

CHEM 1110

Midterm Exam 1 Study Guide (Ch. 1-2)

This study guide is meant to provide only the barest direction as you study. Try to find practice problems from the textbook (both in the chapter text and in the end-of-chapter questions) rather than just relying on this guide. Note that most tables and equations will not be provided here, or on the exam. You can find them in your textbook now, but should memorize them in preparation for the exam.

Chapter 1 – Matter and Measurements

- Physical and chemical properties
- Physical and chemical changes
- States of matter and state changes
- Elements, compounds, homogeneous mixtures, and heterogeneous mixtures
- Chemical reactions (reactants and products)
- Chemical formulas
- Finding derived units from measurements (e.g. density from mass and volume)
- Converting between units (be careful for squared and cubed units)
- Use of metric prefixes and scientific notation to describe very large or very small numbers
- Precision vs. accuracy
- Significant figures in a number
- Propagating significant figures in mathematical operations ($+$ $-$ rule and \times \div rule)
- Solving problems through dimensional analysis
- Temperature changes with heat transfer; Heat capacities

Chapter 2 – Atoms and the Periodic Table

- Atomic theory
- Atomic mass unit
- Subatomic particles and their interactions
- Modern view of an atom – nucleus with electron cloud
- Neutrons, electrons, and protons

- Neutrons and protons make up most of the mass
 - Electrons make up most of the volume
 - Charges of electrons and protons
 - Protons define the element
- Writing atomic symbols from numbers of electrons, neutrons, and protons and vice-versa
- Calculating atomic weights from isotope mass and percent abundance
- The periodic table
 - Names of certain families (alkali, alkaline earth, halogens, and noble gases)
 - Metals vs. non-metal vs. metalloids
 - Transition metals vs. main group elements
- Quantized electronic energy levels - wavelike nature of electrons
- Shells and subshells - s, p, d, and f subshells
- Orbitals and spin - 2 electrons per orbital
- Electron configurations
 - Energy level diagrams
 - Noble-gas condensed configurations
- Electronic structure and the structure of the periodic table
- Core vs valence electrons
- Electron dot symbols