

Name:
Teacher:
Period:
Date:

Solutions
(Molarity, Solution Stoichiometry, and Dilutions)
Unit 4: Chemical Reactions (Notes 1)

AP Chemistry Standards: 4.5 Stoichiometry

[Video](#) notes: Solutions and Molarity

amount of

volum

molari

Solution Stoichiometry: using dimensional analysis to calculate

volume

amount of solute (moles)

molarity

Also, check out this video:
[Calculating Molarity \(Silent Movie Style\)](#) by Tyler DeWitt

Dilutions

Example: If you have 2.0 M HCl in the lab, how do you prepare 100. mL of 0.40 M HCl?

Practice Problems:

1. In the lab, you have a beaker that contains 100. mL of NaCl solution. For each change, determine whether the volume, molarity, or number (moles) of particles increases, decreases, or stays the same.
- a. You dilute the 0.5 M NaCl solution by adding water.

volume: _____ molarity: _____ number of particles (in moles): _____

- b. You add a small chunk of NaCl to the 0.5 M NaCl solution.

volume: _____ molarity: _____ number of particles (in moles): _____

- c. You pour more 0.5 M NaCl solution into the beaker of 0.5 M NaCl.

volume: _____ molarity: _____ number of particles (in moles): _____

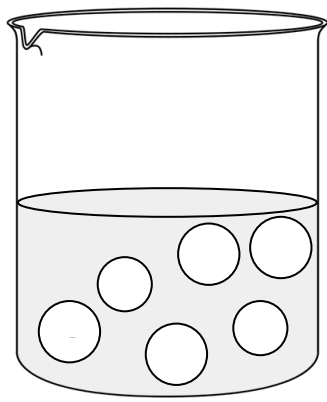
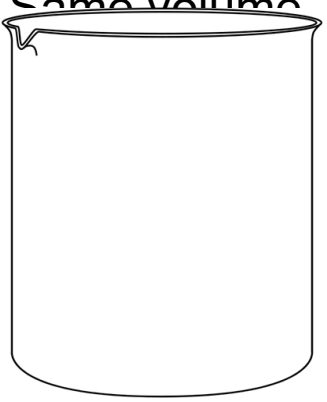
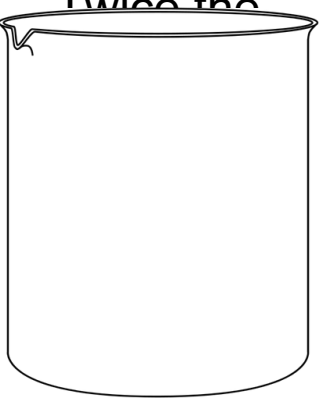
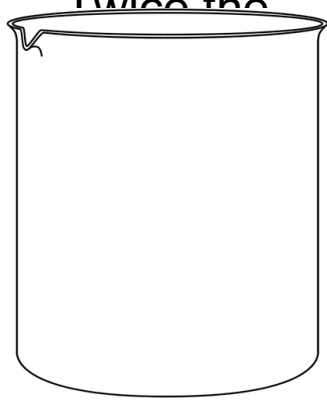
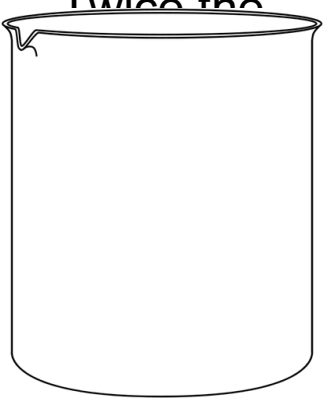
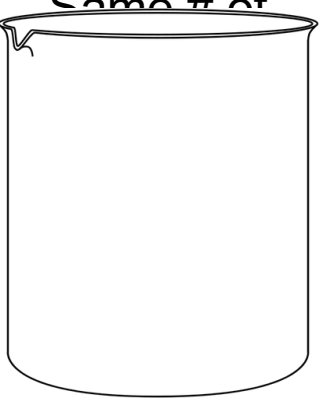
- d. You heat the beaker of 0.5 M NaCl solution, causing some water to evaporate.

volume: _____ molarity: _____ number of particles (in moles): _____

- e. You pour some of the 0.5 M NaCl solution into the sink.

volume: _____ molarity: _____ number of particles (in moles): _____

2. The particle diagram for a particular solution of $\text{MgCl}_2(\text{aq})$ is shown. Draw particle diagrams for other MgCl_2 solutions with the specified changes. Some diagrams will be identical to each other.

	Same volume 	Twice the 
Twice the 	Twice the 	Same # of 

3. Molarity is the ratio of _____ to _____.

You can use the molarity of a solution to convert from _____ to _____.

4. Complete the following stoichiometry calculations.

- a. A student adds 0.40 moles of KCl to a graduated cylinder, fills the graduated cylinder up to the 25.0-mL mark with water, then mixes the solution until it is dissolved. What is the molarity of this solution?

- b. What amount (in moles) of KBr is in a 2.0-L solution of 0.45-M KBr?

- c. You have 1.5 moles of solid KBr in a graduated cylinder. What volume of distilled water do you need to make a 0.030-M solution of KBr?

5. You have a graduated cylinder that contains 10.0 mL of 2.0-M NaCl solution, and you want to dilute it to a smaller concentration.

- a. How much water would you have to add to create a solution of 1.0-M NaCl? What total volume of 1.0 M NaCl solution would you have after you do this?

- b. How much water would you need to create a solution of 0.2 M NaCl? What total volume of 0.2 M NaCl solution would you have after you do this?

- c. You add 40.0 mL of distilled water to the 10.0 mL of 2.0 M NaCl solution. What is the molarity of the diluted solution?