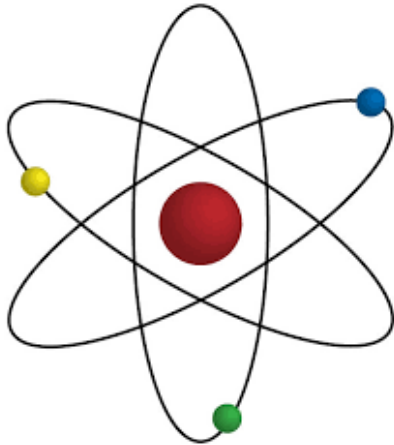


Chemistry-Part 1

Inside the Atom



What is an Atom?

- **Matter** is anything that takes up **space** and has **mass**. Matter is made up of **atoms**.
- **Atoms:**
 - the **smallest** unit into which **matter** can be divided
 - building blocks** of matter
 - comprised of a **nucleus** (at it's center) and an **electron cloud** (surrounding the nucleus)
 - made up of **sub-atomic** particles

INVESTIGATE.

- Take a piece of paper, and cut it in half.
- Cut the half piece of paper in half again.
- Continue until you cannot Cut the remaining piece of paper any longer... (Remember, Scissor Safety!!!)
- How many times were you able to cut it?

Consider This...

- Do you think we could keep cutting the paper forever? Why or why not?
- How many times would you have to cut the paper in half to get the size of an atom? Best Guess?



Consider This...

- You would have to cut the paper in half around thirty-one (31) times to get to the size of any atom.

FAST FACTS:

- It would take a stack of about 50,000 aluminum atoms to equal the thickness of a sheet of aluminum foil from your kitchen
- If you could enlarge a penny until it was as wide as the US, each of its atoms would be only about 3 cm in diameter - about the size of a ping pong ball
- A human hair is about 1 million carbon atoms wide
- A typical human cell contains roughly 1 trillion atoms
- A speck of dust might contain 3×10^{12} (3 trillion) atoms
- It would take you around 500 years to count the number of atoms in a grain of salt

What are Subatomic Particles?

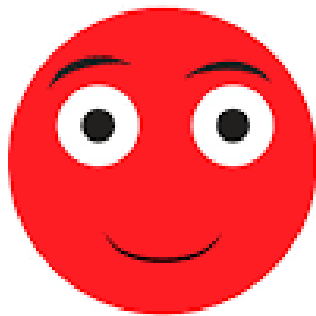
- smaller than an atom

protons (+) - positive charge

neutrons (0) - neutral charge

electrons (-) - negative charge

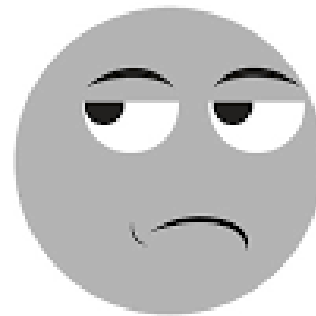
PROTON ELECTRON NEUTRON



I'M POSITIVE



I'M NEGATIVE



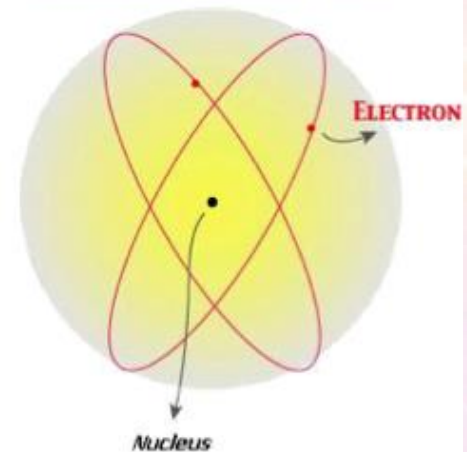
WHATEVER

Early Atomic Models

Rutherford Model:

