

### Terminology

<b>Reactants</b>	substances consumed during a chemical reaction
<b>Products</b>	substances formed as a result of a chemical reaction
<b>Chemical Equation</b>	a description of the identities and proportions of the reactants and the products in a chemical reaction
<b>Balanced Chemical Equation</b>	total number of atoms of each element are the same on the right and left side of the reaction arrow
<b>Law of Conservation of Mass</b>	the principle that the sum of the masses in a chemical reaction is equal to the sum of the masses of the products
<b>Stoichiometry</b>	the study of the numerical relationship between chemical quantities in a chemical reaction
<b>Phase Symbols</b>	represent physical states of reactants and products: (g) gases, (l) liquids, (s) solids, (aq) aqueous solution

### 7.2 Writing Balanced Chemical Equations

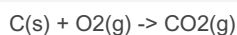
**Chemical Equations** relate the quantities of substances consumed and produced in chemical reactions

**Concepts of Mole & Molar Mass** describe macroscopic quantities of substances in terms of the number of particles they contain

**Combination Reaction** a reaction in which two or more substances form a single product

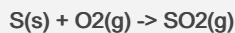
**Combustion Reactions** a rapid reaction between fuel and oxygen that produces and releases energy

**Lack of any coefficients** indicates that one atom of something reacts with a single atom of something else to produce one molecule of product



Any number of moles (X moles) can react with an equal number of moles of another reactant (Y moles) to produce the same quantity of product (XY moles)

### 7.2 Describing Chemical Reactions



#### 4 Ways to Describe Chemical Reactions

- 1) One **atom** of sulfur reacts with one **molecule** of oxygen to produce one **molecule** of sulfur dioxide
- 2) The **coefficients** tell us that one **mole** of sulfur reacts with one **mole** of oxygen to produce one **mole** of sulfur dioxide
- 3) **Avogadro's constant** describes that  $6.022 \times 10^{23}$  **atoms** of sulfur react with  $6.022 \times 10^{23}$  **molecules** of oxygen forming  $6.022 \times 10^{23}$  **molecules** of sulfur dioxide
- 4) The **Molar Masses** of the **reactants** and **products** allow us to say that **32.06 grams** of sulfur react with **32.00 grams** of oxygen to produce **64.06 grams** of sulfur dioxide

### General Rules for Balancing Equations

First attempts at balancing equations may not work. Try a different approach starting with a different element.

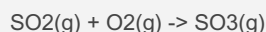
Balance pure elements last (O<sub>2</sub>, H<sub>2</sub>, N<sub>2</sub>)

Do not break up polyatomic ions (SO<sub>4</sub><sup>2-</sup>)

### 4-Step Method for Writing Balanced Equations

Element	Sulfur
---------	--------

1) Write a preliminary expression containing a single particle (atom, molecule, or formula unit) of each reactant and product with a reaction arrow separating reactants from products. Include phase symbols indicating physical states.



2) Check whether the expression is balanced by counting the atoms of each element on each side of the reaction arrow.

Reactant Side	1
Product Side	1
Balanced?	yes

Element	Oxygen
---------	--------

Reactant Side	2+2 = 4
Product Side	3
Balanced?	no

3) Choose an element that appears in only one reactant and one product and balance it first.

The only element that occurs only once on each side of the reaction arrow in this equation is sulfur, but it is already balanced, so this step can be skipped.



### 4-Step Method for Writing Balanced Equations (cont)

4) Choose coefficients for the other substances so that the number of atoms for each element is the same on both sides of the reaction arrow.

### Reaction Stoichiometry

#### Ratio of Coefficients in a Chemical Reaction (Mole Ratio)

\* specify the relative amounts in molecules or moles of each of the substances involved in the reaction

\* act as a conversion factor between the amount in moles/molecules of the reactants and products

\* can be used to determine how much of one reactant is needed to completely react with another quantity of the other reactant

#### Example Ratio of Coefficients

if 22.0 moles of C<sub>8</sub>H<sub>18</sub> are burned, how many moles of CO<sub>2</sub> form?

Stoichiometric Ratio

$22.0 \text{ mol C}_8\text{H}_{18} \times 16 \text{ mol CO}_2 / 2 \text{ mol C}_8\text{H}_{18} = 176 \text{ mol CO}_2$



By **W00kin**  
[cheatography.com/w00kin/](https://cheatography.com/w00kin/)

Not published yet.  
Last updated 1st December, 2022.  
Page 2 of 2.

Sponsored by **Readable.com**  
Measure your website readability!  
<https://readable.com>