Name:	Class Period:
Lab Partner	Lab Partner

Pennies and Isotopes

In the activity you will be investigating the concept of isotopes using pennies. You will be determining the relative amounts of different isotopes of the element "coinium" which has two forms, pre-1982 with a mass of 3.09 grams and post-1982 form with a mass of 2.52 grams. Each group will obtain a container of 10 pennies and they will have to determine the composition of their element without opening the container. After obtaining the mass of the container with the pennies and the mass of an empty container an equation can be derived that will let you determine the relative amounts of the isotopes of the element.

Purpose: to simulate one way that scientists can determine the relative amounts of different isotopes present in a sample of an element

Materials:
Canister of unknown mixture of pre and post 1982 pennies
Balance

Procedure:

1. Find the mass of the sealed container of 10 pennies
2. Subtract the mass of an empty canister to find the total mass of all 10 pennies
3. Set up an algebraic equation : **Hint: Set x = to the pre 1982 pennies**
4. Calculate the number of pre and post 1982 pennies. After, determining the number of pre and post 1982 pennies check the dates on the pennies and see if your calculations are correct.
5. Show all work below

Calculations:

Questions:

1. What property of the element "coinium" distinquishes the pre and post 1982 forms from each other?

2. Why is the element "coinium" a good analogy or model for actual element isotopes? In what way is it misleading?

3. Naturally occurring iodine is a mixture of 3 isotopes.. 80% I-127, 17% I-126 and 3% I-128. Calculate the weighted atomic mass.

4. What is the basic difference between isotopes of the same element , other than atomic weight?

5. Why are the atomic masses on the periodic table not listed in whole numbers?

6. Aluminum has an atomic weight of 27 (rounded off) , but aluminum isotopes have mass numbers of 24, 25, 26, 28, 29 and 30. Why are they considered to be aluminum atoms?

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1) Atoms of the same element that have different numbers of neutrons are classified as

A) charged nuclei B) isomers C) charged atoms D) isotopes

2) An atom of carbon-12 and an atom of carbon-14 differ in

A) mass number
B) number of electrons
C) atomic number
D) nuclear charge

3) Which two notations represent atoms that are isotopes of the same element?

A) ${}^{19}_{8}O$ and ${}^{19}_{9}F$ B) ${}^{39}_{17}Cl$ and ${}^{39}_{19}K$ C) ${}^{121}_{50}Sn$ and ${}^{119}_{50}Sn$ D) ${}^{121}_{50}Sn$ and ${}^{121}_{50}Sn$

4) Naturally occurring elemental carbon is a mixture of isotopes. The percent composition of the two most abundant isotopes is listed below.

- 98.93% of the carbon atoms have a mass of 12.00 atomic mass units.
- 1.07% of the carbon atoms have a mass of 13.00 atomic mass units.

Write a correct numerical setup for calculating the average atomic mass of carbon.

Questions 5 and 6 refer to the following:

The data table below shows three isotopes of neon.

Isotope	Atomic Mass (atomic mass units)	Percent Natural Abundance
^{20}Ne	19.99	90.9%
^{21}Ne	20.99	0.3%
^{22}Ne	21.99	8.8%

5) In terms of atomic particles, state *one* difference between the three isotopes of neon shown in the data table.

6) Based on the atomic masses and the natural abundances shown in the given data table, show a correct numerical setup for calculating the average atomic mass of neon.