Section 15.2

Describing Solution Composition

Objectives

1. To understand mass percent and how to calculate it
2. To understand and use molarity
3. To learn to calculate the concentration of a solution made by diluting a stock solution

Describing Solution Composition

A. Solution Composition: Mass Percent

$$\text{Mass percent} = \frac{\text{mass of solute}}{\text{mass of solution}} \times 100\%$$

$$= \frac{\text{grams of solute}}{\text{grams of solute} + \text{grams of solvent}} \times 100\%$$

Describing Solution Composition

B. Solution Composition: Molarity

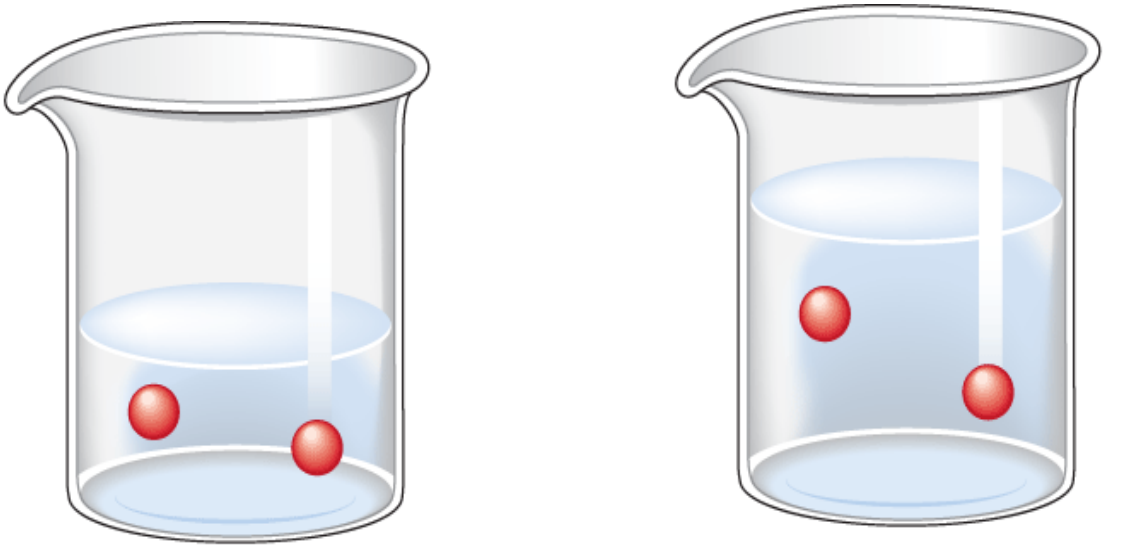
Molarity is the number of moles of solute per volume of solution in liters.

$$M = \text{molarity} = \frac{\text{moles of solute}}{\text{liters of solution}} = \frac{\text{mol}}{\text{L}}$$

- Concentration of a solution is the amount of solute in a given volume of solution.

Describing Solution Composition

B. Solution Composition: Molarity



Solution A
Volume = 1.0 L

Solution B
Volume = 2.0 L

- Consider both the amount of solute and the volume to find concentration.

Describing Solution Composition

B. Solution Composition: Molarity

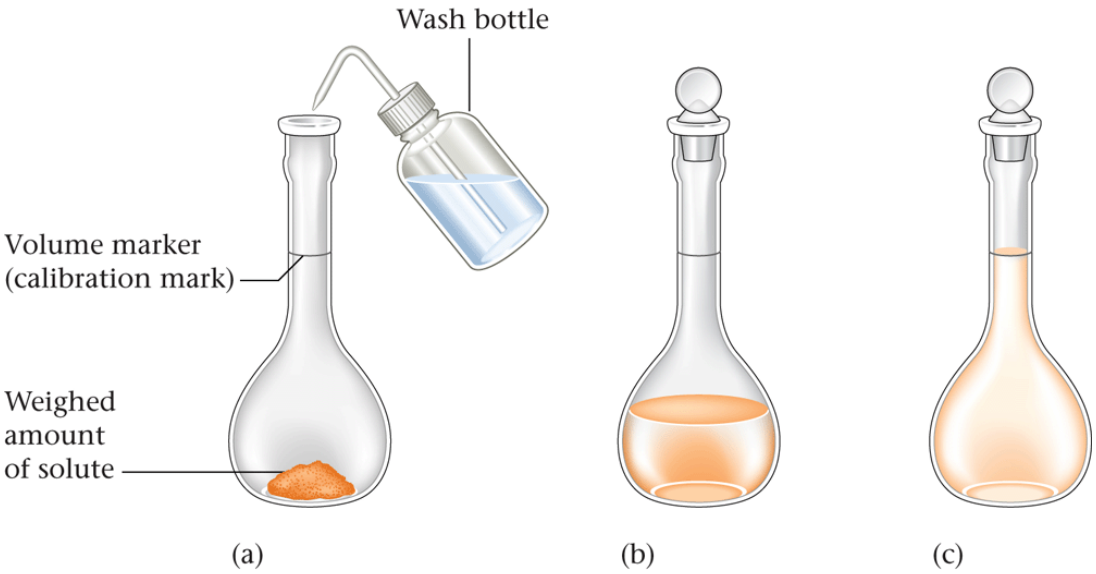
- To find the moles of solute in a given volume of solution of known molarity use the definition of molarity.

$$\text{Liters of solution} \times \text{molarity} = \cancel{\text{liters of solution}} \times \frac{\text{moles of solute}}{\cancel{\text{liters of solution}}}$$
$$= \text{moles of solute}$$

Describing Solution Composition

B. Solution Composition: Molarity

- Standard solution - a solution whose concentration is accurately known
- To make a standard solution
  - Weigh out a sample of solute.
  - Transfer to a volumetric flask.
  - Add enough solvent to mark on flask.



Describing Solution Composition

C. Dilution

- Water can be added to an aqueous solution to dilute the solution to a lower concentration.
- Only water is added in the dilution – the amount of solute is the same in both the original and final solution.

Describing Solution Composition

D. Dilution

- Diluting a solution
  - Transfer a measured amount of original solution to a flask containing some water.
  - Add water to the flask to the mark (with swirling) and mix by inverting the flask.