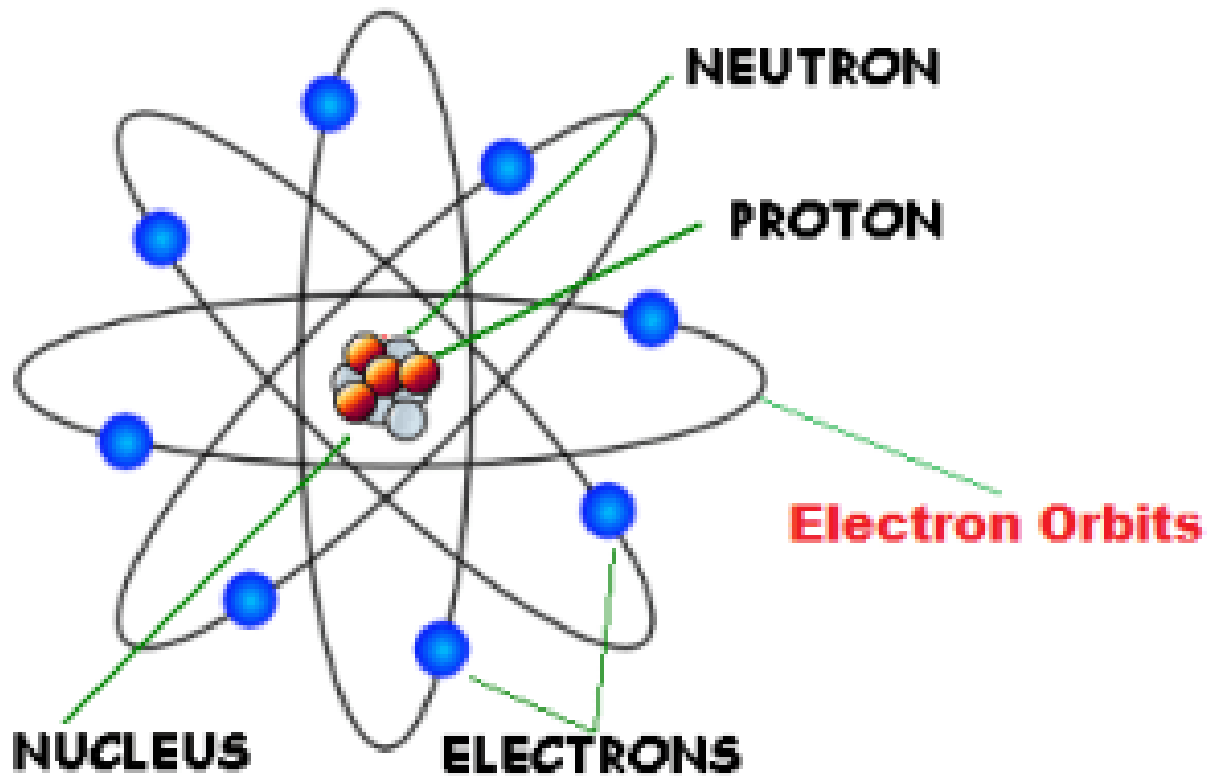
- Most empty space.
- Small, Positive Nucleus
- Contained protons and electrons scattered around the outside.

RUTHERFORD'S MODEL OF ATOM



Early Atomic Models

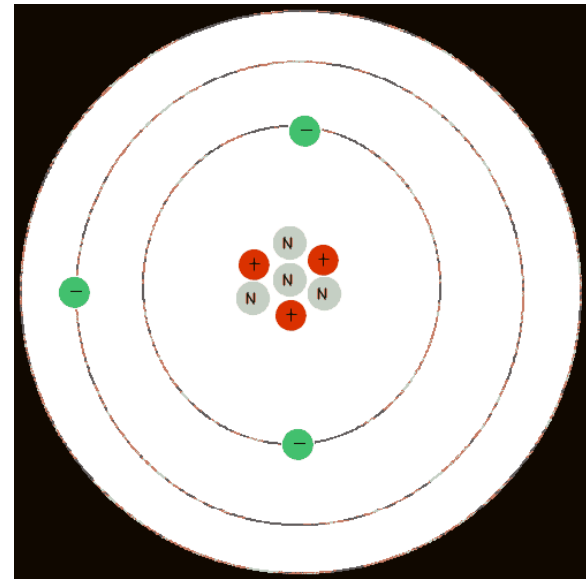
Rutherford Model:



