

## Dilutions Worksheet

- 1) If I add 25 mL of water to 125 mL of a 0.15 M NaOH solution, what will the molarity of the diluted solution be?
- 2) If I add water to 100 mL of a 0.15 M NaOH solution until the final volume is 150 mL, what will the molarity of the diluted solution be?
- 3) How much 0.05 M HCl solution can be made by diluting 250 mL of 10 M HCl?
- 4) I have 345 mL of a 1.5 M NaCl solution. If I boil the water until the volume of the solution is 250 mL, what will the molarity of the solution be?
- 5) How much water would I need to add to 500 mL of a 2.4 M KCl solution to make a 1.0 M solution?

## Dilution Problems

Remember that moles = moles, so  $M_1V_1 = M_2V_2$ .

1. A solution of 1.00 M NaCl is available. How many milliliters of this solution are needed to make a total of 100.0 mL of 0.750 M NaCl solution.
2. What volume of 0.250 M KCl is needed to make 100.0 mL of 0.100 M KCl solution?
3. Concentrated  $H_2SO_4$  is 18.0 M. What volume of 18 M solution is needed to make 2.00 L of 1.00 M  $H_2SO_4$  solution?
4. Concentrated HCl is 12.0 M. What volume of 12 M solution is needed to make 2.00 L of 1.00 M HCl solution?
5. A solution of 10.0 M NaOH is prepared. From this solution, you need to make 250.0 mL of 0.375 M NaOH solution. How many mL will be required?
6. A solution of 6.00 M KOH is prepared. From this solution, you need to make 250.0 mL of 0.875 M solution. How many mL will be required?
7. 2.00 L of 0.800 M  $NaNO_3$  must be prepared from a solution which 1.50 M in concentration. How many mL of the 1.50 M are required?
8. 2.00 L of 0.800 M  $KNO_3$  must be prepared from a solution which 1.50 M in concentration. How many mL of the 1.50 M are required?
9. A 0.500 M solution is to be diluted to 500.0 mL with the new concentration to be 0.150 M. How many mL of the 0.500 M solution are required?

These two are a bit more difficult. Hint - calculate the total moles present and the total volume the moles are dissolved in.

10. Calculate the final concentration if 2.00 L of 3.00 M NaCl and 4.00 L of 1.50 M NaCl are mixed.
11. Calculate the final concentration if 2.00 L of 3.00 M NaCl, 4.00 L of 1.50 M NaCl and 4.00 L of water are mixed.

### More Solution Problems (included for future reference, not required as HW)

1. Write a balanced equation for the dissolving of potassium chloride (KCl) in water. (KCl ionizes.)
2. When 4.00 grams of potassium chloride dissolve, how many moles of the solid dissolve?
3. How many moles of potassium ions dissolve in question 2?
4. Determine the total number of moles of ions that are formed in question 2.
5. Write a balanced equation for the dissolving of magnesium chloride ( $MgCl_2$ ) in water. ( $MgCl_2$  ionizes.)
6. When 44.00 grams of magnesium chloride dissolve, how many moles of the solid dissolve?
7. How many moles of chloride ions dissolve in question 6?
8. Determine the total number of moles of ions that are formed in question 6.
9. Write a balanced equation for the dissolving of sugar ( $C_6H_{12}O_6$ ) in water. (Sugar does not ionize.)
10. When 54.00 grams of sugar dissolve, how many moles of the solid dissolve?
11. How many moles of molecules dissolve in question 10?