

Isotopes of "Pennium"

Introduction To the casual observer, all the pennies in circulation seem to be identical in size, thickness, and composition. But just as the elements in the periodic table have one or more isotopes with different masses, the pennies in circulation have different masses. In this investigation, you are going to use pennies with different masses to represent different "isotopes" of an imaginary element called "pennium" or "Pe".

Remember that chemical isotopes are atoms that have the same number of protons, but different numbers of neutrons. Thus, isotopes have nearly identical chemical properties, but some different physical properties - such as mass.

In this investigation, you will determine the percentage of the isotopes of "pennium" and the masses of each isotope in the sample of "pennium" which is given to you. You will then use this information to calculate the average atomic weight of "pennium".

Pre-lab Questions

1. What does the bag of 20 pennies in this investigation represent?
2. What do the different masses of the pennies represent?
3. What do you need to know to calculate the average atomic mass (weight) of an element?

Materials

A bag of 20 pennies Balance

Procedure

- 1) Count the pennies, be sure that there are 20.
- 2) Determine the combined mass of your 20 pennies, to the nearest 0.01g.
- 3) Find the mass of each penny separately. In a data table like the one below, record the year and the mass of each penny to the nearest 0.01g.

Data Table

Penny	Year	Mass (g)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Analysis Questions

1. Inspect your data carefully. How many isotopes of "pennium" are present?
2. Explain the evidence for the number of isotopes of "pennium" (Hint: use the year the pennies were minted).
3. Calculate the percentage of each isotope in your sample (number of pennies of each isotope divided by the total number of pennies in the sample).
4. Calculate the average atomic mass of each isotope. (total of the masses of the pennies of each isotope divided by number of pennies for that isotope).
5. Calculate the average atomic mass of Pe. (the total (add) of the % of each isotope x its average mass)

Conclusion

Write a paragraph about what you learned about isotopes and average atomic masses as they relate to the periodic table.