Early Atomic Models

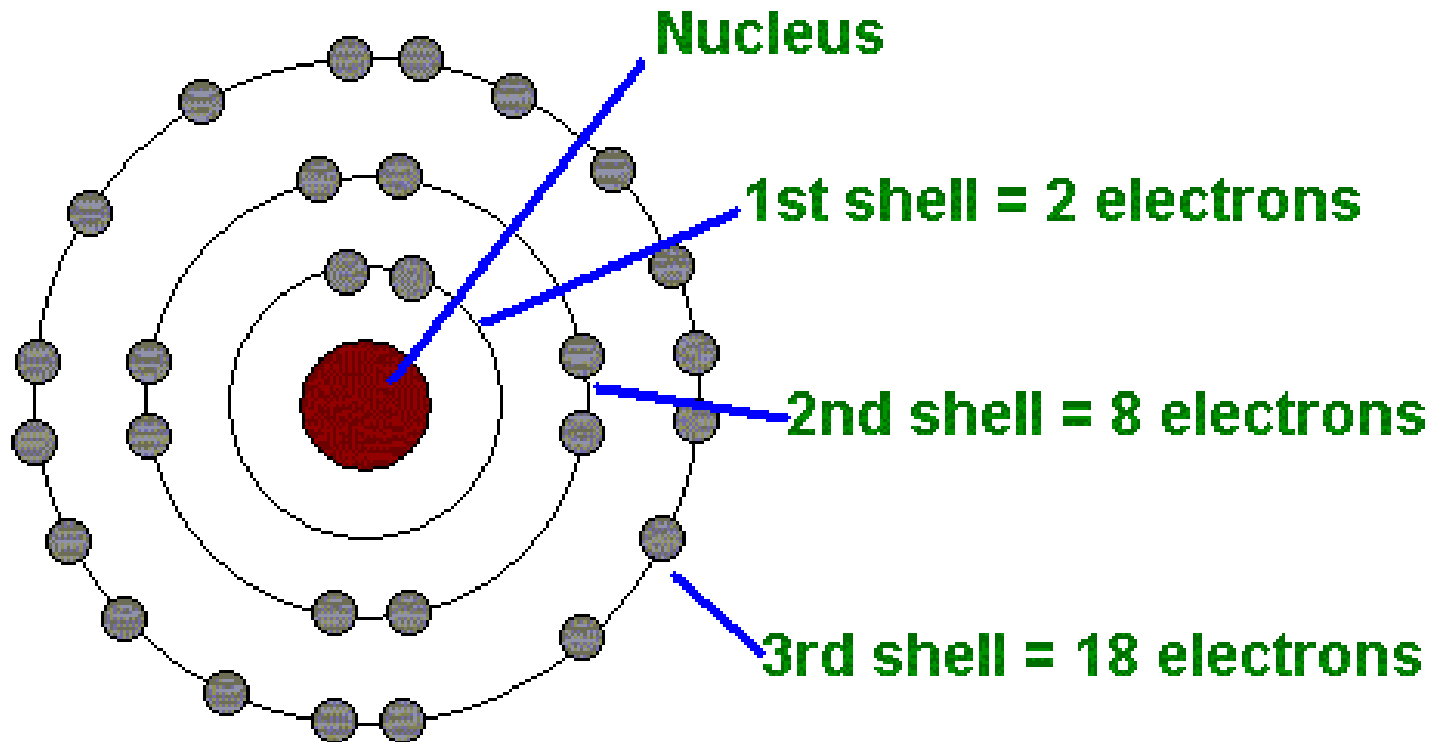
Bohr Model:

-Electrons move in defined **orbits** around the nucleus.



Early Atomic Models

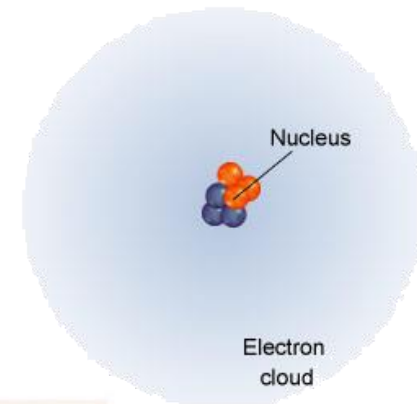
Bohr Model:



Early Atomic Models

Electron Cloud Model:

- sometimes called the **wave** model.
- spherical cloud of varying density.
- varying density shows where an electron is more or less likely to be.



