

PreLab Activity: Concentration, Molarity, and Dilutions Name _____

*Purpose: To introduce the concepts of concentration, molarity, and dilutions (Sec 4.5 in **Chemistry: The Central Science**). To learn/practice making solutions in the laboratory. To determine the concentration of a solution using a standard curve (AKA a “Beers Law” plot).*

Introductory definitions and equations

Solute – a general name for any chemical substance that is soluble in a given liquid.

Solvent – a general name given to the liquid that solutes are dissolved into.

Solution – the resulting mixture of a solute and solvent.

$$\text{Concentration} = \frac{\text{amount of solute}}{\text{amount of solvent or solution}}$$

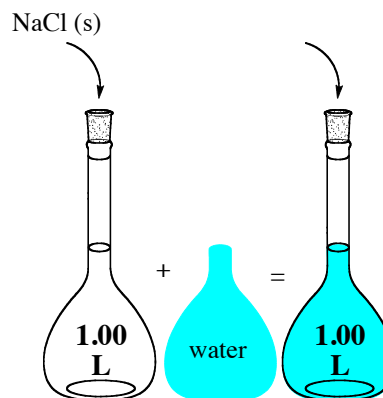
When the amount of **solute** is given is **moles**, and the amount of **solution** is in **liters** then we call this concentration, the **molarity** of a **solution**.

$$\text{Molarity} = \frac{\text{moles of solute}}{\text{liters of solution}} = \frac{\text{moles}}{L}$$

Pre-lab Calculations (Complete calculations in your lab notebook under the “Pre-lab” heading and then transfer your calculations to this page in a clear and concise fashion.)

Molarity

1) Calculate the molarity of a solution when 1.23 g of NaCl (solute) is dissolved in 1.00 L water (solvent).



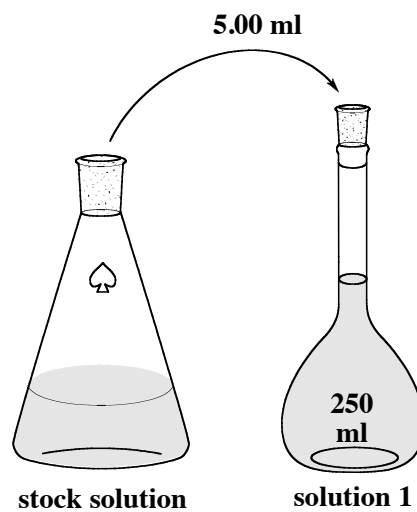
2) Calculate the molarity of a solution when 1.23 g of NaCl is dissolved in 0.333 L water.

3) Calculate the molarity of Na^+ , Cl^- , and total electrolyte concentration in question 2.

4) Calculate the molarity of a CaCl_2 , Ca^{2+} , and Cl^- made by dissolving 1.78 g of CaCl_2 in 0.250 L water.

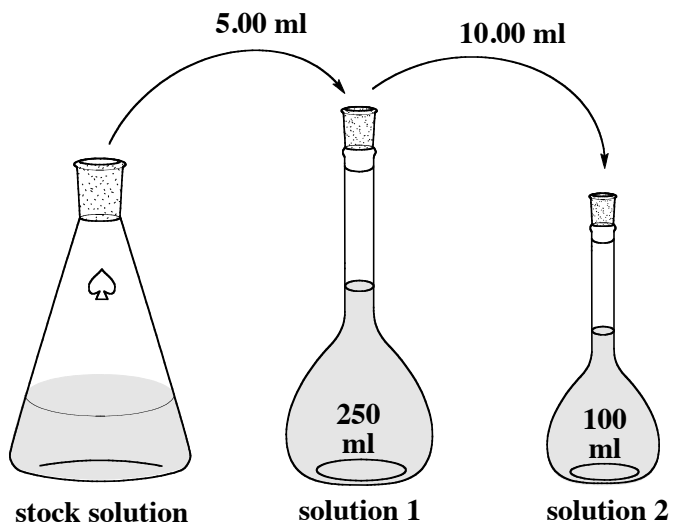
Dilutions

5) What is the concentration (molarity) of a solution made by taking 5.00 mL of a 1.23 M solution and diluting it to a final volume of 250.00 mL?



6) What is the concentration (molarity) of a solution made by taking 10.00 mL of a 1.23 M solution and diluting it to a final volume of 100.00 mL?

7) Consider a situation where 5.00 mL of stock solution (1.23 M) is diluted to 250.00 mL (solution 1) and then this diluted solution is again diluted by taking 10.00 mL of it (solution 1) and diluting it to a final volume of 100.00 mL (solution 2). What is the molarity of solution 1 and solution 2?



8) Consider a situation where 10.00 mL of stock solution (2.37 M) is diluted to 100.00 mL (solution 1) and then this diluted solution is again diluted by taking 20.00 mL of it (solution 1) and diluting it to a final volume of 250.00 mL (solution 2). What is the molarity of solution 1 and solution 2?