Chem 101 Solutions Lecture Problems

1) Determine the molarity of a solution of $CuCl_2$ when 540. g $CuCl_2$ is dissolved to form a solution with a final volume of 2,000. mL.

2) Consider two 1.00 L solutions of 2.00 M $CuCl_2$.
   - The first solution is labeled solution A.
   - Half (500. mL) of the second solution is poured out into another container. This is solution B.
   - 500. mL of water is added to the remaining solution in the beaker to double its volume. This is solution C.

   Determine which solution(s) have the greatest concentration, volume, and number of moles of solute.

	Concentration (M)
1)	A only
2)	B only
3)	C only
4)	A and B
5)	A and C

	Moles solute (mol)
1)	A only
2)	B only
3)	C only
4)	A and B
5)	A and C

	Volume (L)
1)	A only
2)	B only
3)	C only
4)	A and B
5)	A and C

3) Determine the concentration, number of moles of solute, and overall volume of solution for each of solutions A, B, and C.

4) Solutions B and C are poured together. What is the molarity of the new solution? Show work demonstrating how you found the concentration of the new solution.
   a) 3.00 M
   b) 2.00 M
   c) 1.67 M
   d) 1.50 M
   e) 1.33 M

5) You have a 2.00 M solution of copper(II) chloride. You need to make 100.0 mL of a 0.75 M solution. How would you do this?

6) What are the concentrations of copper and chloride ions in this 100.0 mL of 0.75 M solution? Explain.

	Concentration Cu^{+2} (M)	Concentration Cl^{-} (M)
a)	0.75 M	0.75 M
b)	1.50 M	1.50 M
c)	0.75 M	1.50 M
d)	0.75 M	2.25 M
e)	1.50 M	1.50 M

Solutions Practice Problems: Chemistry 101

1. You have 1.00 mol of sugar in 125.0 mL of solution. Calculate the concentration in units of molarity.

2. You have a 2.50 M sugar solution. Calculate the number of moles of sugar in 300.0 mL of this solution.

3. You have a 10.0 M sugar solution. What volume of this solution do you need to have 2.00 mol of sugar?

4. Assume that Kool-aid powder consists primarily of sugar ($C_6H_{12}O_6$) dissolved in water. If you have a container of 189 grams of sugar and Kool-aid has a concentration of 0.70 M, what volume of Kool-aid can be made?

5. You add 250.0 mL of water to 250.0 mL of a 4.00 M sugar solution. Calculate the concentration of the new solution in units of molarity.

6. Consider separate solutions of NaOH and KCl made by dissolving equal masses of each solute in equal volumes of solution. Which solution has the greater concentration?

7. We have an 0.800 M solution of NaOH. You need 75.0 mL of a 0.35 M solution. How do you make such a solution?

8. You prepare 525 mL of a 0.50 M solution of HI in an Erlenmeyer flask. You forget to seal the flask and don't realize this until you find it three days later. Checking its molarity, you now find it to be a 0.82 M solution. How much water evaporated?

9. Answer the following questions for 60.0 mL of 2.00 M calcium chloride solution.

a) How many moles of calcium chloride are in solution? How many moles of chloride ions are in this same solution?

b) You add 40.0 mL of water to the solution. How many moles of calcium chloride are in the new solution?

c) What is the molarity of the new solution?

10. I mix 220 mL of 1.5 M HCl solution with 405 mL of 0.42 M HCl solution. Indicate the volume and molarity of the final solution.

Answers: 1) 8.00 M 2) 0.750 mol 3) 200. mL 4) 1500 mL 5) 2.00 M 6) NaOH 7) Use 32.8 mL of the 0.800 M solution and add water until its volume is 75.0 mL 8) 205 mL 9) a. 0.12 mol $CaCl_2$, 0.24 mol Cl-, b. 0.24 mol Cl^- c. 1.2 M $CaCl_2$ 10) 0.800 M