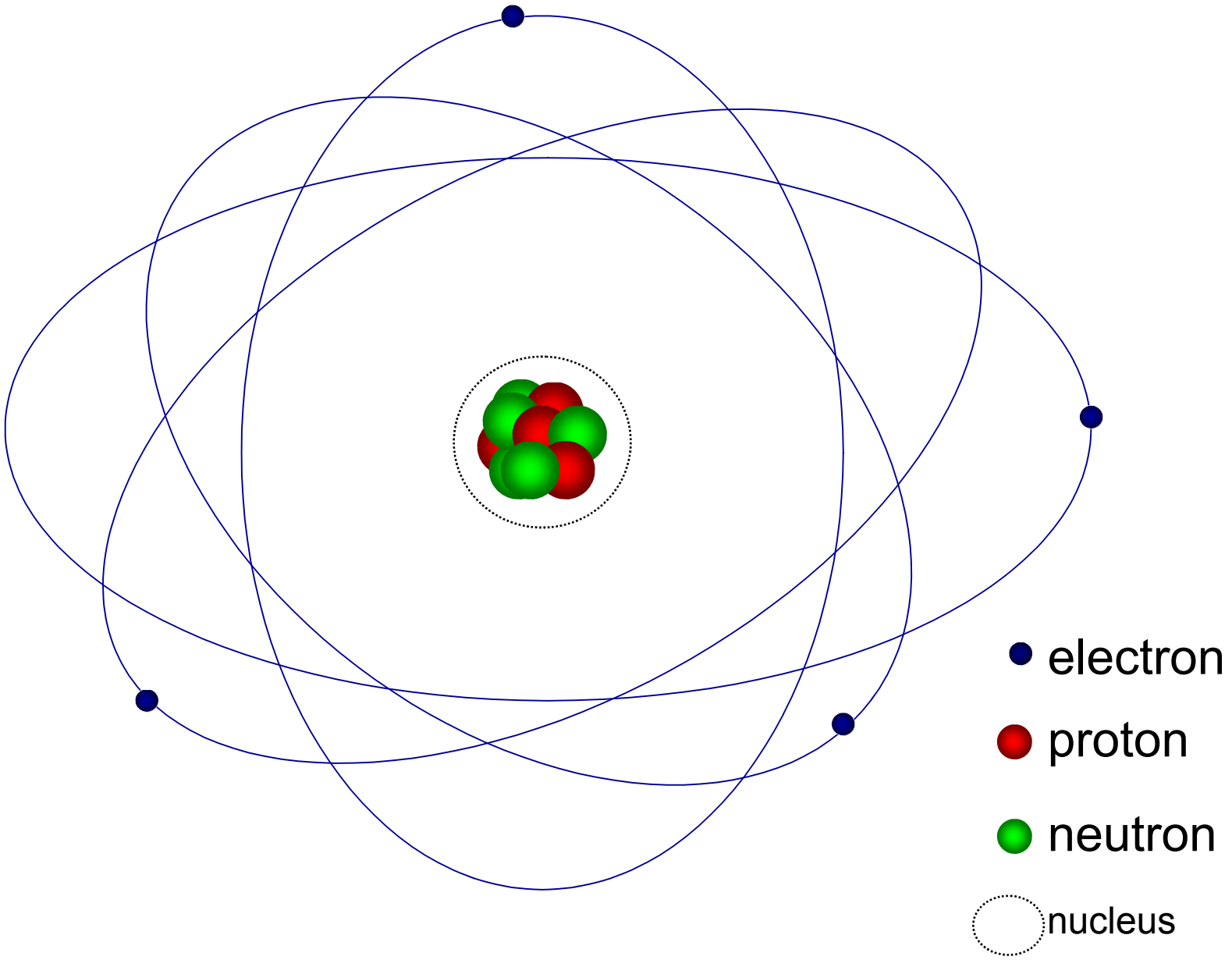
An Atom (Beryllium)



Comparing Parts of the Atom

	Relative Mass	Relative Charge
Proton	1	+1
Neutron	1	0
Electron	negligible	-1

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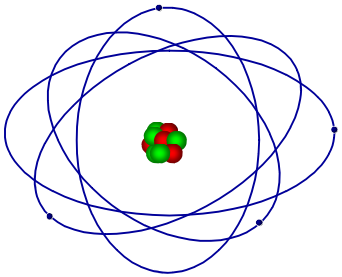
The Neutral Atom and Ions

The atom doesn't have an electrical charge because it has the same number of positive protons in the nucleus as there are negative electrons orbiting it.

The neutron doesn't have a charge, so the number of neutrons doesn't contribute to the charge on the atom.



In this case….

4 positive protons

4 negative electrons

If an atom **LOSES** an electron, there is a shortage of negative charge, so the atom is more **POSITIVE.** **It has an overall positive charge.**

We have a positive ion.

If an atom **GAINS** an electron, it has too much negative charge, so the atom is more **NEGATIVE.** **It has an overall negative charge.**

We have a negative ion.

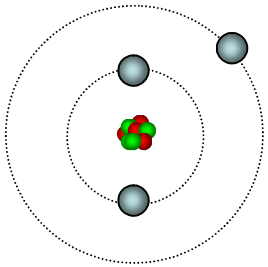
The Neutral Atom and Ions

Metal atoms lose their outer electrons to be left with a full outer shell.

This forms positive ions.

