Atomic Mass

- after discovery of subatomic particles, more attention is given to mass of atoms
- hydrogen was initially used to determine the masses of other atoms since hydrogen was the lightest element
- atoms were simply compared to hydrogen
- if an atom had twice the mass compared to a hydrogen atom, it was given an atomic mass 2 hydrogen masses
- however, eventually the isotope, carbon-12 was used instead
- since carbon was 12 times heavier than hydrogen, 1 atomic mass was set at 1/12 the mass of carbon-12
- this allowed hydrogen to still have a mass of 1
- this is called the 1 amu or 1 **unified atomic mass unit (μ)** (=1/12 the mass of a carbon-12 atom)

- however, samples of elements were found to contain different numbers of isotopes of the same element
- this had to be factored in when defining an element's atomic mass
- mass spectroscopy is used to determine the amount of abundance of each type of isotope of an element
- this can be used to calculate the **average atomic mass**.

Average Atomic Mass = ∑ (proportion)(atomic mass of isotope)

e.g. A sample of silver contains 51.83% of ^{107}Ag with an atomic mass of 106.9051 μ and 48.17% of ^{109}Ag with an atomic mass of 108.9041 μ. Calculate the average atomic mass of silver.

51.83% of ^{107}Ag has an atomic mass of 106.9051 μ

48.17% of ^{109}Ag has an atomic mass of 108.9041 μ

Average Atomic Mass = [(atomic mass)(fraction of ^{107}Ag)] + [(atomic mass)(fraction of ^{109}Ag)]

= [(106.9051 μ)(0.5183)] + [(108.9041 μ)(0.4187)
= 55.4322 μ + 52.4591 μ
= 107.8913 μ (which is close to what is given in the periodic table = 107.9 μ)