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| CHEMISTRY | CODE: SCS21 |
| 2014-2015 SCHOOL YEAR | INSTRUCTOR: Ms. Bui |
| CLASSROOM: 510 | LAB ROOM: 506 |

**LAB 05**

**CANDIUM - ISOTOPES**

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| Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Subject: Chemistry |

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| **PRE-LAB:**  A new element has been discovered in the Kingdom of Halloween. The Pumpkin King wants to name the new element Candium. However, he is not sure what is the atomic mass of the new element Candium since the element is made up of three isotopes (M&Ms, Skittles, and Reese’s). You have been tasked with the responsibility of determining the atomic mass of the new element. Before you begin your task, you the Sweet Library to review some basic concepts.   1. What two pieces of data do you need to know about an element in order to determine the atomic mass?    1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_    2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2. Why do you need these two data?   The extremely small size of atoms makes it impossible to count them or determine their individual masses using direct means. An instrument called a mass spectrometer allows for such determinations. The average atomic masses depend on the number and masses of the isotopes of an element.  Isotopes are atoms of the same atomic number having different masses due to different numbers of neutrons. The atomic mass of an element is the weighted average of the masses of the isotopes of that element. The weighted average takes account both the mass and relative abundance of each isotope as it occurs in nature. |

**Lab Rubric**

Teacher’s Grade:

* Participation (20 points):
* On Task (20 points):  
  Understanding (20 points):
* Accuracy (20 points):

Lab Partner’s Grade:

* Lab Partners (20 points): (you may each give up to 20 points the grade you think this person deserve for contributing to the lab project. I will review and make a determination from there.
  + Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Your Reflection (how did I perform)\_\_\_\_\_\_\_\_\_\_\_

**Materials:**

Electronic balance

Calculator

Sample of M&M in a zip lock bag

Sample of skittles in a zip lock bag

Sample of Reeces in a zip lock bag

cup

**Procedure**

1. Count each isotope group (group of candies) and record below
   1. M&M \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Skittle\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Reese’s\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Total\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Determining the Mass: Record the weight for each isotope group
   1. M&M \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Skittle\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Reese’s\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Total\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Calculate the Relative Abundance: Divide the number in each isotope group by the total number of all isotopes to get the relative abundance of each isotope (show work and report to 3 decimal places). Formula: Example: (Number of M&M)/(Total number of candies)
   1. M&M \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Skittle\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. Reese’s\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Total \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Calculate the Average Mass: Divide the mass of each isotope group by the number in each isotope to get the average mass of one isotope (account for significant figures)
   * 1. M&M \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     2. Skittle\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     3. Reese’s\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Multiple the relative abundance by the average mass of each isotope to get the relative mass of each isotope
   * 1. M&M \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     2. Skittle\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     3. Reese’s\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. Add the Relative Masses of the isotopes to get the weighted average mass (“Atomic Mass”) of the Candium element.

**Post Lab Questions**: (all responses should be in complete sentences)

1. Your average *atomic mass* is closest to the average mass of which type of candies?
   1. M&M
   2. Skittles
   3. Reeces
2. Provide evidence to support your claim from Question 1 (make sure to use RELATIVE ABUNDANCE to support your claim). 2-3 complete sentences.
3. Find the *average atomic mass* obtained by another lab group in this class. Write it here. \_\_\_\_\_\_\_\_\_\_
   1. State your claim: My group’s average atomic mass is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the average atomic mass of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ group.
   2. Provide the evidence for the comparison (2-3 complete sentences)
   3. Explain the reasoning behind the similarity or the difference (2-3 complete sentences)
4. How does knowing the atomic mass provide us with details about the properties of an element? Explain and provide support in 3-5 sentences.