Early Atomic Models

Electron Cloud Model:

ELECTRON CLOUD
(region or space where
electrons are likely to
be found)



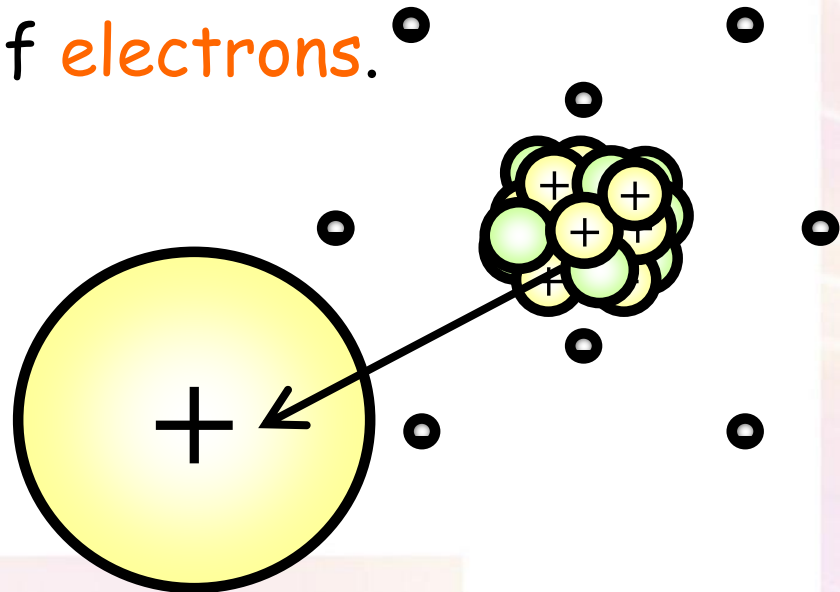
nucleus

ELECTRON CLOUD | VIZISCIENCE.COM

Subatomic Particles

What are Protons?

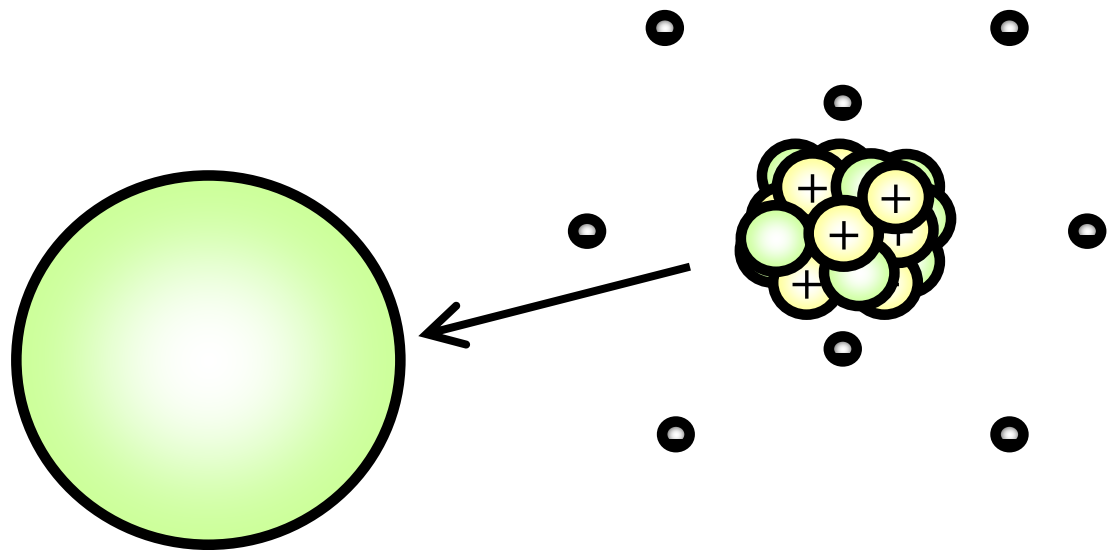
- positively** charged particles.
- Help make up the nucleus of the atom.
- Equal to the **atomic number** of the atom.
- Contributes to the **atomic mass**.
- Equal to the number of **electrons**.



Subatomic Particles

What are Neutrons?

