

Chemistry Chapter 4

Balancing chemical Equations

Chemical Reactions

- Reactions involve chemical changes in matter resulting in new substances
- Reactions involve rearrangement and exchange of atoms to produce new molecules
 - Elements are not transmuted during a reaction

Chemical Equations



- CH_4 and O_2 are the reactants, and CO_2 and H_2O are the products
- the (g) after the formulas tells us the state of the chemical
- the number in front of each substance tells us the numbers of those molecules in the reaction
 - called the **coefficients**

Balancing chemical equations

- Step 1: Determine the state of the reactants and products in the chemical reaction
- Step 2: Write the unbalanced chemical equation
- Step 3: Balance the number of atoms of each element in the reactant and product side, starting with the most complicated molecule

Balancing a Hypothetical Chemical Equation



- In this hypothetical reaction, C and D are the reactants, and X and Y are the products
- The number in front of each substance tells us the numbers of those molecules of reactants and products in the reaction
- So, if you react exactly 3 moles of C with 2 moles of D, then you will produce 5 moles of X and 2 moles of Y.
- If you reacted 6 moles of C with 4 moles of D, you will produce 10 moles of X and 4 moles of Y.

Example: Balancing chemical equations

- Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) reacts with Oxygen gas to produce gaseous carbondioxide and water vapor



Reactants

6 C
12 H
8 O

Products

1 C
2 H
3 O

Chapter 4 Solutions Manual Chemistry

**Julie Henderleiter, Charles Trapp, Peter
Atkins, Loretta Jones**



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Study Guide and Solutions Manual to Accompany The Essence of Organic Chemistry Jane M. Cram, Donald J. Cram, 1978 *Organic Synthesis* Michael Smith, 2024-08-13 Organic Synthesis 5e provides a reaction based approach to this important branch of organic chemistry Updated and accessible this eagerly awaited revision offers a comprehensive foundation for graduate students coming from disparate backgrounds and knowledge levels to provide them with critical working knowledge of basic reactions stereochemistry and conformational principles This reliable resource uniquely incorporates molecular modeling content problems and visualizations and includes reaction examples and homework problems drawn from the latest in the current literature There have been advancements in organic reactions particularly organometallic reactions and there is a need to show how these advancements have influenced current organic synthesis The goal is to revise and update the examples of reaction examples taken from the synthesis literature from about 2017 2023 The reactions illustrate those that are used most often in modern organic synthesis but recent examples will show their current relevance Where new approaches and new reactions have been developed for organic synthesis examples will be added as new material Provides new content reaction examples and study problems from recent research Features improved organization new art and new chapter content on process chemistry and green organic chemistry Includes revised homework for each chapter with new examples and questions

Merrill Chemistry Robert C. Smoot, Smoot, Richard G. Smith, Jack Price, 1998

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