Chemistry 103 Final Exam review guide.

Expect a comprehensive and challenging test. The test is worth 250 points and can significantly affect your grade favorably or unfavorably. About 55% of the final will be on the subject matter covered in chapters 18 and 21. About 35% will be on Test #2 related material. It is intended to ascertain that you have learned the fundamentals of material included in chapters 14-18 and 21. It will not cover material designated in the syllabus as "spectroscopy". This review guide is not comprehensive. You may want to go back and look at review guides for tests 1 and 2 after you have finished reviewing chapters 18 and 21. It is our intention to provide basic questions as well as challenging problems. As such the level of the questions will be varied. If you can do the basic questions, the intention is that you receive a "C" for the test. If you can also successfully apply concepts to more integrated problems, thus showing that you have the mastered the material, then we expect you to get a higher letter grade.

To start your review, we suggest that you understand how to do all the homework problems especially on electrochemistry and nuclear chemistry. Next, make sure you are able to do problems like the examples given in the text book. We list them below:

1) Chapter 18: Be able to do all of them (they are increasing in complexity and are a good start for checking whether you understand the material or not). Study the following examples in chapter 18-1, 18-2, 18-3, 18-4, 18-6, 18-7, 18-8, 18-9, 18-10, 18-11, 18-12, 18-13, 18-14, 18-15.
2) Chapter 21. Study the following examples in chapter 21: 21-1 (page 1002), 21-2, 21-4, 21-5, 21-6, 21-7, 21-9, 21-10,
3) What is the potential for a galvanic cell with the following cell notation?
   $Mn(s)|Mn^{2+}(1.0\ M)||Mn^{2+}(.00001M)|Mn(s)$.

   (If we did not get a chance to discuss cell notation during the Wednesday lecture, here's an explanation. The "|"'s represent the phase boundaries between the components of the galvanic cell. For example, the above notation means a Mn metal electrode immersed in 1 M Mn^{2+} solution, connected by a saltbridge ("||") to a sol'n of .00001M Mn^{2+} sol'n in which Mn(s) is immersed.)
4) Balance the most complicated half reactions in table 18-1. (start with only the redox couples)
5) Balance: $PbO_2 + SO_4^{2-} + Au \rightarrow PbSO_4 + Au^{3+}$
6) In 5) above, identify the reducing agent. Oxidant. Redox couples.
7) If the above were the cell reaction for a galvanic cell, which would the
8) Write the reactions (from memory) describing the rusting process. Describe and bolster with chemical equations and potentials what happens when iron is galvanized.
9) Write down the chemical reactions present in the following batteries: dry cell, lead car battery and mercury batteries. Describe their distinguishing properties based on the chemical reactions.
10) What is equilibrium constant for a redox reaction whose standard reaction potential is .0134 V? What is the maximum work that this reaction can do?
11) Review your experiments especially, be prepared to tackle problems involving Beer's Law (see Expt 25), and the equations relating transmittance, & absorbance.
12) Write the balanced nuclear equation for alpha emission by polonium, $^{210}_{84}Po$. Write down the net nuclear equation if $^{210}_{84}Po$ decays by α, β, α,β emission.
13) Which of the following types of decay would be most likely for $^{12}_{5}B$? (stable boron nuclide is $_5{}^{10}B$)?
    a) α decay b) β-decay c) positron decay d) γ -decay e) δ-decay
14) Determine the energy released by the absorption of a neutron by a hydrogen nucleus, $_1{}^1H$:
    $_1{}^1H$ (1.007825 amu) + $_0{}^1n$ (1.008665 amu) ---> $_1{}^2H$ (2.01410 amu)
15) If the half life of a radioactive element is 30 days, then what will the radioactivity of a .5 millicurie (mCi) sample be after 100 days?
(16) A fossil is found to contain 60% of the initial amount of carbon-14 isotope that it did when it was living tissue. Could it date back to the time of the arrival of Columbus in America? (half life of C-14 is 5730years). If we use carbon dating for a fossil 60 million years old, what % C-14 would be remaining?