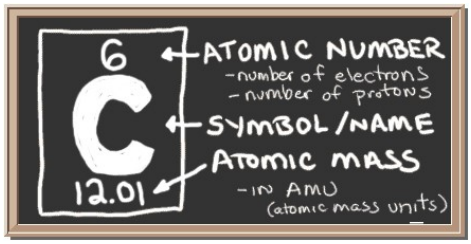
Average Atomic Mass

Average Atomic Mass

- An oxygen atom weighs 2.657×10^{-22} g. This is difficult to use.
- The atomic mass unit (amu) was developed for the purpose of making calculations easier.



Average Atomic Mass

- 1 amu = 1/12th the mass of Carbon-12
- Percent Abundance: The ratio of the number of atoms of a specific isotope of an element to the total number of atoms present in the natural world

Average Atomic Mass

- The average atomic mass is a WEIGHTED average of ALL of the isotopes for an element.
- The average atomic mass of a sample of an element can be found on the periodic table
- Ex.) Zinc = 65.39 amu

Average Atomic Mass

- The mass of one atom is not exactly the same as the average mass of many
- Ex.) 1 atom of Zinc ≠ 65.39 amu

To find the atomic mass, you need to know:

- Number of stable isotopes
- Mass of each isotope
- Natural % abundance of each isotope

Don't Forget!
All percentages must add up to 100%

Category	Weight	Your Score
Notebook	15%	90
Assignments	15%	95
Labs	20%	80
Quizzes and Tests	50%	70

Do not Write ☺

$$\text{Grade} = \frac{(15 \times 90) + (15 \times 95) + (20 \times 80) + (50 \times 70)}{100}$$

$$\text{Grade} = \frac{(1350) + (1425) + (1600) + (3500)}{100} = 78.75\%$$

Atomic mass of element =

$$\frac{\text{A.M. isotope}_1 * (\%_1) + \text{A.M. of isotope}_2 * (\%_2) + \ldots}{100}$$

Example 1: Chlorine

Calculate the atomic mass of chlorine if the two common isotopes of chlorine have masses of 35.45 amu (75.00% abundance) and 37.29 amu (25.00% abundance).

$$\frac{(35.45\text{amu} \times 75.00) + (37.29\text{amu} \times 25.00)}{100}$$

$$\frac{2659\ \text{amu} + 932.3\ \text{amu}}{100} = \frac{3591\ \text{amu}}{100}$$

$$= \boxed{35.91\ \text{amu}}$$

Example 2: Copper

- There are two isotopes of copper. Cu-63 and Cu-65. Which is the most abundant?

Cu-63 b/c the mass is closer to the average atomic mass found on the periodic table (63.55)