**Solutions and Acids/Bases Review**

Factors that Affect the Rate a Solute Dissolves in a Solvent

1. What are 3 factors affect the rate a solute dissolves in a solvent?
2. Why does each factor affect the rate the solute dissolves?

Concentration: Molarity **M = n/V**

1. Calculate the molarity if 60.0g of MgCO3 are dissolved in 0.88L of solution.
2. How many moles of NaNO3 are dissolved into 1.33L of solution to make a 2.1M solution?
3. What is the volume, in L, of a 0.45M solution of H2SO4 that was made by dissolving 55.5g of H2SO4 in it?

Dilutions **M1V1 = M2V2**

1. You have a stock solution of HF with a concentration of 6.00M. You need to dilute it to 0.20L of a 3.00M solution, what is the original volume of your stock solution you used?
2. You have a concentrated solution of sugar water (C12H22O11) with a concentration of 10.0M. You need to dilute it to 0.050L of a 1.00M, what volume of your concentrated solution should you use?

Molality and Colligative Properties: Freezing Point Depression and Boiling Point Elevation **ΔTf = kf****im ΔTb = kb****im**

1. Why does adding a solute to a pure solvent lower the freezing point of the resulting solution?
2. Why does adding a solute to a pure solvent raise the boiling point of the resulting solution?
3. What is the change in the freezing point of a solution made by dissolving salt (NaCl) in water with a molality of 3.12m? The kf = 1.86**°**C/m.
4. Ethanol (C2H5OH) has a normal freezing point of -114.6**°**C. If you add enough of acetone (C3H6O) to ethanol to make a 1.72m solution, what would be the new freezing point of the solution? kf = 1.99**°**C/m.
5. Water has a boiling point of 100**°**C. If you add anough Ca(NO3)2 to water to make a 0.711m solution, what would be the new boiling point of the solution? kb = 0.512**°**C/m.
6. Define these terms.
   1. Solute d. Unsaturated g. Dilute
   2. Solvent e. Supersaturated
   3. Saturated f. Concentrated

Properties of Acids and Bases

1. What is an Arrhenius acid? An Arrhenius base. Give an example of each.
2. What is an operational definition of an acid? A base?
3. What is a Brønsted-Lowry acid? What is a Brønsted-Lowry base? What is a conjugate acid? What is a conjugate base?
4. Identify the Brønsted-Lowry acid (B-L acid), Brønsted-Lowry base (B-L base), conjugate acid (CA) and conjugate base (CB) in the following reactions.
   1. NH4+ (aq) + H2O (l) 🡪 NH3 (aq) + H3O+ (aq)
   2. HSO4- (aq) + H2O (l) 🡪 H2SO4 (aq) + OH- (aq)

pH Calculations **pH = -log[H+] pOH = -loh[OH-] pH + pOH = 14**

1. What is the pH of a 6.54 × 10-6 M HNO3?
2. Determine the pH of a solution of 8.75 × 10-9M LiOH?
3. Determine the pH of a 7.25 × 10-7M H2SO4 solution.
4. What is the [H+] of a solution of HCl with a pH of 4.30?

Neutralization Reactions **MAVA = MBVB**

1. What is the molarity of HI if 65.1mL is used to neutralize 87.4mL of 1.60M KOH?
2. What is the volume of .45M H2SO4 needed to neutralize 50.0mL of 0.36M NaOH?
3. What is the molarity of 21.2mL HBr needed to neutralize 10.0mL of 2.15M Ca(OH)2?