

**CHM 101 A**  
**Preparation for Exam 1**  
**Chapters 1, 2, and 3**

1. Classify matter at a macroscopic scale, a molecular level, and by formulas; distinguish between homogeneous and heterogeneous matter, pure substances and mixtures, elements and compounds.
2. Know the names and symbols of the elements highlighted on the periodic table handed out in class (and posted on Blackboard).
3. Distinguish between chemical and physical properties and chemical and physical changes.
4. Characterize the three states of matter in terms of structural organization and amount of particle motion. Describe phase transitions on both a macroscopic and molecular scale. Know the names for phase transitions.
5. Understand how the physical state of a substance is dependent upon temperature and its unique melting point and boiling point (or sublimation point).
6. Write numerical values in exponential notation and in decimal form (Math Toolbox 1.1).
7. Convert from one unit to another. Know and use the conversion factors for converting between units within the metric system (know prefixes in Math Toolbox 1.3 or in notes and handout). When given other conversion factors, use them appropriately to convert between units.
8. Know how to determine volume from length measurements, and know the units used for volume. Know that  $1 \text{ cm}^3 = 1 \text{ mL}$ .
9. Solve problems using dimensional analysis or other means; keep track of units when calculations involve proportional relations. Know how to cancel and combine units during calculations to give appropriate units on calculation result.
10. Understand the difference between the three temperature scales. Convert between degrees Celsius and Kelvin. What is different about the Kelvin scale?
11. Distinguish between precision and accuracy in collecting experimental data.
12. Determine the proper number of significant figures when recording experimental values and reporting the result of a calculation involving measurements (Math Toolbox 1.2).
13. Know the units for heat (energy).
14. Describe energy as kinetic and potential energy. Define each.
15. Distinguish between atoms, molecules, compounds, and ions.
16. Understand the significance of the *law of conservation of mass* and the *law of definite proportions*.
17. Understand Thomson's and Rutherford's experiments carried out to determine the structure of the atom.
18. Determine the number of protons, electrons, and neutrons for any atom or ion; determine atomic number, mass number, and neutron number for any atom or ion.
19. Know how elements are classified in the periodic table. Know which elements occur naturally as diatomic molecules.
20. Define relative atomic mass. Calculate relative atomic mass for an element from masses of isotopes and relative abundance.
21. Know the difference between the elemental form and ion form of an element.
22. Distinguish between ionic compounds and molecular compounds from their formulas or names.
23. Compare properties of ionic and molecular compounds (Table 3.1)
24. Predict the formulas and charges of common monatomic ions (Fig. 3.12)
25. Predict the formulas and charges of simple monatomic ions and polyatomic ions. Be able to name and write formulas for the commonly-encountered polyatomic ions (the bold ones on your handout).
26. Write correct formulas for ionic compounds, molecular compounds, and elements from their names.
27. Write the correct names of compounds from their formulas.