

Chem 1061 Exam 1 Study Guide
Fall 2004
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A conversion sheet and periodic table identical to ones you have already been given **will be provided** in the exam packet. You will **not** be allowed to use your own personal copy.

You will need a calculator to successfully complete the exam. Please bring one.

You may use either pen or pencil on the exam, however, exams completed in pencil will not be allowed regrades beyond grade-totaling errors. If you wish to have the option of a regrade on your exam, please complete it in pen. Ample scratch paper will be provided.

Your writing instrument and calculator are the only personal items you will be allowed to have on the desk with you. Exam, scratch paper, periodic table, and conversion charts will be provided to you.

Note: concepts and skills on this study guide are provided as a study aid and are *not* the sole material from which the exam will be constructed. Remember, any information presented in the reading assignments, lectures, or labs may appear on the exam.

Chapter 1:

Concepts to master

- The scientific method; differences between hypothesis, theory, and law; process of experimentation and revision.
- Physical states of matter and the names of the processes of converting between solid, liquid, and gas.
- Characteristics of elements, compounds, substances, and mixtures; differences between homogeneous and heterogeneous mixtures.
- Accuracy vs. precision in measurements; uncertainty in measurements; significant figures.
- SI base units and prefixes. Creation of derived units from base units. (e.g. volume from length)
- Dimensional analysis as a method of unit interconversion through the use of conversion factors, always making sure all unwanted units cancel.

Skills to master

- Proper use of significant figures and rounding in arithmetic operations
- Converting a temperature from any one scale to another (equations are on conversion sheet)
- Calculating the density of a material, and relate density, mass, and volume.
- Converting units. Any conversion factors necessary to convert from English to Metric and vice-versa are provided to you. Memorization of the SI prefixes in green in table 1.3 on p. 21 of Ebbing & Gammon will assist you in converting metric units. SI prefixes and their definitions will *not* be provided.

Chapter 2:

Concepts to master

- Dalton's atomic theory and its four postulates.
- Consequences of Dalton's atomic theory including the laws of definite proportions and conservation of mass.
- Differences of meaning between atom and element.
- Discovery of the electron through Thompson's cathode ray tube experiments.
- Discovery of the nucleus through Rutherford's gold foil experiments, and Rutherford's nuclear model.
- Modern atomic theory: protons, neutrons, electrons.
- Atomic number and mass number in relation to numbers of protons and neutrons.
- Differences of meaning between nuclide and isotope.
- Relation of isotopes, isotopic masses, atomic weight, and fractional abundances.
- Usefulness of a mass spectrometer; what data it provides.
- Arrangement of periodic table; groups vs. periods; properties of metals, nonmetals, and metalloids.
- Chemical formulas as a representation of proportions of atoms in a compound.
- Identification and differentiation of, and chemical nomenclature as a method to systematically name ionic compounds, binary molecular compounds, acids, and hydrates.
- Chemical equations as a representation of a chemical reaction, and balancing as a way to uphold law of conservation of mass.

Skills to master

- Writing nuclide names and symbols given number of protons and neutrons in a nucleus, and vice-versa
- Determining atomic weight given isotopic masses and their fractional abundances, using the "weighted average" method.
- Write the name of a chemical compound from its formula, and vice-versa. Ionic, binary molecular, acid, and hydrate nomenclature. Only elements from table 2.1 on page 44 of Ebbing & Gammon will be used, so review the symbols and names of those elements if you need to – names of elements and their corresponding symbols will *not* be provided.
- Use of Greek prefixes to name binary molecular compounds.
- Writing the names or formulas with charge of the polyatomic ions in table 2.6 on page 66 of Ebbing & Gammon. This table should be memorized for use in the nomenclature of ionic compounds. Proper use of *-ite* and *-ate* suffixes as well as *hypo-* and *per-* prefixes.
- Nomenclature of acids corresponding to oxoanions you learned; nomenclature of binary acids (HF, HCl, etc.); differences in names of gaseous vs. aqueous binary acids.
- Balancing simple chemical equations, given formulas of reactants and products.