

**Isotopes**

**Isotopes** – atoms of an element that have the same number of \_\_\_\_\_ but different numbers of \_\_\_\_\_.

- isotopes of an element have the \_\_\_\_\_ but \_\_\_\_\_.
- The mass number for an isotope is shown after the element's symbol.

Ex. There are three isotopes of hydrogen:

|     |   |       |         |         |
|-----|---|-------|---------|---------|
| H-1 | H | _____ | # of p= | # of n= |
| H-2 | H | _____ | # of p= | # of n= |
| H-3 | H | _____ | # of p= | # of n= |

**Radioisotopes**

- many elements have one or more isotopes that are \_\_\_\_\_
- atoms of unstable isotopes \_\_\_\_\_, emitting \_\_\_\_\_ as their \_\_\_\_\_ changes
- depending on the nucleus, these nuclear changes might happen very \_\_\_\_\_ or extremely \_\_\_\_\_

Ex. U → Th + He (alpha particle)

**Radioactive** – capable of spontaneously \_\_\_\_\_

**Medical Isotopes** - A medical isotope is a very small quantity of radioactive substance used in \_\_\_\_\_:

- medical isotopes can be delivered \_\_\_\_\_ to the site of diseased cells.

**Atomic Mass** – mass of each element with respect to carbon having a mass of \_\_\_\_\_

$1\text{ u} = 1.66 \times 10^{-27}\text{ kg}$

The atomic mass that is shown on periodic tables for each element is actually the \_\_\_\_\_ of the masses of all the element's isotopes. We call this mass the \_\_\_\_\_.

The mass of each element is made with respect to C-12 having a mass of 12 u (atomic mass units).

**Calculating Average Atomic Mass:**

- we need to know the \_\_\_\_\_ and the \_\_\_\_\_ of each isotope
- use a \_\_\_\_\_

average atomic mass  
 = (atomic mass of isotope A) x (abundance of isotope A)  
 + (atomic mass of isotope B) x (abundance of isotope B)  
 + .....

Ex. 1 Natural argon contains 99.60% Ar-40, 0.34% Ar-36, and 0.06% Ar-38. Calculate the average atomic mass of argon.

**Questions:**

1. There are two isotopes of silver: silver-107 and silver-109.  
Fill in the table below. Use your periodic table to find the atomic number of silver (Ag)

|            | Mass number | Atomic number | # of protons | # of neutrons |
|------------|-------------|---------------|--------------|---------------|
| Silver-107 |             |               |              |               |
| Silver-109 |             |               |              |               |

Based on your table:

- What is different about these two isotopes?
  - What is the same about these two isotopes?
  - Silver contains 52% silver-107 and 48% silver-109. Find the average atomic mass of silver.
2. What is a radioisotope?
3. How are radioisotopes useful?
4. Chlorine has two naturally occurring isotopes: Chlorine-35 with an abundance of 76%  
Chlorine-37 with an abundance of 24%.  
Find the average atomic mass of chlorine.