## Chem 103, Spring 2006 Prof. Sevian Study Guide for Exam 2

The second exam will be given in the same two locations as the first exam, according the first letter of your last name:

Last names beginning A – H: McCormack 1<sup>st</sup> floor, room 207 (M/1/207)

Last names beginning I – Z: Small Science Auditorium S/1/006 (where class is held) Please show up directly to the correct location, so as to have the maximum time available on the exam.

The exam will take place during regular class time, 10:00-11:15 a.m., on Thursday, March 30. You will have the entire class period to complete the exam, but you will need to work efficiently to complete it. All exams must be turned in by 11:20. If you arrive late to the exam, you will not be given extra time. If you arrive after the first exam has been turned in, you will not be allowed to take the exam. I urge you to leave home earlier than usual to allow for surprise commuting problems.

When you arrive at the exam, please take alternate seating (*i.e.*, there should be a vacant seat to the left and right of you). Bring more than one pencil and an eraser (no pens or colored pencils) and your calculator. Be sure your calculator is working and that you have spare batteries, if needed. You may bring a spare calculator if you wish.

The exam will have a cover page. You should write your answers on the test pages (there is no separate answer sheet). Make sure you write all numeric answers with the proper number of significant figures. In addition to the test packet, attached to your exam will be a copy of the periodic table, which you can remove and use in conjunction with any question. Use the back of the periodic table if you need scrap paper (work on scrap paper will not be graded). You may not use notes, books, or your own scrap paper during the exam.

There will be multiple versions of the exam, and yours will probably not be identical to others around you. Please be aware that you are bound by academic honesty principles at the university. If it is evident that you have cheated on the exam, expect a grade of zero. Further action may also be taken, which can result in expulsion from the university. As indicated in the syllabus, anyone bringing any device capable of communicating with any other device (*e.g.*, activated cell phone, pager, communicating calculator) will receive a zero on the exam. Also, no sharing of calculators is allowed.

As announced in class, the exam will cover lecture material through March 23, and possibly some material that is reviewed on March 28 (possibly including a group problem on Tuesday, March 28), and Assignments 4-7. These correspond to chapters 4 and 5 in the text, plus material from chapter 3 not covered on Exam 1. A sample exam and answer key from a previous year's course have been posted on the course website, to assist you in gauging the level of difficulty of questions and scope of the exam. The format of the exam and style of questioning in this course may differ from the sample exam. In particular, we are using the ACS exam format, so it may be helpful to you to prepare for the exam using the ACS exam study guide, available in the bookstore.

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Exam 2 will consist of the following parts, worth 100 points total:

Multiple choice and short response: worth approximately 60 points of the total

Problems: worth approximately 30 points of the total

Laboratory: worth 10 points

Avogadro's number (1 mol of units =  $6.022 \times 10^{23}$  units) will be provided on the exam.

<u>Multiple-choice/Short response</u>: You should study and make sure you are proficient at each of the following skills, calculations, and conceptual understandings:

- Determine whether a compound is an electrolyte when dissolved in water
- Write net ionic equations
  - You will need to be able to predict products of exchange reactions if you are told the reactants this means you need to know the polyatomic ions and their charges, which you learned for Exam 1
  - Identify and indicate states (*aq*, *s*, *l*, or *g*)
  - Make sure you know the polyatomic ions so that you can distinguish ions (and their correct charges) inside of compounds
  - Use the solubility guidelines to predict whether products of a reaction form precipitates
- Distinguish exchange, acid-base, and redox reactions
- Calculate solution concentration and/or determine how to prepare a solution of a specific molarity
- Calculation of concentration of an ionic species in a solution
- Determine whether a reaction would occur between two compounds or ions, reasoning using solubility guidelines or metal activity series
- Compare weak vs. strong, acids vs. bases, in terms of pH, and identify which can neutralize which and what the products would be
- Assign oxidation numbers
- For a given redox reaction, determine species oxidized and species reduced, and oxidizing and reducing agents
- Identify whether specific changes are endothermic or exothermic, and what the signs of  $q_{sys}$  and  $\Delta H$  should be in such cases
- Use Hess's Law to determine the standard enthalpy change for a given reaction, given standard heats of formation of chemicals involved in the reaction
- Calculate the amount of heat energy transferred in a calorimetry experiment

Problems: There will be two or three problems, which will include

1. A limiting reagent problem involving solution stoichiometry

- 2. A calorimetry problem
- 3. A problem requiring the use of Hess's law

One of these will be very similar to one of the in-class group problems.

Laboratory: There will be one problem that is related to one of the four labs you have done.

3. *Reactions of copper* 

Relevant concepts: determining net ionic reactions based on observations in the laboratory

4. *Stoichiometry* 

Relevant concepts: determining the percent composition of a mixture or the waters of hydration by heating to constant mass

- 5. *Concentrations* Relevant concepts: dilution, solution concentration, determining the concentration of a solution using spectroscopy and a Beer's law plot
- 6. *Heats of reaction* Relevant concepts: determining the molar enthalpy (heat) of reaction using a coffee cup calorimeter