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## CHE1031: Recitation exercise on molarity

### Why?

- Many important chemical reactions take place in an aqueous environment: in solution.
- Frequently, chemists store concentrated stock solutions of chemicals that are used regularly in their labs, and then dilute them as necessary for individual experiments.

### Key terms:

- Solute – the substance that is dissolved
- Solvent – the liquid that the solute is dissolved in
- Solution – the combination of the solvent and its dissolved solute

**Definition of molarity:**  $M = \text{moles solute/liter solution}$

### Critical Thinking Questions:

1. In the lab, volume is often measured in milliliters. What is the conversion factor for mL to L? What is a quick way to convert from mL to L? From L to mL?
2. Rearrange the definition of molarity to solve for moles.
3. In the rearranged equation, plug in the usual units of molarity (moles/liters) and the unit of volume (liter) used in this definition. Show that the units will give you an answer of moles.
4. Now rearrange the equation to solve for volume.
5. Plug in units of molarity and moles in this version of the equation and show that the answer will have units of liters.

### Exercises:

1. What is the molarity of a solution made by dissolving 2.5 moles of NaCl to a volume of 500 mLs?
2. What is the molarity of a solution made by dissolving 25 grams of aluminum nitrate to a final volume of 800 mLs?
3. How many moles of sodium carbonate are contained in 150 mLs of a 3.4 M solution? Grams?
4. How many liters of 0.22 M  $\text{CaCl}_2$  are needed to give 0.5 moles? How many mL is this?
5. Calcium bromide reacts with silver nitrate to produce silver bromide and calcium nitrate. Silver is a +1 ion.
  - (a) Write the balanced equation for this reaction.
  - (b) Identify soluble and insoluble species (don't give the ionic equation, though).
  - (c) How many mL of 0.4 M silver nitrate are needed to react with excess calcium bromide to produce 65 grams of silver bromide precipitate? (Hint – do the stoichiometry first to get the moles of  $\text{AgNO}_3$  needed and then convert from moles to volume using the definition of molarity.)