Review Chem Equations

November 8, 2022

Chemistry Department, Cypress College

Class Announcements

Lecture

- Review Chemical Equations and Limiting Reagent problems
- Work in groups and present the exam problems (If we finish, everyone receive 2 EC pt in lieu of HW presentations)
- Ch 7 - Electromagnetic Radiation
- Quiz and Homework assignment released Fri, Nov 4th at 3pm

Outline

Review: Chemical Equation

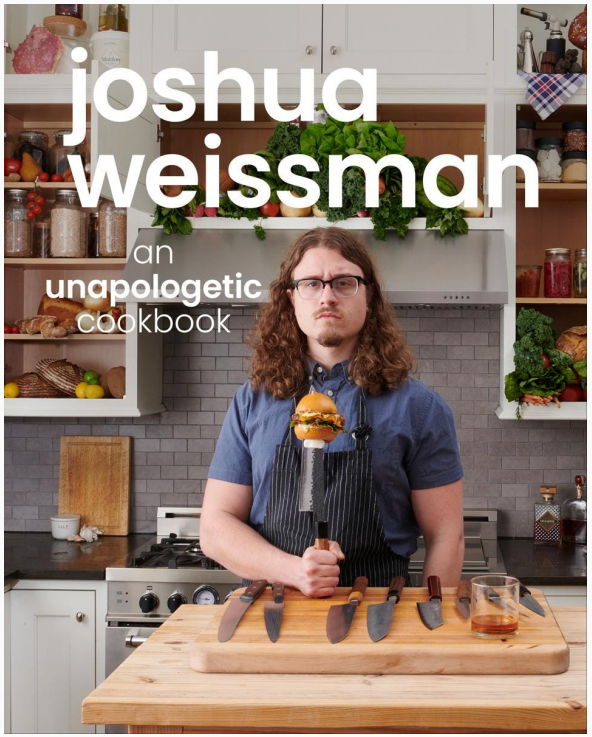
Meaning of a Chemical Equation

$$aA + bB \rightarrow cC + dD \tag{1}$$

where a, b, c, and d are coefficients for the reactants A/B and products C/D

- Provides the means to determine how much product is produced for a given amount of reactants
- Relate to molar masses, number of molecules, amount of moles and masses

Analogy to Recipe Cookbook



Analogy: Cookbook recipe- Popeyes Chicken but better

Photosynthesis

$$6CO_2(g) + 6H_2O(l) \rightarrow C_6H_{12}O_6(s) + 6O_2(g) \tag{2}$$

Properties

- Balanced chemical equation satisfies the conservation of mass
- Coefficients in front of the molecules represent the relative moles of reactants and products
- **Q:** How many moles of $H_2O(l)$ are needed to react with 12 moles of $CO_2(g)$?

Practice: Ammonia Production

Ammonia is produced using the Haber Bosch process. How many moles of ammonia are produced if 2kg of hydrogen are reacted with an excess of nitrogen?

$2\ N_2(g) + 3\ H_2(g) \rightarrow 2\ NH_3(g)$

Practice: Acid-Base Reaction

Suppose you have 50mL of 1.5M HCl(aq) and you attempt to neutralize the acid with 1M NaOH(aq). Write the balanced chemical reaction. Determine what volume of 1M NaOH(aq) is needed.

Approaching Limiting Reactant Problems

$$\mathrm{R1} + \mathrm{R2} \rightarrow \mathrm{P1} \tag{3}$$

- Given a certain amount of each reagents (R1 and R2) to produce P1, determine how much the R2 is needed to completely react with R1
- Based on that calculated value, determine whether there is enough R2 to completely react with R1
- If the amount of R2 is less than what is needed, then R2 is the limiting
- If the amount of R2 is more than what is needed, then R2 is the excess

Practice: Limiting Reagent

Consider respiration, it is the process of breaking down sugar molecules:

$C_6H_{12}O_6(s) + 6\ O_2(g) \rightarrow 6\ CO_2(g) + 6\ H_2O$

What mass of carbon dioxide forms in the reaction of 25 g of glucose ($C_6H_{12}O_6$) with 40 g of oxygen?