

Chem 104 - Section 1
Spring, 2006
Study Guide for Test I

The test will be given during regular class time on Friday, March 3rd. When you come to class, please take alternate seating (i.e., every other seat and every other row) to the extent possible. Bring your calculator(s) (with extra batteries, if needed), several sharp pencils (or a mechanical pencil with extra leads), and erasers. Do not use colored pencil or pen. *Nothing else is permitted during the test.* Remember: no operating communication devices are allowed. Be prepared to provide your student number on the front cover of the test. **Do not cheat!**

The test will cover the lecture material corresponding to the assigned sections of chapters 10, 11, and 13 (cf. Assignments 1 - 4). It will consist of questions and problems similar to those assigned for homework and given as examples in class. The test consists of five pages, including the cover page. The following information will appear on the cover of the test.

Ideal Gas Law Constant = $R = 0.08206 \text{ L}\cdot\text{atm}/\text{K}\cdot\text{mol} = 8.314 \text{ J}/\text{K}\cdot\text{mol}$

Molar volume of an ideal gas at STP = $22.4 \text{ L}/\text{mol}$

$\text{K} = ^\circ\text{C} + 273.15$

$1.00 \text{ atm} = 760 \text{ mm Hg}$

$N_A = 6.022 \times 10^{23}$

You will also receive a loose copy of the periodic table, which you may use for any question. Use the back of it for scratch paper, if you need it. However, if you mark on it, please throw it away at the end of the test period. If it is unmarked, turn it in, and we will use it again.

The test itself consists of the following three sections.

1. (64 points; 4 points each) Circle the best answer to each of the following.
Each of the sixteen multiple-choice questions has five choices, only one of which is correct. Questions range across all topics covered for this test. Some are reasoning questions (of the type "Which of the following has the highest boiling point?"), and others are short calculation questions (of the type "What is the volume of this gas when ...?"). With a calculation question, look at the numbers and think about the principles involved before picking up your calculator – try to get a sense of how big or small the numerical answer ought to be. With numerical answers, circle the choice closest to the value you calculate, making allowances for significant figures and the usual differences in rounding. There is no penalty for guessing, so when in doubt pick one of the five choices that seems most reasonable to you.
2. (10 points) A calculation based on colligative properties of a solution. This may involve calculating the magnitude of the effect, or the concentration of the solution giving the effect, or the molecular weight of the solute, or any of these. You must show work in the space provided leading to your answers.
3. (26 points + 5 points bonus) A series of three calculations (10 points + 10 points + 6 points) for a certain solution, involving concentration and colligative properties. These problems could involve molarity, molality, mole fraction, Raoult's Law (special case or general case), freezing point depression, boiling point elevation, or osmotic pressure. There is a short 5-point bonus question relating to the same solution, which requires a correct answer to one of the preceding parts. You must show work in the spaces provided leading to your answers for all parts.