Chemistry
Ms. Ye

Name _____
Date _____Block_____

Mixtures Revisited: *Go to: bit.ly/SolutionPhet*

1. **Mixture #1:**

a. Click on the drop down menu for "**solute**" and select "**Cobalt Chloride**". Make sure the solute type is set to "**solid**"

b. Click and drag the shaker to dispense some $CoCl_2$ particles into the water.

c. For the mixture you made, were the solid particles evenly spread throughout the water when they were dissolved? Was the mixture you created a ***homogeneous*** or ***heterogeneous*** **mixture**?

2. **Mixture #2**

a. Click on the drop down menu for "**solute**" and select "**Copper Sulfate**" and set the solute to "**liquid**"

b. Click on the dropper to dispense some Copper Sulfate liquid into the water.

c. For the mixture you made, was the Copper Sulfate liquid evenly spread throughout the water when they were mixed? Was the mixture you created a ***homogeneous*** or ***heterogeneous*** **mixture**?

SOLUTIONS

The mixtures you observed are a special type of _____ ***mixture*** (fill in blank with answer from part c above) known as a ***solution.*** A solution is made up of a ***solute*** and a ***solvent***.

In each solution above, the solute was the substance you selected from the drop down menu and the solvent was water. Based on the mixtures you made, come up with a definition for solute and solvent.

Solute: The substance _____ in a solution

Solvent: The substance in which the _____

*Note: solutes, solvents, and solutions can exist in any phase (solid, liquid, or gas).

An **aqueous solution (aq)** is a special type of solution with a particular solvent. Based on the name, what do you think the solvent for an aqueous solution is?

***Aqueous Solution (aq)** = a solution in which the solvent is _____

What Does Concentration Mean?

1. Drag the **purple circular probe** attached to the **"Concentration"** read out meter into the water.

2. Change the "**solute**" to **solid Copper Sulfate** and dispense about **2 shakes** of it into the water. What is the concentration?

3. Dispense about 5 more shakes of the solid Copper Sulfate into the water. What is the concentration now?

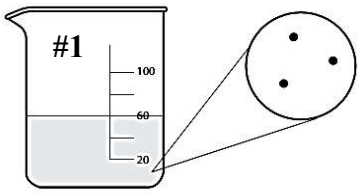
4. Compare **Solution 1 (from #2)** to **Solution 2 (from #3)**
   a. Which solution has a darker color?

   b. What is responsible for the darker color in one of the solutions, the amount of solute or the amount of solvent? Explain.

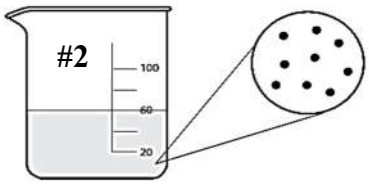
5. Solution 2 is considered to be concentrated, and Solution 1 is considered to be dilute. Do the terms "concentrated" and "dilute" provide any specific information about the quantities of solute or solvent in a solution? Explain.

Solution Concentration: Molarity

M = Molarity
"3 M" is read as "three molar"



1 M Glucose Solution
0.06 mole glucose in 0.06 L solution



3 M Glucose Solution
0.18 mole glucose in 0.06 L solution

1. What does the letter "M" stand for?

2. Look at the data you're given. How do you think the molarity value is calculated (i.e. is it moles x liters, moles divided by liters, moles + liters…)?

3. Which type of solution (dilute or concentrated) will have a larger molarity value?

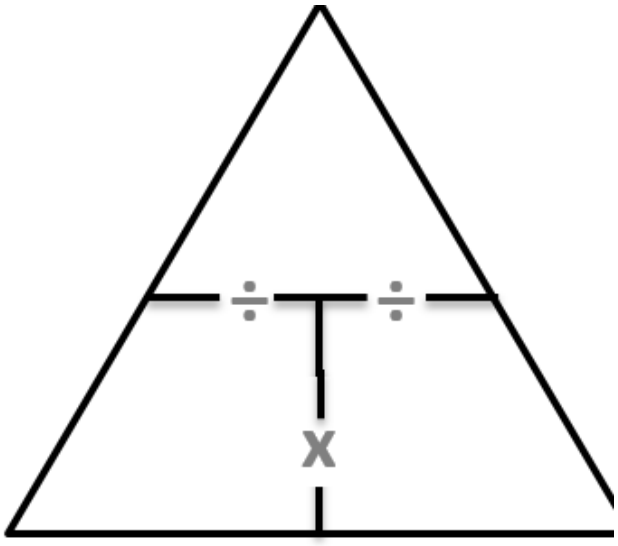
Practice: Based on the definitions you came up with for solute and solvent, identify the solute and solvent in the following solutions

Solution	Solute	Solvent
2 grams of sugar and 100 mL of water		
100 mL of water and 1 g of NaCl (table salt)		
NaCl (aq)		
KCl (aq)		
16 oz coke and 2 g carbon dioxide gas		

Calculating Concentration: Molarity is a unit for concentration

$$MOLARITY = \frac{\boldsymbol{moles}\ of\ solute}{\boldsymbol{Liters}\ of\ solution}$$

***** Your units must be in **MOLES** of solute/**LITERS** of solution.
If not, you must **CONVERT** before you can calculate the molarity!



Molarity Practice: Make the necessary conversions and set up each question using the molarity formula. Then, place a checkmark in the final answer column to confirm you got the correct answer for each problem.

Given Question	**Make any necessary conversions so you have <u>moles</u> and <u>Liters</u>**	**Rearrange molarity formula to solve for your unknown**	**Final ans w/ sig figs & units**
Calculate the molarity of a solution in which 0.50 moles of $MgCl_2$ are dissolved to produce 1.5 liters of solution.			**0.33 M**
What is the molarity of a solution containing 1.0 mole of $NaNO_3$ in 500. mL of H_2O			**2.0 M**
What is the molarity of a solution containing 170 g of $NaNO_3$ in 250 mL of H_2O ($NaNO_3$ M.M.= 85 g/mol)			**8.0 M**
Determine the number of moles needed to make a 2.00 L solution of 6.00 M HCl			**12.0 moles**
Determine the number of moles needed to make a 45.1 mL of 0.124 M sodium carbonate, Na_2CO_3			**0.00559 moles**
Determine the volume of water needed to make the following solution: 12.0 g of lithium hydroxide (LiOH, M.M. = 23.95 g/mol) to make a 3.54 M solution			**0.142 L**