CHM 101
Chapter 4 Study Guide / Learning Objectives

Chapter 4 in your textbook introduces our small-scale picture of matter. We discussed early notions of the atom (Dalton's atomic theory) which explained things like the law of conservation of mass. We then introduced a more modern conception of the atom and its internal structure - containing three subatomic particles called protons, neutrons, and electrons arranged in a system that you can think of as being similar to our solar system. From there, we discussed some terminology related to the atom - atomic number, atomic weight, etc., and how to classify atoms using the periodic table. Finally, we discussed compounds (elements chemically combined) - noting that compounds are formed in more than one way. One way (sharing electrons) resulted in molecules, while the other way resulted in ions (charged particles).

After reading Chapter 4 and your class notes, you should be able to:

[Terminology]

- Define terms related to the atom: **atom**, **proton**, **neutron**, **electron**, **nucleus**.
- Define terms related to the classification of atoms: **isotope**, **atomic number**, **mass number**, **atomic weight**
- Define terms related to the periodic table: **period**, **group**, **metal**, **nonmetal**, **metalloid**
- Define terms relating to compounds: **chemical formula**, **diatomic molecule**
- Define terms relating to ions: **ion**, **cation**, **anion**, **formula unit**

[Dalton and the atom]

- List and describe Dalton's four postulates.
- Describe Dalton's definitions of **atoms**, **elements**, and **compounds**.

[Structure of the atom]

- Describe where protons, neutrons, and electrons are found in the atom.
- Draw a diagram of an atom.
- Explain where the mass of an atom is located.
- Explain how isotopes of the same element are different and how they are the same.
- List how many protons, neutrons, and electrons are present in a given isotope.
- Use atomic symbol notation (including mass numbers and atomic numbers).

[The periodic table]

- Locate an element in the periodic table given any of the following: element name, element symbol, atomic number, or group/period.
- Determine, given an element, whether the element is metallic, nonmetallic, or a metalloid.
- Describe how chemical properties and groups on the periodic table are related.
- List the common properties of metals, nonmetals, and metalloids.

[Compounds]

- Given the number of atoms of each element present, write a chemical formula.
- List the common elements that form diatomic molecules.

[Ions]

- Determine whether a compound is molecular or ionic, given the elements it contains.
- Determine what kind of ions form when atoms gain or lose electrons.
- Describe how the structure of an ionic solid is different from the structure of a molecule.
- Explain how a solution containing an ionic substance can conduct electricity, while plain water does not conduct electricity.

[Practice]

- (p 85b-85f) Q&P: 8, 10, 16, 18, 20, 22, 24, 30, 34, 36, 38, 42, 44, 48, 50, 58, 66, 72, 74, 76, 78, 80, 84