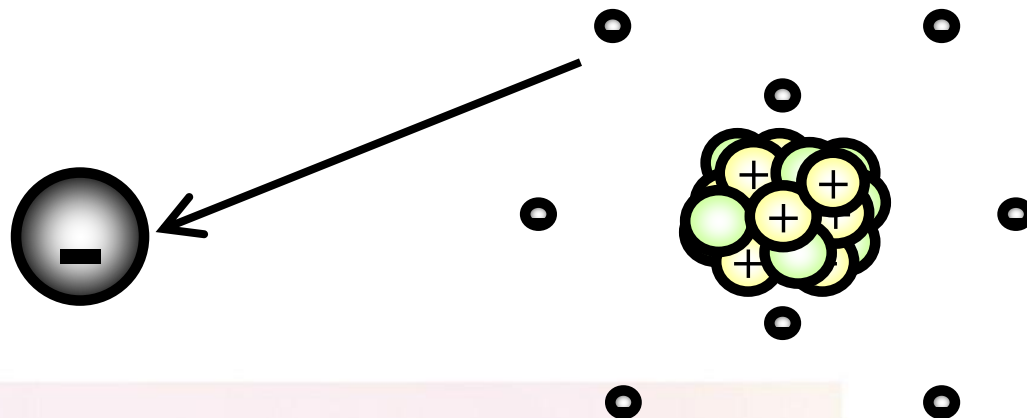
- neutral particles; have no charge.
- Help make up the nucleus of the atom.
- Contributes to the atomic mass.



Subatomic Particles

What are Electrons?

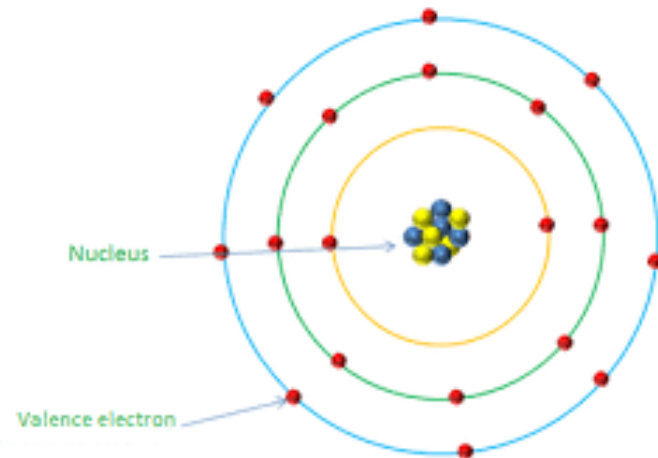
- negatively** charged particles.
- Found outside the nucleus of atom in the electron **orbitals**.
- Each orbit/level can hold a **different** number of electrons.
- 1st Orbital **2 e's**, 2nd and on Orbital **8 e's.**,



