

Chapter 6: Quantities in Chemical Reactions

October 3, 2022

Chemistry Department, Cypress College

Class Annoucements

Lab

- Double Displacement Reactions - precipitation rules and acid base reactions
- Use 1mL of each solution
- Recall indications for chemical reaction (color, solids, temp, etc.)

Lecture

- Keep submitting the homework assignment on time ($\sim 1 - 2$ hours grace period)
- Go over homework 4 - present and get 1 EC point
- Quiz submissions are slacking (Quiz 5 due tonight at 11:59pm)
- Homework and Quiz will be released Fri, Oct 7 at 3pm

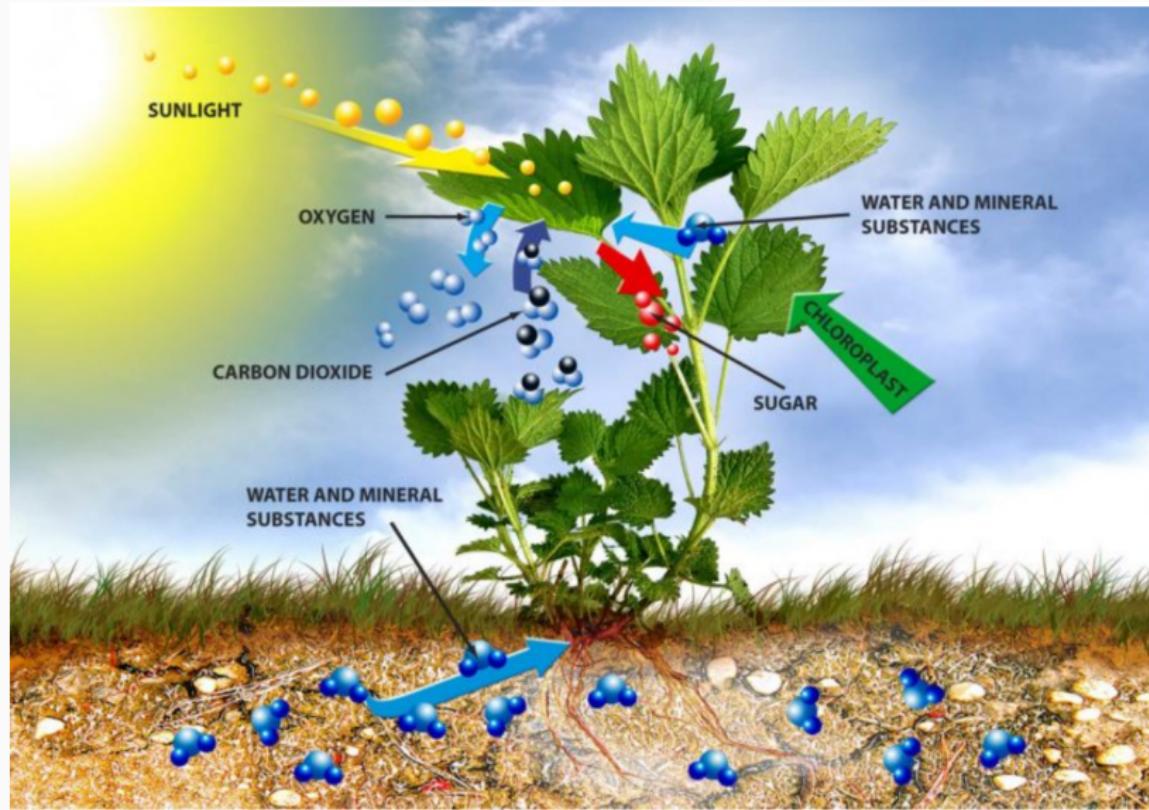
Outline

Stoichiometry: Relationship Between Reactants and Products

Mole-mole Conversion

Mass-mass Conversion

Balanced Chemical Equation: Photosynthesis



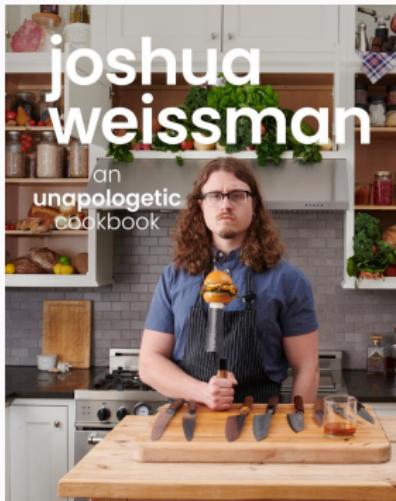
Meaning of a Balanced Equation

Photosynthesis Chemical Equation



- Balanced chemical equation satisfies the conservation of mass
- Coefficients in front of the molecules represent the relative moles of reactants and products
- Hence, moles of reactants and products are not necessarily equal

What can be accomplished with a balanced equation?



- Analogy: Cookbook recipe- Popeyes Chicken but better
- 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

Example: Mole-mole Conversion

If 1.14 mol of $\text{CO}_2(\text{g})$ was formed by combustion of $\text{C}_3\text{H}_8(\text{g})$, how many moles of $\text{H}_2\text{O}(\text{g})$ were also formed?

Determine: What is given and what is the question asking?

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$$1.14\text{mol CO}_2 \times \frac{4\text{mol H}_2\text{O}}{3\text{mol CO}_2} = 1.52\text{mol H}_2\text{O}$$

Example: Mole-mole Conversion

Pure methanol (CH_3OH) is used as a fuel for race cars in the Indy Racing League and in the Championship Auto Racing Teams.

Given that 1.00 gal of methanol contains 94.5 mol, how many moles of oxygen will react with 1.00 gal of methanol?

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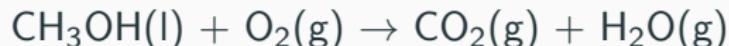
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$$94.5\text{mol CH}_3\text{OH} \times \frac{3\text{mol O}_2}{2\text{molCH}_3\text{OH}} = 142\text{mol O}_2$$

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Q: What is the quantity needed to convert between mols and grams?