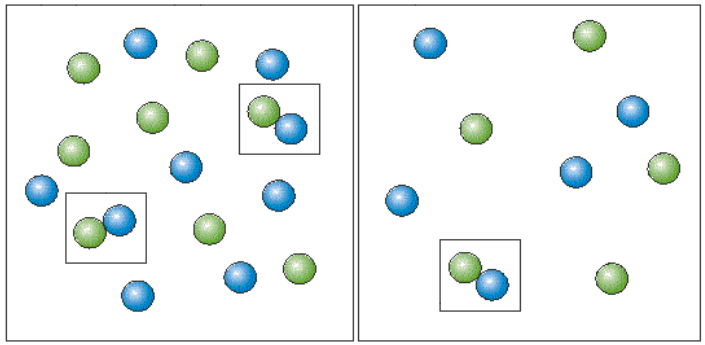


[4.2] Molarity

Molarity and Concentration

Molarity (also sometimes referred to as concentration): which is the number of moles in one liter of solution.

We calculate molarity by:

$$\text{Molarity (M)} = \frac{n(\text{moles of solute})}{V\ (\text{total volume of solution in Liters, L})}$$

Sometime "C" is used instead of M

Okay, but what is a mole?

The Mole

- The mole (**mol**) is a **unit of measure for an amount of a chemical substance**
- A mole is **Avogadro's number of particles**, that Is 6.02×10^{23} particles.

1 *mol* = Avogadro's Number = 6.02×10^{23} units

- We can use the mole relationship to convert between the number of particles and the mass of a substance

The Mole

The mole is just a number like:

1. Pair = 2
2. Pi (π) = 3.14159…
3. Dozen = 12

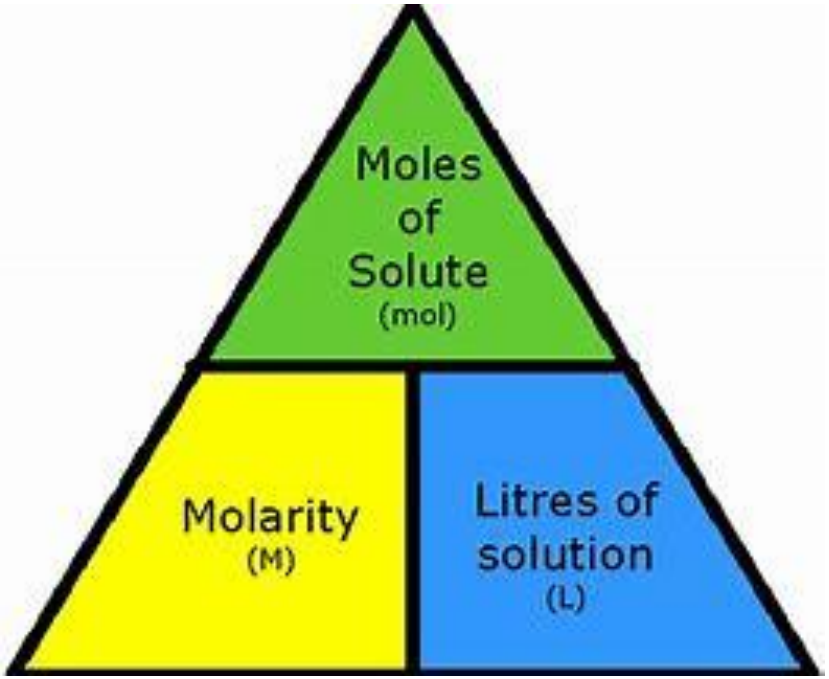
MOLE is 602,000,000,000,000,000,000,000

Example: A **mole** of apples is 6.02×10^{23} apples

Molarity and Concentration

When calculating Molarity:

- Convert solute to **moles**
- Volume must be in **liters**



Practice Problem 1:

- When Ms. Funk makes coffee, she brews (makes) 5.0 moles of ground coffee in 1.0 liter of hot water. What is the molarity of her coffee?

Molarity (M) = $\frac{\text{n(moles of solute)}}{\text{V (total volume of solution in Liters, L)}}$

Molarity (M) = $\frac{\text{5.0 moles}}{\text{1.0 L}}$

Molarity = 5.0 mol/L

Practice Problem 2:

- In a beaker, Mr. Hudson mixed 5.50 moles of HCl(aq) in 700 mL of water. What is the molarity of the hydrochloric acid solution?

Molarity (M) = $\frac{\text{n(moles of solute)}}{\text{V (total volume of solution in Liters, L)}}$

Molarity (M) = $\frac{\text{5.50 moles}}{\text{700 mL x (1L÷1000mL)}}$

Molarity = 7.9 M hydrochloric acid solution

Practice Problem 3:

- Sherman Jen is coming to our chemistry class to do a lab demonstration. He needs to make a 8.00 M NaCl solution and has 3.00 moles of NaCl. **How much water** will he need to make the solution?

$$\textbf{Molarity (M)} = \frac{\textbf{n(moles of solute)}}{\textbf{V (total volume of solution in Liters, L)}}$$

$$\textbf{8.0M} = \frac{\textbf{3.00 moles}}{\textbf{V}}$$

$$\textbf{V} = \frac{\textbf{3.00 moles}}{\textbf{8.00 M}}$$

V= 0.375 liters

HOMEWORK

- [4.1] Homework from Textbook
- [4.2] Practice problems on Worksheet

- 1. What is the molarity of a 0.30 liter solution containing 0.50 moles of NaCl?
-
-
- 2. Calculate the molarity of 0.289 moles of FeCl3 dissolved in 120 ml of solution?
-
-
- 3. If a 0.075 liter solution contains 0.0877 moles of CuCO3, what is the molarity?
-
-
- 4. How many moles of NaCl are present in 600 ml of a 1.55 M NaCl solution?
-
-
-
- 5. How many moles of H2SO4 are present in 1.63 liters of a 0.954 M solution?
-
-
-
- 6. How many liters of solution are needed to make a 1.66 M solution containing 2.11 moles of KMnO4?
-
-
-
- 7. What volume of a 0.25 M solution can be made using 0.55 moles of Ca(OH)2?
-