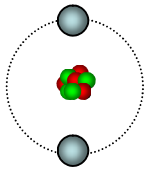
e.g.

The number of protons doesn't change, so it is always the same element.



4 Neutrons
3 Protons
3 Electrons

Loses one electron

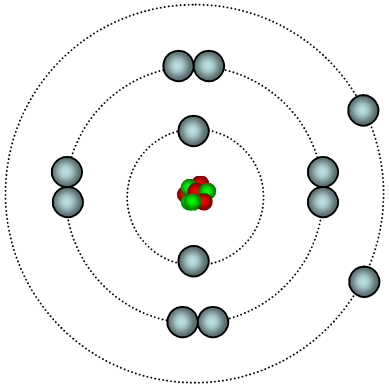


4 Neutrons
3 Protons
2 Electrons

Lithium atom, Li

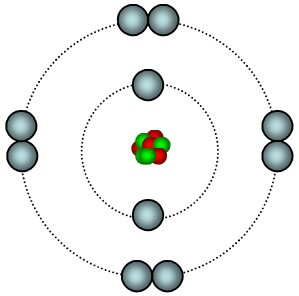
Lithium ion, Li^+

electron
nucleus



12 Neutrons
12 Protons
12 Electrons

Loses two electrons



12 Neutrons
12 Protons
11 Electrons

Magnesium atom, Mg

Magnesium ion, Mg^{2+}

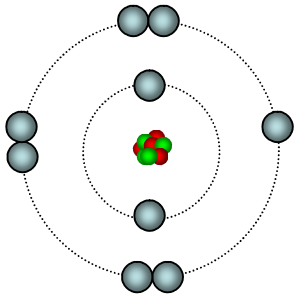
The Neutral Atom and Ions

Non metal atoms gain electrons to get a full outer shell.

This forms negative ions.

e.g.

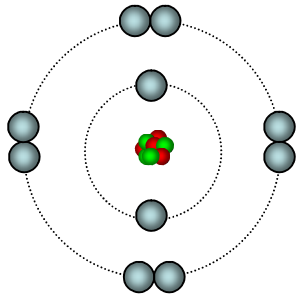
The number of protons doesn't change, so it is always the same element.



10 Neutrons
9 Protons
9 Electrons

Fluorine atom, F

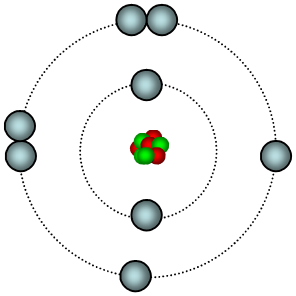
Gains one electron



10 Neutrons
9 Protons
10 Electrons

Fluoride ion, F^-

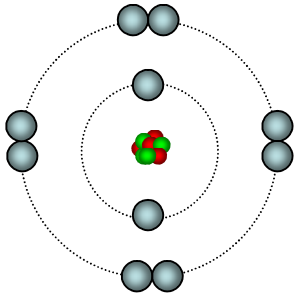
electron
nucleus



8 Neutrons
8 Protons
8 Electrons

Oxygen atom, O

Gains two electrons



8 Neutrons
8 Protons
10 Electrons

Oxide ion, O^{2-}

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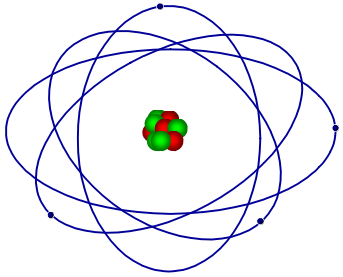
The Atom

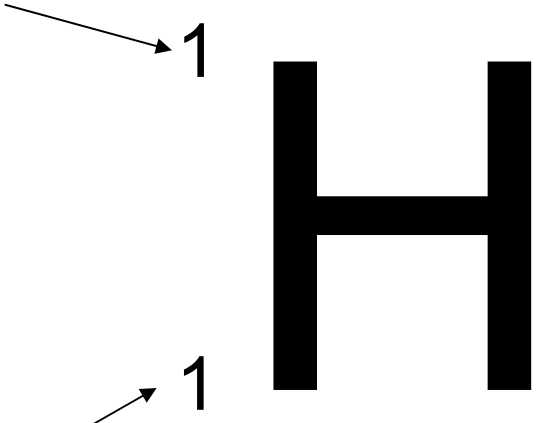


We use the atomic number and the mass number to show the composition of the atom.

Mass number

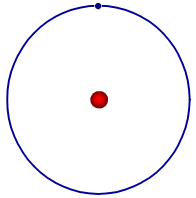
(number of protons + neutrons)

Hydrogen symbol



Atomic Number

(number of protons which is equal to the number of electrons in the neutral atom)



Hydrogen has a nucleus with one proton (there is no neutron) and one electron orbiting it.

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Exercise

Fill in the gaps in the following table.

Atomic Number

Mass Number – Atomic number

Atomic number (if it's not an ion)

Element	Name of element	Number of protons	Number of neutrons	Number of electrons
$^{1}_{1}H$	Hydrogen			
$^{12}_{6}C$	Carbon			
$^{9}_{4}Be$	Beryllium			
$^{197}_{79}Au$	Gold			
$^{7}_{3}Li$	Lithium			
$^{16}_{8}O$	Oxygen			
$^{27}_{13}Al$	Aluminium			
$^{19}_{9}F$	Fluorine			
$^{39}_{19}K$	Potassium			

Hint