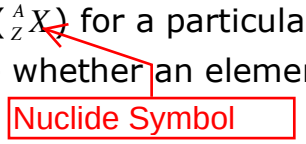
Chapter 2—Atoms, Molecules, and Ions

9/27/05 6:45 PM

After this chapter, you should be able to…

- List the main features of Dalton's atomic hypothesis
- Describe the structure of an atom in terms of protons, neutrons, and electrons
  - Recall the approximate diameter of an atom and its nucleus
  - Sketch a diagram of an atom, and label its relevant regions
  - List the *relative* charges and symbols of the three subatomic particles
- Explain what is meant by atomic number (Z), mass number (A), and isotopes
  - Explain what an isotope is
  - Calculate {atomic number, mass number, # of neutrons} given two items of information about an atom
  - Given an element name, be able to determine its atomic number by using a periodic table (and vice-versa)
  - Write a full element symbol ($^{A}_{Z}X$) for a particular isotope
- From the periodic table, determine whether an element is a metal/metalloid/non-metal
  - Recall the common names given to elements in groups IA, IIA, VIIA, and VIIIA
  - Determine whether an element is a transition metal
- Explain what a molecule is
- Explain what an ion is
  - Classify an ion as being an anion or cation correctly
  - Calculate the numbers of protons, neutrons, and electrons that a specified ion has
- Interpret and write a molecular formula
- Explain what is meant by an empirical formula
  - Be able to write an empirical formula, given the molecular formula (or relevant information)
- Explain how the charges on ions determines the ionic formula
  - Write ionic formulas given the two elements that combine (for metals that only have one possible charge)
  - Name ionic compounds, given a formula
  - Write the formula of an ionic compound, given a name



    - Know the formulas, charges, and names of the following polyatomic ions:
        - ~~Mercury(I)~~
        - Ammonium
        - Hydroxide, cyanide, bicarbonate, nitrate, nitrite, acetate, chlorate, dihydrogen phosphate
        - Sulfate, sulfite, carbonate, hydrogen phosphate
        - Phosphate also: permanganate, chromate, dichromate
- Write the formula of a molecular compound, given the name
- Write the name of a molecular compound, given the formula
- Know the names and formulas of the following acids:
    - Sulfuric acid
    - Nitric acid
    - Perchloric acid
    - Phosphoric acid
- Explain what is meant by an oxoacid
- Know the names of the simple acids formed between hydrogen and monatomic ions (hydro_____ic acid)
- Write the formula of a hydrate, given its name (and vice versa)

You should also be able to solve every homework problem on your syllabus!

Learning the polyatomic ions, and figuring out how to name compounds and write formulas takes a LOT of practice!

Be sure to take the time to learn these topics inside and out, because I always include many questions on these topics on my exams.