CHEM 3410, Test #1 Review Sheet

Information that you will have at your disposal:
-Periodic table, scratch paper, various information such as “a” and “b” for van der waals constants, etc. that are necessary

The make-up of the test: multi-match, short-answer, discussion, short and long problems

Skills to master for any chapter:

- Understand the “big picture” concept.
- Understand practical uses (both in chemistry and in non-chemistry real life) of w, q, and ^U.
- Be able to discuss graphs and figures within the chapter. (This aids your understanding of what’s physically or chemically happening within the system.)
- Be able to work problems with all formulas presented in class.

Suggested Study problems…2009--may need to add to this list depending on if test material goes further or not.
Ch. 1→
exercises: 1, 2, 3, 4, 5, 7b, 11, 13, 16
Problems: 2, 24, 28

Ch. 2→ Make sure we note that it states above the exercises to treat all gases as ideal unless otherwise stated. (We haven’t started discussions on ^H. Thus, don’t worry about any ^H part of a problem listed here.)
Exercises: 1, 2, 5, 7
Problems: 2 (skip the last question)

Chapter 1 Outline for Test Preparation
Derivations to know
Ideal gas law from individual gas laws
Eq. 1.17 from PV=nRT

The outline for this material follows the notes that are on the web page. Thus, we really don’t need an outline for Ch. 1.

Lab: All material from the Excel lab

Chapter 2 Outline for Test Preparation
Updated 2009

Skills to master:

- Understand the “big picture” concept of how energy is transferred via work and heat and be able to relate this to total internal energy and enthalpy.

2.1 Work, Heat, and Energy
Definitions of system, surroundings, boundaries (open, closed, isolated, diathermic, adiabatic)
endoT, exoT processes
radiation, conductance
sign conventions
when to use endothermic/exothermic

2.2 The First Law
Introduction of internal E
State functions
Intensive and extensive properties
1 cal = 4.184 J, 1000 cal = 1 Cal (food calorie)
(a) The conservation of E

Defining the first law using $\Delta U = q + w$
Vantage point of looking at things from the system's point-of-view

(b) The formal statement of the First Law

(c) The mechanical definition of heat

Work (compression) and heat

2.3 Expansion work—work from a change in V

(a) The general expression for work

$dw = -p_{ex}dV$ when integrated yields $w = -p_{ex}\Delta V$ **derivation**

The three cases of work…

(b) Free expansion $w = 0$

(c) Expansion against a constant pressure

$w = -p_{ex}\Delta V$

(d) Reversible expansion (infinitely small changes in pressure or temperature)

a. Special case: Isothermal reversible expansion (infinitely small changes in T to remain isoT, must have an expression for pressure→ideal gas equation provides it.)
derivation

Understand the three cases
physically what's happening and why
the differences in the three cases
under what conditions to use each one.

The existence of other types of work, e.g. electrical.

2.4 Heat transactions

An additional definition of the change in U $dU = dq + dw_{\exp ansion} + dw_{extra}$

The definition of change in U at constant V (no additional work) $\Delta U = q_V$ **derivation**

(a) Calorimetry

Introduction of different definitions of q

$q = ms\Delta T$

$q = C\Delta T$

$q = IVt$

Types of calorimeters (ways to determine ΔH but not necessarily directly measure it)

Bomb calorimetry

Know the parts of the bomb calorimeter
Equations and calculations involved
Calibration of calorimeter
Determining heats of combustion of chemicals

Lab: All material covered so far in the bomb calorimetry lab