Chemistry-B "I Can" Statements Mr. D. Scott; CHS

**Course Intro**

1. Follow the safety rules listed on the Laboratory Safety Agreement
2. Locate the following lab safety equipment in room 108:
    a. Fire extinguishers
    b. Fire blanket
    c. Eye wash fountain
    d. Safety shower
    e. Fume hood
    f. First aid kit
    g. Spill control powders
    h. Broken glass container
3. Describe how to use each of the items listed above.
4. Describe what can happen to a person's eyes when exposed to corrosive substances.
5. Log on to WebAssign, open my assignments, and submit answers to the questions on the assignments.
6. Use Mr. Scott's website (http://chemistrybyscott.org) to locate the following:
    - Weekly schedule/assignment sheet
    - Cancellation/delay information
    - Topic pages
    - Segments of notes over each topic

**Stoichiometry**

1. Balance a chemical equation and explain why a chemical equation must be balanced.
2. Identify the stoichiometric mole ratios in a balanced equation.
3. Utilize mole ratios to predict the various product and reactant quantities in a chemical reaction.
4. Calculate mass to mass conversions in a chemical reaction to and from any reactant or product position.
5. Determine the excess and limiting reactants in a chemical reaction
6. Determine the % Yield of a chemical reaction
7. Use the known % Yield data of a chemical reaction to calculate reactant quantities.
8. Summarize the Kinetic Molecular Theory.
9. Define temperature in terms of kinetic energy.
10. Perform calculations with the Ideal Gas Equation: PV=nRT
11. Calculate stoichiometric gas quantities for chemical reactions at non-STP conditions.

## Phases & Mixtures

1. Name the six phase changes between the phases solid, liquid, and gas.
2. Calculate the heat quantity involved with the temperature change of water in any of its three phases.
3. Calculate the heat quantity involved with the phase changes of water.
4. Cite natural events that relate to all six of the phase changes of water.
5. Define vapor pressure
6. Relate vapor pressure values to intermolecular forces
7. Summarize the relationship between evaporation rate and vapor pressure.
8. Define boiling
9. Explain how boiling points can be elevated or depressed.
10. Cite an everyday event related to the elevation or depression of boiling points.
11. Sort common substance into heterogeneous or homogeneous categories.
12. Explain the differences between solutions, colloids, and suspensions
13. Cite an everyday event that demonstrates the Tyndall Effect
14. Classify everyday colloids into the categories of: liquid/solid aerosol, liquid/solid foam, emulsion, sol, and gel.
15. Identify the solute and solvent in various solution mixtures.
16. Explain the relationship of polarity to miscibility of substances
17. Sort various molecules into polar and non-polar categories
18. Describe the dissolution of a salt into water
19. Describe the dissolution of a molecular solute into water
20. Identify the factors affecting solubility
21. Utilize a solubility graph to predict the behavior of a solution as the variables of temperature, solvent volume and solute mass are changed.
22. Discuss how the temperature and pressure of a gas are related to its solubility.
23. Summarize Henry's Law and cite an everyday application of this law.
24. Report the concentration of a solution using molarity, percent, parts per million, mole fraction, or molality.
25. Utilize the dilution formula of $C_1V_1=C_2V_2$
26. Define the term electrolyte
27. Measure the conductivity of a solution
28. Differentiate between Strong, weak, and non-electrolytes
29. Calculate the concentration of ions in various electrolyte solutions.
30. Identify four colligative properties
31. Calculate the boiling point elevation and the freezing point depression of a solution.

**Kinetics, Equilibrium & Thermodynamics** "I Can"

1. Write an equilibrium expression for a chemical reaction using its balanced equation.
2. Calculate the equilibrium constant for a reaction.
3. Interpret the value of the equilibrium constant.
4. Calculate either $K_c$ or $K_p$ when given either value for a certain chemical reaction.
5. Relate the reaction quotient (Q) to the equilibrium constant.
6. Summarize Le Chatelier's Principle
7. Predict the direction a reaction will shift when temperature, concentration or volume are changed.
8. Summarize how the collision theory describes the rate of a chemical reaction
9. Define activation energy
10. Identify the factors affecting the rates of chemical reactions
11. Explain how a catalyst affects the rate of a chemical reaction.
12. Explain how temperature affects the rate of a chemical reaction.
13. Explain how concentration affects the rate of a chemical reaction.
14. Define heat
15. Summarize the First Law of Thermodynamics
16. Define enthalpy
17. Discuss the relationship of chemical bonds and the energy of a chemical reaction.
18. Calculate the enthalpy change of a reaction given the standard enthalpy of formation of the substances involved.
19. Interpret whether a reaction is endothermic or exothermic based on its enthalpy value.
20. Define entropy
21. Predict the general entropy change associated with phase changes, temperature changes, mixing of substances, and various chemical reactions.
22. Calculate the entropy change for a chemical reaction given the standard enthalpy values for the substances involved.
23. Using the Gibbs-Helmholtz equation ($\Delta G=\Delta H-T\Delta S$) predict if a proposed reaction is able to occur.
24. Calculate the free energy change of a chemical reaction using the Gibbs-Helmholtz equation
25. Given combinations of $\Delta H$ and $\Delta S$, predict the effect of temperature on the spontaneity of a chemical reaction.

## Acids & Bases

1. Identify a variety of everyday substances that are acids and bases.
2. Restate the three prevailing definitions of acids and bases found within the theories of: Arrhenius, Bronsted, and Lewis.
3. Describe the neutralization reaction of acids and bases.
4. Identify the conjugate acid-base pairs in an acid-base reaction.
5. Describe the auto-ionization of water.
6. Define the term amphoteric
7. Identify a hydronium ion
8. Recall the value of $K_w$ and the conditions at which it is determined.
9. Compute pH, pOH, $[H^+]$, and $[OH^-]$ for acidic and basic solutions.
10. Relate the pH scale to acidic and basic conditions.
11. Define strength as it relates to acids and bases.
12. Recall the names and formulas of the seven strong acids.
13. Recall the names and formulas of the strong bases.
14. Utilize $K_a$ and $K_b$ values when comparing the relative strength of weak acids and bases.
15. Compare and contrast the concepts of weak vs. strong and concentrated vs. dilute as they relate to acidic and basic solutions.
16. Recognize miltiprotic acids from their names and formulas.
17. Summarize the color changes of the acid base indicators of phenolphthalein, litmus, and universal.