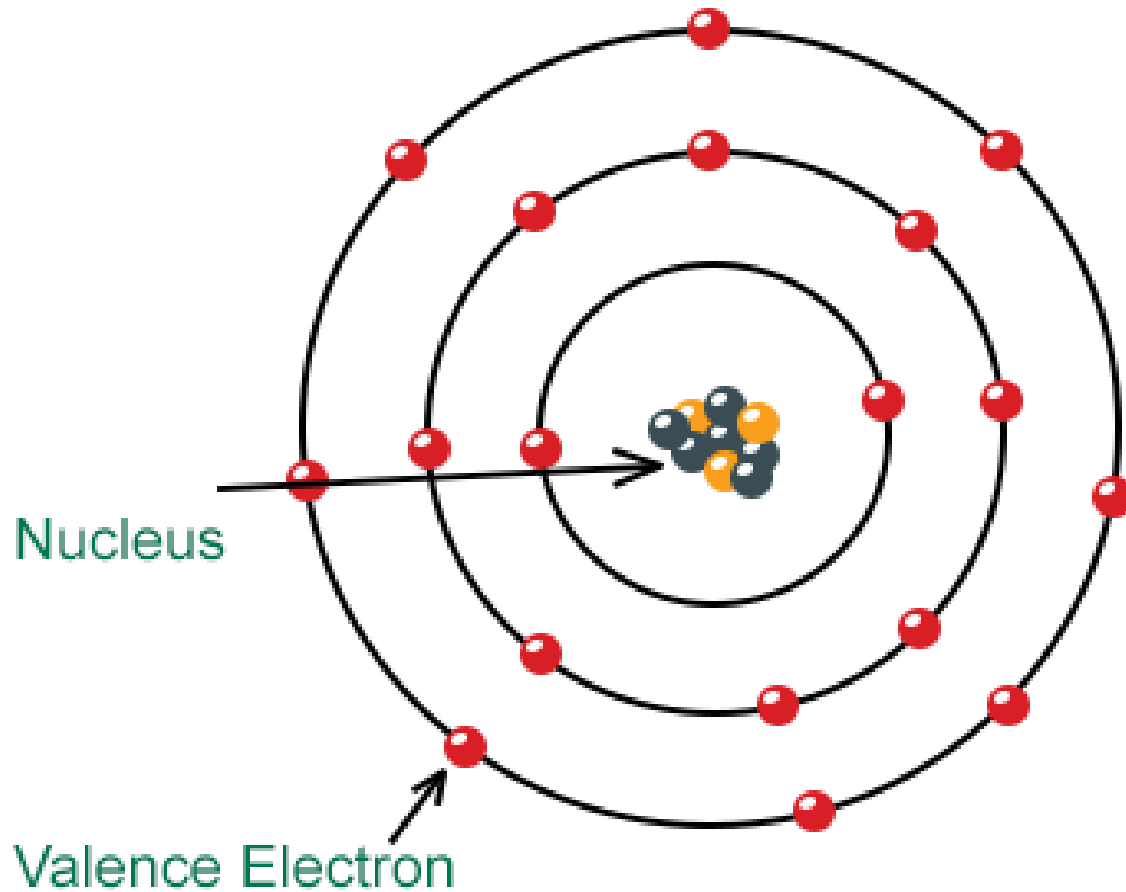
Subatomic Particles

Valence Electrons:

- Found in the outermost energy level of the electron cloud. (Called the **valence** shell)
- Involved in **bonding**.
- Determine the chemical properties of an **element**.

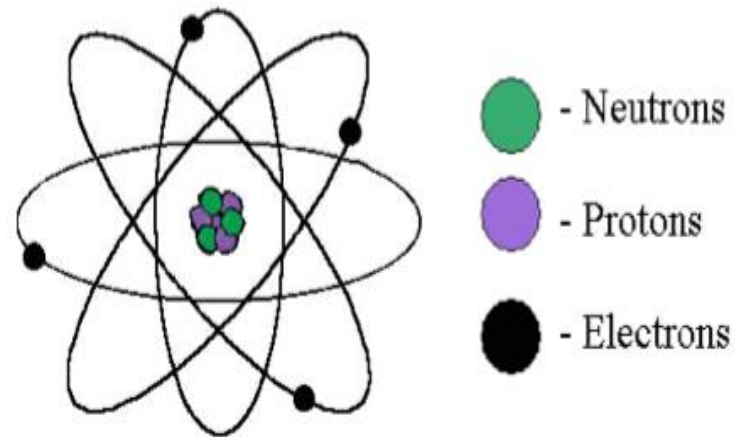
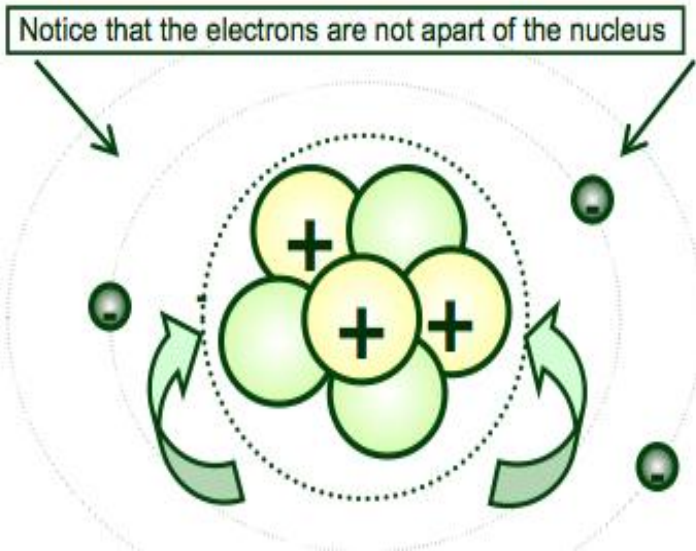


