Name: _____ Date: _____

Notes: Molarity and Dilutions

What about water never changes? _____

What does it mean that oxygen is more electronegative than hydrogen? _____

_____

What does this difference in electronegativity cause? _____

Why can water dissolve both ionic and polar covalent compounds so well?

_____

What happens to a substance when it dissolves? _____

_____

Define ***concentration***: _____

_____

How is concentration measured? _____

$$\text{Molarity} = \frac{\text{moles of solute}}{\text{liter of solution}} \qquad M = \frac{\text{mol}}{\text{L}}$$

What does [NaCl] mean? _____

How would you read "1.5 M solution"? _____

Calculating Molarity
Step 1: Determine the # of *moles*. (If given grams, divide by formula mass to get moles.)
Step 2: Determine the # of *liters of solution*. (If given mL, divide by 1000 ml/L to get liters.)
Step 3: Divide moles of solute by liters of solution.

How do you make a solution *more concentrated*? _____

How would you ***dilute*** a solution? _____

What would this mean adding in an *aqueous* solution? _____

$$\left(\begin{matrix}\text{Volume of}\\ \text{solution 1}\end{matrix}\right)\left(\begin{matrix}\text{molarity of}\\ \text{solution 1}\end{matrix}\right) = \left(\begin{matrix}\text{volume of}\\ \text{solution 2}\end{matrix}\right)\left(\begin{matrix}\text{molarity of}\\ \text{solution 2}\end{matrix}\right) \qquad V_1M_1 = V_2M_2$$

Calculating Dilutions
Step 1: Place the volume and molarity measurements that belong together on one side.
Step 2: Place the measurement that is by itself next to your unknown.
Step 3: Divide to solve for your unknown.

Important Fact: *The unit of volume you start with is the one you will end with!*

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1. What is the molarity of a solution if 2.50 moles of NaCl are dissolved in 5.00 liters of solution?

Were you given ***moles***?
□Yes □No → divide by formula mass

Were you given ***liters***?
□Yes □No → divide by 1000 mL/L

2. What is the molarity of a solution if 75.0 grams of LiBr are dissolved in 1.20 L of water?

Were you given ***moles***?
□Yes □No → divide by formula mass

Were you given ***liters***?
□Yes □No → divide by 1000 mL/L

3. What is the molarity of a solution if 5.00 mol of HNO_3 are dissolved in .500 liter of solution?

Were you given ***moles***?
□Yes □No → divide by formula mass

Were you given ***liters***?
□Yes □No → divide by 1000 mL/L

4. What is the molarity of a solution made by dissolving 12.5 g of NaCl in enough water to make 125 mL of solution?

Were you given ***moles***?
□Yes □No → divide by formula mass

Were you given ***liters***?
□Yes □No → divide by 1000 mL/L

5. A student wants to make 100. mL of 0.50 M H_2SO_4 by diluting a 12.0 M H_2SO_4 solution. How much of that solution should be used?

6. A teacher starts with 2.0 L of a 0.25 M $CaCl_2$ solution and dilutes it to 3.0 L. What is the concentration of $CaCl_2$ in the new solution?

7. How many milliliters of 5.0 M HCl solution would be required to make 125 mL of 0.40 M HCl solution?