

Chem E-1a
Friday Review Notes
Chapter 3

Molar Mass, Empirical/Molecular Formulas, and Percent Composition:

- *Practice Problems* pp. 6-7
- See pages 70-75 in the textbook
- You must develop a method for working through these problems, and then simply get practice doing them! Go over the example problems in the book, do the problems in the *Practice Problems*, and see problems #1 and #2 on this review. Then go and work through Problems #1-3 on Problem Set 2.
- Determining the molecular formula once you know the empirical formula requires knowing the molar mass of the compound.

Balancing Equations:

- *Practice Problems* page 8
- See pages 75-79 in the textbook

Notes:

- Balancing chemical reactions is essentially a trial-and-error technique. Start by balancing one element, and continue balancing successive elements until the reaction is balanced. In general, you should balance any elements that are by themselves and monatomic ions last. When you are done, go back and check that each element is balanced.
- Your final balanced equation should have all whole-number coefficients that are in lowest terms.
- Know the 7 diatomic elements: H_2 , N_2 , O_2 , F_2 , Cl_2 , Br_2 , and I_2 . It is OK to use fractional coefficients in front of these elements in a balanced equation.
- Be sure to include phase designations (i.e. (s), (l), (g), or (aq)) in all reactions unless you are specifically told that you do not need to include them.

Stoichiometry:

- *Practice Problems* pp. 9-12
- See pages 79-87 in the textbook
- Stoichiometry is simply the quantitative molar relationship between species in a balanced chemical reaction.
- Use the coefficients in a balanced chemical reaction essentially as conversion factors in a dimensional analysis setup to convert between quantities of reactants and products in a chemical reaction.
- Simple Stoichiometry
 - Only one reactant is present in a limited (i.e. specified) quantity. All other reactants are present in excess.
 - The reactant that is present in a limited (or specified) quantity will be completely consumed.
- Limiting Reagent Stoichiometry
 - Two or more reactants are present in limited quantities.
 - One of the reactants that is present in a limited quantity will be completely consumed. This reactant is called the "limiting reagent".
 - The other reactant (or reactants) are excess reagents and will not be completely consumed.
 - You must do calculations to determine which reactant will be the limiting reagent. It will not necessarily be the reactant that is present in the smallest quantity!
- Stoichiometry of Mixtures
 - See *Practice Problems* pages 11-12 and Problem Set 2 #7-8
 - These problems often (but not always) involve defining two variables and setting up two equations with the two variables, and then solving for the variables.
 - Be careful! Ask yourself: Do the initial components of the mixture react with each other, or do they react independently with something else? If they react independently, then you must write out two separate reactions.
 - Be sure to review the mathematical techniques necessary to solve a set of two equations with two variables.