Name: _____ Date: _____

# **Unit 7** - Topic 3

Weighted Atomic Mass & Allotropes

1. Hydrogen has three isotopes with mass numbers of 1, 2, and 3 and has an average atomic mass of 1.00794 u. This information indicates that
   (1) equal numbers of each isotope are present
   (2) more isotopes have an atomic mass of 2 or 3 than of 1
   (3) more isotopes have an atomic mass of 1 than of 2 or 3
   (4) isotopes have only an atomic mass of 1

2. The atomic mass of an element is calculated using the
   (1) atomic number and the ratios of its naturally occurring isotopes
   (2) atomic number and the half-lives of each of its isotopes
   (3) masses and the ratios of its naturally occurring isotopes
   (4) masses and the half-lives of each of its isotopes

3. An atom of carbon-12 and an atom of carbon-14 differ in number of
   (1) electrons
   (2) neutrons
   (3) protons

4. Element *X* has two isotopes. If 72.0% of the element has an isotopic mass of 84.9 atomic mass units, and 28.0% of the element has an isotopic mass of 87.0 atomic mass units, the average atomic mass of element *X* is numerically equal to

   (1) $(72.0 + 84.9) \times (28.0 + 87.0)$
   (2) $(72.0 - 84.9) \times (28.0 + 87.0)$
   (3) $\frac{(72.0 \times 84.9)}{100} + \frac{(28.0 \times 87.0)}{100}$
   (4) $(72.0 \times 84.9) + (28.0 \times 87.0)$

5. The atomic mass of an element is defined as the weighted average mass of that element's
   (1) most abundant isotope
   (2) least abundant isotope
   (3) naturally occurring isotopes
   (4) radioactive isotopes

6. In a sample of any element found in nature, the atoms that compose the sample are a mixture of isotopes of that element. The atomic mass of the element is based upon
   (1) the masses of individual isotopes only
   (2) the relative abundances of the isotopes only
   (3) both #1 and #2
   (4) neither #1 nor #2

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**Calculating Atomic Mass**

Elements come in a variety of isotopes, meaning they are made up of atoms with the same atomic number but different atomic masses. These atoms differ in the number of neutrons. The average atomic mass is the weighted average of all the isotopes of an element.

*Example:* A sample of cesium is 75% $^{133}Cs$, 20% $^{132}Cs$, and 5% $^{134}Cs$. What is its average atomic mass?

Answer:
0.75 x 133 = 99.75
0.20 x 132 = 26.4
0.05 x 134 = 06.7
**Total = 132.85 amu**

Determine the average atomic mass of the following mixtures of isotopes.

| | | |
|---|---|---|
| 1 | 80% $^{127}I$, 17% $^{126}I$, 3% $^{128}I$ | |
| 2 | 50% $^{197}Au$, 50% $^{198}Au$ | |
| 3 | 15% $^{55}Fe$, 85% $^{56}Fe$ | |
| 4 | 99% $^{1}H$, 0.8% $^{2}H$, 0.2% $^{3}H$ | |