Review Guide for Chem 102 Second Midterm Exam Exam is on: Feb.25 (Wednesday)
A review session will be on Monday 12-1pm at PS 607

The test will mainly focus on material in Chapters 11 and 13. (Skip chapt 12). The midterm exam will include multiple choice questions. No "cheat sheets" are allowed. Students are expected to know the important equations or to be able to derive them.

Study your lecture notes, group quizzes, practice problems posted in the website or emailed to you and the written homework assignments. Test yourselves by doing problems similar to the homework under time constraints. The following topics are mentioned to help focus your review.

Chapter 11 Liquids, solids and materials

1) Be able to do calculations involving the Clausius-Clapeyron equation: for example, predict the boiling point of a liquid. (you would be given the ΔH_v in kJ). Know how to interpret P vs T graphs of vapor pressure. Understand how Fig. 11.4 is related to Fig. 11.5 and also to the C-C equation. How is the slope of the graph of lnP vs 1/T related to ΔH_{av} etc.

2) Miscellaneous: Know how to calculate relative humidity. What gives rise to fog and morning dew? Go over tables 11.2, 11.3. Understand the unique properties of water.

3) Know how to draw (and use) the heating curve, and the phase diagram. (make sure you know the difference). Describe all the areas, points and lines in the Phase Diagram. Distinguish between water and the substances and what the implications of this for the biosphere. If you had a substance that had not 3 but 4 phases, what would you expect the phase diagram to look like. (N.b. some substances have more than 3 phases. Don't include the superfluid as a "phase".).

4) Be able to do problems involving crystals: determining density, atomic radius or %occupancy or SC, BCC, FCC cubic unit cells. Go over the problem-solving example 11.7 (page 515) in the textbook. (sections 11.7-11.9 will not be tested in the midterm). Cobalt (Co, 58.9g/mol) has a radius of 1.25Å. What would its density be if it were (a) simple cubic? (b) face-centered cubic? (c) body-centered cubic?(ans:6.26, 8.85, 8.13)

Chapter 13 Chemical Kinetics

1) Know how to calculate reaction rate based on stoichiometry. Determine the reaction rate for the following reaction: 2A + 3B -->5 C + 1/2 D. Given: D appears at a rate of .1 M/s. Determine also the rates of change of A,B and C.
(answer: -0.4 M/s, -0.6 M/s, and +1 M/s respectively)
2) Determine the rate law from the initial rates given in a table. It is mandatory to do ALL problem solving examples in this chapter if you hope to do well in quizzes and exams. Given a reaction mechanism, determine the rate law it predicts. Go over the 3 practice exercises on pages 641-642. Try a challenging one: suppose the rate law is $v=k[A]^x[B]^y[C]^z$. what are x, y, z and k given the following data:

Expt	[A]	[B]	[C]	v
1	0.26mM	0.23mM	1.00mM	4.86mM/min
2	0.21	0.23	1.00	3.17
3	0.28	0.27	1.00	6.11
4	0.21	0.23	1.44	2.64

(answer x =2, y =1/2, z=-1/2, k = 1.50×10^{-2}. Sometimes, using ln makes solving this easier.)

3) Know **the integrated rate laws** for reactions involving only 1 reactant. Use a graphical result to determine k. Use half life to determine k. You are responsible for: 0^{th}, 1^{st} and 2^{nd} order reactions. Draw the straightline graphs expected for these 3 types of reactions and understand the significance of the differences between them.

5) Draw the Boltzmann distribution curve and use it to derive the Arrhenius equation. Use Arrhenius equation to determine activation energy of particular reaction given the rate of reaction at 2 given temperatures for example. Do it from a graph of lnk vs (1/T). Predict what the rate will be at some other temperature. Calculate the boiling point at a different atmospheric pressure.

6) Describe the effect of catalysts on the energy of activation. Calculate the ΔE_a resulting from the presence of a catalyst by analyzing the reaction rate with and without the catalyst.