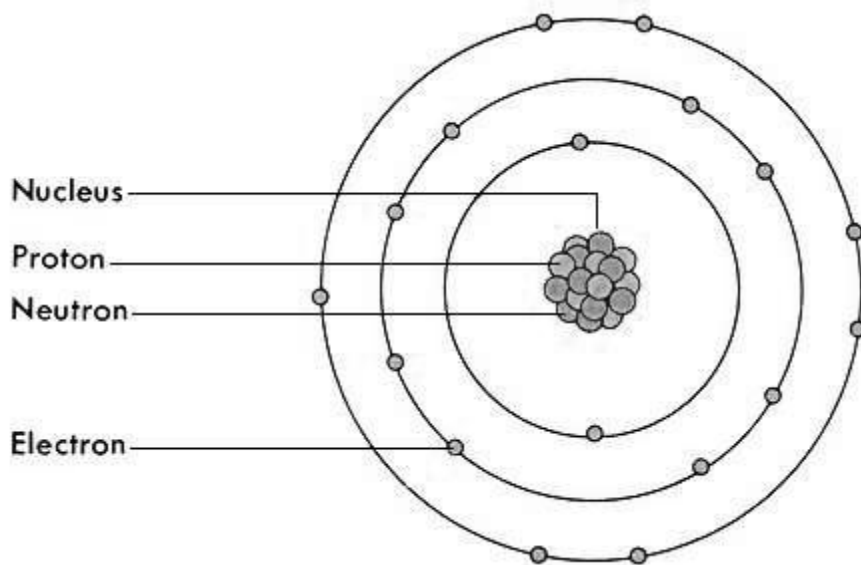


Introduction to Atomic Particles

Neil's Bohr the physicists developed a model of the atom which contains protons and neutrons in the nucleus and electrons in the outer orbits or shells



| Part of Atom | Count |
|---------------|-------|
| protons | |
| neutrons | |
| electrons | |
| nucleus total | |
| total charge | |

Parts of the Atom

| Part of Atom | Overall Charge | Atomic Weight (u) | Description |
|--------------|----------------|-------------------|-------------|
| nucleus | 0 (neutral) | depends on atom | |
| proton | | | |
| neutron | | | |
| electron | | | |

1. What is the charge of an electron, proton and neutron?
2. Where is the weight of an atom concentrated in an atom?

Review of Chemistry

Atomic Theory:

The atom is the smallest whole unit of matter that can retain chemical properties, but the atom is made up of more than 200 subatomic particles. There are 3 main subatomic particles that are very important:

AMU: Atomic Mass Unit = a special unit of weight used to measure the mass of one PROTON (or Neutron). One (1) gram is approximately 602 213 670 000 000 000 000 000 amu's.

The proton:

- These are subatomic particles with a POSITIVE charge
- The positive charge is equal but opposite to the charge of an electron
- Every Atom must have at least one proton
- In every neutrally charged atom, # protons = number of electrons
- The proton has a mass of 1 AMU
- Atoms do not gain or lose protons in normal chemical reactions

The neutron:

- These are subatomic particles with no charge (neutral)
- They are found in every atom's nucleus except for in Hydrogen.
- Atoms do not gain or lose neutrons *in normal chemical reactions*
- The function of the neutron is to help stabilize the nucleus
- If there are too few or too many neutrons in a nucleus, it will fall apart!!
- A neutron weighs 1 AMU

The electron:

- These are subatomic particles with a negative charge
- The negative charge is equal but opposite to the charge of a proton
- An electrons circles the nucleus in a path called an electron cloud In every neutrally charged atom, # protons = number of electrons
- The electron has a mass of $1/1836$ AMUs
(1836 electrons = 1 AMU)
- Electrons move very fast (about 13 000 km/h)
- You cannot know the exact position of an electron; you can only know the probability of the region in which it can be found. This region is known as the electron cloud.
- The electron clouds give the atom its shape
- The Electrons are responsible for the chemical properties of atoms

The nucleus

The **protons** and **neutrons** are contained in the middle of the atom in a region known as the NUCLEUS.

- the nucleus is the core or center of the atom
- it contains 99.9% of the mass of the entire atom but.
- it is 100,000 times smaller than the size of the entire atom.

How to find the number of neutrons $A - Z$

If 'A' is the mass number and 'Z' is the number of protons $A - Z$ gives the number of neutrons. The mass number is the larger number sometimes referred to as the "atomic mass" this number is rounded off to the nearest whole number and called 'Mass Number' = A, the atomic number which is the number of protons in an atom is the smaller whole number represented by 'Z'.

'N' Number of Neutrons = (Mass Number - Atomic Number) or $N = A - Z$

Example

Na Sodium is 22.999 amu

The nearest whole number is 23 so the mass number = 23 or A

In sodium the number of protons $Z = 11$

N the number of neutrons = $A - Z$ or $(23 - 11) = 12$

There are 12 Neutrons in Na-23