"CANDIUM" LAB

WHAT TO TURN IN: Hypothesis, Data Table 1, Data Table 2, Sample calculations, Error Analysis, Conclusion, Questions #1-5

***** IMPORTANT NOTE: All candy used in this lab will <u>not</u> contain any nuts. *****

Background Information

Isotopes are different forms of the same element. Therefore, they have the same number of protons and electrons, but they differ in the number of neutrons. As an example, consider the three isotopes of hydrogen. H-1 is regular hydrogen and can be called protium, H-2 is called deuterium, and H-3 is known as tritium. They are all types of hydrogen with only one proton in the nucleus and one electron in an energy level around the nucleus, but all three have different numbers of neutrons in their nuclei.

In this lab, the element is called Candium, since students are working with candy. Any round candies will work. Students will call the three forms (isotopes) of Candium names such as M&Mium, Skittlium, LifeSavium, Smartium, etc.

Alternately, students can use colored marbles or beads instead of candy. As an example, any student who uses marbles can call the element Marblium. The isotope names correspond to the colors of the marbles used: Whitium, Purplium, Peachium, etc.

Materials

Electronic balance
Samples of round candies (at least one handful of each) – do not eat until lab is over
Weigh boats, weighing papers, or other containers such as beakers

Formulas for calculations

$$\text{Average mass (g)} = \frac{\text{mass of the sample}}{\text{number of pieces of candy}}$$

$$\text{Relative abundance (\%)} = \frac{\text{number of pieces of one type of candium}}{\text{total number of pieces of candy}} \times 100$$

Procedure

1) Separate the isotopes of Candium into separate piles if they are not already separated. Place them on clean paper towels or in clean containers.
2) Count the number of each type of isotope and record in Data Table 1. Do not deliberately make the piles the same amounts.
3) Zero the balance and take the mass of each sample. Record in Data Table 1.

Data Table 1: Isotopes of Candium

	Isotope 1 name:	Isotope 2 name:	Isotope 3 name:
Mass (g)			
Number of pieces			
Average mass for the isotope (g)			
Relative Abundance (%)			

TOTAL NUMBER OF PIECES OF CANDY = _____

Data Table 2: Summary Information

Mass (g) of whole sample	
Total number of pieces of candy	
Average mass (g) for the total sample	

Sample Calculations: Write out one example of average mass and one example of relative abundance calculations, using the formulas on page one of this lab.

Questions

1) Use the information from data table 2 to draw a cell or box from the periodic table. Make up a symbol for candium (or whatever you used), being careful not to use a symbol that is already in use, such as Cd or Cn. For your atomic number, do not use one that is already in use, such as 98. Use the average atomic mass that you calculated in lab.
2) See the background information section at the beginning of this lab. How many neutrons each do H-1, H-2, and H-3 have?
3) Does your average mass match the average mass for one of your isotopes? If so, which one? If not, why not?
4) Which isotope of candium had the heaviest mass? Which isotope of candium had the lightest mass?
5) If the isotopes of candium were truly isotopes (not candy pieces), what characteristics would they have in common?