

**Exam 3 Review Sheet for Friday, April 2 Exam
Chem 1120, Spring 2004, Robertson**

Our exam will include material from parts of **chapters 18, 19, 20**. **Only material that I have covered in class, have assigned homework problems for or is mentioned on this review sheet will be tested. Previous material is fair game but will be covered only indirectly.** On Friday, you should be able to:

Chapter 18 – Acids, Bases, Salts

- Explain the reasons for attempting to classify substances as acids, bases, and salts. Explain the models of acid/base behavior from the viewpoint of Arrhenius, Bronsted-Lowry, and Lewis.
- Be able to use the BL theory to identify in a reaction acid, base, CA, CB.
- Define terms such as monoprotic, polyprotic, monobasic, polybasic, amphiprotic, and hydronium ion.
- Name binary and ternary acids and their anions.
- Identify strong acids from weak acids, and strong bases from weak bases. Write appropriate chemical reactions for their ionization in water.
- Write the appropriate reactions for a polyprotic acid in water.
- Define pH and pOH. Define K_w . List what the relationship between hydronium and hydroxide is in aqueous solution for a solution that is acidic, basic, or neutral. Work problems involving strong acids and strong bases to determine pH and pOH and the corresponding concentrations of hydronium ion and hydroxide ion.
- Write weak acid and weak base equilibrium constant expressions and solve for pH, pOH, and anion and cation concentrations. Be able to use the quadratic equation.
- Predict whether a salt will dissolve in water to give an acidic, basic or neutral solution. Calculate the pH and pOH of the resulting salt solutions using the hydrolysis constant.

Chapter 19 – Buffers, Titrations, K_{sp}

- Explain the operation of a buffer. Derive the Henderson Hasselbalch equation and use it to find the pH of a buffer, this includes the initial composition of the buffer as well as the pH after strong acid or strong base is added.
- Define and explain the titration process. Sketch the general shape of an acid/base titration curve. Find the equivalence point of an acid/base titration. Find the pH before, at, and beyond the equivalence point. Predict what indicator should be used in an acid/base titration.
- Write the expression for K_{sp} . Be able to: find the K_{sp} from solubility, find the solubility from K_{sp} (even with common ions), determine whether precipitation will occur when solutions are mixed together

Chapter 20 - Thermodynamics

- List the 3 laws of thermodynamics
- Explain the idea of reaction spontaneity from a chemical viewpoint and apply the 2nd law to practical phenomena.
- Predict what the entropy change (+ or -) would be for a given reaction. Predict what the entropy change for the surroundings would be.
- Write the definition of G and use the expression for ΔG at constant T & P ($\Delta G = \Delta H - T\Delta S$) to answer practical questions. Explain what ΔG measures.
- Predict under various conditions of ΔH and ΔS whether a reaction will be spontaneous. Find the temperature at which a reaction may go from spontaneous to non-spontaneous ($\Delta G = 0$)