

CHEM 101: REVIEW SHEET FOR EXAM 2

What you need to know about the exam:

- The exam is scheduled for 11 – 11:50 AM on **Monday, 5 November, 2007** in VLH.
- **BRING A WORKING CALCULATOR! Check the batteries before the exam!** You are not allowed to use any preprogrammed functions on your calculator such as automatic unit conversions.
- The exam is closed book and closed notes.
- If you have a documented need for special accommodations, please contact Arwyn immediately to arrange for you needs.

Exam format:

The exam will be similar to the first exam, a mixture of multiple choice, short answer, and quantitative problems. **You will be given a periodic table** with the exam.

What you should study: PRACTICE PROBLEMS

Use your lecture notes, conference and lab materials, problem sets, and suggested end-of-chapter problems as a guide to what material in the text is most important. The exam covers material since the last exam through the material on Monday's lecture (10/29/07).

Resources that you will find on the Chem 101 website:

Reading page: Complete list of reading assignments and suggested end-of-chapter problems

News page: Pdf files of various lecture handouts

Conference page: Conference worksheets and their solutions

Homework page: Problem Sets and their solutions

Note: You will not get PS#7 back before the exam. Read through the posted solutions to confirm you know how to do the problems.

Here are the major topics that we have covered since the last exam:

Note: Each topic implies a concept and one or more skills that you have been asked to apply in the context of problems. Make sure you know both the concepts and the skills for the exam.

Metal/nonmetal division in periodic table, characteristics of metals vs. nonmetals in forming cations vs. anions

Do you know what kinds of combinations of elements typically yield ionic compounds?

Covalent compounds?

Definition of a mole and Avogadro's number (you don't need to memorize the number)

Isotopic abundance and calculations of average atomic mass

Basic concept of how mass spectrometry works

Evidence of global climate change

The Global Carbon Cycle and working with new units...ppm and Tg or Pg C

Where and in what form is carbon stored globally?

Molar mass and mass/mole conversions

Weight % composition (i.e. Ca in CaCO₃ or C in CO₂, etc.)

Concentration: know the definition of molarity (1 M = 1 mol/L)

Calculations involving dilutions, concentrations (think about examples used in lab)

MORE ON THE BACK

Distinguishing and counting core and valence electrons for an atom

Drawing Lewis dot structures (for both small inorganic and larger organic molecules)

- Multiple bonds vs. single bonds: predictions of relative bond lengths and strengths
- Formal charge (you should know how to calculate it for an atom in a Lewis structure)
- Drawing resonance structures, structural implications of resonance structures
- What is the difference between resonance structures and structural isomers

Electronegativity: Know definition and periodic trends (who are the 3 electron hogs?)

Polar covalent bonds

- Given a bond between two atoms, could you draw the orientation of the bond dipole?
- Given a set of different bonds, could you predict which bonds would be the most polar?

VSEPR theory and drawing 3-dimensional structures

- Can you predict the electronic geometry, molecular shapes and bond angles around a given atom in a molecule?
- Memorize the bond angles for each ideal geometry. What is the effect of lone pairs on a bond angle?

Predicting overall polarity of molecules and orientation of molecular dipole moment

What is the greenhouse effect?

- What is the simplified version of the solar radiation budget?
- Definitions of solar constant and albedo
- Explanations behind planetary temperatures of Venus, Earth, and Mars

What are the greenhouse gases? Why? What makes them greenhouse gases?

Vibrational modes of molecules and identifying IR active modes (changing dipoles)

Sources and sinks of CO₂

Balancing chemical equations and reaction stoichiometry calculations

Combustion reactions: Learn how to write and balance these for organic molecules

Using the heat content of fuels

Limiting reagents

Interpreting line structures for organic compounds

Functional groups: memorize these!

- You should be able to identify functional groups in a molecule or draw a Lewis structure that contains a particular functional group.