Subatomic Particles



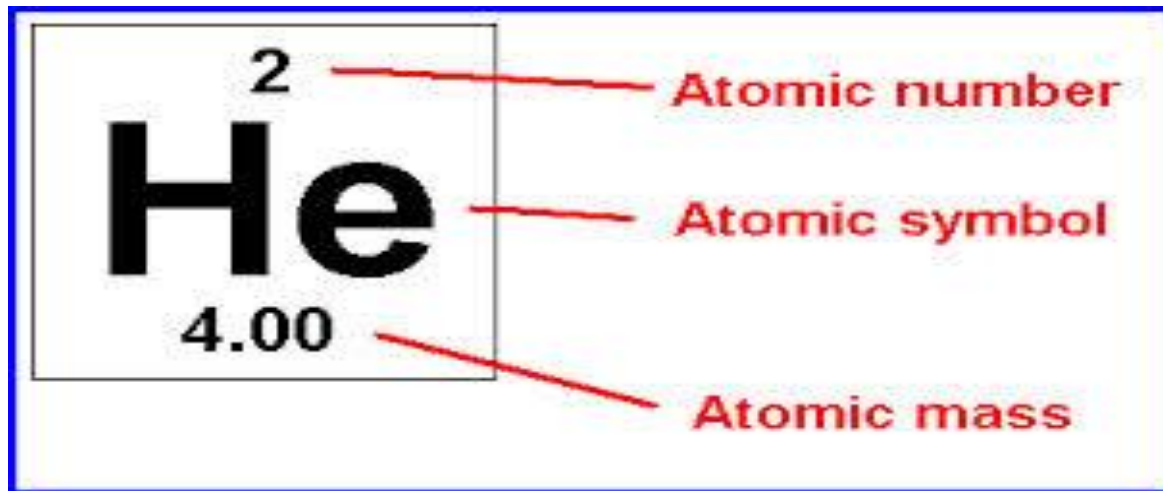
Atomic Center - Nucleus

- Protons and neutrons are grouped together to form the "center" or **nucleus** of the atom.



How are Atoms Described?

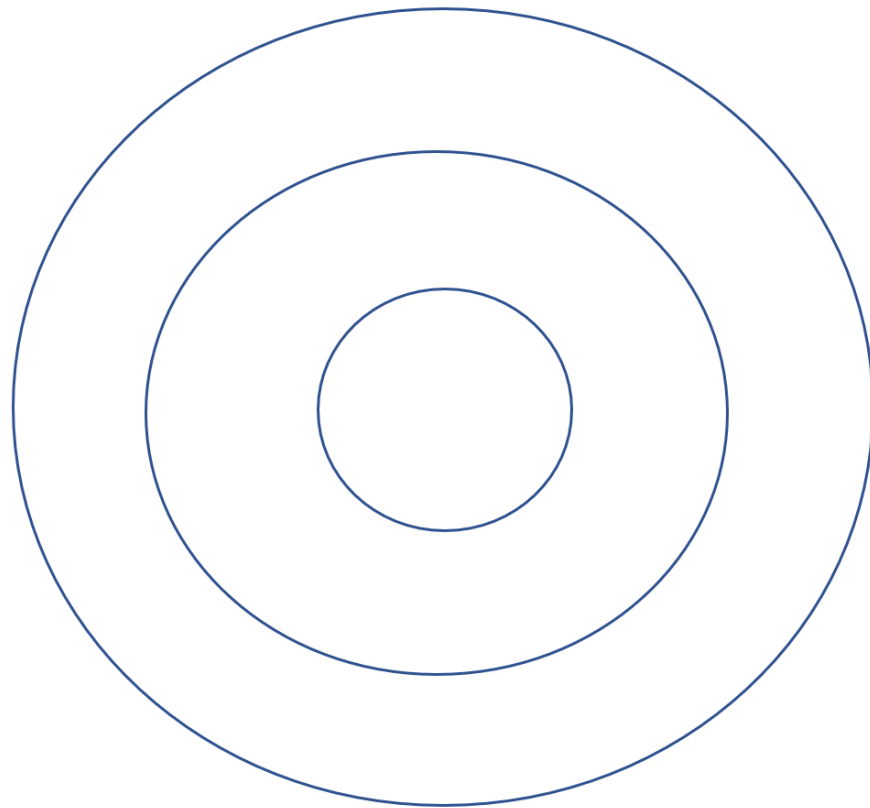
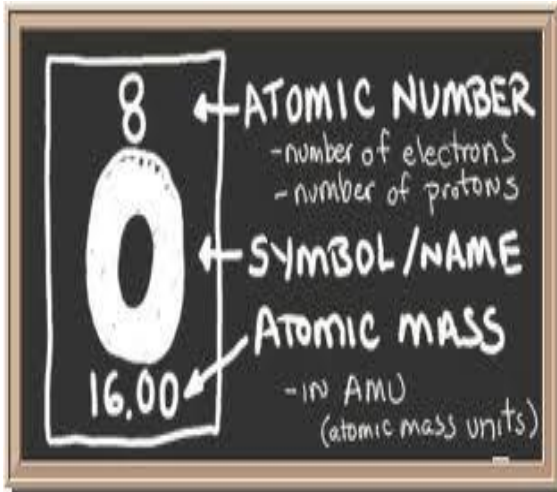
- **Atomic Number** = number of **Protons**.
- In a neutral atom, the number of **protons** = the number of **electrons**.
- **Atomic Mass** is the number of **Protons** + the number of **Neutrons**.



