1. Decide whether the following substance will dissolve in either water (a polar solvent) or benzene (a non-polar solvent whose formula is C₆H₆)?
   a. cyclohexane - C₆H₁₂
   b. Li₂S
   c. methyl alcohol - CH₃OH
   d. CCl₄

   Water or Benzene?

2. In general, as the temperature of the solvent is increased, the solubility of
   a. a soluble solid (INCREASES , DECREASES).
   b. a soluble gas (INCREASES , DECREASES).

3. Decide how the following substances break apart when added to water.
   
   ex) Na₂CO₃ → 2 Na⁺(aq) + CO₃⁻²(aq)
   
   a. K₂S
   b. FeCl₃
   c. Al(NO₃)₃
   d. K₂SO₄

4. Indicate the number of equivalents of each of the following.
   
   a. 2.0 moles of Cl⁻¹
   
   b. 0.25 moles of Ca⁺²
   
   c. 2.43g Mg⁺²
   
   d. 5.25g of HPO₄⁻²
5. Calculate the amount needed for each of the following.
   a. The amount of solution that contains 35g of a 5.0% (w/v) NaOH solution.
   
   b. The amount of solution that contains 12 g of KI in a 8.0% (w/w) KI solution.

   c. The amount of solute required to make 1.5 L of a 15% (v/v) isopropyl alcohol solution.

6. Calculate the following Molarity problems.
   a. What is the molarity of a solution made by dissolving 32.0 g of potassium sulfate in 500.mL of solution?

   b. How many grams of nickel(II) bromide are present in 75.3mL of a 0.0250M solution?

7. Calculate the required amount of each of the diluted solutions.
   a. a 5.0mL sample of a 8.0M H$_2$SO$_4$ solution is diluted to 400.mL.

   b. a 40.0mL sample of a 25% NaCl (m/v) solution is diluted to 5.0%.
8. Given the reaction below, how many grams of AgCl will form if 45.0mL of a 0.120M AgNO$_3$ solution is reacted with an excess of NaCl solution?

$$\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq}) \rightarrow \text{AgCl}(s) + \text{NaNO}_3(\text{aq})$$

9. Given the reaction below, what volume of a 0.0750M HCl solution would be required to completely react with 50.0mL of a 0.200M Na$_2$CO$_3$ solution?

$$\text{Na}_2\text{CO}_3(\text{aq}) + 2 \text{HCl}(\text{aq}) \rightarrow 2 \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$$

10. Two solutions are separated by a semipermeable membrane. Solution A has a concentration of 5% glucose while solution B has a concentration of 10% glucose.

   a. which solution has the higher osmotic pressure?  A or B

   b. which direction will the solvent flow?  A $\rightarrow$ B or B $\rightarrow$ A

   c. which solution will increase in total volume?  A or B