

# ATOMIC STRUCTURE

Name \_\_\_\_\_

An atom is made up of protons and neutrons (both found in the nucleus) and electrons (in the surrounding electron cloud). The atomic number is equal to the number of protons. The mass number is equal to the number of protons plus neutrons. In a neutral atom, the number of protons equals the number of electrons. The charge on an ion indicates an imbalance between protons and electrons. Too many electrons produces a negative charge, too few, a positive charge.

This structure can be written as part of a chemical symbol.

**Example:**

$\begin{matrix} \text{mass} \\ \text{number} \\ \downarrow \\ \text{15N}^{+3} \\ \uparrow \\ \text{7} \\ \text{atomic} \\ \text{number} \end{matrix}$

$\swarrow$  charge

7 protons  
 8 neutrons (15 - 7)  
 4 electrons

Complete the following chart.

Element/ Ion	Atomic Number	Atomic Mass	Mass Number	Protons	Neutrons	Electrons
H						
H <sup>+</sup>						
$^{12}_6\text{C}$						
$^7_3\text{Li}^+$						
$^{35}_{17}\text{Cl}^-$						
$^{39}_{19}\text{K}$						
$^{24}_{12}\text{Mg}^{2+}$						
As <sup>3-</sup>						
Ag						
Ag <sup>+1</sup>						
S <sup>-2</sup>						
U						

# ISOTOPES AND AVERAGE ATOMIC MASS

Name \_\_\_\_\_

Elements come in a variety of isotopes, meaning they are made up of atoms with the same atomic number but different atomic masses. These atoms differ in the number of neutrons.

The average atomic mass is the weighted average of all the isotopes of an element.

**Example:** A sample of cesium is 75%  $^{133}\text{Cs}$ , 20%  $^{132}\text{Cs}$  and 5%  $^{134}\text{Cs}$ . What is its average atomic mass?

Answer:  $.75 \times 133 = 99.75$

$.20 \times 132 = 26.4$

$.05 \times 134 = \underline{6.7}$

Total = 132.85 amu = average atomic mass

Determine the average atomic mass of the following mixtures of isotopes.

1. 80% $^{127}\text{I}$ , 17% $^{126}\text{I}$ , 3% $^{128}\text{I}$					
2. 50% $^{197}\text{Au}$ , 50% $^{198}\text{Au}$					
3. 15% $^{55}\text{Fe}$ , 85% $^{56}\text{Fe}$					
4. 99% $^1\text{H}$ , 0.8% $^2\text{H}$ , 0.2% $^3\text{H}$					
5. 95% $^{14}\text{N}$ , 3% $^{15}\text{N}$ , 2% $^{16}\text{N}$					
6. 98% $^{12}\text{C}$ , 2% $^{14}\text{C}$					