Example:

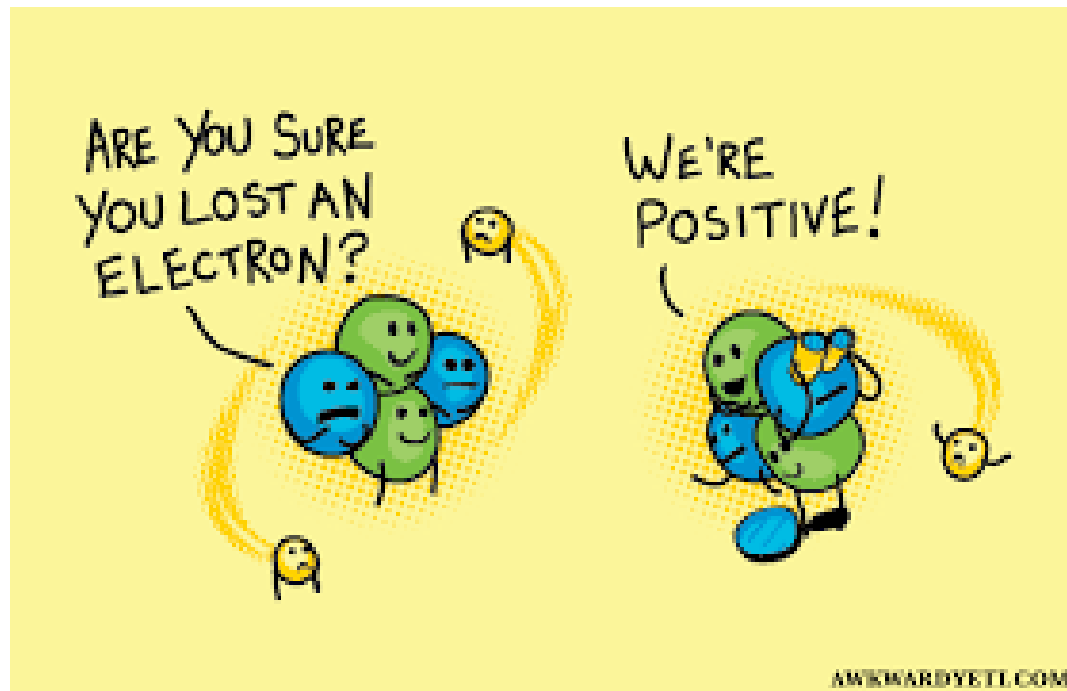
Oxygen Atom:

Bohr Model:



Changing the Properties of Atoms:

- An **ion** is an atom or molecule with a net electric charge due to the loss or gain of one or more electrons.



Changing the Properties of Atoms:

- An **isotope** is each of two or more forms of the same element that contain equal numbers of protons, but different numbers of neutrons in their nuclei, and have a different atomic mass but not in different chemical properties.
- A **molecule** is a group of atoms bonded together, representing the smallest fundamental unit of a chemical compound that can take part in a chemical reaction.

What Forms If...?

