CANDIUM LAB

Background – It's Candium

Sugar City, USA – Nuclear chemists, performing basic research on dirty kindergarten students today discovered what is believed to be element 120. The researchers have named this element **Candium** derived from the dietary staple of these students. It was this type of sweet residue that parents could not remove from children that led to the research and ultimate discovery.

Further research of the new element, this reporter was told, will be conducted in more suitable surroundings, namely laboratories in a nearby school – Ocean Lakes High School. Student excitement regarding the discovery is running at a fever pitch. Many chemistry students have generously volunteered their time to help with the follow-up experiments involving the new element.

A reliable source was overheard to say that the first experiments will determine how many isotopes of this element exist. Isotopes are atoms of an element which behave chemically the same, but have different physical properties. One variable property is their atomic mass. After finding out how many isotopes comprise the element, researchers will look for the atomic mass of each isotope and finally the average atomic mass of candium.

One unique property of candium should make these experiments particularly easy: candium atoms are very large. Therefore, sorting the isotopes of this element should be accomplished with very little difficulty. Detailed procedures of the experiment which will be performed appear on the following page. A data sheet format is also provided to aid you in keeping up with this news story as new information is released. Scientists are expecting a complete comprehensive summary within the week.

Procedure

1. Sort the candium sample according to the type of isotope (candy).

2. Count each type of isotope (candies). Measure the mass of each isotope sample. Record in the data table.

3. Calculate the mass of each isotope by dividing the mass of each sample by the number of isotopes (candies) in the sample. This is the atomic mass of each isotope. Show your work.

4. Calculate the % abundance of each isotope (show your work):

$$\frac{\text{\# of candies in isotope sample}}{\text{Total \# of candies in container}} \times 100$$

5. Determine the average atomic mass of the element candium. Show your work.

EXPERIMENT – DETERMINATION OF THE AVERAGE ATOMIC MASS OF CANDIUM

Pre-Lab Assignment

1. What is the basic atomic difference between isotopes of the same element?

2. If there are 100 isotope A, 27 isotope B and 173 isotope C in a container, what is the percent composition of the container by isotope? Show your work.

3. What is the formula for calculating the average atomic mass of an element with 3 isotopes?

Data Table

Total number of candy atoms in the container _____

Isotope Breakdown

Type	# of Atoms	Mass of Whole Isotope Group
a) Isotope A _____	_____	_____
b) Isotope B_____	_____	_____
c) Isotope C_____	_____	_____

Calculations (Show all of your work)

Atomic Mass of Isotope

a)

b)

c)

Percent Abundance

a)

b)

c)

Average Atomic Mass of Candium

Candium: Discussion Problems

1. What is the difference between isotopes of the same element? What is the same?

2. Calculate the average atomic mass of potassium given the following information:

potassium-39	38.964 amu	93.12%
potassium-41	40.962 amu	6.88%