Name _____ Weighted Average Atomic Mass (W.A.A.M.) of Smarterium (St)

Purpose: To analyze the isotopes of Smarterium (St) and to calculate its weighted average atomic mass

Pre-Lab Questions:

1. What are the two things that stay the same for samples of an isotope?
   a) b)

2. What are two things that differ for samples in an isotope?
   a) b)

I. Determining the Abundance of Each Isotope

1.) Count the number of each isotope (color) of Smarterium and record in the data table. Add up these numbers for the total number of atoms in your sample and record.

- you may not HAVE all colors present – that's ok!!

2.) Determine the percent abundance for each isotope in your sample. The formula is given to you in the data table.

DATA TABLE

Isotope of St (color)	Mass of Each Isotope	Number of Each	% Abundance $\frac{\text{part}}{\text{whole}}$ x 100
White	**1.88 amu**		
Yellow	**1.36 amu**		
Pink	**1.54 amu**		
Green	**0.85 amu**		
Purple	**0.92 amu**		
Orange	**0.43 amu**		
		15 Total	**100 %**

2.) Which isotope (color) of Smarterium is most abundant?

_____

3.) Which isotope (color) will contribute the most to the overall mass of the sample? _____

4.) Which isotope (color) would contribute the most to the weighted average of the atomic mass of Smarterium?

_____

II. Calculating the Weighted Atomic Mass

Since the Weighted Atomic Mass depends on BOTH the abundance and mass of each isotope, we **CAN NOT** do a regular average. Use the following formula to determine the WAAM of Smarterium.

$$\text{WAAM} = \frac{(\text{mass of isotope \#1} \times \text{\% abundance})}{100} + \frac{(\text{mass of isotope \#2} \times \text{\% abundance})}{100} + \ldots$$

Questions/Analysis

1. Why can't the average mass be calculated by adding up all the masses for each isotopes and then dividing by how many total "isotopes" there are?

2. How are the three isotopes of Carbon (C-12, C-13 and C-14) alike and how are they different? Fill in the blanks for the following isotope.

C-12	**C-13**	**C-14**
p+= ____	p+= ____	p+= ____
e-= ____	e-= ____	e-= ____
n^0= ____	n^0= ____	n^0= ____

_____3. Which symbols represent atoms that are isotopes of each other?

a) ^{14}C and ^{14}N b) ^{16}O and ^{18}O c) ^{131}I and ^{131}I d) ^{222}Rn and ^{222}Ra

_____4. The atomic mass of an element is defined as the weighted average mass of that element's

a) most abundant isotope b) least abundant isotope c) naturally occurring isotopes d) radioactive isotopes