ISOTOPES OF PENNIUM – ANSWER KEY

1. From the data in the data table, determine the number of isotopes of *Pennium* that exist. Remember, small differences in mass are to be expected due to wear and grime. Ignore these small differences.

*There are **2 isotopes** for Pennium during the time these pennies were in circulation.*

2. In what year did the mass of the *Pennium* change?

***Based on the data collected**, there is not enough information to determine the exact year the mass changed because there is no 1982 penny in the baggie. The mass changed between 1981-1983.*

Before 1982, pennies were 95% copper and 5% zinc. Then after 1982, the composition was 97.6% zinc, and 2.4% copper. So, this means that the pennies made before 1982 will have a different mass from those made after 1982.

3. How many atoms of each isotope of the element were in the Ziploc bag?

In the sample data provided, there are 6 atoms of the ~2.5 g isotope and there are 14 atoms of the ~3.1 isotope.

4. What is the percentage of each isotope of *Pennium*?

~2.5 g Isotope: $\frac{6 \text{ atoms}}{20 \text{ atoms}} = 0.3 \rightarrow$ ***30%***

~3.1 g Isotope: $\frac{14 \text{ atoms}}{20 \text{ atoms}} = 0.7 \rightarrow$ ***70%***

5. What is the "average mass" of each isotope of *Pennium*?

~2.5 g Isotope: $\frac{2.5+2.5+2.5+2.6+2.4+2.5}{6} =$ ***2.50 g***

~3.1 g Isotope: $\frac{3.0+3.1+3.0+3.1+3.1+3.0+3.1+3.1+3.1+3.1+3.1+3.0+3.1+3.1}{14} =$ ***3.07 g***

6. What is the "average atomic mass" of all the isotopes of *Pennium?*

$\frac{3.07 + 2.50}{2} =$ ***2.79 g***