

Ch 4  
Sec 4.1-4.2  
My: 9/23/02 8:43 AM

Atom

- The smallest particle of an element that maintains the properties of the element.
- Dalton's Atomic Theory describes the atom and how it functions.
  - \* 4 Parts
  - 1) All elements consists of tiny indivisible particles called atoms.
  - 2) Atoms of the same element are identical, atoms of different elements are different.
  - 3) Atoms can both physically and chemically combine with each other.
    - \* Physically Combine  $\rightarrow$  mixture.
    - \* Chemically Combine  $\rightarrow$  compound
    - \* Always combine in simple whole number ratios.
  - 4) Chemical Changes occur when atoms combine, separate or are rearranged.
    - \* An atom of one element never becomes an atom of another element.

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Subatomic Particles

- The atom contains 3 subatomic particles.
  - 1) Proton
    - Positively charged particle
    - Located in the nucleus of the atom.
    - Has a relative mass of 1amu.
    - Identifies the type of element.
  - 2) Neutron
    - A neutral particle which is located in the nucleus of the atom.
    - Has a relative mass of 1amu.
    - Neutrons are responsible for the stability of the nucleus.
  - 3) Electron.
    - A negatively charged particle located in the area surrounding the nucleus called the electron cloud.
    - Electrons are massless.
    - Responsible for the chemical properties of an element.

**Table 4.1**  
Properties of Subatomic Particles

Particle	Symbol	Relative charge	Relative mass (mass of proton = 1)	Actual mass (g)
Electron	e <sup>-</sup>	1-	1/1840 - $\ominus$	$9.11 \times 10^{-28}$
Proton	p <sup>+</sup>	1+	1	$1.67 \times 10^{-24}$
Neutron	n <sup>0</sup>	0	1	$1.67 \times 10^{-24}$

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Atomic Structure

- The atom has two distinct regions.

## 1) Nucleus

- Dense inner core of the atom.
- Contains the mass of the atom.
  - \* Sum of the # of protons + neutrons.
- Has a positive charge

## 2) Electron cloud.

- Surrounds the nucleus
  - \* mostly empty space.
- Has no mass
- Is negatively charged

Properties of an Atom

- All atoms are electrically neutral.

\* The charge on the nucleus equals the charge in the electron cloud.

\* The # of protons equals the # of electrons in an atom.

- All atoms except for the noble gases are chemically unstable.

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