

Atomic Structure

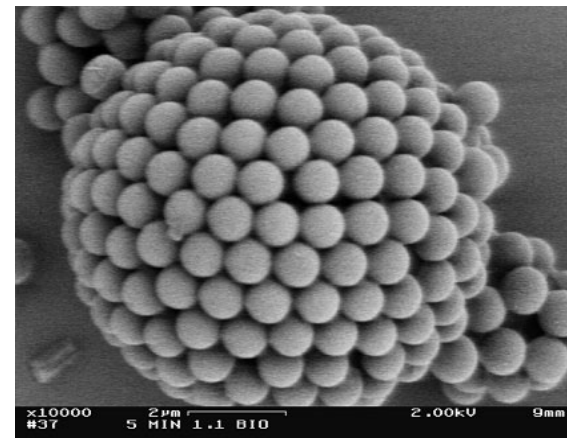
The word **ATOM** comes from the Greek, meaning 'can't be split up'.

An atom is the smallest particle of an element which still retains the properties of that element.



The smallest piece of Gold is called a Gold atom.

Now, using an electron microscope we can actually see atoms.



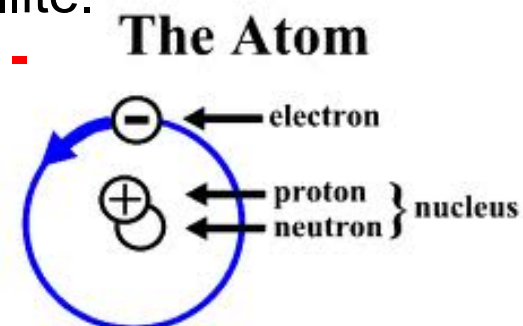
Inside an Atom

In 1897 the **Electron** was found.

An electron is very very light and moves very quickly.

It flies around the outside of an atom like a satellite.

Electrons have a negative electric charge or -



Later the **Proton** was found.

Protons are found at the centre of the atom.

Protons have a positive electric charge or +

In 1932 the **Neutron** was found.

Neutrons are found at the centre of the atom.

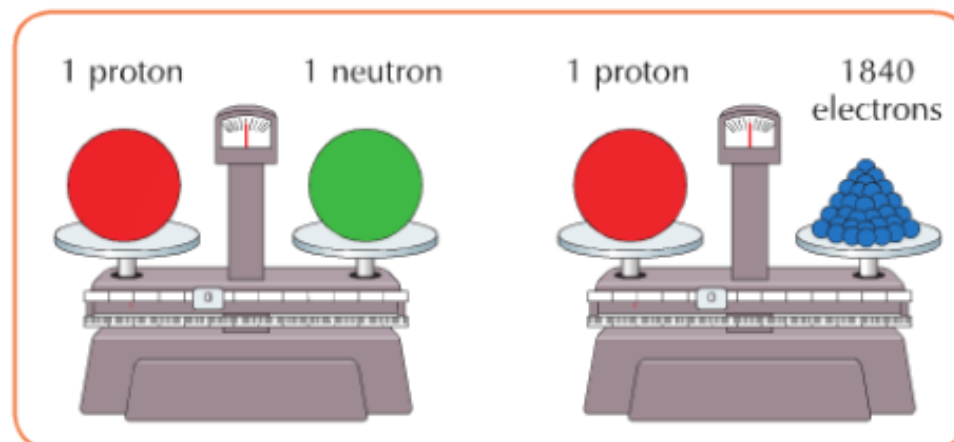
Neutrons have no electric charge - they are Neutral.



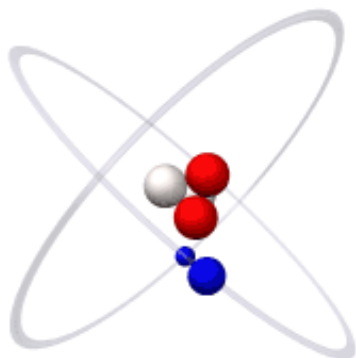
Mass of an Atom

Protons and Neutrons have a mass of **1 a.m.u** (atomic mass units)

Electrons have a mass of only $\frac{1}{1840}$ a.m.u.



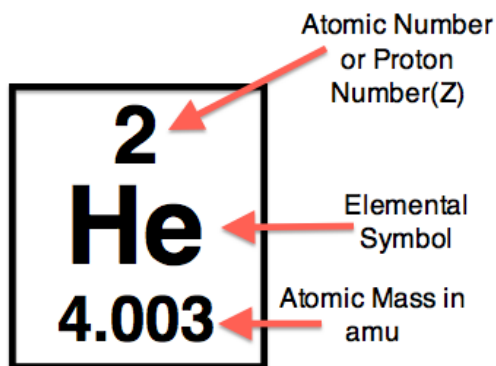
Atomic and Mass Numbers



The **atomic number** of an atom is the number of protons in the nucleus.
e.g. 2 (red balls)

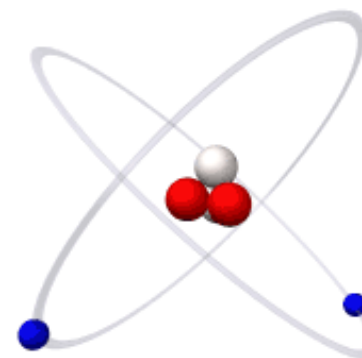
The **mass number** is the number of protons and neutrons in the nucleus.
e.g. 4 (red and white balls).

