Lab makeup

Name:

Activity – Isotopes

Problem: How do isotopes affect average atomic mass?

Key:
Silver = Carbon   **Copper** = Copper   **Paper** = Uranium   **M & M** = Boron

Object	Atomic Mass
Circle washers	11
Small paper clips	12
Thumbtacks	13
Large paper clips	14
Pennies	64
Wire	63
Pink paper	238
White paper	235
Yellow paper	236
Large M & M	10
Small M & M	11

Procedure:
1. Separate the materials into the following piles: silver, copper, paper, M & M's
2. Each different item in a pile represents a different isotope of that element. Use the table above to determine each item's atomic mass.
3. Look at your Carbon pile (silver). Count the number of atoms of each isotope of Carbon and record your information below. **For example:** C-11 are your circle washers (look at table above). You have 1 circle washer, so record a number 1 next to C-11 below. C-12 are your small paper clips (look at table above). How many do you have? Count and record below for C-12. Repeat the process.

   C-11 = __1__   C-12 = __8__   C-13 = __2__   C-14 = __1__

4. Make a **prediction on your data table on the back** on which isotope your average atomic mass will be closest to. Are you predicting your average atomic mass will be closest to the isotope C-11, C-12, C-13, or C-14. Pick one and record under the **Prediction** column.   *12*

5. **Calculate your average atomic mass for Carbon below. Show your work!** Write your answer on the data table on the back under the **Atomic Mass column**. Was your prediction right? **Mark YES or NO under the Prediction Correct column.**

$$\frac{(1 \times 11) + (8 \times 12) + (2 \times 13) + (1 \times 14)}{1 + 8 + 2 + 1} = \frac{147}{12} = 12.25$$

6. Look at your Copper pile (copper). Count the number of atoms of each isotope of Copper and record your information below. Remember to use your table on the top of the front page (this is the same process you did in #3)!

$$Cu\text{-}63 = \underline{\quad 2 \quad} \qquad Cu\text{-}64 = \underline{\quad 2 \quad}$$

7. Make a **prediction on your data table on the back** on which isotope your average atomic mass will be closest to. Are you predicting your average atomic mass will be closest to the isotope Cu-63 or Cu-64? Pick one and record under the **Prediction** column.

8. **Calculate your average atomic mass for Copper below.** Show your work! Write your answer on the data table on the back under the **Atomic Mass column.** Was your prediction right? **Mark YES or NO under the Prediction Correct column.**

9. Look at your Uranium pile (paper). Count the number of atoms of each isotope of Uranium and record your information below. Remember to use your table on the top of the front page (this is the same process you did in #3)!

$$U\text{-}235 = \underline{\quad 20 \quad} \qquad U\text{-}236 = \underline{\quad 1 \quad} \qquad U\text{-}238 = \underline{\quad 1 \quad}$$

10. Make a **prediction on your data table on the back** on which isotope your average atomic mass will be closest to. Are you predicting your average atomic mass will be closest to the isotope U-235, U-236, or U-238? Pick one and record under the **Prediction** column.

11. **Calculate your average atomic mass for Uranium below.** Show your work! Write your answer on the data table on the back under the **Atomic Mass column.** Was your prediction right? **Mark YES or NO under the Prediction Correct column.**

12. Look at your Boron pile (M & M's). Count the number of atoms of each isotope of Boron and record your information below. Remember to use your table on the top of the front page (this is the same process you did in #3)!

$$B\text{-}10 = \underline{\quad 1 \quad} \qquad B\text{-}11 = \underline{\quad 2 \quad}$$

13. Make a **prediction on your data table on the back** on which isotope your average atomic mass will be closest to. Are you predicting your average atomic mass will be closest to the isotope B-10 or B-11? Pick one and record under the **Prediction** column.

14. **Calculate your average atomic mass for Boron below.** Show your work! Write your answer on the data table on the back under the **Atomic Mass column**. Was your prediction right? **Mark YES or NO under the Prediction Correct column.**

Data Table:

Element	Prediction	Calculated Atomic Mass	Prediction Correct?
Carbon			
Copper			
Uranium			
Boron			

Questions:

1. How are isotopes of the same element different from one another?

2. How are isotopes of the same element similar to one another?

3. Compare and contrast the atomic structure of the Carbon isotopes.

	P	E	N
C-11			
C-12			
C-13			
C-14			

How are the four isotopes similar and different?

4. Would the average atomic mass of Copper change if you had 100 atoms of each isotope? Explain your answer.

5. What is the difference between the atomic mass and the average atomic mass?

6. What is Nitrogen's most common isotope number? _____