Chem 401 Study Guide Unit 2 (Equilibrium, Acids & Bases)

Chapter 14 General Equilibria
Be able to:
• Understand how equilibrium is a dynamic process.
• Define equilibrium.
• Write an equilibrium constant expression from a balanced chemical equation.
• Obtain moles of each constituent at equilibrium from starting moles and the moles of any one constituent at equilibrium using stoichiometry.
• Determine the equilibrium constant from equilibrium concentrations or pressures of all species.
• Relate and interconvert Kc and Kp.
• Manipulate Kc - Reaction additions, Rxn direction change, multiplier of a reaction
• Give a qualitative interpretation of the equilibrium constant based on its value.
• Define the reaction quotient, Q.
• Understand comparison between Q and K.
• Determine equilibrium concentrations from initial concentrations and the value of Kc. - using perfect squares - using the quadratic equation - using simplification assumptions - checking simplification assumptions for <5% error caused.
• Understand LeChatlier’s Principle and predict direction of change upon - increasing or decreasing concentrations - increasing or decreasing pressures - increasing or decreasing volume - increasing or decreasing temperature - adding a catalyst.
• Calculate new equilibrium concentrations when an existing equilibrium is disturbed.
• Understand when simplification assumptions can be used in equilibrium calculations.
• Understand and calculate changes in Kc with temperature.
• Understand the links between equilibrium, kinetics, and thermodynamics.

Chapter 10 & 18 (Acids, Bases, and Acid/Base Equilibria)
Be able to:
• Identify 7 strong acids and 8 common strong bases
• Recognize Arrhenius vs Bronstead-Lowry vs Lewis Acids & Bases.
• Understand and use relationships between Ka, Kb, & Kw
• Write Ka/Kb reactions and hydrolysis reactions for weak acids and bases.
• Convert between [H^+] , [OH^-], pH, & pOH
• Calculate the pH of a strong acid and/or a strong base solution of known conc.
• Calculate the pH of a weak acid and/or a weak base solution of known conc.
• Determine the strength of a strong acid or base from it’s pH.
• Identify conjugate acid/base pairs
• Recognize the relative strengths of acids, bases, and conjugate bases from Ka data.
• Determine Ka from Kb or Kb from Ka for a conjugate pair.
• Calculate Ka and pKa from equilibrium concentrations.
• Determine equilibrium concentrations from Ka or pKa data.
• Calculate %ionization from Ka or calculate Ka from % ionization.
• Calculate pH or pOH from Ka and concentration for a weak acid.
• Calculate pH or pOH from Kb and concentration for a weak base.
• Calculate the Ka for a weak acid from its concentration and pH or pOH.
• Calculate the Kb for a weak base form it concentration and pH or pOH.
• Calculate the concentration of all species present in a solution of a weak polyprotic acid.
• Recognize the acidic or basic nature of a salt soln.
• Determine the pH of a solution of a salt of a cation from a strong base and an anion from a weak acid.
• Determine the pH of a solution of a salt with a cation from a weak base and an anion from a strong acid.
• Understand the function of an indicator.
• Know acidic and basic colors for litmus and phenolphthalein.
• Understand pH scale.
• Understand trends in acid strength.
• Write net ionic equations.
• Write hydrolysis reactions.