

Atomic Theory and Matter

Lecture 6

Matter: Anything that takes up space (volume) and has mass.

Matter can exist in 4 states:

solid

liquid

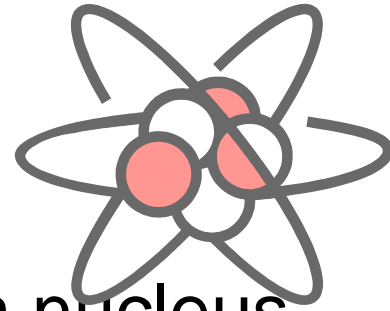
gas

plasma (*gas*

*molecule stripped of electrons:
extremely high temperatures)*

All matter is composed of atoms

Your Basic Atom



- Has a very dense center called a nucleus.

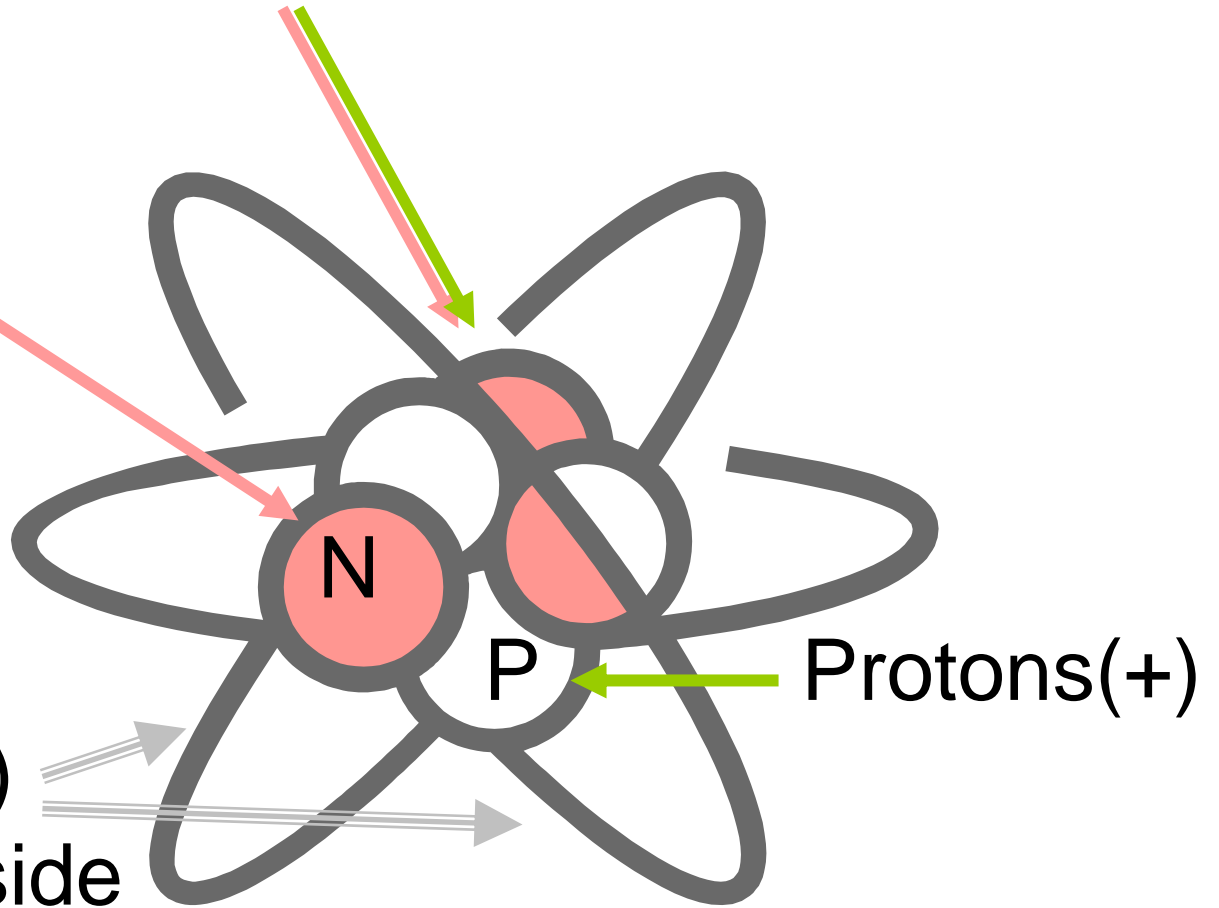
In the nucleus are the two heavy **subatomic particles** called the neutron and the proton.

- Neutrons are neutral and the heaviest particle.
 - Protons are positive and similar in mass to neutrons.
- Orbiting the nucleus are the particles called electrons.
 - Electrons are negative in charge and extremely light.

Nucleus dense center

Neutrons

Electrons (-)
in Orbit outside
of the nucleus.



Ions : charged particles (could be one or more atoms)

- Atoms are made up of particles, the only ones moving from atom to atom are electrons.
- Atoms gaining extra electrons have a net negative charge and are called **anions(-)**
- Atoms losing electrons have a net positive charge and are called **cations.** (+)

Atom: smallest whole unit of matter

- An element is a substance that cannot be broken down by simple chemical means; an atom for which you know the exact number of protons.
- **Atoms bonded together make up molecules.**

Molecules

- The smallest whole unit of a **compound** is a molecule.
- A compound is composed of 2 or more atoms bonded in a fixed ratio, they can be the same or different elements.
 - For example water, H_2O , O_2 , O_3
- A mixture is not homogenous (not uniform).
 - For example air is a mixture of molecules of gases, N_2 , O_2 , CO_2 ...

The Periodic Table of Elements

- Chart / table listing all of the different types of atoms that exist and make up matter.
- The shape of the table has significance and is based on the structure of atoms.
- Structure reveals behavior of atoms.

Structure Determines Behavior

- The subatomic particles which make up atoms give them their specific properties.
- By properties we mean:
 - Mass
 - Conductivity
 - State at room temperature
 - Reactive properties (stable or not)
 - Bonding capacity...

Periodic Table: information

- Each box on the periodic table of elements gives you known information about an atom of a particular element.
- Electron configuration
- Atomic Mass, symbol for the element, (N)
- Atomic number
 - # of electrons
 - # of protons