Chemistry 30
Unit 4: Solutions
Assignment 3   Calculations involving Solution and Ion Concentrations

You must clearly show all work for your calculations. Be sure to highlight your final answer – circle it, underline it, whatever. Be sure to include the units for your answer. Failure to follow these directions will result in a loss of marks.

1. What mass of sodium hydroxide is needed to make 500.0 mL of 0.5 M NaOH solution.

2. What volume of 0.060 M KCl solution contains 2.39 g of KCl?

3. Calculate the concentration of a solution prepared by dissolving 24.2 g of $Fe_2(SO_4)_3$ in enough water to make 250.0 mL of solution.

4. What is the concentration of a solution prepared by dissolving 6.1 g of KSCN in enough water to make 500.0 mL of solution?

5. Describe how to prepare 250 mL of a standard 5.00 M KNO_3 solution. Be sure to identify any special lab equipment required. Show all calculations.

6. Determine the volume of solution that contains 80.0 g of 2.00 M copper(II) nitrate.

7. A student adds enough water to 120 mL of a 6.0 M solution of NaOH until the final volume of the solution is 2.0 L. What is the concentration of the diluted solution?

8. What volume of a 18.0 M H_2SO_4 solution is required to make 2.5 L of a 1.0 M H_2SO_4 solution?

9. What mass of ammonium chloride, NH_4Cl, is present in 0.30 L of a 0.40 M NH_4Cl solution?

Name: _____

10. A chemist evaporates 25.0 mL of NaCl solution to dryness and finds 0.585 g of NaCl. What was the molarity of the original solution?

11. What is the concentration of an ammonia solution prepared by diluting 75.00 mL solution of concentrated ammonia, NH_3 (14.8 M) to a volume of 2.000 L.

12. Calculate the concentrations **of the ions** in the following solutions. Be sure to write a balanced equation for each dissociation reaction. You MUST remember to include proper ion charges for all ions! The first equation is shown for you.

a) an aqueous solution containing 0.075 M strontium nitrate, $Sr(NO_3)_2$

$Sr(NO_3)_2 \rightleftharpoons Sr^{2+}(aq) + 2\ NO_3^-\ (aq)$
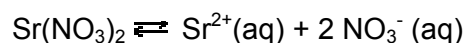
b) a 0.15 M solution of sodium sulfate, Na_2SO_4

c) a 2.000 L aqueous solution containing 107.0 g ammonium chloride, NH_4Cl

   Hint: Begin by calculating the concentration of the NH_4Cl solution.

d) 250.0 mL solution containing 25.50 g of sodium phosphate

   Hint: Be sure to write the correct chemical formula for sodium phosphate. Then determine the concentration of the sodium phosphate solution. Write a balanced dissociation equation in order to next determine the concentration of the ions in solution.