Average Atomic Mass Activity
Chemistry

Name: _____

Date: _____ Hour: _____

Goals:

The goals of this lab are to simulate a mass spectrometer and to determine the average atomic mass of the imaginary element "beanium."

Background:

Almost all of the elements have at least two known isotopes. Isotopes are atoms of the same element which are nearly identical. The single difference between two isotopes is that they have different numbers of neutrons giving them different masses. Different elements have different numbers of isotopes. For example, carbon has three isotopes, iron has four, and zinc has five!

The average atomic mass of an element is an important quantity in chemistry. It is used in many calculations. The process of determining the weighted average of the atomic masses of all the isotopes of an element considers both the mass of each isotope and the percent abundance of the isotope in nature, through the following equation:

Average atomic mass = the sum of (atomic mass x % abundance) for all isotopes

Remember: To turn a percent into a decimal, move the decimal point 2 places to the left!

Example:

The element zinc has 5 isotopes, listed below:

isotopes	percent abundance			
zinc – 64	48.89%	64 x 0.4889	=	31.2896
zinc – 66	27.81%	66 x 0.2781	=	18.3546
zinc – 67	4.11%	67 x 0.0411	=	2.7537
zinc – 68	18.5%	68 x 0.185	=	12.58
zinc – 70	0.62%	70 x 0.0062	=	0.434
				65.4119 amu
				avg. atomic mass

Materials:

1 100 mL beaker
3 massing cups
1 sample of "beanium"
1 cg balance

Hazards:

There are no health hazards associated with this activity.

Procedure:

1. Obtain one 100 mL sample of "beanium."
2. Separate the sample into its three different isotopes.
3. Observe each isotope.
4. Count each isotope.
5. Determine the total number of all isotopes.
6. Determine the percentage abundance of each isotope.
7. Mass three empty massing cups.
8. Mass each isotope in its own massing cup.
9. Determine the mass of just the isotope through subtraction.

10. Determine the average mass of each isotope.
11. Using the average mass and percentage abundance of each isotope, determine the average atomic mass of beanium.

Data:

Isotope	**Kidney Bean**	**Pinto Bean**	**White Bean**
description/drawing			
number of atoms (beans)			

Total number of atoms (beans) = _____

percentage abundance (number ÷ total)			

balance # _____

mass of massing cup			
mass of cup + atoms			
mass of atoms			
average mass of each atom (mass ÷number)			

Show your work for calculating the average atomic mass for the element beanium:
(examples are on the front of this paper in the background section AND in your notes!)

Average atomic mass = _____