Structure of the atom:

An atom is the smallest unit of ordinary matter that forms a chemical element. Its mass is concentrated in a central nucleus, which contains a number A of nucleons, where A is called the mass number as shown in figure 1.

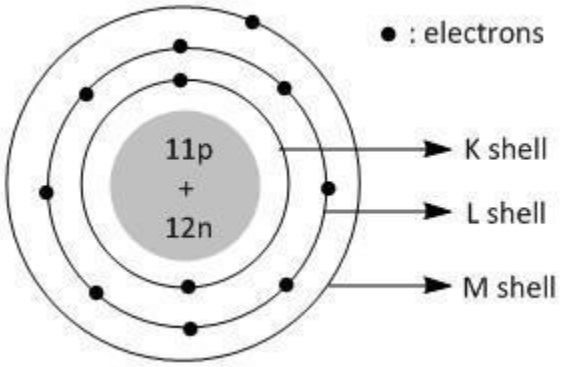

Figure 1: Electron shells in a sodium atom.

The nucleons comprise Z protons, where Z is the atomic number of the element, and so (A-Z) neutrons.

$$N= A-Z$$

#The electrons can only orbit stably, without radiating, in certain orbits at a certain discrete set if distances from the nucleus. These orbits are associated with definite energies and are also called energy shells or energy levels. In these orbits, electrons acceleration does not result in radiation and energy loss as required by classical electromagnetic theory.

#Electrons can only gain or lose energy by jumping from one allowed orbit to another, absorbing or emitting electromagnetic radiation with a frequency (f) determined by the energy difference of the levels according to the Planck relation.

$$\Delta E= hf$$

$$\Delta E = E_1 - E_2$$

ΔE: energy difference

h: Blank constant

f: frequency

The electrons in an atom follow the rules of quantum mechanics, which means they do not follow a specific path, a cloud of electrons surrounding the nucleus.

Electrons shells

n = 1, 2, 3, 4, ... (Principal quantum number)

Occupancy of each shell in $2n^2$

n	occupancy ($2n^2$)
1	2
2	8
3	18
4	32
5	50

Radiation units:

There are five units for measure.

1) Radiation Roentgen (R): the roentgen (R) is the unit of dose of electromagnetic radiation exposure or intensity. It is equal to the radiation intensity that will create 2.08×10^9 ion pairs in a cubic centimeter of air that us:

$$1\ R = 2.08 \times 10^9 \text{ ion pairs/cm}^3$$

Or

Is in terms of electric charge per unit mass of air:

$$1R = 2.58 \times 10^{-4}\ C/kg.$$

The charge refers to the electrons liberated by ionization.