CHEM 1061: Reviewing for the American Chemical Society (ACS) Standardized Final Exam

The CHEM 1061 Final Exam will be a one-term standardized exam written by the ACS. The goal is to see how well students know and understand chemistry, and to see how well the students compare to other students across the country. There are not a ton of math problems – the general assumption is that most first semester students can do basic math if equations are available to plug values into. The math problems present rely on basic stoichiometry or some of the more straightforward equations which you are expected to know as they are ones used over and over again.

Because the exam covers what you know and understand, the best way to review and study for the exam may be to go over previous exams (and this last chapter). As with the exams in this course, there are no direct questions on definitions or terms. However, you are expected to know chemistry vocabulary. There will, of course, be things which we emphasized a lot which will only show up briefly on the final exam and vice versa. However, if you understand the material, you should be able to reason through things which you don't remember as well.

The exam has 70 multiple choice questions, each with four choices. You will be given 110 minutes – the exam is timed. Programmable calculators are not permitted on the exam. Please remember to bring a non programmable calculator to use on the exam. If you don't have one, a scientific calculator can be checked out from the ARCC library.

Things you are expected to know:

- basic chemistry vocabulary/terminology (Look at the end of each chapter for Important Terms given in **bold**)
- chemical/physical change/properties
- rules for significant figures, dimensional analysis, SI units and prefixes
- isotopes and nuclide symbols, atomic numbers and atomic weights, subatomic particles
- rules for nomenclature; including polyatomic ions and Greek prefixes, molecular compounds, ionic compounds, acids, binary
- charges of ions based on position in the periodic table; diatomic elements
- solubility rules, particularly for ions for which there are no exceptions to the rule
- completing and balancing combustion and double replacement reactions
- rules for determining oxidation numbers
- net ionic equations, spectator ions, molecular equations, gas-producing reactions
- strong acids and bases, acid-base reactions
- names of equipment and procedures used in lab and in lecture demos
- basic stoichiometry (molar masses, molar ratios, limiting reactant, percent composition, molarity, percentage yield, etc.)
- empirical and molecular formulas
- gas laws: empirical, ideal, effusion, partial pressures
- kinetic-molecular theory, real gas vs. ideal gas
- calorimetry, thermochemical equations, Hess's Law, heat capacity, specific heat, energy units
- quantum numbers, energy levels
- relation between energy, frequency, and wavelength
- electron configurations, Pauli exclusion principle, building up principle, Hund's Rule, orbital diagrams
- periodic trends (atomic radii, ionization energies, electronegativities, ionic radii)
- Lewis structures, resonance, formal charges, polarity of bonds, exceptions to octet rule, bond order, bond energies
- VSEPR model: molecular geometries, hybridization, polarity of molecules (dipole moment), σ and π bonds
- intermolecular forces, lattice energy, phase transitions, relation of b.p. and m.p. to intermolecular forces (Ch. 11)

- g/cm^3 may be written as $g \cdot cm^{-3}$; $\frac{L \cdot atm}{mol \cdot K}$ may be written as $L \cdot atm \cdot mol^{-1} \cdot K^{-1}$
- The following equations:

$d = \frac{m}{V}$	$\Delta H^o = \Sigma n \Delta H^o_f$(products) - $\Sigma n \Delta H^o_f$(reactants)
$M_1V_1 = M_2V_2$	different concentrations (M, %, etc)
$PV = nRT$	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$
$q = m \times s \times \Delta T$	q (system) = -q (surroundings)

What is provided for you?

- A comprehensive list of abbreviations and symbols
- The values of numerous constants used throughout the course
- Periodic Table (just like the ones you have received in class)

Directions

- You may NOT make marks in the exam booklet.
- Answers will be placed onto an answer sheet using a soft #2 pencil.
- All calculations must be done on the scratch paper provided.
- Each question has only one correct answer and has four choices.
- Your score is based solely on the number of questions answered correctly**. It is to your advantage to answer every question.**

Strategies

- **Don't allow yourself to get stuck on a single problem.** If you don't know how to do it, move along and go back to it later.
- Remember, your score on the final depends on your percentile ranking – there will be several students that were unable to do the same problems.
- Consider writing answers onto scratch paper and transferring several onto answer sheet at one time.
- Spend the least time studying what you know well and the most time studying what you DON'T know well.