Solution Concentration

1. A solution made by dissolving 4.875 g of sodium sulfate with water to make 200.0 mL of solution. Calculate the molarity of the solution. (10 pts)

2. How many grams of magnesium chloride are in 225 mL of a solution that has a concentration of 0.55 M? (10 pts)

3. How many mL of 0.500 M Pb(NO₃)₂ are required to have a mass of 4.00 g of Pb(NO₃)₂? (10 pts)

4. If a sample of 25.0 mL of 12.0 M HCl is diluted to a volume of 200.0 mL, what is the concentration of HCl in the resulting solution? (10 pts)
Solution Stoichiometry

5. How many milliliters of 0.125 M HCl is required to completely precipitate all of the silver in 10.00 mL of a 0.150 M silver nitrate solution? (10 pts)

\[ \text{HCl(aq)} + \text{AgNO}_3(aq) \rightarrow \text{AgCl(s)} + \text{HNO}_3(aq) \]

Electrolytes and Nonelectrolytes

6. Classify each of the following compounds as being a strong electrolyte, weak electrolyte, or nonelectrolyte. (10 pts)

   a. HNO₂ ____________________  
   b. H₂SO₃ ____________________  
   c. C₆H₁₂O₆ ____________________  
   d. NaC₂H₃O₂ ____________________  
   e. Mg(NO₃)₂ ____________________

Precipitation Reactions

7. Complete and balance the following reaction, and write the complete ionic equation and the net ionic equation. (Include phase labels in the molecular and net ionic equations. It is not necessary to include phase labels for the complete ionic equation.) (10 pts)

\[ ____ \text{Ca(NO}_3)_2(aq) + ____ \text{Na}_2\text{CO}_3(aq) \rightarrow \]
8. Complete and balance the following precipitation reactions. Be sure to include phase labels! If no reaction occurs, write “NR.” (20 pts)

a. ___ Pb(NO₃)₂(aq) + ___ CaCl₂(aq) →

b. ___ Na₃PO₄(aq) + ___ ZnSO₄(aq) →

c. ___ KNO₃(aq) + ___ MgSO₄(aq)

f. ___ AlBr₃(aq) + ___ Na₃PO₄(aq) →

r. ___ MgCl₂(aq) + ___ NaOH(aq) →

9. If a solution of 50.00 mL of 0.250 M calcium chloride solution is mixed with 50.00 mL of 0.250 M silver nitrate solution, what is the theoretical yield of the precipitate? (10 pts)