

Name: \_\_\_\_\_ Block: \_\_\_\_\_ Date: \_\_\_\_\_

### LAB ACTIVITY CALCULATING ATOMIC MASS

#### Calculating Average Atomic Mass

1. **Convert:** % abundance → decimal form
2. **Multiply:** abundance (decimal form) of isotope x mass of isotope
3. **Add:** Sum of all products from step 2

Isotope	Abundance	Abundance Decimal	Abundance (decimal) x mass of isotope
$^{133}\text{Cs}$	75%	0.75	$(0.75)(133) = 99.75$
$^{132}\text{Cs}$	20%	0.20	$(0.20)(132) = 26.4$
$^{134}\text{Cs}$	5%	0.05	$(0.05)(134) = 6.7$
Average Atomic Mass			132.85 amu

#### Press Release from the Virginia Beach News: Element 114 – VaBeachium

Virginia Beach, VA- Chemists, working on a project for the city of Virginia Beach, have recently discovered what is believed to be element 114. The researchers have proposed that the element be named VaBeachium (va-beach-e-m), after the city in which it was discovered. The proposed element symbol is Vb.

Samples are currently being distributed to all of the local high schools. Each school is to isolate the individual isotopes, determine the relative abundance of each isotope, and calculate the atomic mass of the new element.

Two properties unique to VaBeachium should make the work particularly easy – VaBeachium atoms are visible to the naked eye and each isotope has a slightly different color.

#### Introduction

The atomic mass of an element must reflect both the masses of each isotope of the element and the relative abundance of the isotopes of the element. Mass number is the total number of protons and neutrons in the nucleus of an atom; the mass number can be used as the mass of the isotope. Atomic number is the number of protons in the nucleus of an atom. Atomic mass is the weighted average of the masses of the isotopes of the element.

#### Procedure

1. Count the total number of atoms.
2. Record this value in your data table.
3. Separate the isotopes of VaBeachium by color.
4. Count the number of atoms of each isotope.
5. Record the quantities in your data table. (Remember, significant figures are not determined by counts.)
6. Calculate the mass number for each isotope. (The numbers of protons, neutrons and electrons in each isotope are written on the front of each atom.)
7. Record the mass number for each isotope in your data table.
8. Write the name of the isotope using hyphen notation in the data table. (use the element name and the mass number (vabeachium-275))

### Data Table

Total number of atoms of VaBeachium in the envelope _____			
Isotope (color)	1 <u>pink</u>	2 <u>yellow</u>	3 <u>blue</u>
# of atoms	4	3	5
Mass # (mass of each isotope)	275	277	278
Hyphen Notation			

### Calculations

1. Calculate the percent abundance of the first isotope.

$$\frac{\text{number of atoms of the isotope}}{\text{total number of atoms in the sample}} \times 100\% = \% \text{ abundance of the isotope}$$

2. Record the % abundance below, rounding the value to 5 significant figures.  
 3. Repeat this calculation for each isotope.

Hyphen Notation	% Abundance
VaBeachium-_____	
VaBeachium-_____	
VaBeachium-_____	

4. Calculate the mass of each isotope.  
 5. Repeat this calculation for each isotope.

$$\begin{array}{ccc} \% \text{ abundance} & & \text{Mass of one} \\ \text{(in decimal} & \times & \text{atom of same} \\ \text{form)} & & \text{isotope} \end{array}$$

$$\text{Isotope 1 (\% abundance} \times \text{mass of 1 atom)} = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\text{Isotope 2 (\% abundance} \times \text{mass of 1 atom)} = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

$$\text{Isotope 3 (\% abundance} \times \text{mass of 1 atom)} = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

6. Calculate the weighted average atomic mass of VaBeachium (add the values obtained in #5)

$$\text{Atomic mass of VaBeachium} = \underline{\hspace{2cm}}$$