General Chemistry II
Summer Problem Set
Due Friday, September 10, 2004 (at 5 p.m.)

As I discussed in the course description, Chemistry 112 assumes that you have a solid background in high school chemistry. The required text for the course, *Chemical Principles*: *The Quest for Insight*, 3rd Edition, also makes this assumption. However, the authors of your text, Peter Atkins and Loretta Jones, have done a nice job of summarizing in a preliminary Fundamentals section introductory material like the periodic table, atomic structure, nomenclature, basic chemical reactions, and stoichiometry calculations. Enclosed is a photocopy of this fundamentals section, appendices covering math and nomenclature, a periodic table, and a page of physical constants and conversion factors.

Your summer assignment is to (1) read (lightly) through the Fundamentals section, (2) answer the questions assigned in this problem set, and (3) memorize/review the chemical formulas and oxidation number handouts. Your problem set will be due on Friday 10 September, the end of the first week of classes. It will be weighted twice as much as a problem set during the semester. Expect to see the material from your summer assignment in lab work, as the building blocks for material we cover in lecture, and as the subject of test questions throughout the semester.

The best way to study chemistry is to do as many problems as possible. Work through the self-tests integrated throughout the text, and work extra problems (beyond those assigned) in the back of each chapter. (Note that I have included the answers to Self-Tests B and odd-numbered exercises at the back of your packet.) Working through problems is essential for mastering the concepts the book discusses. This active approach will become even more important as we move into topics that you have not seen in previous classes.

In numerical problems, be sure to show your reasoning clearly. Report all final numerical answers to the correct number of significant figures. (Refer to pp. A6-A7 for the rules governing significant figures.)

Finally, please feel free to e-mail me (kuwata@macalester.edu) as questions come up during your review. I will be in e-mail contact almost every day in August.

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1. Exercise A.14 (p. F12). Report the density in g cm^{-3} and the radius in m.

2. Exercise A.20 (p. F12). Report the energy in J. (Hint: Look at Exercise A.21.)

3. Exercise B.12 (p. F23).

There are no problems assigned from Section C. You are not responsible for depicting molecular structure (as shown on p. F25) for now, as we will spend a lot of time on this during the semester. You are, however, responsible for the rest of the section's content.

4. Exercises D.6 and D.12 (p. F37)

5. Exercise D.14 (p. F37)

You are responsible for knowing all chemical formulas and names on the handout.

6. Exercise E.20 (p. F44). Report the mass in g.

7. Exercise F.12 (p. F49).

8. Exercise F.14 (p. F49).

9. Exercise G.16 (p. F57). Report the concentration in M and the mass in g. Note that to use the dilution equation (p. F55), it is not necessary to convert volumes to L. All that is necessary is that the same unit for volume be used for both V_{initial} and V_{final}.

10. Exercises H.10 and H.12 (p. F61). You must write down the phases ("state symbols") of all species to receive full credit.

11. Exercise I.16 (p. F67). Two additional requirements: (A) Write the complete ionic equation for each of the three reactions. (B) Choose different spectator ions for each of the three reactions.

You do not need to memorize Table I.1 (p. F65), but you should know how to use it.

12. Exercise J.4 (p. F72). Be sure to balance each of the overall equations.

We will cover acid/base chemistry in great detail later in the semester. When we cover Chapter 10, you will be expected to memorize the strong acids and bases (Table J.1, p. F70). For now, it is sufficient to remember how to write balanced chemical equations for acid/base reactions. (You may write the hydrogen ion either as H^+ or as H_3O^+.)

13. Exercise K.6 (p. F79).

14. Exercise K.14 (p. F79). Justify your answers by labeling the relevant oxidation states.

You are responsible for knowing the rules for assigning oxidation numbers (see handout).

15. Exercise L.8 (p. F87). Report the mass in g.

16. Exercise L.14 (p. F87). Report molar mass in g mol^{-1}.

17. Exercise M.18 (p. F94).