Name _____ Date_____ Block_____

Chemistry: Average Atomic Mass

An element can exist in a number of forms, called isotopes.
Isotopes – are forms of the same element that vary in mass…same # of protons, different # of neutrons.

For example, there are two different types (isotopes) of copper. One isotope of copper has a mass of 62.93amu. The other has a mass of 64.94amu. The lighter isotope is more common of the two naturally occurring copper isotopes.

To find the AVERAGE ATOMIC MASS of an atom, we take into account all of the isotopes, and calculate the percentage of each type. The calculation of the average atomic mass is a WEIGHT.

Average Atomic Mass = $\sum$ (mass of isotope x relative abundance)

Relative Abundance – the % (percentage) of each isotope

To find the average atomic mass, we insert the information of the isotope into the formula and solve. There are two isoptopes for copper, so we will add the contribution of each of the two isotopes. (That's where the $\sum$ sum of symbol comes in.)

Ex. Copper

Average atomic mass copper = (62.93x0.6909) + (64.94x0.3091)

From the calculation, we know that an AVERAGE atom of copper has a mass of 63.55amu. Looking at the problem, we should be able to predict that the average is closer to the weight of the lighter isotope because the lighter isotope is more common.

Isotope name	Isotope mass (amu)	Percentage (%)
Silver-107	106.90509	51.86
Silver-109	108.90470	remainder

1. Calculate the missing percentage. (%)

2. Calculate the Average Atomic Mass of an atom of silver.

Question Group #2

Directions and/or Common Information: Silicon has three naturally occurring isotopes

Isotope name	Isotope mass (amu)	Relative Abundance
Silicon-28	27.98	92.21
Silicon-29	28.98	4.70
Silicon-30	29.97	3.09

Look over the data before you begin the problem. Estimate the value of the answer before calculation. Will the weighted average be closer to 28, 29, or 30?

1.

Now, find the average atomic mass of an atom of silicon

2.

Question Group #3

Directions and/or Common Information: Iron has four isotopes.

Isotope name	Isotope abundance	Isotope mass (amu)
Iron-54	5.90%	53.94
Iron-56	91.72%	55.93
Iron-57	2.10%	56.94
Iron-58	0.280%	57.93

Estimate the average mass.

1.

Calculate the average atomic mass of iron.

2.