

# Chapter 10

# Chemical Equations

# Fast Food Frenzy

You're going out to lunch to buy food for you and a friend.

Big Mac + Pop + McFlurry + fries



Big Mac + Pop + McChicken

Did the Flurry and fries transform  
in the car?

# Fast Food cont.

Let's try again with Wendy's:

Baconater + fries + frosty



Baconater + fries + frosty + pop

You've magically created pop now, eh?

# Formation of Silver Crystals

Chemical reactions such as the one in the demonstration require a specific notation to represent the reaction accurately.

## In Chapter 10 you will learn:

- The components of a chemical equation.
- To write chemical equations.
- To balance chemical equations.
- To predict the products of the reaction.
- How to conduct experiments with various types of reactions.

Silver nitrate reacted with copper metal to produce copper(II) nitrate and silver metal.

**Reactants**



**Products**

silver nitrate + copper



copper(II) nitrate + silver

$\text{AgNO}_{3(\text{aq})} + \text{Cu}_{(\text{s})}$



$\text{Cu}(\text{NO}_3)_2_{(\text{aq})} + \text{Ag}_{(\text{s})}$

$2\text{AgNO}_{3(\text{aq})} + \text{Cu}_{(\text{s})}$



$\text{Cu}(\text{NO}_3)_2_{(\text{aq})} + 2\text{Ag}_{(\text{s})}$

# Symbols Used in Equations

Symbol	Meaning
+	
→	
(s)	
(l)	
(g)	
(aq)	

# Symbols Used in Equations

Symbol	Meaning
+	Separates reactants from each other and products from each other
→	
(s)	
(l)	
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(aq)	

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# Symbols Used in Equations

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+	Separates reactants from each other and products from each other
→	Separate reactants from products
(s)	solid
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(g)	
(aq)	

# Symbols Used in Equations

Symbol	Meaning
+	Separates reactants from each other and products from each other
→	Separate reactants from products
(s)	solid
(l)	liquid
(g)	
(aq)	

# Symbols Used in Equations

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+	Separates reactants from each other and products from each other
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(s)	solid
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# Symbols Used in Equations

Symbol	Meaning
+	Separates reactants from each other and products from each other
→	Separate reactants from products
(s)	solid
(l)	liquid
(g)	gas
(aq)	aqueous (water solution)

# How to write a balanced chemical equation

1. Write a word equation
2. Write individual formulas for reactants and products
3. Determine integer coefficients for each formula so that each type of atom has the same number of atoms on both sides of the equation

# Example 1:

Reactants



Products

(Word Equation)

Aluminum  
sulfate

+

Calcium  
chloride



Aluminum  
chloride

+

Calcium  
sulfate

(Skeleton Equation)

$\text{Al}_2(\text{SO}_4)_3$

+

$\text{CaCl}_2$



$\text{AlCl}_3$

+

$\text{CaSO}_4$

(Balanced Equation)

$\text{Al}_2(\text{SO}_4)_3$

+

$3\text{CaCl}_2$



$2\text{AlCl}_3$

+

$3\text{CaSO}_4$

# Example 2:

Reactants



Products

(Word Equation)

Oxygen + Methane



Water + Carbon Dioxide

(Skeleton Equation)

O<sub>2</sub> + CH<sub>4</sub>



H<sub>2</sub>O + CO<sub>2</sub>

(Balanced Equation)

2O<sub>2</sub> + CH<sub>4</sub>



2H<sub>2</sub>O + CO<sub>2</sub>

# Example 3:

Reactants



Products

(Word Equation)

Aluminum + Oxygen



Aluminum oxide

(Skeleton Equation)

Al + O<sub>2</sub>



Al<sub>2</sub>O<sub>3</sub>

(Balanced Equation)

4Al + 3O<sub>2</sub>



2Al<sub>2</sub>O<sub>3</sub>

Assignment:

Read Sec. 10.1 - 10.2  
Complete Worksheet #1