

Preview Sheet for Test 1
Chemical Fundamentals, Light, Quantum Mechanics, and Atoms
Friday, September 19, 10:50 – 11:50 a.m., OR 101
Fundamentals Section, Chapter 1 (through p. 39), Chapter 2 (pp. 58-60)
Lectures from 8/27 to 9/17 (start of class); Problem Sets 1, 2, and 3

Studying strategies:

- Focus on your lecture notes and homework first, then look at the textbook. Anticipate some conceptual questions not based on homework questions.
- If a topic was not covered in homework or in lecture, you are not responsible for it! Please ask me if you are unsure about whether a particular topic is “fair game” for the exam.
- Read through last year’s exam to get a feel for my test format.
- Make sure you understand the use and significance of each of the equations and constants you will be given in the test booklet (see below).
- In the Fundamentals section, focus on re-sharpening your problem solving skills. Nomenclature will constitute only a very small percentage of the test.
- Do extra problems at the ends of the chapters. In particular, work the odd-numbered exercises paired with the even-numbered exercises you were assigned for homework. (The answers to the odd-numbered exercises are in Section C at the back of your textbook.) If you are stuck on a problem, please come talk with me or one of the student tutors:

Student Tutoring Schedule (in Olin-Rice 341): Sunday: 1:00 – 10:00 p.m. Monday –Thursday: 7:00 – 10:00 p.m.	My Office Hours: Monday: After 2:30 p.m. Tuesday: Before noon Wednesday: After 1:30 p.m. Thursday: Before noon
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- Try not to just memorize facts and problem-solving techniques; think about the underlying concepts and how to apply them in new ways. One of my goals when I write a test is to ask at least one question that will challenge everyone in class!
- The test will consist of ~45% numerical problem solving, and ~55% short answer and explanation questions. (No multiple-choice questions this year.)

[From the test booklet:]

Instructions before starting the test:

1. Write your name in the space above and on the backs of the other pages.
2. This exam is closed-everything.
3. Your exam booklet should have **six** pages total, with questions on pp. 2-4, equations and other reference data on p. 5, and a periodic table on p. 6. Check to see you have six pages now. If you do not, ask for another copy of the exam.
4. You may carefully remove pages 5 and 6 from your booklet.
5. You may use programmable calculators, but chemical data should not be stored in them.

- To receive full credit for a mathematical problem, you must show the method by which you obtained the final answer, including dimensional analysis. However, you do not need to justify how you calculated molar masses.
- A final numerical answer must contain the correct units and number of significant figures to receive full credit.
- You have **60 minutes** to work on this exam. Do not start until you are instructed to.

What not to memorize (they will be provided in the test booklet):

- The periodic table
- Solubility rules (Table I.1 of Atkins and Jones)
- The information below:

$$E_K = \frac{1}{2}mv^2 \quad E_p \propto \frac{q_1q_2}{r_{12}} \quad c = \lambda\nu \quad \frac{1}{\lambda} \equiv \tilde{\nu} \quad E_{\text{photon}} = h\nu$$

$$E_{\text{photon}} = \Phi + E_{K,i} \quad \Phi = \frac{hc}{\lambda_o} \quad E_{K,i} = eV_o$$

$$\Delta E = -\mathcal{R}Z^2 \left(\frac{1}{n_f^2} - \frac{1}{n_i^2} \right) \quad L = n \frac{\lambda}{2} \quad L = n' \lambda \quad \lambda = \frac{h}{mv} \quad E_K = \frac{n^2 h^2}{8mL^2}$$

$$N_A = 6.022 \times 10^{23} \text{ particle mol}^{-1} \quad h = 6.626 \times 10^{-34} \text{ J s particle}^{-1} \quad c = 2.998 \times 10^8 \text{ m s}^{-1}$$

$$1 \text{ L} = 10^3 \text{ mL} \quad m_e = 9.109 \times 10^{-31} \text{ kg particle}^{-1} \quad 1 \text{ J} = 1 \text{ kg m}^2 \text{ s}^{-2}$$

$$1 \text{ m} = 10^9 \text{ nm} = 10^{10} \text{ \AA} \quad \mathcal{R} = 2.179 \times 10^{-18} \text{ J particle}^{-1} \quad 1 \text{ eV} = 1.602 \times 10^{-19} \text{ J}$$

Test-Taking Tips

- Read the problems carefully.
- Pace yourself. Try to make your effort on a given problem proportional to the number of points that it is worth.
- If you can't figure out how to begin a problem after thinking about it for a couple of minutes, go on to the next problem.
- Please ask Professor Varberg (who will be proctoring the exam) if a question doesn't make sense.