The elements are given in your log books for your exams.

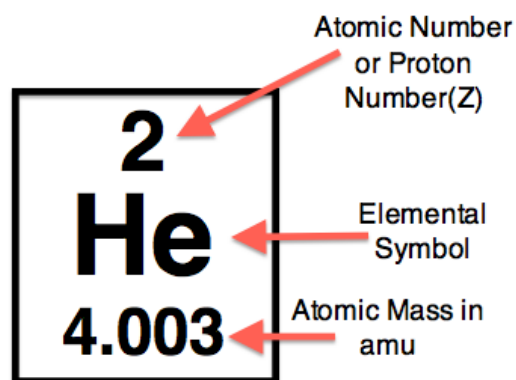


Neutrons

The number of **neutrons** is found by taking the **atomic** number from the **mass** number.



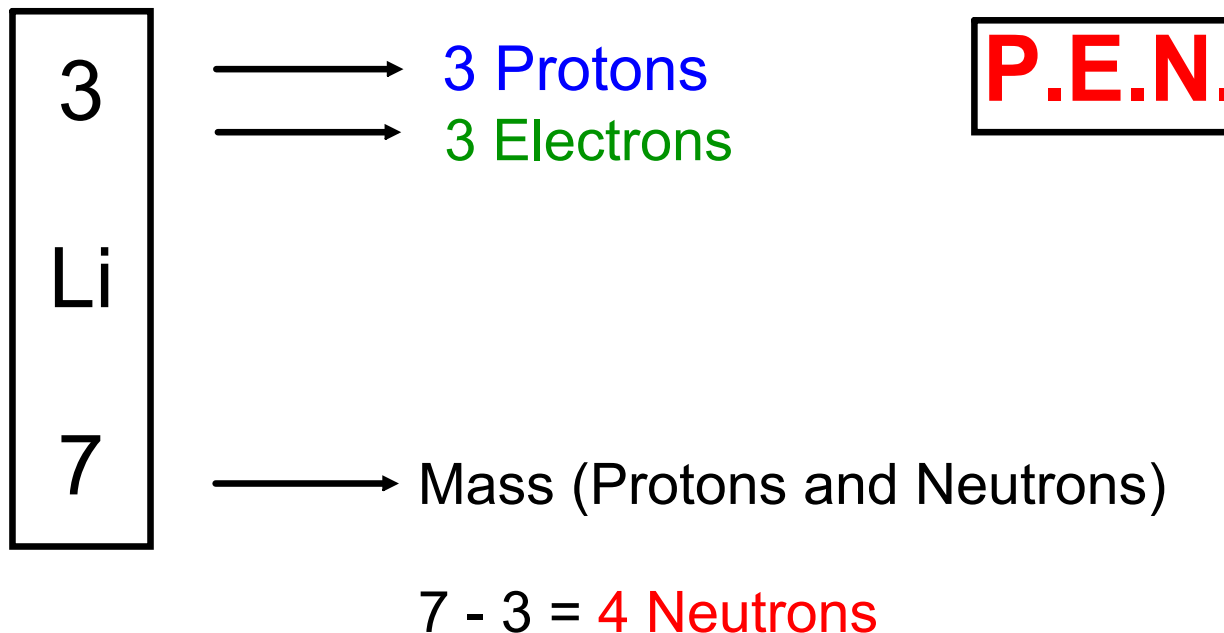
$$\begin{array}{rclcl} \text{Mass} & - & \text{Atomic} & = & \text{Neutrons} \\ 4 \text{ (red and white balls)} & - & 2 \text{ (red)} & = & 2 \text{ white} \end{array}$$



So, for Helium we take the 2 from 4 to get 2 Neutrons

Try a few for yourself...

Periodic table



Now do 1 - 20 from the periodic table



Sample Questions

- (a) An atom with 17 protons and 18 neutrons has an atomic number of and a mass number of
- (b) An element has a mass number of 16 and an atomic number of 8. Write down the nuclear formula for the element.
- (c) The atoms of a certain element contain 15 protons and 16 neutrons. What is the mass number of the element? Name the element.
- (d) List two items of information which the atomic number gives us about the atoms of an element.
- (e) The nuclear formula of potassium is ${}_{19}^{39}\text{K}$. This tells us that there are protons and neutrons in the nucleus of the atom.
- (f) An atom of element X has an atomic number of 18 and a mass number of 40. How many (i) protons; (ii) neutrons; and (iii) electrons are there in the atom. What element is X?. Write the nuclear formula of the atom.

What I should know

- ☞ An atom is the smallest particle of an element which still retains the properties of that element.
- ☞ There are about 100 different kinds of atoms.
- ☞ Atoms contain protons, neutrons and electrons.
- ☞ Protons and neutrons are found in the nucleus of the atom.
- ☞ Electrons move about the nucleus in paths called orbits or shells.
- ☞ Protons and neutrons have a mass of 1 a.m.u. Electrons have a mass of $\frac{1}{1840}$ a.m.u.
- ☞ Protons carry a charge of +1, electrons carry a charge of -1, neutrons carry no charge.
- ☞ There are equal numbers of protons and electrons in an atom of an element.
- ☞ The atomic number of an atom is the number of protons in the nucleus of that atom.
- ☞ The mass number of an atom is the sum of the number of protons and neutrons.
- ☞ The number of neutrons in an atom is calculated by subtracting the atomic number from the mass number.