Study Guide for Exam One

For Exam one, you will need

- a non-programmable, non-graphing calculator (You will NOT be allowed to share or borrow a calculator or use a cell phone for a calculator during the exam.)
- a #2 pencil
- a scantron (like the one shown in class)

Exam 1 Protocol:

- Read each question and the directions carefully. The directions may change from problem to problem.
- If you don't know how to do a problem, skip it and move on. Careful of the time. Some of the multiple-choice questions will be worth only a few points but could take a while. Try to do the big point problems that you know how to do first.
- Be sure any work you do is clear and easy to follow. I am not a mind reader.
- Follow all of the rules of significant figures and label all answers with the appropriate units.
- Look at the posted equation sheet and constants to see what will be given.

Exam 1 will primarily cover all of chapter 6, 11.6, 11.7 and chapter 17 (sections 1-4, and 6), any problems assigned from those chapters (including worksheets) and anything covered in lecture. The exam also could cover the labs completed so far (types of reactions, ideal gas law, heat of sublimation and heat of combustion). The exam will consist of multiple-choice questions, some true-false questions, some short answer questions, and some problems. etc. Don't ask me too many specific questions because I haven't written the exam yet!

What should you know from Chapters 1-5? (You should already be familiar with this stuff and should not require any review.)

- Conversion from one metric unit to another (g to mg, m to km, etc)
- Conversion from English to Metric given conversion factor
- Basic Chemical Nomenclature (what is formula for sodium chloride? Carbon dioxide?)
- Traits of different states of matter (solid, liquid, gas)
- Components of Matter (Compounds, elements, atoms, ions, electrons, protons, neutrons, isotopes)
- Translating & Balancing Chemical Equations – this includes being able to predict products for types of reactions like in the lab
- Using Chemical Equations to do Stoichiometry (given this reaction, X grams of reactant Y makes how many grams of product Z?)
- Recognizing simple reaction types (metathesis, displacement, combination, decomposition, etc.)
- Knowing & Using the Ideal Gas Law PV = nRT

What should you know from Chapter 6?

- Definition of system, surroundings, heat, work, and internal energy
- Knowing the different forms of energy (kinetic, thermal, potential, and chemical) and to what they relate
- Law of conservation of energy or the first law of thermodynamics
- Total internal energy of a system $\Delta E = q + w$
- State functions vs. path functions
- Sign convention (+ means what? - means what?)
- Calorimetry – different types of heat capacities, $q_{lost} = - q_{gained}$, what a large or small heat capacity will do to a sample upon heating
- Specific heat of liquid water: $c = 4.184$ J/g·°C
- When to use these equations: $q = mc\Delta T$ or $q = n\Delta H$
- Enthalpy – what does it mean, when do we use it? Endothermic vs. exothermic, drawing and using enthalpy/energy diagrams
- Energy units: 1 calorie = 4.184 J, 1000 J = 1 kJ, 1 Calorie = 1 kcal
- Thermochemical equations and how to convert between moles and Joules
- Hess's Law
- Know how to write balanced chemical equation describing a formation
- $\Delta H_{rxn} = \Sigma\, n_p\, \Delta H_f^o$ (products) - $\Sigma\, n_R\, \Delta H_f^o$ (reactants)
- You should be able to convert from q to ΔH many different ways. Review all of the ways we have calculated heats.

What should you know from Chapter 11?

- The different types of phase changes and their official names.
- The enthalpy of phase changes and whether it should be positive or negative depending on the direction.
- Understanding and being able to read information off of a heating/cooling curve like that in Figure 11.36 on page 482.
- Can you do different heat calculations if the temperature **and** phase changes?

What should you know from Chapter 17?

- What does it mean if something is spontaneous?
- What is entropy (technical definition using Boltzman's Law)
- Second Law of Thermodynamics
- How entropy changes for phase changes and why
- Calculate $\Delta S_{rxn} = \Sigma\, n_p\, S_m^o$ (products) - $\Sigma\, n_R\, S_m^o$ (reactants)
- Third Law of Thermodynamics
- What happens to entropy for phase change, changing mass (within same phase), changing complexity (still same phase) and dissolving solid
- Know which values of $\Delta H_f°$, and S^o are zero for what substances

What should you know from the labs?

- The four different reaction types
- How to write balanced chemical equations given the reactants and the observations

- All the polyatomic ions (formulas and charges) mentioned in the reactions lab: nitrate, sulfate, phosphate, carbonate, and hydroxide and the formula for hydrochloric acid.
- The Ideal Gas Law: PV=nRT and the proper units for all of the variables
- How to convert from °C to K
- How to convert from torr to atm (1 atm = 760 torr)
- How to use the ideal gas law and stoichiometry together (see the last question on the back of the reactions lab)
- How to calculate ΔH_{sub} from calorimetry data
- How would ΔH_{sub} be affected if a student made some common errors (refers to some of the questions on the lab)
- How to calculate ΔH_{comb} from calorimetry data and Hess's Law

This list may not include everything. The best way to study is to practice, practice, and practice. Do problems on the worksheets and the homework. Read over your notes and your text for the concepts. Come see me if you have questions and need help. Good luck with the studying.